



HPLC

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HPLC for Small Molecules

Supelco, A Pioneer in Chromatography

HPLC for Small Molecules

Supelco, A Pioneer in Chromatography

Supelco has been a leader in chromatography for over 30 years.

The first base deactivated column, SUPELCOSIL LC-18-DB was introduced in 1982 and provided improved peak shape for basic compounds that tailed with early generation columns. The embedded polar group (EPG) column was also first launched in the early 1980s and has evolved through several generations to include Ascentis Express RP-Amide, the newest EPG column introduced to the market.

The innovative Ascentis Express Column, based on Fused-Core technology, was introduced in 2007 and provides high speed and resolution at low backpressures. Furthermore, expansion into the chiral chromatography market occurred with the acquisition of Astec chiral chromatography products.

Supelco, along with Sigma, Aldrich, and Fluka provides thousands of chromatography related products through worldwide research and development, manufacturing, distribution and sales operations.

HPLC Column Selection

How to Choose an HPLC Column

Reversed-Phase HPLC Column Selection Flow Chart

This flow chart provides information for choosing an initial column for reversed-phase method development.

Packing Pore Size

The size of the molecules to be analyzed will determine the packing pore size. Small molecules can diffuse in and out of 80 to 120 Å pore packings (Ascentis® Express, Ascentis®, and Discovery HS), but peptides and proteins may not. For this reason, it is recommended to use 200 to 300 Å pore-size packings (Discovery and Discovery Biowide) for separations of peptides and proteins.



Column Diameter

Column diameter defines how much material one can inject onto a column. Conventional analytical HPLC uses 4.6 mm internal diameter. However, smaller diameter columns (2.1 and 3.0 mm) provide increased sensitivity and therefore are commonly used in limited sample applications and LC-MS. Larger diameter columns (10 mm and 21.2 mm) allow for high sample loading which is beneficial for sample collection.



Particle Size

For conventional analytical HPLC, the standard particle size is 5 µm. However, smaller particles provide higher efficiency and resolution but at a higher backpressure on the HPLC system. The latest particle technology, Fused Core, combines the benefits of higher resolution and lower backpressure into a single column format. Larger particles provide lower backpressure making them amenable to large columns such as those used in preparative chromatography.



Column Length

The conventional column length for analytical HPLC is 150 mm or 250 mm for high resolution. For fast analysis, shorter columns (30 to 50 mm) should be used.



Column Bonded Phase

A C18 phase is often utilized as a starting point for many separations. C18 will provide enough retention for most non-polar and moderately polar molecules. Analysis of polar molecules or molecules that are highly functionalized will often be enhanced by using a more polar stationary phase such as Phenyl, RP-Amide, F5, or Cyano.

Custom-prepared HPLC Columns

If the column of your choice is not listed as a stock product in our catalog, Supelco may be able to prepare it for you on a custom basis. In order to discuss a specific request and obtain a quote on price and delivery, please contact Technical Service.

Delivery: Supelco typically ships custom-prepared analytical HPLC columns within 5 to 7 business days to anywhere in the world. Larger sizes and special requests may take longer.

Performance testing: Supelco tests custom-prepared columns for efficiency and symmetry. Please let us know if you have special test criteria.

Assistance with method development: Our Technical Service chemists are available to assist you with your method development needs. They may be able to provide recommendations, technical data and in-house testing in support of your testing needs.

HPLC for Small Molecules

HPLC Column Selection: *Supelco HPLC Columns conform to USP standards**Supelco HPLC Columns conform to USP standards*

HPLC Packings

USP Code	Description	Recommended Packing
L1	Octadecyl silane chemically bonded to porous or non-porous silica or ceramic micro-particles, 1.5 to 10 µm in diameter, or a monolithic rod.	Ascentis® C18 Ascentis® Express C18 Discovery® C18 Discovery® HS F5 Discovery® BIO Wide Pore C18 SUPELCO SM LC-18 SUPELCO SM LC-18-DB SUPELCO SM LC-318
L3	Porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Ascentis® Express HILIC Ascentis® Si SUPELCO SM LC-Si SUPELCO SM LC-3Si
L7	Octylsilane chemically bonded to totally or superficially porous silica particles, 1.5 to 10 µm in diameter, or a monolithic silica rod.	Ascentis® C8 Ascentis® Express C8 Discovery® C8 Discovery® BIO Wide Pore C8 SUPELCO SM LC-8, SUPELCO SM LC-8-DB SUPELCO SM LC-308
L8	An essentially monomolecular layer of amino-propylsilane chemically bonded to totally porous silica gel support, 1.5 to 10 µm in diameter.	SUPELCO SM LC-NH2 SUPELCO SM LC-NH2-NP
L9	Irregular or spherical, totally porous silica gel having a chemically bonded, strongly acidic cation-exchange coating, 3 to 10 µm in diameter.	SUPELCO SM LC-SCX
L10	Nitrile groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter.	Ascentis® ES Cyano Discovery® Cyano SUPELCO SM LC-CN SUPELCO SM LC-PCN
L11	Phenyl groups chemically bonded to porous silica particles, 1.5 to 10 µm in diameter.	Ascentis® Phenyl Ascentis® Express Phenyl-Hexyl SUPELCO SM LC-DP SUPELCO SM LC-3DP
L13	Trimethylsilane chemically bonded to porous silica particles, 3 to 10 µm in diameter.	SUPELCO SM LC-1
L14	Silica gel having a chemically bonded, strongly basic quaternary ammonium anion-exchange coating, 5 to 10 µm in diameter.	SUPELCO SM SAX1
L17	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the hydrogen form, 6 to 12 µm in diameter.	SUPELCO SM C-610H SUPELCO SM H
L19	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the calcium form, about 9 µm in diameter.	SUPELCO SM Ca
L20	Dihydroxypropane groups chemically bonded to porous silica or hybrid particles, 1.5 to 10 µm in diameter.	Kromasil® Diol SUPELCO SM LC-Diol
L21	A rigid, spherical styrene-divinylbenzene copolymer, 3 to 10 µm in diameter.	PRP-1
L22	A cation-exchange resin made of porous polystyrene gel with sulfonic acid groups, about 10 µm in size.	PRP-X200 PRP-X300 SUPELCO SM C-160H SUPELCO SM H
L23	An anion-exchange resin made of porous polymethacrylate or polyacrylate gel with quaternary ammonium groups, 7 to 12 µm in size.	Discovery® BIO PolyMA-WAX
L26	Butyl silane chemically bonded to totally porous silica particles, 1.5 to 10 µm in diameter.	SUPELCO SM LC-304
L27	Porous silica particles, 30 to 50 µm in diameter.	Discovery® DSC-Si Supelclean™ LC-Si Pelliguard™ LC-Si
L32	A chiral ligand-exchange resin packing-L-proline copper complex covalently bonded to irregularly shaped silica particles, 5 to 10 µm in diameter.	Astec™ CLC-D Astec™ CLC-L
L34	Strong cation-exchange resin consisting of sulfonated cross-linked styrene-divinylbenzene copolymer in the lead form, about 7 to 9 µm in diameter.	SUPELCO SM Pb
L40	Cellulose tris-3,5-dimethylphenylcarbamate coated porous silica particles, 5 to 20 µm in diameter.	Astec™ Cellulose DMP Kromasil® CelluCoat®
L41	Immobilized a1-acid glycoprotein on spherical silica particles, 5 µm in diameter.	Chiral-AGP
L43	Pentafluorophenyl groups chemically bonded to silica particles by a propyl spacer, 5 to 10 µm in diameter.	Ascentis® Express F5 Discovery® HS F5
L45	Beta cyclodextrin bonded to porous silica particles, 5 to 10 µm in diameter.	Astec™ CYCLOBOND® I 2000 Series
L47	High capacity anion-exchange microporous substrate, fully functionalized with a trimethylamine group, 8 µm in diameter.	PRP-X100
L49	A reversed-phase packing made by coating a thin layer of polybutadiene onto spherical porous zirconia particles, 3 to 10 µm in diameter.	Discovery® Zr-PBD
L52	A strong cation exchange resin made of porous silica with sulfopropyl groups, 5 to 10 µm in diameter.	SUPELCO SM LC-SCX

HPLC for Small Molecules

HPLC Column Selection: *Supelco HPLC Columns conform to USP standards*

HPLC Packings

USP Code	Description	Recommended Packing
L59	Packing for the size-exclusion separations of proteins (separation by molecular weight) over the range of 5 to 7,000 kDa. It is spherical (1.5 to 10 μm), silica or hybrid packing with a hydrophilic coating.	Discovery® BIO GFC 100 Discovery® BIO GFC 150 Discovery® BIO GFC 300 Discovery® BIO GFC 500 Discovery® BIO GFC 1000 Discovery® BIO GFC 2000
L60	Spherical, porous silica gel, 10 μm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and endcapped.	Ascentis® RP-Amide Ascentis® Express RP-Amide Discovery® RP-AmideC16 SPELCO SIL™ ABZ+PLUS SPELCO SIL™ LC-ABZ
L63	Glycopeptide teicoplanin linked through multiple covalent bonds to a 100 Å units spherical silica.	Astec™ CHIROBIOTIC® T Astec™ CHIROBIOTIC® T2 Astec™ CHIROBIOTIC® TAG
L67	Porous vinyl alcohol copolymer with a C18 alkyl group attached to the hydroxyl group of the polymer, 2 to 10 μm in diameter.	apHera™ C18
L68	Spherical, porous silica, 10 μm or less in diameter, the surface of which has been covalently modified with alkyl amide groups and not endcapped.	Suplex pKb-100



Helpful Hints

Properties of Organic Solvents Commonly Used in HPLC

Solvent	Polarity	Miscible with Water?	UV Cutoff ¹	Refractive Index 20 °C	Solvent Strength, ϵ^0 (silica)	Viscosity at 20 °C, C P
Hexane	nonpolar ↓ polar	no	200	1.3750	0.00	0.33
Isooctane		no	200	1.3910	0.01	0.50
Carbon tetrachloride		no	263	1.4595	0.14	0.97
Chloroform		no	245	1.4460	0.31	0.57
Methylene chloride		no	235	1.4240	0.32	0.44
Tetrahydrofuran		yes	215	1.4070	0.35	0.55
Diethyl ether		no	215	1.3530	0.29	0.23
Acetone		yes	330	1.3590	0.43	0.32
Ethyl acetate		poorly	260	1.3720	0.45	0.45
Dioxane		yes	215	1.4220	0.49	1.54
Acetonitrile		yes	190	1.3440	0.50	0.37
2-Propanol		yes	210	1.3770	0.63	2.30
Methanol		yes	205	1.3290	0.73	0.60
Water		yes	—	1.3328	>0.73	1.00

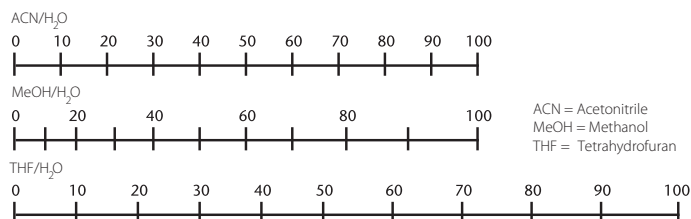
¹Typical values



Helpful Hints

Relative Strengths for Different Solvents

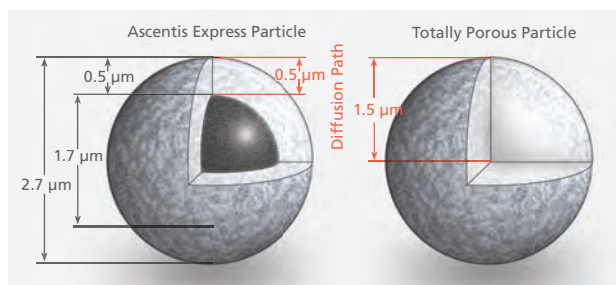
The graph provides for the interconversion of reversed-phase mobile phases having the same strength. Vertical lines in this figure intersect mobile phases having the same strength. For example, 40% Acetonitrile has the same strength as 50% Methanol or 30% THF.



HPLC for Small Molecules

Ascentis® Express 2.7 Micron

Ascentis® Express 2.7 Micron



Ascentis® Express - A Breakthrough in HPLC Performance

Based on innovative Fused-Core® particle technology, Ascentis Express provides the high speed and high efficiency of sub-2 µm particles, but at approximately half the backpressure for the same column length. This lower pressure means that Ascentis Express can be run on conventional HPLC and LC-MS systems, as well as mid-pressure, UPLC® and other ultra-high pressure systems. Lower pressure also means longer columns can be used for additional resolving power. Ascentis Express offers these benefits over sub-2 µm particles, along with excellent column lifetime.

The Fused-Core Advantage

At the heart of Ascentis Express is the 2.7 µm Fused-Core particle which comprises a 1.7 µm solid core and a 0.5 µm porous shell. Compared to totally porous particles, the Fused-Core particles have a much shorter diffusion path because of the solid core. This partial porosity reduces axial dispersion of solutes and minimizes peak broadening. Other features, such as a very tight particle size distribution and high packing density, result in Ascentis Express columns that are capable of 240,000 N/m and higher: comparable to the efficiency of sub-2 µm particle columns and nearly twice the efficiency possible with 3 µm particles.

While the Ascentis Express efficiency is as high as sub-2 µm columns, the larger particle size delivers approximately half the backpressure for the same column dimensions and conditions. This allows Ascentis Express to turn any HPLC system into an extreme performance workhorse for your lab.

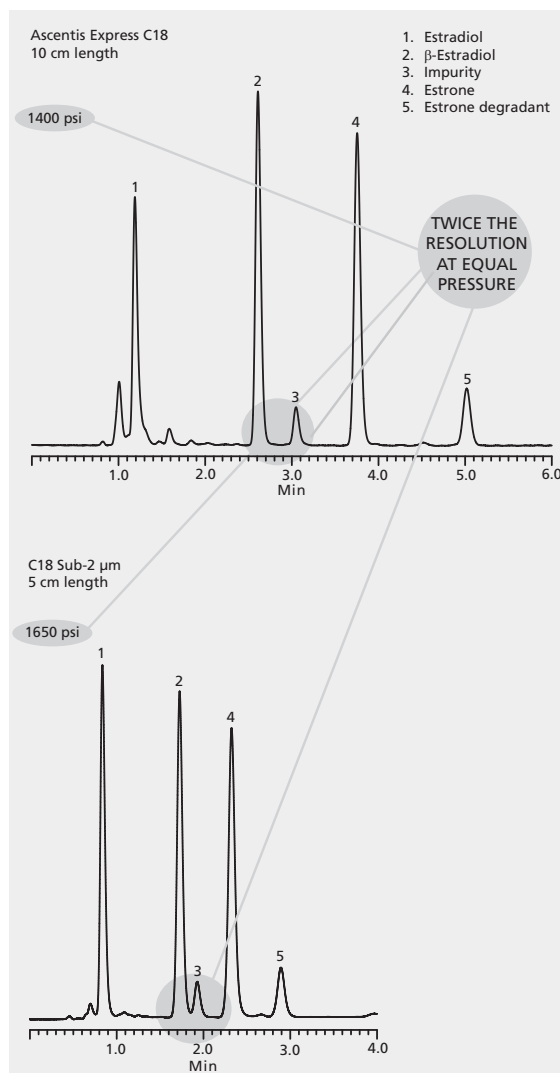
Four Benefits of Ascentis® Express

1. Double the Speed
- Designed for high flow rates
- Half the backpressure of sub-2 µm particles

HPLC Analysis of Hyper-Fast Separations on Ascentis® Express at Half the Pressures of sub-2 µm Columns on Ascentis® Express C18

► application for HPLC

column Ascentis Express C18, 10 cm × 2.1 mm I.D., 2.7 µm particles and sub-2 µm particle column, 5 cm × 2.1 mm I.D. (53823-U)
 mobile phase 55:45 or 54:46, water/acetonitrile
 flow rate 0.2 mL/min
 column temp. ambient
 detector UV at 200 nm
 injection 1 µL
 Application No. G003973



HPLC for Small Molecules

Ascentis® Express 2.7 Micron: Four Benefits of Ascentis® Express

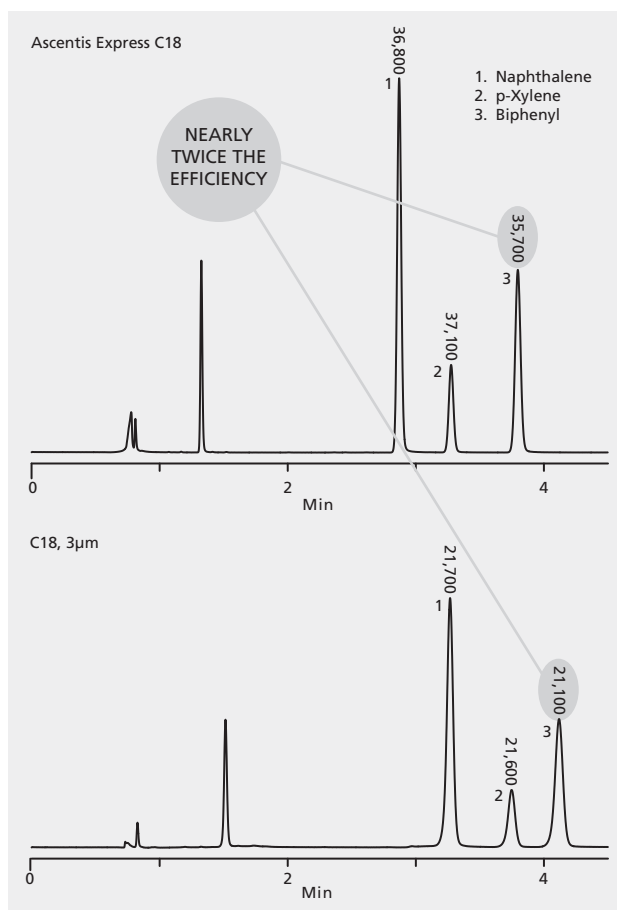
2. Double the Efficiency

- Short analyte diffusion path
- Longer columns permit doubling the plates over sub-2 μm particles
- Twice the efficiency of 3 μm particles

High Efficiency Resolution on Ascentis® Express Versus 3 μm Particles

► application for HPLC

column .. Ascentis Express C18, 15 cm x 4.6 mm I.D., 2.7 μm particles and C18, 15 cm x 4.6 mm I.D., 3 μm particles (53829-U)
 mobile phase 35:65 or 27.5:72.5, water:acetonitrile
 flow rate 1.5 mL/min
 column temp. ambient
 detector UV at 220 nm
 injection 2 μL
 Application No. G003979



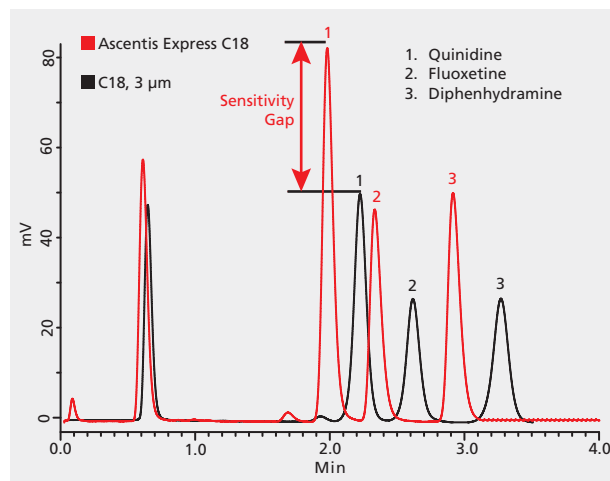
3. High sample loading capacity and signal/noise for trace analysis

- High sample loading from thick, porous shell layer
- High column efficiency for high S/N

HPLC Analysis Higher Efficiency of Ascentis® Express Compared to 3 μm Particles Gives Better Sensitivity on Ascentis® Express C18

► application for HPLC

column .. Ascentis Express C18, 5 cm x 2.1 mm I.D., 2.7 μm particles and C18, 5 cm x 2.1 mm I.D., 3 μm particles (53822-U)
 mobile phase 35:0:65 or 35:4:61, 25 mM dibasic ammonium phosphate (pH 7.0):water:acetonitrile
 flow rate 0.2 mL/min
 column temp. 35 $^{\circ}\text{C}$
 detector UV at 220 nm
 injection 1 μL
 Application No. G003977



4. Extended column lifetime compared to both 3 μm and sub-2 μm columns

- Narrow particle size distribution allows use of 2 μm frits
- Dense particles for more stable bed

HPLC for Small Molecules

Ascentis® Express 2.7 Micron: Improving HPLC Sample Throughput

Improving HPLC Sample Throughput

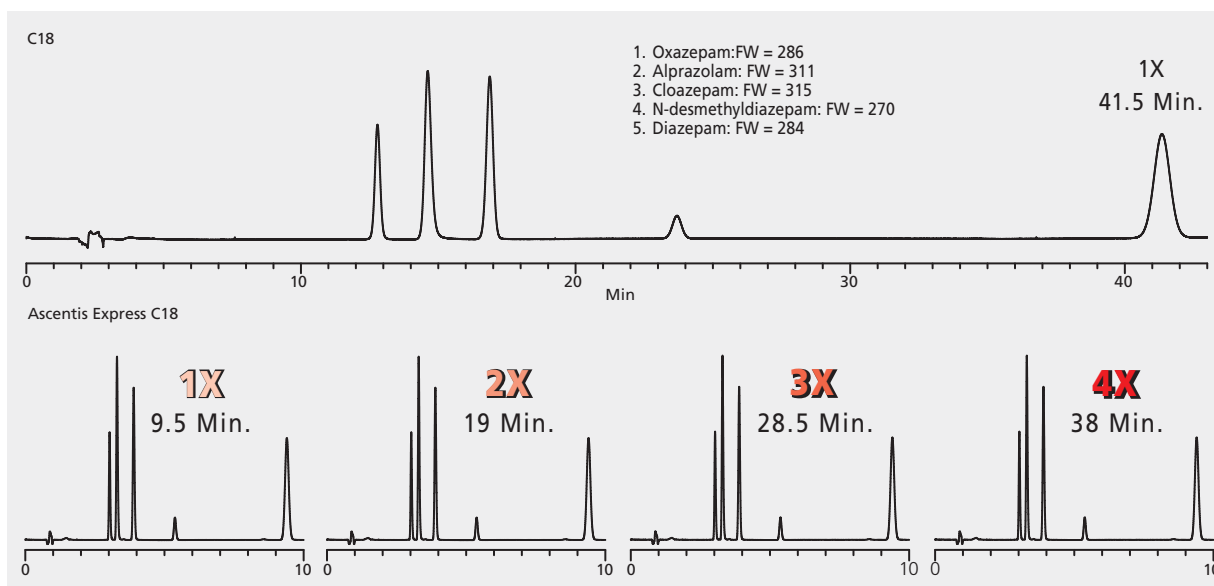
The demand for increased sample throughput and speed of results has driven HPLC users to search for breakthroughs in HPLC instruments and column technology. Although improvements have been realized, setbacks have been encountered. Reduction in column ruggedness, costly replacements of existing instrumentation, and difficulties in transferring methods to new systems have often made these past improvements unappealing to analysts.

The Fused-Core® HPLC particle technology behind Ascentis Express permits 4- to 6-fold reduction in analysis time, with a subsequent increase in sample throughput compared to conventional HPLC columns, without sacrificing resolution or column ruggedness and without the need to change systems or sample prep procedures.

HPLC Analysis of Sample Throughput on Standard C18 versus Ascentis® Express C18

► application for HPLC

column C18, 25 cm × 4.6 mm I.D., 5 µm particles and Ascentis Express C18, 10 cm × 4.6 mm I.D., 2.7 µm particles
 mobile phase 65:35, water:acetonitrile
 flow rate 1 mL/min
 column temp. ambient
 detector UV at 254 nm
 Application No. G004039



HPLC for Small Molecules

Ascentis® Express 2.7 Micron: *Do More Work in Less Time Without Changing your Method*

Do More Work in Less Time Without Changing your Method

Ascentis Express is the ideal choice for HPLC analysts interested in increasing sample throughput while maintaining or even improving resolution. By reducing solute dispersion, the unique Fused-Core technology gives Ascentis Express an advantage over conventional particles. Its low backpressure compared to sub-2 µm particles means that Ascentis Express can achieve UHPLC-like performance on conventional HPLC systems. Under UHPLC conditions, Ascentis Express can exceed the efficiency possible on sub-2 µm columns because longer columns can be used.

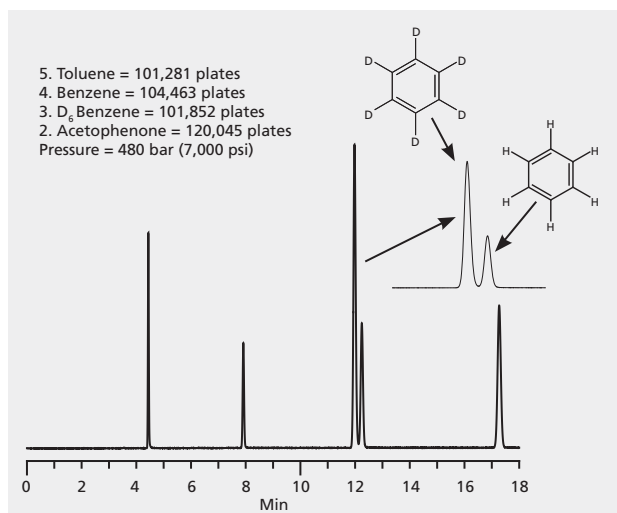
Ultra-High Resolution HPLC: Column Coupling

Column coupling in HPLC is gaining interest since LC systems are being designed to withstand column back pressures of up to 15,000 psi. Column coupling is a simple and practical way to increase resolution by simply increasing column length. Because Ascentis Express HPLC columns provide higher efficiencies at any pressure compared to 3 µm and sub-2 µm particles, the coupling of Ascentis Express columns enables significantly higher resolution than any other column on any commercial HPLC system.

HPLC Analysis of Benzene and Deuterated Benzene on Ascentis® Express C18

► application for HPLC

column Ascentis Express C18, 15 cm × 4.6 mm I.D.
 mobile phase 55:45, acetonitrile:water
 flow rate 1.0 mL/min
 column temp. 50 °C
 detector 254 nm
 injection 10 µL
 Application No. G004046



Ascentis® Express C18

Ascentis® Express C18, 2.7 Micron HPLC Column

Ascentis Express HPLC columns, through the use of Fused-Core® particle technology, can provide you with both the high speed and high efficiencies of sub-2 µm particles while maintaining lower backpressures. The combination of high efficiency and low backpressure benefits UPLC® (or other ultra high pressure system) users, as well as conventional HPLC users. Visit the Ascentis Express home page for more information on this new column technology.

Watch a 5-minute presentation that explains how Ascentis Express columns can help Maximize Sample Throughput.

suitable for L1 per USP

particle platform Fused-Core
 metals <5 ppm
 endcapped Yes
 pore size 90 Å
 operating pH 2 - 9
 temp. range 60 °C

Ref: 1. Ethan R. Badman, Richard L. Beardsley, Zhenmin Liang, Surendra Bansal, Accelerating high quality bioanalytical LC/MS/MS assays using fused core columns *J. Chromatogr. B. Analyt. Technol. Biomed. Life Sci.* **878**, 2307-2313 (2010)

2. Ahmed Abraham, Mohammad Al-Sayah, Peter Skrdla, Yuri Berezniiski, Yadan Chen, Najun Wu, Practical comparison of 2.7 µm fused-core silica particles and porous sub-2 µm particles for fast separations in pharmaceutical process development *J. Pharm. Biomed. Anal.* **51**, 131-137 (2010)

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	2	53799-U	1 ea
2.1	3	53802-U	1 ea
2.1	7.5	53804-U	1 ea
2.1	5	53822-U	1 ea
2.1	10	53823-U	1 ea
2.1	15	53825-U	1 ea
3.0	3	53805-U	1 ea
3.0	5	53811-U	1 ea
3.0	7.5	53812-U	1 ea
3.0	10	53814-U	1 ea
3.0	15	53816-U	1 ea
4.6	3	53818-U	1 ea
4.6	5	53826-U	1 ea
4.6	7.5	53819-U	1 ea
4.6	10	53827-U	1 ea
4.6	15	53829-U	1 ea
1.0	5	582711-U	1 ea
10	15	53793-U	1 ea

Ascentis® Express C18, 2.7 Micron Validation Pack

An Ascentis Express C18 Validation Pack makes it easy to demonstrate method reproducibility on 3 different lots. The validation pack contains a kit with 3 columns - 1 from each of 3 lots of bonded phase. And with Ascentis Express columns, you can be assured that all three columns will meet your expectations.

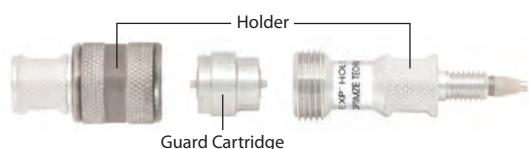
HPLC for Small Molecules

Ascentis® Express 2.7 Micron: *Ascentis® Express C18*

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	5	53994-U	3 ea
4.6	10	53995-U	3 ea
4.6	15	53996-U	3 ea

Ascentis® Express C18, 2.7 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. **Order guard column holder separately.**



Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
2.7	5 × 2.1	53501-U	3 ea
2.7	5 × 3.0	53504-U	3 ea
2.7	5 × 4.6	53508-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U	1 ea
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Ascentis® Express C8**Ascentis® Express C8, 2.7 Micron HPLC Column**

Ascentis Express HPLC columns, through the use of Fused-Core® particle technology, can provide you with both the high speed and high efficiencies of sub-2 µm particles while maintaining lower backpressures. The combination of high efficiency and low backpressure benefits UPLC® (or other ultra high pressure system) users, as well as conventional HPLC users. Visit the Ascentis Express home page for more information on this new column technology.

Watch a 5-minute presentation that explains how Ascentis Express columns can help Maximize Sample Throughput.

suitable for L7 per USP

particle platform	Fused-Core
metals	<5 ppm
endcapped	Yes
pore size	90 Å
operating pH range	2 - 9
temp. range	60 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	2	53795-U	1 ea
2.1	3	53839-U	1 ea
2.1	5	53831-U	1 ea
2.1	7.5	53843-U	1 ea
2.1	10	53832-U	1 ea
2.1	15	53834-U	1 ea
3.0	3	53844-U	1 ea
3.0	5	53848-U	1 ea
3.0	7.5	53849-U	1 ea
3.0	10	53852-U	1 ea
3.0	15	53853-U	1 ea
4.6	3	53857-U	1 ea
4.6	5	53836-U	1 ea
4.6	7.5	53858-U	1 ea
4.6	10	53837-U	1 ea
4.6	15	53838-U	1 ea

Ascentis® Express C8, 2.7 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. **Order guard column holder separately.**

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
2.7	5 × 2.1	53509-U	3 ea
2.7	5 × 3.0	53511-U	3 ea
2.7	5 × 4.6	53512-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U	1 ea
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HPLC for Small Molecules

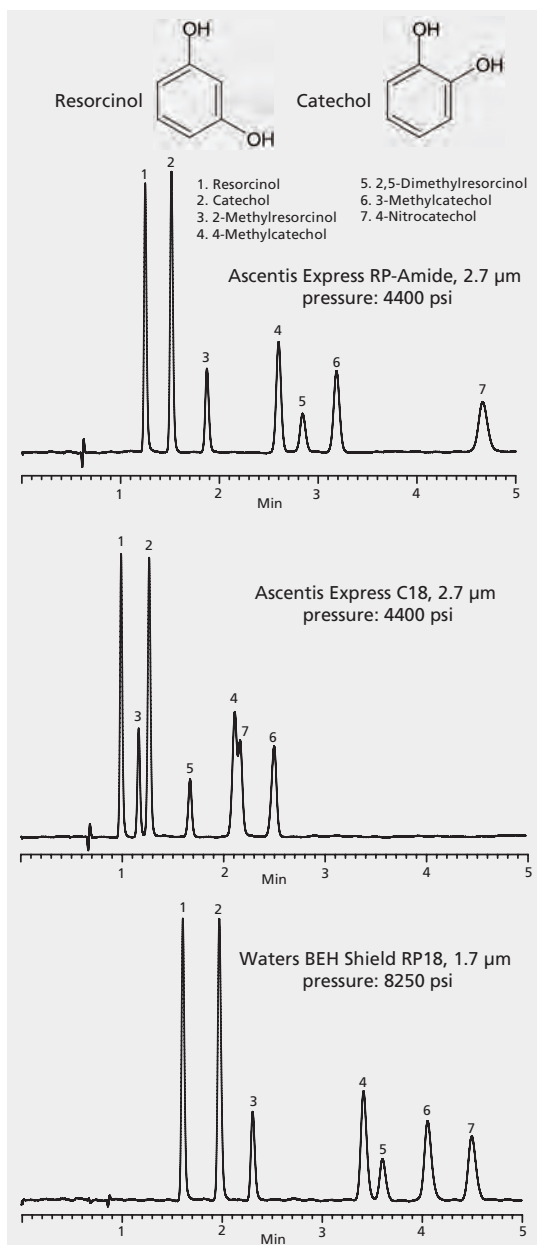
Ascentis® Express 2.7 Micron: Alternate Selectivity with Ascentis® Express RP-Amide

Alternate Selectivity with Ascentis® Express RP-Amide

While the Ascentis Express C18 provides classic reversed-phase selectivity, the Ascentis Express RP-Amide provides increased selectivity for polar compounds, especially those that can act as a hydrogen-bond donor. Other attributes of the RP-Amide include improved peak shape for bases, 100% aqueous compatibility, and low bleed for LC-MS applications.

Separation of phenolics - a comparative evaluation

Application No. _____ G004390



Ascentis® Express RP-Amide

Ascentis® Express RP-Amide, 2.7 Micron HPLC Column

Watch a 6-minute presentation on the effective use of phase chemistry to alter retention in this Beverage Analysis Application.

suitable for L60 per USP

particle platform Fused-Core
metals <5 ppm
endcapped Yes
pore size 90 Å
operating pH range 2 - 9
temp. range 60 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	3	53910-U	1 ea
2.1	5	53911-U	1 ea
2.1	7.5	53912-U	1 ea
2.1	10	53913-U	1 ea
2.1	15	53914-U	1 ea
3.0	3	53915-U	1 ea
3.0	5	53916-U	1 ea
3.0	7.5	53917-U	1 ea
3.0	10	53918-U	1 ea
3.0	15	53919-U	1 ea
4.6	3	53921-U	1 ea
4.6	5	53922-U	1 ea
4.6	7.5	53923-U	1 ea
4.6	10	53929-U	1 ea
4.6	15	53931-U	1 ea
2.1	2	53797-U	1 ea

Ascentis® Express RP-Amide, 2.7 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. Order guard column holder separately.

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
2.7	5 × 2.1	53514-U	3 ea
2.7	5 × 3.0	53516-U	3 ea
2.7	5 × 4.6	53519-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

► for use with Ascentis Express Guard Columns

53500-U 1 ea

HPLC for Small Molecules

Ascentis® Express 2.7 Micron: Ascentis® Express F5

Ascentis® Express F5

NEW PRODUCTS

Ascentis® Express F5, 2.7 Micron HPLC Column

The pentafluorophenylpropyl stationary phase of Ascentis Express F5 provides a stable reversed phase packing with electron-deficient phenyl rings due to the presence of electronegative fluorines. In addition to forming pi-pi and mildly steric interactions, F5 phases also retain compounds by polar interactions. Ascentis Express F5 can be used for basic, acidic, or neutral compounds with alternate selectivity from C18.

Watch a 3-minute presentation that demonstrates how the F5 phase can help Solve 2 Common HPLC Problems.

suitable for L43 per USP

particle platform	Fused-Core
metals	<5 ppm
endcapped	Yes
pore size	90 Å
operating pH range	1 - 9
temp. range	60 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	2	53592-U	1 ea
2.1	3	53566-U	1 ea
2.1	5	53567-U	1 ea
2.1	7.5	53568-U	1 ea
2.1	10	53569-U	1 ea
2.1	15	53571-U	1 ea
3.0	3	53574-U	1 ea
3.0	5	53576-U	1 ea
3.0	7.5	53577-U	1 ea
3.0	10	53578-U	1 ea
3.0	15	53579-U	1 ea
4.6	3	53581-U	1 ea
4.6	5	53583-U	1 ea
4.6	7.5	53584-U	1 ea
4.6	10	53590-U	1 ea
4.6	15	53591-U	1 ea

Ascentis® Express F5, 2.7 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-core® particles. Order guard column holder separately.

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
2.7	5 × 2.1	53594-U	3 ea
2.7	5 × 3.0	53597-U	3 ea
2.7	5 × 4.6	53599-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U	1 ea
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Ascentis® Express Phenyl-Hexyl

NEW PRODUCTS

Ascentis® Express Phenyl-Hexyl, 2.7 Micron HPLC Column

The Phenyl-Hexyl phase has unique selectivity arising from solute interaction with the aromatic ring and its delocalized electrons. It is complementary (orthogonal) to both C18 and RP-Amide phases because of this unique aromaticity. The Phenyl-Hexyl phase also tends to exhibit good shape selectivity, which may originate from solute multipoint interaction with the planar ring system. More retention and selectivity will often be observed for solutes with aromatic electron-withdrawing groups (fluorine, nitro, etc.) or with a delocalized heterocyclic ring system such as the benzodiazepine compounds.

Watch a 3-minute presentation that explores the Selectivity Advantage of Phenyl Bonded Phases.

suitable for L11 per USP

particle platform	Fused-Core
metals	<5 ppm
endcapped	Yes
pore size	90 Å
pH-range	2 - 9
temp. range	60 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	3	53332-U	1 ea
2.1	5	53334-U	1 ea
2.1	7.5	53335-U	1 ea
2.1	10	53336-U	1 ea
2.1	15	53338-U	1 ea
3.0	3	53341-U	1 ea
3.0	5	53342-U	1 ea
3.0	7.5	53343-U	1 ea
3.0	10	53345-U	1 ea
3.0	15	53346-U	1 ea
4.6	3	53347-U	1 ea
4.6	5	53348-U	1 ea
4.6	7.5	53351-U	1 ea
4.6	10	53352-U	1 ea
4.6	15	53353-U	1 ea
2.1	2	53798-U	1 ea

Ascentis® Express Phenyl-Hexyl, 2.7 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. Order guard column holder separately.

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
2.7	5 × 2.1	53524-U	3 ea
2.7	5 × 3.0	53526-U	3 ea
2.7	5 × 4.6	53531-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U	1 ea
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HPLC for Small Molecules

Ascentis® Express 2.7 Micron: *Ascentis® Express ES-Cyano*

Ascentis® Express ES-Cyano

NEW PRODUCTS

Ascentis® Express ES-Cyano, 2.7 Micron HPLC Column

Ascentis® Express ES-Cyano HPLC column is a high-speed, high-performance liquid chromatography column based on 90Å Fused-Core® particles. The Fused-Core particle provides a thin porous shell of high-purity silica surrounding a solid silica core. This particle design exhibits very high column efficiency due to the shallow diffusion paths in the 0.5-micron thick porous shell and the small overall particle size of 2.7-microns. The sterically protected, extensively endcapped diisopropyl-cyanopropylsilane stationary phase of Ascentis Express ES-Cyano provides a stable, reversed-phase packing that can be used for basic, acidic, or neutral compounds.

particle platform Fused-Core
metals <5 ppm
feature
endcapped Yes
pore size 90 Å
pH-range 1 - 8
temp. range ≤100 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	3	53468-U	1 ea
2.1	5	53470-U	1 ea
2.1	7.5	53472-U	1 ea
2.1	10	53473-U	1 ea
2.1	15	53475-U	1 ea
3.0	3	53476-U	1 ea
3.0	5	53478-U	1 ea
3.0	7.5	53479-U	1 ea
3.0	10	53481-U	1 ea
3.0	15	53483-U	1 ea
4.6	3	53484-U	1 ea
4.6	5	53486-U	1 ea
4.6	7.5	53489-U	1 ea
4.6	10	53491-U	1 ea
4.6	15	53492-U	1 ea
2.1	2	53494-U	1 ea

Ascentis® Express ES-Cyano, 2.7 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. **Order guard column holder separately.**

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
2.7	5 × 2.1	53495-U	3 ea
2.7	5 × 3.0	53496-U	3 ea
2.7	5 × 4.6	53497-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U	1 ea
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Ascentis® Express OH5

NEW PRODUCTS

Ascentis® Express OH5, 2.7 Micron HPLC Column

particle platform Fused-Core
metals <5 ppm
endcapped No
pore size 90 Å
operating pH 2-9
temp. range <60 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	2	53779-U	1 ea
2.1	3	53748-U	1 ea
2.1	5	53749-U	1 ea
2.1	7.5	53755-U	1 ea
2.1	10	53757-U	1 ea
2.1	15	53764-U	1 ea
3.0	3	53766-U	1 ea
3.0	5	53767-U	1 ea
3.0	7.5	53768-U	1 ea
3.0	10	53769-U	1 ea
3.0	15	53771-U	1 ea
4.6	3	53772-U	1 ea
4.6	5	53774-U	1 ea
4.6	7.5	53775-U	1 ea
4.6	10	53776-U	1 ea
4.6	15	53778-U	1 ea

Ascentis® Express OH5, 2.7 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. **Order guard column holder separately.**

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
2.7	5 × 2.1	53780-U	3 ea
2.7	5 × 3.0	53781-U	3 ea
2.7	5 × 4.6	53782-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U	1 ea
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Ascentis® Express Peptide ES C18

NEW PRODUCTS

Ascentis® Express Peptide ES-C18, 2.7 Micron HPLC Column

Ascentis Express Peptide ES-C18 columns are specifically engineered to separate higher molecular weight compounds such as peptides and small proteins. These columns contain advanced Fused-Core particles that have larger pores (160 Å versus 90 Å in standard Ascentis Express), bonded with sterically-protected C18 ligands to provide extra stability (ES) at very low pH (< 1) and high temperatures (up to 100°C). This greatly expands the application range for Ascentis Express columns.

Watch a 3-minute presentation that describes the Applications and Advantages of Peptide ES-C18 Columns.

suitable for L1 per USP

particle platform Fused-Core
 metals <5 ppm
 endcapped No
 pore size 160 Å
 operating pH range 1 - 9
 temp. range ≤100 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	3	53299-U	1 ea
2.1	5	53301-U	1 ea
2.1	7.5	53304-U	1 ea
2.1	10	53306-U	1 ea
2.1	15	53307-U	1 ea
3.0	3	53308-U	1 ea
3.0	5	53311-U	1 ea
3.0	7.5	53312-U	1 ea
3.0	10	53313-U	1 ea
3.0	15	53314-U	1 ea
4.6	3	53316-U	1 ea
4.6	5	53318-U	1 ea
4.6	7.5	53323-U	1 ea
4.6	10	53324-U	1 ea
4.6	15	53328-U	1 ea

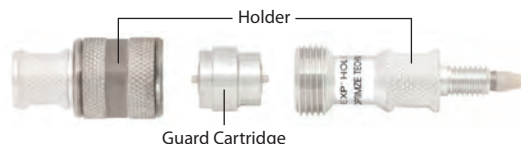
Ascentis® Express Peptide ES-C18, 2.7 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. **Order guard column holder (53500-U) separately.**

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
2.7	5 × 2.1	53536-U	3 ea
2.7	5 × 3.0	53537-U	3 ea
2.7	5 × 4.6	53542-U	3 ea

HPLC for Small Molecules

Ascentis® Express 2.7 Micron: Ascentis® Express Peptide ES C18



Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

► for use with Ascentis Express Guard Columns

53500-U 1 ea

Polar Compound Retention with Ascentis® Express HILIC

HILIC (Hydrophilic Interaction Liquid Chromatography) is gaining popularity due to the ability to show increased retention of polar compounds. Many classes of polar compounds can be retained in HILIC. These include polar neutrals, polar acids, and polar and non-polar basic amines. Both polar and ionic interactions can contribute to retention and selectivity in this mode of chromatography.

HILIC, also referred to as Aqueous Normal-Phase (ANP) Chromatography, is a variation of normal-phase chromatography with the distinction that one of the major components of the mobile phase is water. Typical eluents of HILIC consists of 60-95% acetonitrile in water or an aqueous buffer. The high volatility of the mobile phase makes HILIC LC-MS friendly where one can realize a dramatic increase in sensitivity compared to reversed-phase chromatography.

Benefits of HILIC Separation

- Retention of highly polar analytes like metabolites
- Complimentary selectivity to reversed-phase chromatography
- Increased MS sensitivity
- Quick transfer from final steps of sample prep (SPE, protein, precipitation, etc.)

Ascentis® Express HILIC

Ascentis® Express HILIC, 2.7 Micron HPLC Column

Ascentis Express HPLC columns, through the use of Fused-Core® particle technology, can provide you with both the high speed and high efficiencies of sub-2 µm particles while maintaining lower backpressures. The combination of high efficiency and low backpressure benefits UPLC® (or other ultra high pressure system) users, as well as conventional HPLC users. Visit the Ascentis Express home page for more information on this new column technology.

Watch a 4-minute presentation that demonstrates the power of the HILIC phase for resolving complex mixtures in this Metabolomic Profiling Study.

suitable for L3 per USP

particle platform Fused-Core
 metals <5 ppm
 endcapped No
 pore size 90 Å
 operating pH range 2 - 8
 temp. range ≤100 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	3	53933-U	1 ea
2.1	5	53934-U	1 ea
2.1	7.5	53938-U	1 ea
2.1	10	53939-U	1 ea
2.1	15	53946-U	1 ea
3.0	3	53964-U	1 ea
3.0	5	53967-U	1 ea

HPLC for Small Molecules

Ascentis® Express 2.7 Micron: *Ascentis® Express HILIC*

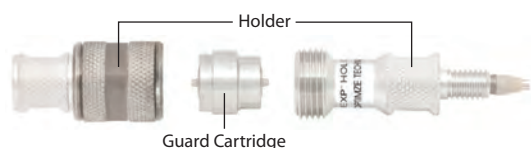
Ascentis® Express HILIC, 2.7 Micron HPLC Column (continued)

I.D. (mm)	L (cm)	Cat. No.	Qty
3.0	7.5	53969-U	1 ea
3.0	10	53970-U	1 ea
3.0	15	53972-U	1 ea
4.6	3	53974-U	1 ea
4.6	5	53975-U	1 ea
4.6	7.5	53977-U	1 ea
4.6	10	53979-U	1 ea
4.6	15	53981-U	1 ea

Ascentis® Express HILIC, 2.7 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. Order guard column holder separately.

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
2.7	5 × 2.1	53520-U	3 ea
2.7	5 × 3.0	53521-U	3 ea
2.7	5 × 4.6	53523-U	3 ea



Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U	1 ea
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Ascentis® Express Capillary HPLC Columns

NEW PRODUCTS

Ascentis Express columns provide a breakthrough in HPLC column performance. Based on Fused-Core particle technology, Ascentis Express provides the benefits of high speed and high efficiencies of sub-2 µm particles. The Fused-Core particle consists of a 1.7 µm solid core and a 0.5 µm porous shell allowing for a smaller diffusion path (0.5 µm) compared to conventional fully porous particles.

Key Benefits:

- Higher peak capacities than traditional columns
- Lower backpressure than sub 2 micron columns
- 90 Angstrom pore size for peptides and digests

Ascentis® Express C18, 2.7 Micron Capillary HPLC Column

suitable for L1 per USP

particle platform	Fused-Core
metals	<5 ppm
endcapped	Yes
pore size	90 Å
operating pH	2 - 9
temp. range	60 °C

I.D. (µm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
75	5	53982-U	1 ea
100	5	53985-U	1 ea
200	5	53989-U	1 ea
300	5	53992-U	1 ea
500	5	53998-U	1 ea
75	15	54219-U	1 ea
100	15	54256-U	1 ea
200	15	54261-U	1 ea
300	15	54271-U	1 ea
500	15	54273-U	1 ea

Ascentis® Express Peptide ES-C18, 2.7 Micron Capillary HPLC Column

suitable for L1 per USP

particle platform	Fused-Core
metals	<5 ppm
endcapped	No
pore size	160 Å
pH-range	1 - 9
temp. range	≤100 °C

I.D.	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
75 µm	5	53543-U	1 ea
100 µm	5	53544-U	1 ea
200 µm	5	53545-U	1 ea
300 µm	5	53546-U	1 ea
500 µm	5	53547-U	1 ea
1.0 mm	5	53548-U	1 ea
75 µm	15	53549-U	1 ea
100 µm	15	53552-U	1 ea
200 µm	15	53553-U	1 ea
300 µm	15	53554-U	1 ea
500 µm	15	53558-U	1 ea
1.0 mm	15	53561-U	1 ea

Ascentis® Express C8 Capillary, 2.7 micron HPLC Column

suitable for L7 per USP

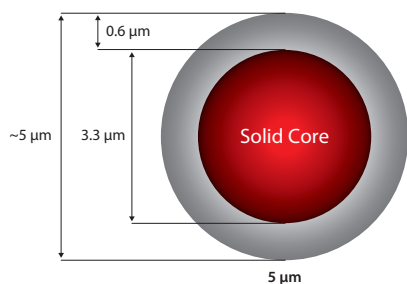
particle platform	Fused-Core
metals	<5 ppm
endcapped	Yes
pore size	90 Å
operating pH range	2 - 9
temp. range	60 °C

I.D. (µm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
75	5	53983-U	1 ea
100	5	53987-U	1 ea
200	5	53991-U	1 ea
300	5	53997-U	1 ea
500	5	53999-U	1 ea
75	15	54229-U	1 ea
100	15	54260-U	1 ea
200	15	54262-U	1 ea
300	15	54272-U	1 ea
500	15	54275-U	1 ea

HPLC for Small Molecules

Ascentis® Express 5 Micron

Ascentis® Express 5 Micron



Achieve Faster Separations With No Backpressure Concerns

Ascentis Express 5 µm columns provide a new choice for improving the performance of traditional HPLC systems. Ascentis Express provides the benefits of *high speed* and *high efficiencies* without the concerns of smaller particle columns. Due to the high efficiencies at low backpressures, Ascentis Express 5 µm can benefit conventional HPLC users with no drawbacks.

Features at a Glance

- High efficiencies
- Low backpressures
- Same instrument - no change of methods of sample prep
- Faster method development
- Rugged design
- Outperforms popular 3 µm and 5 µm columns

Leverage Easy Implementation on Any System

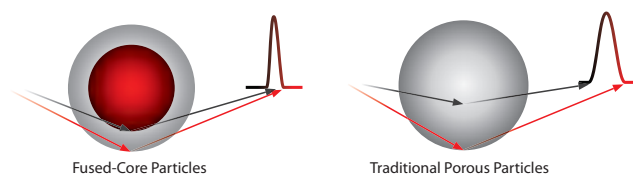
Small Diffusion Path

The new Fused-Core particle consists of a 3.3 µm solid core and a 0.6 µm porous shell. A major benefit of the Fused-Core particle is the small diffusion path (0.6 µm) compared to conventional fully porous particles. The short diffusion path reduces axial dispersion of solutes and minimizes peak broadening. In fact, Ascentis Express 5 µm columns are able to achieve greater speed and efficiency than any other 5 µm particle based column. This means that Ascentis Express 5 µm becomes the standard column for all of your 5 µm based methods.

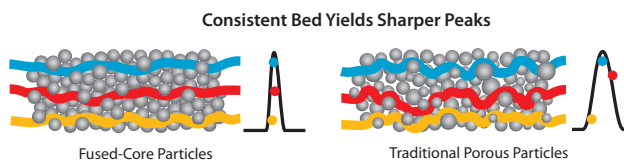
Beyond the new standard column for all 5 µm based methods, Ascentis Express 5 µm is an excellent choice for bioanalytical LC/MS methods. The Ascentis Express 5 µm excels under high flow rates and the high throughput demands of these methods. Furthermore, the large particle format provides an extremely rugged HPLC column.

Maximize Performance Efficiencies with Fused-Core

Fast HPLC with Shorter Diffusion Path

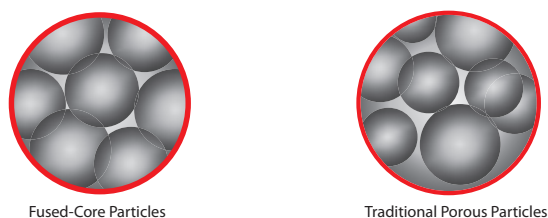


Consistent Bed Yields Sharper Peaks



Narrow Particle Distribution and Rugged Column Design

Narrow Particle Size Distribution and Rugged Column Design



Ascentis® Express C18

NEW PRODUCTS

Ascentis® Express C18, 5 Micron HPLC Column

Ascentis® Express 5 µm C18 is a high-speed, high-performance liquid chromatography column based on the highly efficient Fused-Core® particle design. The Fused-Core® particle provides a thin porous shell of high-purity silica surrounding a solid silica core. This particle design exhibits very high column efficiency due to the shallow diffusion paths in the 0.5-micron thick porous shell and the highly uniform overall particle size of 5-microns. The densely bonded, extensively endcapped dimethyloctadecyl stationary phase of Ascentis Express 5 µm C18 provides a stable, reversed-phase packing that can be used for basic, acidic, or neutral compounds.

suitable for L1 per USP

particle platform	Fused-Core
metals	<5 ppm
endcapped	Yes
pore size	90 Å
operating pH	2-9
temp. range	60 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	50507-U	1 ea
2.1	3	50508-U	1 ea
2.1	5	50509-U	1 ea
2.1	7.5	50511-U	1 ea
2.1	10	50517-U	1 ea
2.1	15	50518-U	1 ea
2.1	25	50521-U	1 ea
3.0	3	50522-U	1 ea
3.0	5	50523-U	1 ea
3.0	7.5	50525-U	1 ea
3.0	10	50526-U	1 ea
3.0	15	50527-U	1 ea

HPLC for Small Molecules

Ascentis® Express 5 Micron: *Ascentis® Express C18*

Ascentis® Express C18, 5 Micron HPLC Column (*continued*)

I.D. (mm)	L (cm)	Cat. No.	Qty
3.0	25	50528-U	1 ea
4.6	3	50529-U	1 ea
4.6	5	50530-U	1 ea
4.6	7.5	50533-U	1 ea
4.6	10	50536-U	1 ea
4.6	15	50537-U	1 ea
4.6	25	50538-U	1 ea

Ascentis® Express C18, 5 Micron Guard Cartridge

Ascentis® Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® articles. **Order guard column holder separately.**

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
5	5 × 2.1	50539-U	3 ea
5	5 × 3.0	50541-U	3 ea
5	5 × 4.6	50542-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U 1 ea

Ascentis® Express C8

NEW PRODUCTS

Ascentis® Express C8, 5 Micron HPLC Column

Ascentis® Express 5 µm C8 is a high-speed, high-performance liquid chromatography column based on the highly efficient Fused-Core® particle design. The Fused-Core particle provides a thin porous shell of high-purity silica surrounding a solid silica core. This particle design exhibits very high column efficiency due to the shallow diffusion paths in the 0.6-micron thick porous shell and the highly uniform overall particle size of 5-microns. The densely bonded, extensively endcapped dimethyloctyl stationary phase of Ascentis Express 5 µm C8 provides a stable, reversed-phase packing that can be used for basic, acidic, or neutral compounds.

suitable for L7 per USP

particle platform	Fused-Core
metals	<5 ppm
endcapped	Yes
pore size	90 Å
operating pH	2-9
temp. range	60 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	50362-U	1 ea
2.1	3	50363-U	1 ea
2.1	5	50364-U	1 ea
2.1	7.5	50367-U	1 ea
2.1	10	50368-U	1 ea

I.D. (mm)	L (cm)	Cat. No.	Qty
2.1	15	50372-U	1 ea
2.1	25	50373-U	1 ea
3.0	3	50376-U	1 ea
3.0	5	50377-U	1 ea
3.0	7.5	50378-U	1 ea
3.0	10	50381-U	1 ea
3.0	15	50382-U	1 ea
3.0	25	50385-U	1 ea
4.6	3	50386-U	1 ea
4.6	5	50389-U	1 ea
4.6	7.5	50390-U	1 ea
4.6	10	50391-U	1 ea
4.6	15	50392-U	1 ea
4.6	25	50394-U	1 ea

Ascentis® Express C8, 5 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. **Order guard column holder separately.**

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
5	5 × 2.1	50395-U	3 ea
5	5 × 3.0	50396-U	3 ea
5	5 × 4.6	50399-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U 1 ea

Ascentis® Express F5

NEW PRODUCTS

Ascentis® Express F5, 5 Micron HPLC Column

Ascentis® Express 5 µm F5 is a high-speed, high-performance liquid chromatography column based on the highly efficient Fused-Core® particle design. The bonded, endcapped, dimethylpentafluorophenyl-propylsilane stationary phase of Ascentis Express 5 µm F5 provides a stable, reversed-phase packing with electron-deficient phenyl rings due to the presence of electronegative fluorines. In addition to forming π-π and mildly steric interactions, F5 phases also retain compounds by polar interactions. As a result of having both polar and non-polar character, F5 phases can show dual-mode retention behavior, sometimes producing a "U-shaped" retention as a function of acetonitrile content of the mobile phase, with retention increasing at both low and high concentrations of ACN (reversed-phase and HILIC retention modes). Ascentis Express 5 µm F5 can be used for basic, acidic, or neutral compounds with alternate selectivity from C18.

HPLC for Small Molecules

Ascentis® Express 5 Micron: Ascentis® Express F5

suitable for L43 per USP

particle platform	Fused-Core
metals	<5 ppm
endcapped	Yes
pore size	90 Å
operating pH	1-9
temp. range	60 °C

I.D. (mm)	L	Cat. No.	Qty
particle size 5 µm			
2.1	2 cm	50603-U	1 ea
2.1	3 cm	50604-U	1 ea
2.1	5 cm	50605-U	1 ea
2.1	7.5 cm	50607-U	1 ea
2.1	10 cm	50612-U	1 ea
2.1	15 cm	50613-U	1 ea
2.1	25 cm	50614-U	1 ea
3.0	3 cm	50615-U	1 ea
3.0	5 cm	50616-U	1 ea
3.0	7.5 cm	50619-U	1 ea
3.0	10 cm	50622-U	1 ea
3.0	15 cm	50623-U	1 ea
3.0	25 cm	50624-U	1 ea
4.6	3 cm	50625-U	1 ea
4.6	5 cm	50626-U	1 ea
4.6	7.5 cm	50627-U	1 ea
4.6	10 mm	50628-U	1 ea
4.6	15 cm	50631-U	1 ea
4.6	25 cm	50632-U	1 ea

Ascentis® Express F5, 5 Micron Guard Cartridge

Ascentis® Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. Order guard column holder separately.

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
5	5 × 2.1	50633-U	3 ea
5	5 × 3.0	50634-U	3 ea
5	5 × 4.6	50635-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U	1 ea
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Ascentis® Express Phenyl-Hexyl

NEW PRODUCTS

Ascentis® Express Phenyl-Hexyl, 5 Micron HPLC Column

The Phenyl-Hexyl phase has unique selectivity arising from solute interaction with the aromatic ring and its delocalized electrons. It is complementary (orthogonal) to both C18 and RP-Amide phases because of this unique aromaticity. The Phenyl-Hexyl phase also tends to exhibit good shape selectivity, which may originate from solute multipoint interaction with the planar ring system. More retention and selectivity will often be observed for solutes with aromatic electron-withdrawing groups (fluorine, nitro, etc.) or with a delocalized heterocyclic ring system such as the benzodiazepine compounds.

suitable for L11 per USP

particle platform	Fused-Core
metals	<5 ppm
endcapped	Yes
pore size	90 Å
operating pH	2-9
temp. range	60 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	50442-U	1 ea
2.1	3	50443-U	1 ea
2.1	5	50446-U	1 ea
2.1	7.5	50451-U	1 ea
2.1	10	50454-U	1 ea
2.1	15	50455-U	1 ea
2.1	25	50456-U	1 ea
3.0	3	50459-U	1 ea
3.0	5	50464-U	1 ea
3.0	7.5	50466-U	1 ea
3.0	10	50469-U	1 ea
3.0	15	50470-U	1 ea
3.0	25	50472-U	1 ea
4.6	3	50474-U	1 ea
4.6	5	50477-U	1 ea
4.6	7.5	50479-U	1 ea
4.6	10	50482-U	1 ea
4.6	15	50483-U	1 ea
4.6	25	50487-U	1 ea

Ascentis® Express Phenyl-Hexyl, 5 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. Order guard column holder separately.

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
5	5 × 2.1	50496-U	3 ea
5	5 × 3.0	50497-U	3 ea
5	5 × 4.6	50498-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U	1 ea
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Ascentis® Express ES-Cyano

NEW PRODUCTS

Ascentis® Express ES-Cyano, 5 Micron HPLC Column

Ascentis® Express 5 micron ES-Cyano HPLC column is a high-speed, high-performance liquid chromatography column based on 90Å Fused-Core® particles. The Fused-Core particle provides a thin porous shell of high-purity silica surrounding a solid silica core. This particle design exhibits very high column efficiency due to the shallow diffusion paths in the 0.6-micron thick porous shell and the overall particle size of 5-microns. The sterically protected, extensively endcapped diisopropyl-cyanopropylsilane stationary phase of Ascentis Express ES-Cyano provides a stable, reversed-phase packing that can be used for basic, acidic, or neutral compounds

HPLC for Small Molecules

Ascentis® Express 5 Micron: *Ascentis® Express ES-Cyano*

Ascentis® Express ES-Cyano, 5 Micron HPLC Column (continued)

suitable for L10 per USP

particle platform	(Fused-Core)
metals	<5 ppm
endcapped	Yes
pore size	90 Å
operating pH	2-9
temp. range	60 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	50557-U	1 ea
2.1	3	50558-U	1 ea
2.1	5	50559-U	1 ea
2.1	7.5	50562-U	1 ea
2.1	10	50563-U	1 ea
2.1	15	50564-U	1 ea
2.1	25	50566-U	1 ea
3.0	3	50567-U	1 ea
3.0	5	50568-U	1 ea
3.0	7.5	50569-U	1 ea
3.0	10	50570-U	1 ea
3.0	15	50574-U	1 ea
3.0	25	50575-U	1 ea
4.6	3	50577-U	1 ea
4.6	5	50581-U	1 ea
4.6	7.5	50583-U	1 ea
4.6	10	50585-U	1 ea
4.6	15	50588-U	1 ea
4.6	25	50591-U	1 ea

Ascentis® Express ES-Cyano, 5 Micron Guard Cartridge

Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. **Order guard column holder separately.**

Particle Size (µm)	L × I.D. (mm)	Cat. No.	Qty
5	5 × 2.1	50592-U	3 ea
5	5 × 3.0	50593-U	3 ea
5	5 × 4.6	50597-U	3 ea

Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

▶ for use with Ascentis Express Guard Columns

53500-U	1 ea
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Ascentis®

The Ascentis® Family of HPLC Columns

The Ascentis family of columns is the fourth generation of HPLC column technology from Supelco scientists. Ascentis columns are bonded on high purity, 100 Angstrom silica including 3, 5, and 10 micron particle size. Columns are designed for small molecule applications and are scalable from micro columns (1.0 mm I.D.) to preparative dimensions (50 mm I.D.). The family includes C18, C8, Phenyl, Si and embedded polar group phase, RP-Amide.

Columns are manufactured at our ISO 9001 registered facility in Bellefonte, PA. This ISO 9001 registration provides quality oversight into all aspects of the manufacturing process leading to a product that consistently meets exacting specifications.

Maximum Retentivity

High surface area silica (450 m²/g) and advanced bonding chemistry make the Ascentis family of columns highly retentive.

High retentivity allows the chromatographer to run at higher organic solvent composition. This is ideal for LC-MS applications and can increase MS sensitivity.

Ionization efficiency and the accompanying MS signal are often enhanced when analytes evaporate under higher organic conditions. Utilizing high organic

mobile phases promotes easier sample preparation due to solubility.

Preparative chromatography procedures are improved by minimizing evaporation and

reconstitution steps. The high retentivity advantage extends into highly aqueous mobile phases for Phenyl, RP-Amide and C8, thus retaining even the most

polar compounds beyond the void.

Optimized for LC-MS

Excellent LC-MS Bleed Characteristics

Mass spectral responses from background ions often inhibit both qualitative and quantitative analysis in LC-MS experiments. Common sources of background ions include the solvents, interface or system contamination and HPLC column bleed. The presence of background ions can be reduced by using high quality solvents such as LC-MS CHROMASOLV®, maintaining a clean LC-MS system and by using high quality HPLC stationary phases from Supelco.

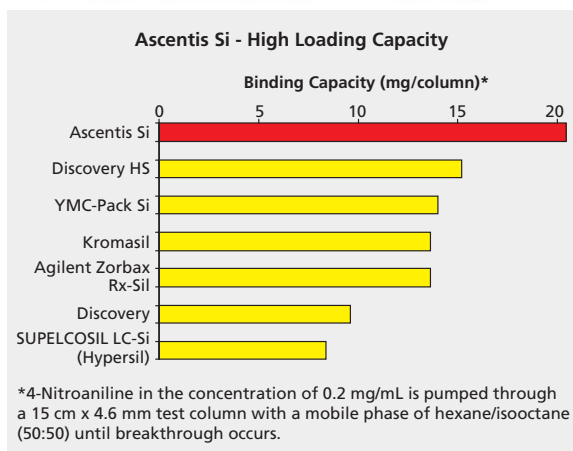
Ascentis utilizes advanced bonding chemistry and highly purified silica to minimize the potential for column bleed.

HPLC for Small Molecules

Ascentis®: High Loading Capacity

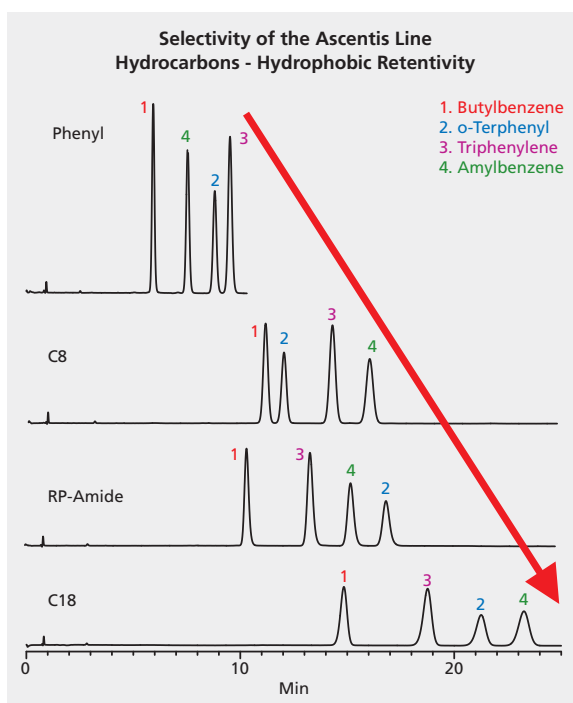
High Loading Capacity

Ascentis Si is a high surface area silica that provides a platform for high loading capacity and longer retention. These features allow for the purification of larger quantities of material per injection.



Hydrophobic Retentivity

Hydrophobic interactions are the main interaction responsible for the separation of hydrophobic molecules. Even with strictly hydrocarbon molecules, there are selectivity variations based on such phenomena as shape selectivity. Note, each Ascentis phase has a unique selectivity on this test mixture!



Column: 15 cm x 4.6 mm I.D., 5 μ m particles
Mobile Phase: 35:65 water:acetonitrile
Temp.: 35 °C
Flow Rate: 1.5 mL/min
Det.: UV, 220 nm

Preparative Scale HPLC Separations



Ascentis phases available in preparative dimensions.

Choose 5 μ m particles when you need high efficiency because of a complex sample matrix or closely-eluting peaks. Economical columns containing 10 μ m particles are a good choice when compounds of interest are widely spaced or when high throughput or lower back pressure is required. Flow rate and sample volume are related to the column volume, and are proportional to the ratio of the square of the column radius. For fixed column length and linear velocity, the numbers in the table below show a progressive increase in sample capacity and optimum flow rate as column I. D. increases. Sample capacity, however, also is dependent on the elution volume and resolution of the separation. The higher the resolution and longer the retention, the more sample can be purified per injection.

Please contact Technical Service for a quote on a preparative scale column that you require.

Determining Sample Capacities for Preparative Columns

Column Type	I.D. (mm)	Optimum Flow Rate (mL/min)	Optimum Capacity	Max. Analytical Capacity	Max. Purification Multiplier*
Analytical	4.6	0.7	200 μ g	1 mg	1
Semi-Prep	10	3.4	1 mg	5 mg	4.8
Preparative	21.2	14.8	4.2 mg	21 mg	21.2
Preparative	50.0	85.4	24 mg	122 mg	122

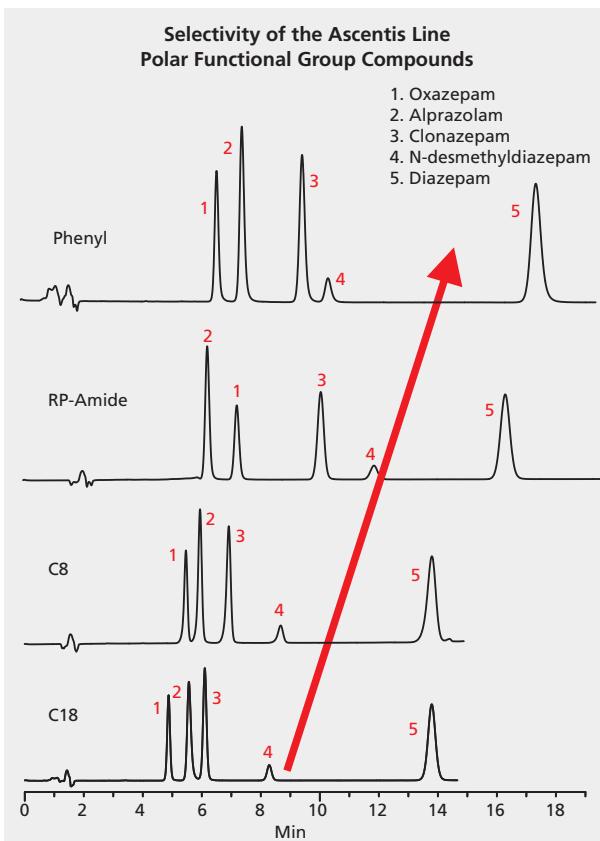
*Relative to 4.6 mm I.D. column

HPLC for Small Molecules

Ascentis®: Polar Compound Analysis

Polar Compound Analysis

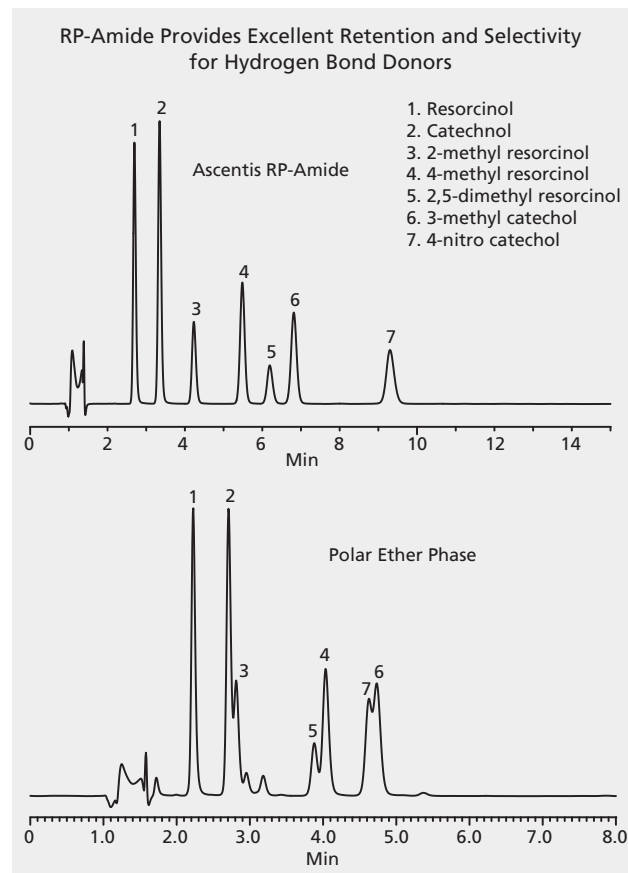
Polar compounds will often have greater retention on Ascentis Phenyl and RP-Amide compared to strictly hydrophobic phases such as C18 or C8. This is due to the polar interactions of these phases such as hydrogen bonding and pi-pi interactions.



Column: 15 cm x 4.6 mm I.D., 5 µm particles
Mobile Phase: 60:40 water:acetonitrile
Temp.: 25°C
Flow Rate: 1.0 mL/min
Det.: UV, 254 nm

Ascentis® RP-Amide versus Competition

The chromatograms show that the Ascentis RP-Amide column is more retentive and selective for catechols and resorcinols. The polar phase that contains an ether group does not have the hydrogen bonding ability of an amide group toward phenols.



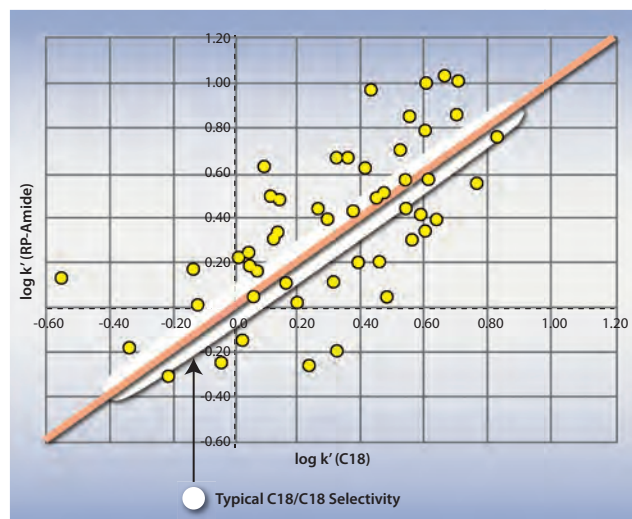
Column: 15 cm x 4.6 mm I.D., 5 µm particles
Mobile Phase: 75:25 20mM phosphoric acid:acetonitrile
Temp.: 30 °C
Flow Rate: 1.5 mL/min
Det.: UV, 270 nm

HPLC for Small Molecules

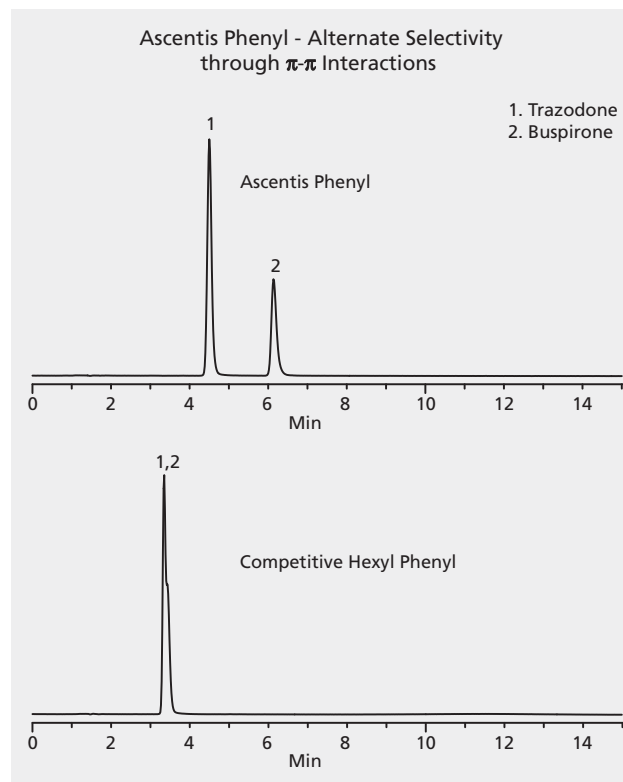
Ascentis®: *Orthogonal Selectivity**Orthogonal Selectivity*

While good retention and high efficiency are important in separations, **selectivity is the most powerful parameter for achieving separations.**

Supelco had that in mind when designing the Ascentis family. Move between the C18 and C8 when small differences in retention and selectivity are desired. The RP-Amide or Phenyl can create larger differences in selectivity for resolving difficult pairs or confirming identity. This orthogonal difference is illustrated clearly in the log k' vs. log k' plot. Typical column pairs show less scatter as compared to this plot.

*Ascentis® Phenyl versus Competition*

The exceptional selectivity of Ascentis Phenyl for compounds that contain aromatic or aromatic-like ring systems is shown in this application. A competitive phenyl that employs a hexyl linker displays very little selectivity for these compounds under these conditions. Ascentis Phenyl provides a clear choice when alternate selectivity is desired.



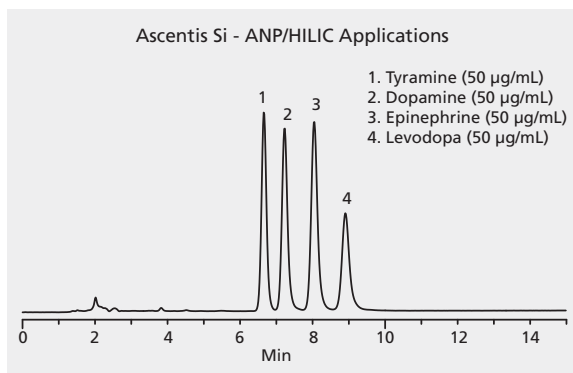
Column: 15 cm x 4.6 mm I.D., 5 μ m particles
 Mobile Phase: 40:60 10 mM ammonium acetate (pH 5.5 with acetic acid): acetonitrile
 Temp.: 35 °C
 Flow Rate: 1.0 mL/min
 Det.: UV, 254 nm

HPLC for Small Molecules

Ascentis®: HILIC using Ascentis® Si

HILIC using Ascentis® Si

Retention of small polar compounds can be achieved using Ascentis Si. In the ANP/HILIC (Aqueous Normal Phase/Hydrophilic Interaction Chromatography) mode, retention is caused by a mix of partitioning and cation exchange. This provides enhanced retention and alternateselectivity for neutral polar and basic compounds. Ascentis Si columns are well suited for ANP/HILIC applications and are shipped with ethanol mobile phase for easy use with ANP/HILIC eluents.



Column: 15 cm x 4.6 mm I.D., 5 µm particles
 Mobile Phase: 15:85 0.1% ammonium acetate in water:0.1% ammonium acetate in acetonitrile
 Temp.: 35 °C
 Flow Rate: 1.0 mL/min
 Det.: UV, 280 nm

Ascentis® C18

Ascentis® C18 HPLC Column

The Ascentis family of columns is the fourth generation of HPLC column technology from Supelco scientists. Ascentis columns are bonded on high purity, 100 Angstrom silica including 3, 5, and 10 micron particle size. Columns are designed for small molecule applications and are scalable from micro columns (1.0 mm I.D.) to preparative dimensions (50 mm I.D.). The family includes C18, C8, Phenyl, Si and embedded polar group phase, RP-Amide.

Ascentis C18 is an extremely stable and reliable first choice HPLC column that gives symmetric peak shape and excellent retention even for difficult compounds.

Features and Benefits

- Excellent retention
- Symmetric peak shape
- High reproducibility
- Complete LC-MS compatibility

suitable for L1 per USP

loading 25% Carbon
 matrix silica gel high purity, spherical
 phase octadecylsilane
 surface coverage 3.7 µmol/m²
 metals <5 ppm
 surface area 450 m²/g
 endcapped Yes
 pore size 100 Å
 operating pH range 2 - 8
 temp. range ≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
1.0	5	581311-U	1 ea
1.0	10	581364-U	1 ea
1.0	15	581365-U	1 ea
2.1	2	581312-U	1 ea
2.1	3	581313-U	1 ea
2.1	5	581300-U	1 ea
2.1	10	581301-U	1 ea
2.1	15	581302-U	1 ea
3.0	2	581314-U	1 ea
3.0	3	581306-U	1 ea
3.0	5	581307-U	1 ea
3.0	10	581308-U	1 ea
4.6	2	581315-U	1 ea
4.6	3	581316-U	1 ea
4.6	3.3	581336-U	1 ea
4.6	5	581320-U	1 ea
4.6	10	581321-U	1 ea
4.6	15	581322-U	1 ea
10.0	5	581335-U	1 ea
particle size 5 µm			
2.1	2	581368-U	1 ea
2.1	3	581327-U	1 ea
2.1	5	581303-U	1 ea
2.1	10	581326-U	1 ea
2.1	15	581304-U	1 ea
2.1	25	581305-U	1 ea
3.0	2	581328-U	1 ea
3.0	3	581369-U	1 ea
3.0	5	581329-U	1 ea
4.6	2	581330-U	1 ea
4.6	3	581331-U	1 ea
4.6	5	581323-U	1 ea
4.6	7.5	581332-U	1 ea
4.6	15	581324-U	1 ea
4.6	25	581325-U	1 ea
10.0	5	581340-U	1 ea
10.0	10	581341-U	1 ea
10.0	15	581342-U	1 ea
10.0	25	581343-U	1 ea
21.2	5	581344-U	1 ea
21.2	10	581345-U	1 ea
21.2	15	581346-U	1 ea
21.2	25	581347-U	1 ea
particle size 10 µm			
4.6	15	581350-U	1 ea
4.6	25	581351-U	1 ea
10.0	5	581352-U	1 ea
10.0	10	581353-U	1 ea
10.0	15	581354-U	1 ea
10.0	25	581355-U	1 ea
21.2	5	581356-U	1 ea
21.2	10	581357-U	1 ea
21.2	15	581358-U	1 ea
21.2	25	581359-U	1 ea

HPLC for Small Molecules

Ascentis®: Ascentis® C18

Ascentis C18 Validation Pack

An Ascentis C18 Validation Pack makes it easy to demonstrate method reproducibility on 3 different lots. The validation pack contains a kit with 3 columns - 1 from each of 3 lots of bonded phase. And with Ascentis columns, you can be assured that all three columns will meet your expectations.

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	15	581390-U	3 ea
4.6	25	581391-U	3 ea

Ascentis® C18 Supelguard™ Guard Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	2	581376-U	1 kit
2.1	2	581377-U	2 ea
4.0	2	581378-U	1 kit
4.0	2	581379-U	2 ea
particle size 5 µm			
2.1	2	581370-U	2 ea
2.1	2	581371-U	1 kit
3.0	2	581374-U	2 ea
3.0	2	581375-U	1 kit
4.0	2	581372-U	2 ea
4.0	2	581373-U	1 kit
particle size 10 µm			
10.0	1	581388-U	1 ea

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules. (10mm i.d guard requires the purchase of 567499-U)

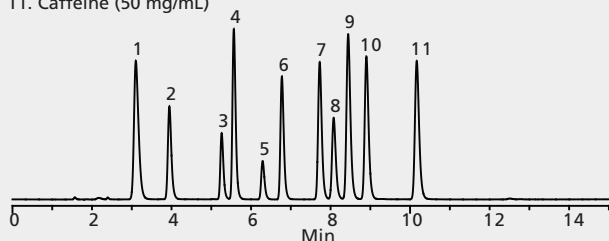
Ascentis® RP-Amide

Ascentis RP-Amide Application

Caffeine is metabolized in the body primarily by cytochrome P450 to form various metabolites and analogs. The baseline resolution of all 11 analytes demonstrates the usefulness of the Ascentis RP-Amide for small polar molecule applications.

1. Uric acid (50 mg/mL)
2. Xanthine (30 mg/mL)
3. 7-methylxanthine (20 mg/mL)
4. 1-methyluric acid (40 mg/mL)
5. 1-methylxanthine (20 mg/mL)
6. Theobromine (30 mg/mL)
7. 1,7-dimethyluric acid (40 mg/mL)
8. 1,7-dimethylxanthine (50 mg/mL)
9. Theophylline (50 mg/mL)
10. beta-(hydroxyethyl) theophylline (50 mg/mL)
11. Caffeine (50 mg/mL)

Gradient Program		
Time (min)	%A	%B
0	98	2
3	92	8
12	80	20
14	80	20
14.1	98	2
15	98	2



Ascentis® RP-Amide HPLC Column

The Ascentis family of columns is the fourth generation of HPLC column technology from Supelco scientists. Ascentis columns are bonded on high purity, 100 Angstrom silica including 3, 5, and 10 micron particle size. Columns are designed for small molecule applications and are scalable from micro columns (1.0 mm I.D.) to preparative dimensions (50 mm I.D.). The family includes C18, C8, Phenyl, Si and embedded polar group phase, RP-Amide.

Ascentis RP-Amide is a new generation ultra low bleed, embedded polar group (EPG) phase that provides orthogonal selectivity and increased resolution for HPLC and LC-MS analysis of polar compounds. The Ascentis RP-Amide is the first choice in embedded polar group HPLC phases.

Features and Benefits

- Excellent retention and peak shape for polar compounds
- 100% aqueous compatibility
- Ultra low bleed, LC-MS compatible
- Unique selectivity

suitable for L60 per USP

loading	19.5% Carbon
matrix	silica gel high purity, spherical
matrix active group	amido embedded reversed-phase
surface coverage	2.7 µmol/m ²
metals	<5 ppm
surface area	450 m ² /g
endcapped	Yes
pore size	100 Å
operating pH range	2 - 8
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
1.0	5	565309-U	1 ea
1.0	10	565389-U	1 ea
1.0	15	65566-U	1 ea
2.1	2	565313-U	1 ea
2.1	3	565314-U	1 ea
2.1	5	565300-U	1 ea
2.1	10	565301-U	1 ea
2.1	15	565302-U	1 ea
3.0	2	565315-U	1 ea
3.0	3	565310-U	1 ea
3.0	5	565311-U	1 ea
3.0	10	565312-U	1 ea
4.6	2	565316-U	1 ea
4.6	3	565317-U	1 ea
4.6	5	565320-U	1 ea
4.6	10	565321-U	1 ea
4.6	15	565322-U	1 ea
particle size 5 µm			
2.1	2	565391-U	1 ea
2.1	3	565331-U	1 ea
2.1	5	565303-U	1 ea
2.1	10	565304-U	1 ea
2.1	15	565305-U	1 ea
2.1	25	565306-U	1 ea
3.0	2	565332-U	1 ea
3.0	3	565392-U	1 ea
3.0	5	565333-U	1 ea
3.0	15	565338-U	1 ea
4.0	25	565327-U	1 ea
4.6	2	565335-U	1 ea
4.6	3	565336-U	1 ea
4.6	5	565323-U	1 ea
4.6	10	565328-U	1 ea

HPLC for Small Molecules

Ascentis®: Ascentis® RP-Amide

Ascentis® RP-Amide HPLC Column (continued)

I.D. (mm)	L (cm)	Cat. No.	Qty
4.6	15	565324-U	1 ea
4.6	25	565325-U	1 ea
10.0	5	565340-U	1 ea
10.0	10	565341-U	1 ea
10.0	15	565343-U	1 ea
10.0	25	565344-U	1 ea
21.2	5	565345-U	1 ea
21.2	10	565346-U	1 ea
21.2	15	565347-U	1 ea
21.2	25	565348-U	1 ea
particle size 10 µm			
4.6	15	565352-U	1 ea
4.6	25	565353-U	1 ea
10.0	5	565354-U	1 ea
10.0	10	565355-U	1 ea
10.0	15	565356-U	1 ea
10.0	25	565357-U	1 ea
21.2	5	565358-U	1 ea
21.2	10	565359-U	1 ea
21.2	15	565360-U	1 ea
21.2	25	565361-U	1 ea

Ascentis RP-Amide Validation Pack

An Ascentis RP-Amide Validation Pack makes it easy to demonstrate method reproducibility on 3 different lots. The validation pack contains a kit with 3 columns - 1 from each of 3 lots of bonded phase. And with Ascentis RP-Amide columns, you can be assured that all three columns will meet your expectations.

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	15	565394-U	3 ea
4.6	25	565395-U	3 ea

Ascentis® RP-Amide Supelguard™ Guard Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	565372-U	2 ea
2.1	2	565373-U	1 kit
3.0	2	565374-U	2 ea
3.0	2	565375-U	1 kit
4.0	2	565370-U	2 ea
4.0	2	565371-U	1 kit
10.0	1	565376-U	1 ea

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules. (10mm i.d guard requires the purchase of 567499-U)

Ascentis® ES Cyano

NEW PRODUCTS

Ascentis® ES-Cyano HPLC Column

Extra stable for low pH mobile phases due to sterically protected phase.

Useful for selectivity in the reversed-phase mode, including π π and dipole-dipole interacting compounds. Can also be used HILIC mode and normal phase chromatography.

Features and Benefits

- Enhanced stability at low pH
- Operates in reversed-phase, HILIC, and normal phase modes of chromatography
- Low MS bleed
- 100% aqueous compatible
- Available as 3 µm and 5 µm particles
- Particle composition: Type B silica gel
- Particle shape: Spherical

suitable for L10 per USP

loading	10% Carbon
matrix	silica gel high purity, spherical
phase	diisopropyl cyano propyl
surface coverage	2.5 µmol/m ²
metals	<5 ppm
surface area	450 m ² /g
endcapped	Yes
pore size	100 Å
operating pH	1 - 8
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	5	577308-U	1 ea
2.1	10	577309-U	1 ea
2.1	15	577310-U	1 ea
4.6	5	577311-U	1 ea
4.6	10	577312-U	1 ea
particle size 5 µm			
2.1	5	577300-U	1 ea
2.1	10	577301-U	1 ea
2.1	15	577303-U	1 ea
4.6	5	577304-U	1 ea
4.6	10	577305-U	1 ea
4.6	15	577306-U	1 ea
4.6	25	577307-U	1 ea

Ascentis® C8

Ascentis® C8 HPLC Column

The Ascentis family of columns is the fourth generation of HPLC column technology from Supelco scientists. Ascentis columns are bonded on high purity, 100 Angstrom silica including 3, 5, and 10 micron particle size. Columns are designed for small molecule applications and are scalable from micro columns (1.0 mm I.D.) to preparative dimensions (50 mm I.D.). The family includes C18, C8, Phenyl, Si and embedded polar group phase, RP-Amide.

The Ascentis C8 is a highly reproducible column with excellent selectivity towards polar compounds. The phase excels in highly aqueous mobile phases as well as high organic mobile phases.

HPLC for Small Molecules

Ascentis®: Ascentis® C8

Features and Benefits

- Superior retention for hydrophobic molecules
- Excellent peak shape
- Low bleed LC-MS separations

suitable for L7 per USP

loading	15% Carbon
matrix	silica gel high purity, spherical
phase	octylsilane
surface coverage	4.0 µmol/m ²
metals	<5 ppm
surface area	450 m ² /g
endcapped	Yes
pore size	100 Å
operating pH range	2 - 8
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
1.0	5	581412-U	1 ea
1.0	10	581435-U	1 ea
1.0	15	581436-U	1 ea
2.1	2	581413-U	1 ea
2.1	3	581414-U	1 ea
2.1	10	581401-U	1 ea
2.1	5	581400-U	1 ea
2.1	15	581402-U	1 ea
3.0	2	581415-U	1 ea
3.0	3	581403-U	1 ea
3.0	5	581404-U	1 ea
3.0	10	581405-U	1 ea
4.6	2	581416-U	1 ea
4.6	3	581417-U	1 ea
4.6	5	581406-U	1 ea
4.6	10	581407-U	1 ea
4.6	15	581408-U	1 ea
particle size 5 µm			
2.1	2	581439-U	1 ea
2.1	3	581430-U	1 ea
2.1	5	581420-U	1 ea
2.1	10	581419-U	1 ea
2.1	15	581421-U	1 ea
2.1	25	581422-U	1 ea
3.0	2	581431-U	1 ea
3.0	3	581440-U	1 ea
3.0	5	581432-U	1 ea
4.6	2	581433-U	1 ea
4.6	3	581434-U	1 ea
4.6	5	581423-U	1 ea
4.6	15	581424-U	1 ea
4.6	25	581425-U	1 ea
10	25	581441-U	1 ea
21.2	25	581442-U	1 ea
particle size 10 µm			
4.6	25	581444-U	1 ea
10.0	25	581445-U	1 ea

Ascentis® C8 Supelguard™ Guard Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.0	2	581426-U	2 ea
4.0	2	581427-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Ascentis® Phenyl

Ascentis® Phenyl HPLC Column

The Ascentis family of columns is the fourth generation of HPLC column technology from Supelco scientists. Ascentis columns are bonded on high purity, 100 Angstrom silica including 3, 5, and 10 micron particle size. Columns are designed for small molecule applications and are scalable from micro columns (1.0 mm I.D.) to preparative dimensions (50 mm I.D.). The family includes C18, C8, Phenyl, Si and embedded polar group phase, RP-Amide.

The Ascentis Phenyl provides superior separations in reversed-phase mode including 100% aqueous conditions. It may also be used in HILIC/ANP (aqueous normal phase) mode and shows low UV/MS bleed for gradient applications.

Features and Benefits

- 100% Aqueous Compatible
- ANP/HILIC and reversed-phase
- Low UV/MS bleed for gradient applications
- Alternate selectivity

suitable for L11 per USP

loading	19% Carbon
matrix	silica gel high purity, spherical
phase	butyl phenyl
surface coverage	5.2 µmol/m ²
metals	<5 ppm
surface area	450 m ² /g
endcapped	Yes
pore size	100 Å
operating pH range	2 - 8
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
1.0	10	581600-U	1 ea
1.0	15	581601-U	1 ea
2.1	3	581602-U	1 ea
2.1	5	581603-U	1 ea
2.1	10	581604-U	1 ea
2.1	15	581605-U	1 ea
3.0	3	581606-U	1 ea
3.0	10	581607-U	1 ea
4.6	5	581608-U	1 ea
4.6	10	581609-U	1 ea
4.6	15	581610-U	1 ea
particle size 5 µm			
2.1	5	581611-U	1 ea
2.1	10	581612-U	1 ea
2.1	15	581613-U	1 ea
2.1	25	581614-U	1 ea
4.6	5	581615-U	1 ea
4.6	15	581616-U	1 ea
4.6	25	581617-U	1 ea
10	25	581618-U	1 ea
21.2	25	581619-U	1 ea

Ascentis Phenyl Validation Pack

An Ascentis Phenyl Validation Pack makes it easy to demonstrate method reproducibility on 3 different lots. The validation pack contains a kit with 3 columns - 1 from each of 3 lots of bonded phase. And with Ascentis Phenyl columns, you can be assured that all three columns will meet your expectations.

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	15	581695-U	3 ea
4.6	25	581696-U	3 ea

HPLC for Small Molecules

Ascentis®: *Ascentis® Phenyl*

Ascentis® Phenyl Supelguard™ Guard Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.0	2	581620-U	2 ea
4.0	2	581621-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Ascentis® Si

Ascentis® Si HPLC Column

The Ascentis family of columns is the fourth generation of HPLC column technology from Supelco scientists. Ascentis columns are bonded on high purity, 100 Angstrom silica including 3, 5, and 10 micron particle size. Columns are designed for small molecule applications and are scalable from micro columns (1.0 mm I.D.) to preparative dimensions (50 mm I.D.). The family includes C18, C8, Phenyl, Si and embedded polar group phase, RP-Amide.

The Ascentis Si is a high loading capacity silica with excellent peak shape. The Ascentis Si performs in both normal-phase and HILIC/ANP (aqueous normal phase) mode.

suitable for L3 per USP

matrix	silica gel high purity, spherical
metals	<5 ppm
surface area	450 m ² /g
endcapped	No
pore size	100 Å
operating pH range	2 - 6
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
1.0	10	581520-U	1 ea
1.0	15	581521-U	1 ea
2.1	3	581522-U	1 ea
2.1	5	581500-U	1 ea
2.1	10	581501-U	1 ea
2.1	15	581502-U	1 ea
3.0	3	581523-U	1 ea
3.0	10	581503-U	1 ea
4.6	5	581504-U	1 ea
4.6	10	581505-U	1 ea
4.6	15	581506-U	1 ea
particle size 5 µm			
2.1	5	581507-U	1 ea
2.1	10	581508-U	1 ea
2.1	15	581509-U	1 ea
2.1	25	581510-U	1 ea
4.6	5	581511-U	1 ea
4.6	15	581512-U	1 ea
4.6	25	581513-U	1 ea
10.0	25	581514-U	1 ea
21.2	25	581515-U	1 ea
particle size 10 µm			
10.0	25	581516-U	1 ea
21.2	25	581517-U	1 ea
4.6	25	581524-U	1 ea
particle size 5 µm			
3.0	5	581525-U	1 ea
3.0	10	581526-U	1 ea
3.0	25	581527-U	1 ea

Ascentis Si Validation Pack

An Ascentis Silica Validation Pack makes it easy to demonstrate method reproducibility on 3 different lots. The validation pack contains a kit with 3 columns - 1 from each of 3 lots of bonded phase. And with Ascentis Silica columns, you can be assured that all three columns will meet your expectations.

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	15	581595-U	3 ea
4.6	25	581596-U	3 ea

Ascentis® Si Supelguard™ Guard Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.0	2	581518-U	2 ea
4.0	2	581519-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Ascentis® HPLC Validation Packs

Do you need to validate a method? Do you need to demonstrate method reproducibility on 3 different lots of an HPLC column? An Ascentis HPLC Column Validation Pack makes it easy! Choose the chemistry you want, and we will send you a kit with 3 columns - 1 from each of 3 lots of bonded phase. What could be simpler? And with Ascentis columns, you can be assured that all three columns will meet your expectations.

Ascentis validation packs are available for the C18, RP-Amide, Phenyl and Si phases.

apHera™ - For Higher pH Applications

apHera™ C18 HPLC Column

apHera™ reversed columns were developed specifically to provide the superior advantages of both silica and polystyrene columns, without the disadvantages of either. This was accomplished using a vinyl alcohol copolymer base that keeps the surface wetted even with high carbon loads. The porous structure has an average pore diameter large enough to produce ideal results for small analytes, peptides and small proteins. These columns equal silica based columns in separation efficiency with organic solvents but provide efficiency with buffered alkaline solutions not possible on silica. One of the most significant features is logical elution order of alkylated bases where retention increases proportionately with increasing chain length.

Features of apHera™ Reversed Phase Columns

- Stable vinyl copolymer base
- Stable pH range 2-12
- 300 angstrom pore size
- Stable in all organic solvents
- Expanded applications: peptides, proteins
- Efficient separation of any basic substance
- Amenability to washing and alkaline solutions

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.0	15	56100AST	1 ea
4.6	5	56101AST	1 ea
4.6	15	56102AST	1 ea
4.6	25	56103AST	1 ea
6.0	15	56105AST	1 ea
6.0	25	56106AST	1 ea
10.0	25	56108AST	1 ea

HPLC for Small Molecules

apHera™ - For Higher pH Applications

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 9 µm			
20	30	56112AST	1 ea
particle size 13 µm			
28.0	30	56116AST	1 ea

apHera™ C18 HPLC Guard Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.0	1	56129AST	1 ea
4.6	1	56130AST	1 ea
6.0	1	56131AST	1 ea
particle size 13 µm			
7.5	5	56133AST	1 ea
20	10	56135AST	1 ea

apHera™ C4 HPLC Column

apHera™ reversed columns were developed specifically to provide the superior advantages of both silica and polystyrene columns, without the disadvantages of either. This was accomplished using a vinyl alcohol copolymer base that keeps the surface wetted even with high carbon loads. The porous structure has an average pore diameter large enough to produce ideal results for small analytes, peptides and small proteins. These columns equal silica based columns in separation efficiency with organic solvents but provide efficiency with buffered alkaline solutions not possible on silica. One of the most significant features is logical elution order of alkylated bases where retention increases proportionately with increasing chain length.

Features of apHera™ Reversed Phase Columns

- Stable vinyl copolymer base
- Stable pH range 2-12
- 300 angstrom pore size
- Stable in all organic solvents
- Expanded applications: peptides, proteins
- Efficient separation of any basic substance
- Amenability to washing and alkaline solutions

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	15	56302AST	1 ea
4.6	25	56303AST	1 ea
10.0	25	56308AST	1 ea

apHera™ C4 HPLC Guard Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	1	56330AST	1 ea
7.5	5	56332AST	1 ea

apHera™ C8 HPLC Column

apHera™ reversed columns were developed specifically to provide the superior advantages of both silica and polystyrene columns, without the disadvantages of either. This was accomplished using a vinyl alcohol copolymer base that keeps the surface wetted even with high carbon loads. The porous structure has an average pore diameter large enough to produce ideal results for small analytes, peptides and small proteins. These columns equal silica based columns in separation efficiency with organic solvents but provide efficiency with buffered alkaline solutions not possible on silica. One of the most significant features is logical elution order of alkylated bases where retention increases proportionately with increasing chain length.

Features of apHera™ Reversed Phase Columns

- Stable vinyl copolymer base
- Stable pH range 2-12
- 300 angstrom pore size
- Stable in all organic solvents
- Expanded applications: peptides, proteins
- Efficient separation of any basic substance
- Amenability to washing and alkaline solutions

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	15	56202AST	1 ea
4.6	25	56203AST	1 ea
10.0	25	56208AST	1 ea

apHera™ C8 HPLC Guard Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	1	56230AST	1 ea
7.5	5	56232AST	1 ea

apHera™ NH₂ HPLC Column

apHera™ amino columns are based on covalently bonded polyamine specifically optimized for the separation of mono- and oligosaccharides. The elution order mono-, di-, tri-saccharide shows increased elution volume with increased acetonitrile concentration and complete stability for both acidic and alkaline eluents. The small, robust PVA copolymer bead provides mechanical and chemical strength as well as high column efficiency. Conventional cation columns based on silica do not show long column life, perhaps due to hydrolysis of silica particle by the basic amino group. Since Supelco uses a strong alkaline compatible polymer, these problems are eliminated. Stable retention time and long column life are also characteristic of the column.

Features of Amino apHera™ Columns

- High efficiency for carbohydrate analysis
- Ideal for basic conditions/amphoteric detection
- High selectivity mono- to oligosaccharides
- pH range 2-13
- 300 angstrom pore size
- Stable, predictable retention
- Long column life

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.0	15	56400AST	1 ea
4.6	15	56401AST	1 ea
4.6	25	56403AST	1 ea
10.0	25	56408AST	1 ea
particle size 9 µm			
20	30	56412AST	1 ea
particle size 13 µm			
28.0	30	56416AST	1 ea

apHera™ NH₂ HPLC Guard Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.0	1	56429AST	1 ea
4.6	1	56430AST	1 ea
6.0	1	56431AST	1 ea
particle size 13 µm			
7.5	5	56433AST	1 ea

HPLC for Small Molecules

Hamilton Company HPLC Columns

Hamilton Company HPLC Columns

NEW PRODUCTS



Hamilton PRP-X100 HPLC Column

The Hamilton PRP-X100, polymeric HPLC columns used for the separation of anions in ion chromatography. suitable for L47 per USP

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
4.6	15	82017-U	1 ea
4.6	25	82023-U	1 ea
particle size 10 μm			
4.1	10	82026-U	1 ea
4.1	15	82014-U	1 ea
4.1	25	82011-U	1 ea
4.6	15	82028-U	1 ea
4.6	25	82020-U	1 ea

Hamilton PRP-1 HPLC Column

The Hamilton PRP-1, polymeric reversed phase columns are ideal for high pH (pH 8 - 13) operation or with analytes that give poor chromatography on silica-based columns. suitable for L21 per USP

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
4.1	15	82013-U	1 ea
4.1	25	82021-U	1 ea
4.6	15	82030-U	1 ea
4.6	25	82025-U	1 ea
particle size 7 μm			
4.1	25	82016-U	1 ea
4.6	25	82024-U	1 ea
particle size 10 μm			
4.1	15	82018-U	1 ea
4.1	25	82012-U	1 ea

Hamilton PRP-X300 HPLC Column

The Hamilton PRP-X300, polymeric reversed phase columns are used in the separation of alcohols and organic acids. suitable for L17 per USP

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 7 μm			
4.1	25	82015-U	1 ea

Hamilton PRP-X200 HPLC Column

The Hamilton PRP-X200, polymeric reversed phase columns are used in the separation of inorganic and organic, mono or divalent cations suitable for L17 per USP

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 10 μm			
4.1	15	82019-U	1 ea
4.1	25	82027-U	1 ea

Hamilton HC-75 HPLC Column

Hamilton HC-75 columns are used for the separation of mono and disaccharides, organic acids, sugars, and sugar alcohols. suitable for L19 per USP

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 9 μm			
4.1	25	82031-U	1 ea
7.8	30	82022-U	1 ea

Hamilton Company HPLC Guard Cartridge

NEW PRODUCTS

Hamilton PRP-X100 HPLC Guard Cartridge

matrix PRP-X100

Hardware	Particle Size (μm)	L x I.D.	Cat. No.	Qty
stainless steel	10	2 cm x 2.0 mm	82032-U	1 kit
PEEK	10	2 cm x 2.0 mm	82035-U	1 kit
stainless steel	10	2 cm x 2.0 mm	82039-U	5 ea
PEEK	10	2 cm x 2.0 mm	82042-U	5 ea

Hamilton PRP-1 HPLC Guard Cartridge

matrix PRP-1

Hardware	Particle Size (μm)	L x I.D.	Cat. No.	Qty
stainless steel	10	2 cm x 2.0 mm	82033-U	1 kit
PEEK	10	2 cm x 2.0 mm	82038-U	1 kit
stainless steel	10	2 cm x 2.0 mm	82040-U	5 ea
PEEK	10	2 cm x 2.0 mm	82045-U	5 ea

Hamilton PRP-X300 HPLC Guard Cartridge

matrix PRP-X300

Hardware	Particle Size (μm)	L x I.D.	Cat. No.	Qty
stainless steel	12	2 cm x 2.0 mm	82034-U	1 kit
stainless steel	12	2 cm x 2.0 mm	82041-U	5 ea

HPLC for Small Molecules

Hamilton Company HPLC Guard Cartridge

Hamilton PRP-X200 HPLC Guard Cartridge

matrix PRP-X200

Hardware	Particle Size (μm)	L x I.D.	Cat. No.	Qty
stainless steel	10	2 cm x 2.0 mm	82036-U	1 kit
stainless steel	10	2 cm x 2.0 mm	82043-U	5 ea

Hamilton Hydrogen Form HPLC Guard Cartridge

matrix Hydrogen Form

Hardware	Particle Size (μm)	L x I.D.	Cat. No.	Qty
stainless steel	12	2 cm x 2.0 mm	82037-U	1 kit
stainless steel	12	2 cm x 2.0 mm	82044-U	5 ea

Discovery®

The Discovery® Suite of Reversed-Phase HPLC Columns

Discovery® is a suite of HPLC columns featuring functionalized reversed-phases designed to provide differentiated separations vs. C18 based on unique combinations of polar and hydrophobic retention mechanisms.

The Discovery® suite of reversed-phases enables you to optimize your separation with respect to:

- Retention
- Resolution
- Selectivity
- Analysis Time

all while minimizing method development time.

Discovery® HS F5 exhibits unique retention

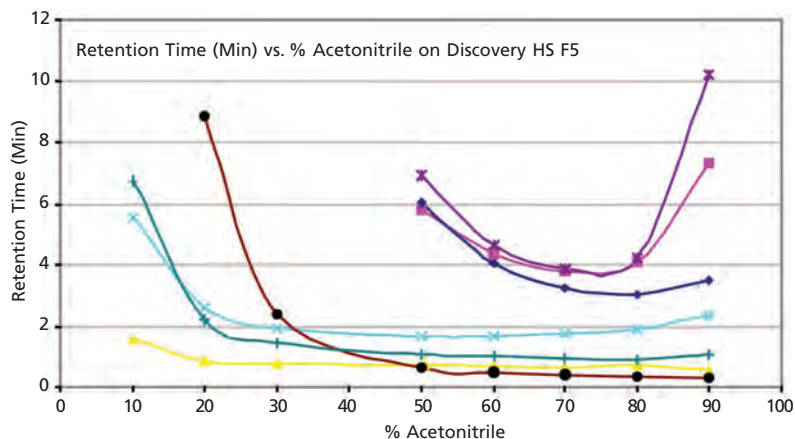


Discovery® HS F5 Exhibits "U-Shape" Retention Profile

Under certain mobile phase conditions and with certain analytes, certain polar phases, like Discovery® HS F5, can exhibit both reversed-phase and normal-phase behavior. At low percent organic, retention decreases with increasing percent organic following reversed-phase behavior. However, at higher percent organic, retention increases with increasing percent organic following normal-phase behavior. The result is a "U-shape" retention profile for these compounds. If your compounds exhibit this U-shape profile, use it to your advantage to:

- Improve LC-MS detection by using higher % organic mobile phase
- Use mobile phase concentration to alter selectivity at high % organic

U-Shape Retention Profile on Discovery HS F5



Column: Discovery HS F5, 5 cm x 4.6 mm ID,
3 μm particles (567504-U)
Mobile Phase: 10 mM ammonium acetate (pH 6.8) with
varying percentages of 100% CH_3CN
Flow Rate: 1 mL/min
Temp.: 35 °C

- Amitriptyline
- ▲— Cimetidine
- ×— Clonidine
- *— Fluoxetine
- Nifedipine
- +— Trimethoprim
- ◆— Verapamil

HPLC for Small Molecules

Discovery®: Discovery® HS F5

Discovery® HS F5

Discovery® HS F5 HPLC Column

The Discovery® HS F5 bonded phase provides reversed-phase separations that are distinctly different from C18 columns. However, compounds will generally elute within the same retention time window, making most C18 methods easily transferable.

Guidelines for transferring a C18 method to Discovery® HS F5:

Generally, bases are retained longer on the HS F5 than on a C18. Increasing the organic content of a C18 separation 5 to 10 percent will generally provide similar retention on an HS F5. Results with other compounds are highly variable. However, it is generally true that solutes with log $P_{o/w}$ values less than 2.5 will be retained longer on HS F5 compared to a C18. The degree of difference is highly solute dependent.

Features and Benefits

- Unique selectivity
- Similar retention to C18 (sometimes requires stronger mobile phase)
- Excellent peak shape
- Stable, low-bleed LC-MS separations
- Scalable separations from 3 to 10µm particle sizes

suitable for L43 per USP

loading	12% Carbon
particle platform	silica gel, high purity, spherical
phase	pentafluorophenylpropyl
surface coverage	4 µmol/m ²
metals	<10 ppm
surface area	300 m ² /g
endcapped	Yes
pore size	120 Å
operating pH range	2 - 8
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	3.3	567501-U	1 ea
2.1	5	567500-U	1 ea
2.1	10	567502-U	1 ea
2.1	15	567503-U	1 ea
3.0	3.3	567505-U	1 ea
3.0	10	567581-U	1 ea
3.0	15	567542-U	1 ea
4	5	567530-U	1 ea
4	10	567531-U	1 ea
4	15	567532-U	1 ea
4.6	3.3	567509-U	1 ea
4.6	5	567504-U	1 ea
4.6	10	567506-U	1 ea
4.6	15	567507-U	1 ea
particle size 5 µm			
2.1	5	567508-U	1 ea
2.1	10	567510-U	1 ea
2.1	15	567511-U	1 ea
2.1	25	567512-U	1 ea
3.0	15	567541-U	1 ea
4	5	567533-U	1 ea
4	10	567534-U	1 ea
4	15	567535-U	1 ea
4	25	567536-U	1 ea
4.6	5	567513-U	1 ea
4.6	10	567515-U	1 ea
4.6	15	567516-U	1 ea
4.6	25	567517-U	1 ea
10	5	567518-U	1 ea
10	10	567537-U	1 ea
10	15	567519-U	1 ea
10	25	567520-U	1 ea

I.D. (mm)	L (cm)	Cat. No.	Qty
21.2	15	567522-U	1 ea
21.2	25	567523-U	1 ea
particle size 10 µm			
21.2	15	567528-U	1 ea
21.2	25	567529-U	1 ea

Discovery® HS F5 Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	2	567570-U	2 ea
2.1	2	567571-U	1 kit
4.0	2	567572-U	2 ea
4.0	2	567573-U	1 kit
particle size 5 µm			
2.1	2	567574-U	2 ea
2.1	2	567575-U	1 kit
4.0	2	567576-U	2 ea
4.0	2	567577-U	1 kit
10	1	567578-U	1 ea

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Discovery® HS C18

Discovery® HS C18 HPLC Column

Features and Benefits

- Stable, low bleed for LC-MS applications
- Scalable from analytical to preparatory
- Highly stable to ensure excellent run-to-run and lot-to-lot reproducibility
- Higher hydrophobicity for better resolution of difficult analytes

suitable for L1 per USP

loading	20% Carbon
particle platform	silica gel, high purity, spherical
phase	octadecyl
surface coverage	3.2 µmol/m ²
metals	<10 ppm
surface area	300 m ² /g
endcapped	Yes
pore size	120 Å
operating pH range	2 - 8
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	5	569253-U	1 ea
2.1	7.5	569254-U	1 ea
2.1	15	569255-U	1 ea
4.6	5	569250-U	1 ea
4.6	7.5	569251-U	1 ea
4.6	15	569252-U	1 ea
particle size 5 µm			
2.1	5	568500-U	1 ea
2.1	10	568501-U	1 ea
2.1	15	568502-U	1 ea
2.1	25	568503-U	1 ea
4	5	568510-U	1 ea
4	15	568512-U	1 ea
4	25	568513-U	1 ea
4.6	5	568520-U	1 ea
4.6	10	568521-U	1 ea
4.6	15	568522-U	1 ea
4.6	25	568523-U	1 ea
10	5	568530-U	1 ea
10	10	568531-U	1 ea

HPLC for Small Molecules

Discovery®: Discovery® HS C18

I.D. (mm)	L (cm)	Cat. No.	Qty
10	15	568532-U	1 ea
10	25	568533-U	1 ea
21.2	5	568540-U	1 ea
21.2	10	568541-U	1 ea
21.2	15	568542-U	1 ea
21.2	25	568543-U	1 ea
particle size 10 µm			
10	10	568631-U	1 ea
10	15	568632-U	1 ea
10	25	568633-U	1 ea
21.2	25	568643-U	1 ea
50	25	577521-U	1 ea

Discovery® HS C18 Supelguard™ Guard Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	2	569276-U	2 ea
2.1	2	569277-U	1 kit
4.0	2	569274-U	2 ea
4.0	2	569275-U	1 kit
particle size 5 µm			
2.1	2	568570-U	2 ea
2.1	2	568571-U	1 kit
4.0	2	568572-U	2 ea
4.0	2	568573-U	1 kit
10	1	568574-U	1 ea
particle size 10 µm			
10	1	568674-U	1 ea

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Discovery® C18

Discovery® C18 HPLC Column

Use Discovery® C18 for any method that specifies a C18. The exceptional peak shape, reproducibility, and stability make it the column of choice for all C18 methods from demanding to routine.

Features and Benefits

- Excellent reproducibility
- Exceptional peak shape for basic and acidic analytes
- Stable, low-bleed LC-MS separations
- Separation of peptides and small proteins
- Lower hydrophobicity than many comparable C18 columns, providing faster analysis

suitable for L1 per USP

loading	12% Carbon
particle platform	silica gel, high purity, spherical
phase	octadecyl
surface coverage	3 µmol/m ²
metals	<10 ppm
surface area	200 m ² /g
endcapped	Yes
pore size	180 Å
operating pH range	2 - 8
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	577507-U	1 ea
2.1	3	577508-U	1 ea
2.1	5	50494721	1 ea
2.1	10	569220-U	1 ea
2.1	12.5	569229-U	1 ea
2.1	15	50495521	1 ea

I.D. (mm)	L (cm)	Cat. No.	Qty
3.0	2	577509-U	1 ea
3.0	3	577510-U	1 ea
3.0	5	504947-30	1 ea
3.0	10	569221-U	1 ea
3.0	12.5	569230-U	1 ea
3.0	15	504955-30	1 ea
3.0	25	504971-30	1 ea
4.0	5	504947-40	1 ea
4.0	10	569222-U	1 ea
4.0	12.5	569231-U	1 ea
4.0	15	504955-40	1 ea
4.0	25	504971-40	1 ea
4.6	5	504947	1 ea
4.6	10	569223-U	1 ea
4.6	12.5	569232-U	1 ea
4.6	15	504955	1 ea
4.6	25	504971	1 ea
10	25	569224-U	1 ea
21.2	25	569226-U	1 ea
2.1	25	569234-U	1 ea

Discovery® C18 Supelguard™ Guard Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	505188	2 ea
2.1	2	505161	1 kit
3.0	2	59576-U	2 ea
3.0	2	59575-U	1 kit
4.0	2	505137	2 ea
4.0	2	505129	1 kit
10	1	569283-U	1 ea

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Discovery® C18 Validation Pack

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	5	55700-U21	3 ea
4.6	5	55700-U	3 ea
4.6	25	55704-U	3 ea

Pack includes 3 columns, each from a different lot of bonded phase.

Discovery® C8

Discovery® C8 HPLC Column

Features and Benefits

- Excellent reproducibility
- Faster separation of strongly hydrophobic analytes than C18 columns
- Stable, low-bleed LC-MS separations
- Exceptional peak shapes for basic and acidic compounds
- Compatible with low organic/highly aqueous mobile phases

suitable for L7 per USP

loading	7.5% Carbon
base material	silica gel, high purity, spherical
phase	octyl
surface coverage	3.4 µmol/m ²
metals	<10 ppm
surface area	200 m ² /g
endcapped	Yes
pore size	180 Å
operating pH range	2 - 8
temp. range	≤70 °C

HPLC for Small Molecules

Discovery®: *Discovery® C8*

Discovery® C8 HPLC Column (continued)

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	577501-U	1 ea
2.1	3	577502-U	1 ea
2.1	5	59352-U21	1 ea
2.1	10	569420-U	1 ea
2.1	12.5	569424-U	1 ea
2.1	15	59353-U21	1 ea
3.0	2	577503-U	1 ea
3.0	5	59352-U30	1 ea
3.0	10	569421-U	1 ea
3.0	15	59353-U30	1 ea
3.0	25	59354-U30	1 ea
4.0	10	569422-U	1 ea
4.0	12.5	569426-U	1 ea
4.0	15	59353-U40	1 ea
4.0	25	59354-U40	1 ea
4.6	5	59352-U	1 ea
4.6	10	569423-U	1 ea
4.6	12.5	569427-U	1 ea
4.6	15	59353-U	1 ea
4.6	25	59354-U	1 ea

Discovery® C8 Supelguard™ Guard Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	59588-U	2 ea
2.1	2	59587-U	1 kit
3.0	2	59580-U	2 ea
3.0	2	59579-U	1 kit
4.0	2	59590-U	2 ea
4.0	2	59589-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Discovery® Cyano

Discovery® Cyano HPLC Column

Features and Benefits

- Low hydrophobicity for rapid elution of hydrophobic analytes
- Excellent peak shape and retention of strongly basic analytes
- Retention of polar analytes
- Unique selectivity
- Significantly less retention than C18 (typically requires lower % organic mobile phase)
- Stable, low-bleed LC-MS separations
- Compatible with highly aqueous organic phases

suitable for L10 per USP

loading	4.5% Carbon
base material	silica gel, high purity, spherical
phase	cyanopropyl
surface coverage	3.5 µmol/m ²
metals	<10 ppm
surface area	200 m ² /g
endcapped	Yes
pore size	180 Å
operating pH range	2 - 8
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	577513-U	1 ea
2.1	5	59355-U21	1 ea
2.1	10	569521-U	1 ea
2.1	15	59356-U21	1 ea
3.0	2	577515-U	1 ea
3.0	10	569522-U	1 ea
3.0	15	59356-U30	1 ea
3.0	25	59357-U30	1 ea
4.0	12.5	569526-U	1 ea
4.0	15	59356-U40	1 ea
4.0	25	59357-U40	1 ea
4.6	2	577517-U	1 ea
4.6	3	577518-U	1 ea
4.6	5	59355-U	1 ea
4.6	10	569520-U	1 ea
4.6	15	59356-U	1 ea
4.6	25	59357-U	1 ea

Discovery® Cyano Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	59584-U	2 ea
2.1	2	59583-U	1 kit
3.0	2	569571-U	2 ea
3.0	2	569570-U	1 kit
4.0	2	59586-U	2 ea
4.0	2	59585-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Pack includes 3 columns, each from a different lot of bonded phase.

Discovery® RP-AmideC16

Discovery® RP-AmideC16 HPLC Column

Features and Benefits

- Excellent retention and resolution of polar compounds
- Unique selectivity compared to C18
- Excellent peak shape and efficiency
- Less hydrophobic than C18 columns
- Compatible with 100% aqueous mobile phases

loading	11% Carbon
base material	silica gel, high purity, spherical
phase	palmitamidopropyl
surface coverage	2.6 µmol/m ²
metals	<10 ppm
surface area	200 m ² /g
endcapped	Yes
pore size	180 Å
operating pH range	2 - 8
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	5	50500521	1 ea
2.1	10	569320-U	1 ea
2.1	15	50501321	
3.0	5	505005-30	1 ea
3.0	10	569321-U	1 ea
3.0	12.5	569330-U	1 ea
3.0	15	505013-30	1 ea
3.0	25	505064-30	1 ea
4.0	12.5	569331-U	1 ea
4.0	15	505013-40	1 ea

HPLC for Small Molecules

Discovery®: Discovery® RP-AmideC16

I.D. (mm)	L (cm)	Cat. No.	Qty
4.0	25	505064-40	1 ea
4.6	5	505005	1 ea
4.6	10	569323-U	1 ea
4.6	12.5	569332-U	1 ea
4.6	15	50501321 505013	1 ea 1 ea
4.6	25	505064	1 ea
10.0	25	569324-U	1 ea
21.2	25	569326-U	1 ea

Discovery® RP-AmideC16 Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	505110	2 ea
2.1	2	505102	1 kit
3.0	2	59578-U	2 ea
3.0	2	59577-U	1 kit
4.0	2	505099	2 ea
4.0	2	505080	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Discovery® RP-Amide C16 Validation Pack

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	25	55709-U	3 ea

Pack includes 3 columns, each from a different lot of bonded phase.

Discovery® Selectivity Pack

You can conveniently order the four Discovery® column chemistries - RP-AmideC16, C18, C8, and Cyano - in your choice of column dimensions, in a single kit. Quickly evaluate mobile phases on all four columns to find the optimal combination of chemistries for your separation. The Discovery HPLC Column Selectivity Pack gives you a powerful tool for rapid, efficient, simple pharmaceutical method development.

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	15	55722-U21	1 kit

Discovery® Zirconia

Developing Methods on Discovery® Zr

Reversed-phase, zirconia-based particles expand your HPLC method development options by leveraging the unique selectivity and retention provided by pH and temperature extremes.

Discovery® Zr comprises four phase chemistries bonded to porous, spherical, 3 and 5 micron zirconia particles. Zirconia particles have exceptional pH and thermal stability compared to silica and alumina particles. Compared to polymer particles, zirconia does not shrink or swell with changes in temperature, ionic strength, or organic concentration, and has exceptional mechanical strength. The presence of controlled, predictable reversed-phase and ion-exchange retention modes combined with thermal and pH stability open up your method development options.

Discovery® Zr uses all the reversed-phase method development tools you use for developing methods on silica. However, Discovery® Zr gives you four new tools that silica does not allow:

- The full power of pH: to control the ionization state of acids and bases
- The power of temperature: to adjust selectivity and to decrease analysis time

- The power of ionic strength: to alter selectivity, efficiency, and retention
- The power of Lewis acid-base interactions: to give unique selectivity over silica for ionic compounds

The Members of the Discovery® Zr Family

Discovery® Zr-PBD: Polybutadiene-modified zirconia particles give separations most similar to C18-silica, but with benefits of high pH and temperature stability.

Discovery® Zr-PS: Polystyrene modified zirconia particles are ideal for separations of hydrophobic compounds and amines.

Discovery® Zr-CarbonC18: Octadecyl-modified carbon-clad zirconia for universal separations of acids, bases, and neutrals. Very different selectivity relative to C18-silica.

Discovery® Zr-Carbon: Carbon-clad zirconia for separations of geometric isomers and diastereomers.

Discovery Zirconia-based Phases

Specification	Discovery Zr-PS	Discovery Zr-PBD	Discovery Zr-Carbon	Discovery Zr-CarbonC18
USP Code:		L49		
Phase:	Cross-linked polystyrene	Cross-linked polybutadiene	Graphitic-like carbon	Octadecylphenyl modified carbon
Endcap:	No	No	No	No
Particle Platform:	Zirconia	Zirconia	Zirconia	Zirconia
Particle Shape:	Spherical	Spherical	Spherical	Spherical
Particle Sizes (µm):	3 & 5	3 & 5	3 & 5	3 & 5
Pore Size (Å):	300	300	300	300
Surface Area (m ² /g):	30	30	30	30
Packing Density (g/mL):	2.21	2.21	2.21	2.21
% C:	2	2	1	3
Coverage (µmoles/m ²):	n/a	n/a	n/a	2.8
pH Range:	1 to 13	1 to 13	1 to 14	1 to 14
Temperature Range:	≤100 °C ^(a)	≤100 °C ^(a)	≤100 °C ^(b)	≤100 °C ^(b)

^(a)special hardware for operation between 100 °C and 150 °C is available

^(b)special hardware for operation between 100 °C and 200 °C is available

Discovery® Zr-PBD HPLC Column

Discovery® Zr-PBD comprises spherical, porous zirconia particles with a durable coating of polybutadiene. It operates via a reverse-phase mechanism, but is less hydrophobic, so less organic solvent is required for elution. Discovery Zr-PBD complements the selectivity offering of the other zirconia and silica-based Discovery phases, and allows the use of a wide range of mobile phase pH from pH 1 to 13.

Features and Benefits

- General purpose zirconia phase
- Selectivity similar to C18-silica

suitable for L49 per USP

loading 2% Carbon
 particle platform zirconia, spherical, porous
 bonding phase cross-linked polybutadiene
 surface area 30 m²/g
 endcapped No
 no pore size 300 Å
 operating pH range 1 - 13
 temp. range ≤100 °C (up to 150 °C with special hardware)

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	5	65713-U	1 ea
2.1	7.5	65714-U	1 ea
2.1	15	65715-U	1 ea
4.6	5	65716-U	1 ea
4.6	15	65718-U	1 ea

HPLC for Small Molecules

Discovery® Zirconia: *The Members of the Discovery® Zr Family*

Discovery® Zr-PBD HPLC Column (continued)

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	5	65719-U	1 ea
2.1	15	65720-U	1 ea
4.6	5	65722-U	1 ea
4.6	15	65723-U	1 ea
4.6	25	65724-U	1 ea

Discovery® Zr-PBD Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	1	65812-U	2 ea
2.1	1	65811-U	1 kit
4.0	1	65814-U	2 ea
4.0	1	65813-U	1 kit
particle size 5 µm			
2.1	1	65816-U	2 ea
2.1	1	65815-U	1 kit
4.0	1	65818-U	2 ea
4.0	1	65817-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Discovery® Zr-CarbonC18 HPLC Column

Discovery® Zr-CarbonC18 comprises spherical, porous carbon-clad zirconia particles covalently modified with octadecyl (C18) groups. It complements the selectivity offering of the other zirconia- and silica-based Discovery phases, and allows the use of the full range of mobile phase pH from pH 1 to 14.

Features and Benefits

- Partitioning mechanism
- Shape selectivity
- Resistant to phase hydrolysis

loading 3% Carbon
 base material zirconia, spherical, porous
 bonding phase octadecylphenyl modified carbon
 surface area 30 m²/g
 endcapped No
 pore size 300 Å
 operating pH range 1 - 14
 temp. range ≤100 °C (up to 200 °C with special hardware)

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	5	65701-U	1 ea
2.1	7.5	65702-U	1 ea
2.1	15	65703-U	1 ea
4.6	7.5	65705-U	1 ea
4.6	15	65706-U	1 ea
particle size 5 µm			
2.1	5	65707-U	1 ea
4.6	5	65710-U	1 ea
4.6	15	65711-U	1 ea

Discovery® Zr-CarbonC18 Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	1	65801-U	1 kit
2.1	1	65802-U	2 ea
4.0	1	65803-U	1 kit

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	1	65806-U	2 ea
2.1	1	65805-U	1 kit
4.0	1	65807-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Discovery® Zr-Carbon HPLC Column

Discovery Zr-Carbon comprises spherical, porous carbon-coated zirconia particles. It is ideal for the reversed-phase separation of positional isomers and diastereomers. It complements the selectivity offering of the other zirconia- and silica-based Discovery phases, and allows the use of the full range of mobile phase pH from pH 1 to 14. It is a great alternative when C18 does not work.

Features and Benefits

- Excellent separation of geometric isomers and diastereomers.
- Very hydrophobic surface.
- Most different retention compared to other Discovery Zr phases for non-ionic compounds.
- Similar to porous graphitic carbon, but with added ion-exchange interactions.

Avoid fused-ring aromatics as they are too strongly retained by Discovery Zr-Carbon.

loading 1% Carbon
 particle platform zirconia, spherical, porous
 bonding phase graphitic-like carbon
 surface area 30 m²/g
 endcapped No
 pore size 300 Å
 operating pH range 1 - 14
 temp. range ≤100 °C (up to 150 °C with special hardware)

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	5	65725-U	1 ea
2.1	15	65727-U	1 ea
4.6	15	65730-U	1 ea
particle size 5 µm			
2.1	5	65731-U	1 ea
2.1	15	65732-U	1 ea
4.6	15	65735-U	1 ea

Discovery® Zr-Carbon Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	1	65822-U	2 ea
2.1	1	65821-U	1 kit
particle size 5 µm			
2.1	1	65827-U	2 ea
4.0	1	65829-U	2 ea
4.0	1	65828-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Discovery® Zr-PS HPLC Column

Discovery® Zr-PS comprises spherical, porous zirconia particles modified with cross-linked polystyrene. It operates via a reversed-phase mechanism, but is less retentive. It has unique selectivity, especially for aromatic compounds. Discovery Zr-PS complements the selectivity offering of the other zirconia- and silica-based Discovery phases, and allows the use of the full range of mobile phase pH from pH 1 to 13.

Features and Benefits

- Good for very hydrophobic compounds
- Good for basic compounds

HPLC for Small Molecules

Discovery® Zirconia: *The Members of the Discovery® Zr Family*

loading 2% Carbon
 particle platform zirconia, spherical, porous
 bonding phase cross-linked polystyrene
 surface area 30 m²/g
 endcapped No
 pore size 300 Å
 operating pH range 1 - 13
 temp. range ≤100 °C (up to 150 °C with special hardware)

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	5	65737-U	1 ea
2.1	7.5	65738-U	1 ea
2.1	15	65739-U	1 ea
4.6	5	65740-U	1 ea
4.6	7.5	65741-U	1 ea
4.6	15	65742-U	1 ea
particle size 5 µm			
2.1	5	65743-U	1 ea
2.1	15	65744-U	1 ea
4.6	5	65746-U	1 ea
4.6	15	65747-U	1 ea
4.6	25	65748-U	1 ea

Discovery® Zr-PS Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	1	65842-U	2 ea
2.1	1	65841-U	1 kit
4.0	1	65844-U	2 ea
4.0	1	65843-U	1 kit
particle size 5 µm			
2.1	1	65845-U	1 kit
4.0	1	65848-U	2 ea
4.0	1	65847-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Discovery® Zr-SAX HPLC Column

Features and Benefits

- Efficient strong anion-exchanger useful for inorganic and organic anions. Stable from pH 1-12.
- Ideal for the separation of water-soluble vitamins.
- Useful for the separation of bio-molecules such as nucleotides, nucleosides, oligonucleotides, oligodeonucleotides, amino acids and peptides.
- High anion-exchange capacity that can be controlled by the amount of polymer deposited on the porous zirconia substrate.
- Does not shrink or swell as a function of anionic strength or organic modifier content of the mobile phase.
- Extremely stable amino phase for normal phase separation of carbohydrates.
- Thermally stable up to 80°C, which causes different selectivity and high speed separations with lower ionic strength mobile phases. This is very important in the preparation of RNA and DNA samples used for further studies.
- Mixed-mode separation modes may be exploited to optimize separations, including Lewis acid-base interactions, hydrophobic interactions and ion-exchange interactions. These modes may be attenuated by adjusting the strong Lewis base content, organic content and ionic strength of the mobile phase, respectively.

loading 25% Carbon
 particle platform zirconia spherical, porous
 bonding phase polyethyleneimine
 surface area 30 m²/g
 pore size 300 Å
 operating pH range 1 - 12
 temp. range <80 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
4.6	5	65709-U	1 ea
4.6	10	65712-U	1 ea
4.6	15	65721-U	1 ea

Discovery® Zr-SAX Supelguard™ Cartridge

loading 25% Carbon
 particle platform (zirconia, spherical, porous)
 bonding phase polyethyleneimine
 surface area 30 m²/g
 pore size 300 Å
 operating pH range 1 - 12
 temp. range 80 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
4.0	1	65733-U	2 ea

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Discovery® ZR Column Holder

	Cat. No.	Qty
Discovery® ZR Column Holder for use with Discovery ZR Columns	65621-U	1 ea

SUPELCOSIL™

Hydrophobic Phases

SUPELCOSIL™ LC-18 HPLC Column

A general purpose hydrophobic alkyl phase that is very retentive and gives good peak shape for a wide variety of compounds.

suitable for L1 per USP

loading 11.0% carbon
 particle platform silica gel, spherical
 phase octadecyl
 surface coverage 3.1 µmol/m²
 surface area 170 m²/g
 endcapped Yes
 pore size 120 Å
 pH range 2 - 7.5
 temp. limit ≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	25	57942	1 ea
3.0	3.3	58977C30	1 ea
3.0	5	58973C30	1 ea
3.0	15	58985C30	1 ea
4.0	7.5	58984C40	1 ea
4.0	15	58985C40	1 ea
4.6	3.3	58977	1 ea
4.6	5	58973	1 ea
4.6	7.5	58984	1 ea
4.6	15	58985	1 ea
particle size 5 µm			
1.0	30	57982	1 ea
2.1	15	57934	1 ea
2.1	25	57935	1 ea
3.0	10	59209C30	1 ea
3.0	15	58230C30	1 ea
3.0	25	58298C30	1 ea
4.0	5	58239C40	1 ea
4.0	15	58230C40	1 ea
4.0	25	58298C40	1 ea

HPLC for Small Molecules

SUPELCOSM: Hydrophobic PhasesSUPELCOSM LC-18 HPLC Column (continued)

I.D. (mm)	L (cm)	Cat. No.	Qty
4.0	30	59165	1 ea
4.6	5	58239	1 ea
4.6	10	59209	1 ea
4.6	15	58230-U	1 ea
4.6	25	58298	1 ea
10	25	58368	1 ea
21.2	25	54849	1 ea
particle size 12 µm			
4.6	25	59182	1 ea
21.2	25	59185	1 ea
particle size 3 µm			
4.6	20	58615-U	1 ea

SUPELCOSM LC-18 SupelguardSM Cartridge

use to protect LC-18, LC-PAH

matrix silica gel high purity, spherical
 phase octadecyl
 pore size 120 Å
 pH-range 2 - 7.5
 temp. range <70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	59613	2 ea
2.1	2	59612	1 kit
3.0	2	59564C30	2 ea
4.0	2	59564	2 ea
4.0	2	59554	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SUPELCOSM LC-18-DB HPLC Column

SUPELCOSM LC-DB phases are specially deactivated for basic compounds. These columns provide shorter retention, better peak shape, and higher efficiency for organic bases than can be obtained on other Type A silica reversed-phase columns.

suitable for L1 per USP

loading 11.0% Carbon
 particle platform silica gel, spherical
 phase octadecyl
 surface coverage 3.1 µmol/m²
 surface area 170 m²/g
 endcapped Yes
 pore size 120 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	25	57943	1 ea
3.0	3.3	58978C30	1 ea
3.0	7.5	58992C30	1 ea
3.0	15	58993C30	1 ea
4.0	15	58993C40	1 ea
4.6	3.3	58978	1 ea
4.6	7.5	58992	1 ea
4.6	15	58993	1 ea
particle size 5 µm			
2.1	25	57940	1 ea
3.0	10	59208C30	1 ea
3.0	15	58348C30	1 ea
3.0	25	58355C30	1 ea
4.0	15	58348C40	1 ea
4.0	25	58355C40	1 ea
4.0	30	59164	1 ea
4.6	5	58345	1 ea

I.D. (mm)	L (cm)	Cat. No.	Qty
4.6	10	59208	1 ea
4.6	15	58348	1 ea
4.6	25	58355-U	1 ea
10	25	58358	1 ea
21.2	25	54851	1 ea

SUPELCOSM LC-18-DB SupelguardSM Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	59617	2 ea
2.1	2	59616	1 kit
3.0	2	59565C30	2 ea
4.0	2	59565	2 ea
4.0	2	59555	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SUPELCOSM LC-8 HPLC Column

A phase less hydrophobic than C18. Provides less retention of both polar and non-polar compounds than C18. Use a mobile phase containing 5% less organic modifier for the C8 column than C18. Polar compounds are, relatively, more strongly retained on C8 than C18 columns.

suitable for L7 per USP

loading 6.0% carbon
 particle platform silica gel, spherical
 phase octyl
 surface coverage 3.2 µmol/m²
 surface area 170 m²/g
 endcapped Yes
 pore size 120 Å
 pH-range 2 - 7.5
 temp. range ≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
3.0	3.3	58975C30	1 ea
3.0	7.5	58982C30	1 ea
3.0	15	58983C30	1 ea
4.0	15	58983C40	1 ea
4.6	3.3	58975	1 ea
4.6	7.5	58982	1 ea
4.6	15	58983	1 ea
particle size 5 µm			
2.1	25	57929	1 ea
3.0	25	58297C30	1 ea
4.0	15	58220C40	1 ea
4.0	25	58297C40	1 ea
4.6	5	58238	1 ea
4.6	15	58220-U	1 ea
4.6	25	58297	1 ea
10	25	58367	1 ea
particle size 3 µm			
4.6	25	57997-U	1 ea

SUPELCOSM LC-8 SupelguardSM Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	59615	2 ea
2.1	2	59614	1 kit
3.0	2	59562C30	2 ea
4.0	2	59562	2 ea
4.0	2	59552	1 kit

HPLC for Small Molecules

SUPELCOSM: Hydrophobic Phases

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SUPELCOSM LC-8-DB HPLC Column

SUPELCOSM LC-DB phases are specially deactivated for basic compounds. These columns provide less retention, better peak shape, and higher efficiency for organic bases than can be obtained on conventional reversed-phase columns.

suitable for L7 per USP

loading 6.0% carbon
 particle platform silica gel, spherical
 phase octyl
 surface coverage 3.2 $\mu\text{mol}/\text{m}^2$
 surface area 170 m^2/g
 endcapped Yes
 pore size 120 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 μm			
3.0	7.5	58990C30	1 ea
3.0	15	58991C30	1 ea
4.0	15	58991C40	1 ea
4.6	3.3	58976	1 ea
4.6	7.5	58990-U	1 ea
4.6	15	58991	1 ea
particle size 5 μm			
4.0	15	58347C40	1 ea
4.0	25	58354C40	1 ea
4.6	5	58344	1 ea
4.6	15	58347	1 ea
4.6	25	58354	1 ea
particle size 3 μm			
2.1	10	59297-U	1 ea
2.1	3.3	58149-U	1 ea

SUPELCOSM LC-8-DB SupelguardSM Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
2.1	2	59619	2 ea
4.0	2	59563	2 ea
3.0	2	59563C30	2 ea
4.0	2	59553	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SUPELCOSM LC-DP HPLC Column

Contains a diphenyl bonded phase, which gives greater selectivity for aromatic groups compared to alkyl-type bonded phases.

suitable for L11 per USP

loading 6% Carbon
 particle platform silica gel, spherical
 phase diphenyl
 surface coverage 2.4 $\mu\text{mol}/\text{m}^2$
 surface area 170 m^2/g
 endcapped Yes
 pore size 120 Å
 pH-range 2 - 7.5
 temp. range ≤ 70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
3.0	15	59150C30	1 ea
4.0	30	59167	1 ea
4.6	10	59211	1 ea
4.6	15	59150-U	1 ea
4.6	25	58842	1 ea

SUPELCOSM LC-DP SupelguardSM Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
4.0	2	59566	2 ea
4.0	2	59556	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Polar Phases**SUPELCOSM ABZ+Plus HPLC Column**

SUPELCOSM ABZ+Plus columns offer both high deactivation and unique selectivity. Deactivated silica particles of very narrow particle size distribution ensure high efficiency with low back pressure. After bonding and endcapping reactions, the ABZ+Plus phase effectively shields unreacted silanol groups on the silica, preventing them from interacting with most analytes, and provides symmetric peaks regardless of an analyte's functionality. The phase also allows you to use low ionic strength buffers without having to add an ion-suppressing modifier. ABZ+Plus enables you to use simple mobile phases when analyzing the most difficult compounds; acids, strongly basic compounds, and zwitterions.

suitable for L60 per USP

Features and Benefits

- High efficiency for polar, nonpolar, and charged analytes
- Symmetric peaks for the most reactive compounds
- Unique selectivity for polar and charged compounds

loading 12.0% carbon
 particle platform silica gel, spherical
 phase alkylamide
 surface coverage 3.4 $\mu\text{mol}/\text{m}^2$
 surface area 170 m^2/g
 endcapped Yes
 pore size 120 Å
 pH-range 2 - 7.5
 temp. range ≤ 70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 μm			
2.1	3.3	5919121	1 ea
2.1	5	5919221	1 ea
2.1	10	57917	1 ea
3.0	7.5	59193C30	1 ea
3.0	15	59194C30	1 ea
4.6	3.3	59191	1 ea
4.6	7.5	59193	1 ea
4.6	15	59194	1 ea
particle size 5 μm			
1.0	30	57978	1 ea
2.1	5	5919521	1 ea
2.1	10	57925	1 ea
2.1	15	57926	1 ea
2.1	25	57927	1 ea
3.0	5	59195C30	1 ea
3.0	15	59196C30	1 ea
3.0	25	59197C30	1 ea
4.0	15	59196C40	1 ea
4.0	25	59197C40	1 ea
4.6	5	59195-U	1 ea
4.6	15	59196	1 ea
4.6	25	59197	1 ea
10	25	59179	1 ea
21.2	10	59148	1 ea
21.2	25	54855	1 ea

HPLC for Small Molecules

SUPELCOSIL™: Polar Phases

SUPELCOSIL™ ABZ+Plus HPLC Column (continued)

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 12 µm			
4.6	25	59156	1 ea
21.2	25	59174	1 ea

SUPELCOSIL™ ABZ+Plus Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	59605	2 ea
2.1	2	59604	1 kit
3.0	2	59535C30	2 ea
4.0	2	59535-U	2 ea
4.0	2	59534-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SUPELCOSIL™ LC-ABZ HPLC Column

SUPELCOSIL LC-ABZ phase has a unique deactivation technology which provides excellent reversed-phase performance for basic compounds, as well as those that are acidic, polar neutral, and non-polar. Silanol suppressing practices such as using competing amines, operating at high ionic strength, and adjusting mobile phases to pH extremes are typically not required to obtain good peak shape on the LC-ABZ phase.

Features and Benefits

- For acids, bases, zwitterions
- Increased polar retention relative to standard reversed-phases
- Unique selectivity
- Silanol deactivation
- Peak shape, efficiency, and retention are comparable to C8 phases for non-polar analytes

loading	12.0% carbon
particle platform	silica gel, spherical
phase	alkylamide
surface coverage	3.4 µmol/m ²
surface area	170 m ² /g
endcapped	Yes
pore size	120 Å
pH-range	2 - 7.5
temp. limit	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	25	57936	1 ea
3.0	5	59141C30	1 ea
3.0	15	59140C30	1 ea
3.0	25	59142C30	1 ea
4.0	25	59142C40	1 ea
4.6	5	59141	1 ea
4.6	15	59140-U	1 ea
4.6	25	59142	1 ea
10	25	59170	1 ea

SUPELCOSIL™ LC-ABZ Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	59611	2 ea
2.1	2	59610	1 kit
3.0	2	59545C30	2 ea
4.0	2	59545-U	2 ea
4.0	2	59544-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SUPELCOSIL™ Suplex™ pKb-100 HPLC Column

Suplex pKb-100 columns feature the same bonded phase functionality as SUPELCOSIL LC-ABZ columns. These specially deactivated columns differ in that Suplex pKb-100 is not endcapped, while SUPELCOSIL LC-ABZ is endcapped. The absence of the end-capping reagent results in better performance from Suplex pKb-100 for the strongest basic compounds, while LC-ABZ is preferred when the sample also contains acids and/or zwitterions.

loading	12.5% carbon
particle platform	silica gel, spherical
phase	alkylamide
surface coverage	3.4 µmol/m ²
surface area	170 m ² /g
endcapped	No
pore size	120 Å
pH-range	2 - 7.5
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	25	57937	1 ea
3.0	25	58934C30	1 ea
4.0	25	58934C40	1 ea
4.6	5	58921-U	1 ea
4.6	15	58932	1 ea
4.6	25	58934	1 ea
10	25	59172	1 ea

SUPELCOSIL™ Suplex™ pKb-100 Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	59609	2 ea
2.1	2	59608	1 kit
4.0	2	59541-U	2 ea
4.0	2	59531-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SUPELCOSIL™ LC-F HPLC Column

SUPELCOSIL LC-F columns contain a pentafluorophenyl functional group/ endcapped packing material. These columns offer selectivities different from traditional reversed-phase columns for halogenated compounds, esters, ketones, bases, and taxanes, including taxol.

suitable for L43 per USP

loading	5% Carbon
particle platform	silica gel, spherical
phase	pentafluorophenylamido
surface coverage	2.6 µmol/m ²
surface area	170 m ² /g
endcapped	Yes
pore size	120 Å
pH-range	2 - 7.5
temp. limit	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.0	25	59158C40	1 ea
4.6	25	59158	1 ea

SUPELCOSIL™ LC-F Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.0	2	59521	2 ea
4.0	2	59520	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

HPLC for Small Molecules

SUPELCOSM: Polar PhasesSUPELCOSM LC-CN HPLC Column

The LC-CN phase is often used as a substitute for silica because it offers the advantages of a bonded phase (such as quick equilibration, and less sensitivity to small changes of the water content in the mobile phase). More often, however, the LC-CN column is operated under reversed-phase mobile phase conditions.

suitable for L10 per USP

loading 4% Carbon
 particle platform silica gel, spherical
 phase cyanopropyl
 surface coverage 3.5 $\mu\text{mol}/\text{m}^2$
 surface area 170 m^2/g
 endcapped Yes
 pore size 120 Å
 pH-range 2 - 7.5
 temp. range $\leq 70^\circ\text{C}$

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 μm			
3.0	3.3	58979C30	1 ea
3.0	7.5	58986C30	1 ea
4.6	3.3	58979	1 ea
4.6	7.5	58986	1 ea
particle size 5 μm			
3.0	5	58211C30	1 ea
3.0	25	58231C30	1 ea
4.0	15	58221C40	1 ea
4.0	25	58231C40	1 ea
4.6	5	58211	1 ea
4.6	15	58221-U	1 ea
4.6	25	58231	1 ea

SUPELCOSM LC-CN SupelguardSM Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
3.0	2	59567C30	2 ea
4.0	2	59567	2 ea
4.0	2	59557	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SUPELCOSM LC-PCN HPLC Column

The LC-PCN cyanopropyl bonded phase columns are preconditioned for fast and reliable analyses of tricyclic antidepressants.

suitable for L10 per USP

loading 4% carbon
 particle platform silica gel, spherical
 phase cyanopropyl
 surface coverage 3.5 $\mu\text{mol}/\text{m}^2$
 surface area 170 m^2/g
 endcapped Yes
 pore size 120 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
3.0	15	58377C30	1 ea
3.0	25	58378C30	1 ea
4.0	15	58377C40	1 ea
4.6	15	58377	1 ea
4.6	20	59189	1 ea
4.6	25	58378	1 ea

SUPELCOSM LC-PCN SupelguardSM Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
4.0	2	59514	2 ea
4.0	2	59504	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SUPELCOSM LC-1 HPLC Column

Due to a mixed retention mechanism, selectivity differences for polar groups are more pronounced than on C8 and C18 columns. C1 columns require 20-30% less organic modifier to provide retention similar to C18 columns.

suitable for L13 per USP

loading 2% Carbon
 particle platform silica gel, spherical
 phase methyl
 surface coverage 3.4 $\mu\text{mol}/\text{m}^2$
 surface area 170 m^2/g
 endcapped Yes
 pore size 120 Å
 pH-range 2 - 7.5
 temp. range $\leq 70^\circ\text{C}$

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
4.6	5	58237	1 ea
4.6	15	58210-U	1 ea
4.6	25	58296	1 ea

SUPELCOSM LC-1 SupelguardSM Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
4.0	2	59561	2 ea

SUPELCOSM LC-NH₂ HPLC Column

The amino column is most often employed for the separation of mono- and disaccharides. As a normal-phase application, amino columns are used in the petroleum industry (see SUPELCOSM LC-NH₂-NP HPLC Columns for additional details).

suitable for L8 per USP

loading 3% Carbon
 particle platform silica gel, spherical
 phase aminopropyl
 surface coverage 5.1 $\mu\text{mol}/\text{m}^2$
 surface area 170 m^2/g
 endcapped Yes
 pore size 120 Å
 pH-range 2 - 7.5
 temp. range $\leq 70^\circ\text{C}$

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 μm			
3.0	7.5	58988C30	1 ea
3.0	15	58989C30	1 ea
4.6	7.5	58988	1 ea
4.6	15	58989	1 ea
particle size 5 μm			
3.0	25	58338C30	1 ea
4.0	25	58338C40	1 ea
4.6	25	58338	1 ea

HPLC for Small Molecules

SUPELCOSM™: Polar Phases

SUPELCOSM™ LC-NH₂ Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
3.0	2	59568C30	2 ea
4.0	2	59568	2 ea
4.0	2	59558	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SUPELCOSM™ LC-Si HPLC Column

A typical mobile phase used with normal-phase silica columns consists of a hydrocarbon solvent such as hexane or heptane, mixed with a relatively small percentage of more polar solvent. Non-polar compounds will elute from the column first, while polar solutes show stronger interaction with the silanol groups on the silica surface. The polar selectivity of silica is very helpful for separating mycotoxins. Silica is frequently used in preparative chromatography due to its low operating cost and back pressure compared to reversed-phase columns. Silica is particularly popular among organic chemists as a low-pressure preparative tool. The unmodified silica in SUPELCOSM LC-Si columns also separate positional isomers.

suitable for L3 per USP

particle platform	silica gel, spherical
surface area	170 m ² /g
pore size	120 Å
pH-range	2 - 7.5
temp. limit	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
3.0	7.5	58980C30	1 ea
3.0	15	58981C30	1 ea
4.6	3.3	58974	1 ea
4.6	7.5	58980-U	1 ea
4.6	15	58981	1 ea
particle size 5 µm			
1.0	30	57980-U	1 ea
2.1	25	57930-U	1 ea
3.0	10	59210C30	1 ea
3.0	15	58200C30	1 ea
4.0	15	58200C40	1 ea
4.0	25	58295C40	1 ea
4.0	30	59166	1 ea
4.6	5	58236	1 ea
4.6	10	59210-U	1 ea
4.6	15	58200-U	1 ea
4.6	25	58295	1 ea
10	25	58365	1 ea
21.2	25	54843	1 ea
particle size 12 µm			
4.6	25	59180-U	1 ea
21.2	25	59183	1 ea

SUPELCOSM™ LC-Si Supelguard™ Cartridge

use to protect LC-Si, LC-3Si

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
3.0	2	59560C30	2 ea
4.0	2	59560	2 ea
4.0	2	59550	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SUPELCOSM™ LC-Diol HPLC Column

LC-Diol columns can be used to separate proteins by gel filtration chromatography. When operated with an aqueous buffer, the diol phase can effectively shield the silica surface from interacting with proteins. A well-known use of diol columns, under normal phase conditions, is the separation of steroids and sterols.

loading	3.5% carbon
particle platform	silica gel, spherical
phase	diol
surface coverage	3.8 µmol/m ²
surface area	170 m ² /g
endcapped	No
pore size	120 Å
pH-range	2 - 7.5
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
3.0	25	58201C30	1 ea
4.0	25	58201C40	1 ea
4.6	25	58201	1 ea

SUPELCOSM™ LC-Diol Supelguard™ Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.0	2	59569	2 ea
4.0	2	59559	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.



Helpful Hints

Reversed-phase versus Normal Phase

Reversed-phase is characterized by strong interactions between analytes and the polar mobile phase. Interactions between analytes and the nonpolar stationary phase are weak. Mobile phases typically consist of water/organic solvent combinations. Reversed-phase columns include: Amide-C16, C18, C8, Phenyl, C5, Pentafluorinated Phenyl (F5), Cyano, C1, ODP-50, and TPR-100.

Normal phase is characterized by strong interactions between analytes and the polar stationary phase. Interactions between analytes and the nonpolar mobile phase are weak. Mobile phases consist of organic solvents. Normal phase columns include: Cyano, NH₂, and Silica.

Ion-Exchange Phases



SUPELCOSM™ SAX1 HPLC Column

The SUPELCOSM SAX1 column has a strongly basic quaternary aminopropyl phase and is used for separating anions.

suitable for L14 per USP

loading	12% carbon
particle platform	silica gel, spherical
phase	propyltrimethylammonium
surface area	170 m ² /g
pore size	120 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
3.0	25	59138C30	1 ea
4.0	25	59138C40	1 ea
4.6	25	59138	1 ea

HPLC for Small Molecules

SPELCOSM: Ion-Exchange PhasesSPELCOSM SAX1 SupelguardSM Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
4.0	2	59537-U	2 ea
4.0	2	59536-U	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

SPELCOSM LC-SCX HPLC Column

The LC-SCX cation-exchange columns have strongly acidic propylsulfonic acid groups and are used for separating cations. Adjust pH, ionic strength, and organic modifier concentration to control retention and selectivity.

suitable for L52 per USP

suitable for L9 per USP

particle platform	silica gel, spherical
phase	propylsulfonic acid
surface area	170 m ² /g
pore size	120 Å
pH-range	2 - 7.5
temp. limit	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
3.0	25	58997C30	1 ea
4.6	25	58997	1 ea

SPELCOSM LC-SCX SupelguardSM Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
4.0	2	59519	2 ea
4.0	2	59509	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Nucleosides

SPELCOSM LC-18-S HPLC Column

SPELCOSM LC-18-S columns are designed for reliable separations of deoxyribonucleosides and ribonucleosides.

loading	11.0% carbon
particle platform	silica gel, spherical
phase	octadecyl
surface coverage	3.1 μ mol/m ²
surface area	170 m ² /g
endcapped	Yes
pore size	120 Å
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
1.0	30	57920	1 ea
2.1	25	57939	1 ea
4.6	15	58931	1 ea
4.6	25	58928-U	1 ea

SPELCOSM LC-18-S SupelguardSM Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
2.1	2	59162	2 ea
4.0	2	59630	2 ea
4.0	2	59629	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

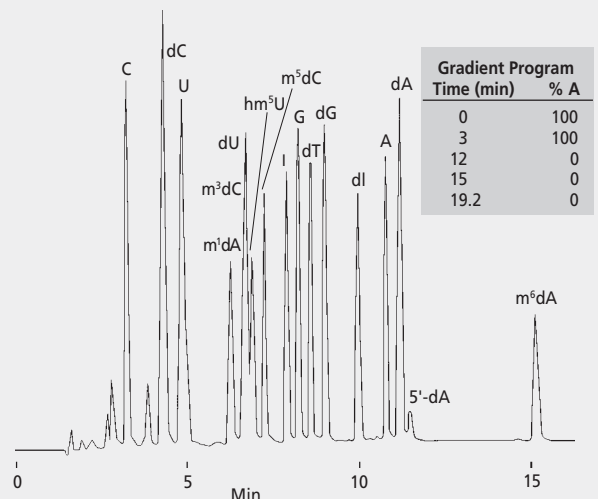
Deoxyribonucleosides and Ribonucleosides on a SPELCOSM LC-18-S Column

Figure provided by Dr. C. W. Gehrke and K.C. Kuo, University of Missouri-Columbia, Experimental Station Chemical Laboratories, Columbia, MO USA

column: SPELCOSM LC-18-S, 15 cm \times 4.6 mm I.D., 5 μ m particles 58931
 mobile phase: 0.05 M K₂HPO₄/KH₂PO₄, pH 4.0: methanol
 A = 97.5: 2.5
 B = 80:20
 flow rate: 1.0 mL/min
 det.: UV, 254 nm
 temp.: 30 °C
 injection: nucleoside standards in water

Nucleotides

SPELCOSM LC-18-T HPLC Column

SPELCOSM LC-18-T columns feature an octadecylsilane bonded phase and a special surface treatment for efficient separations of nucleotides. Each batch of packing material is tested to ensure good peak shape for a representative nucleotide, adenosine diphosphate (ADP). Chromatography of other compounds that exhibit metal chelating properties also can be improved by using this phase.

loading	12.3% carbon
particle platform	silica gel, spherical
phase	octadecyl
surface coverage	3.1 μ mol/m ²
surface area	170 m ² /g
endcapped	Yes
pore size	120 Å
temp. range	≤70 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 μ m			
3.0	15	58970C30	1 ea
4.6	15	58970-U	1 ea
particle size 5 μ m			
4.6	25	58971	1 ea
4.6	15	59136-U	1 ea

HPLC for Small Molecules

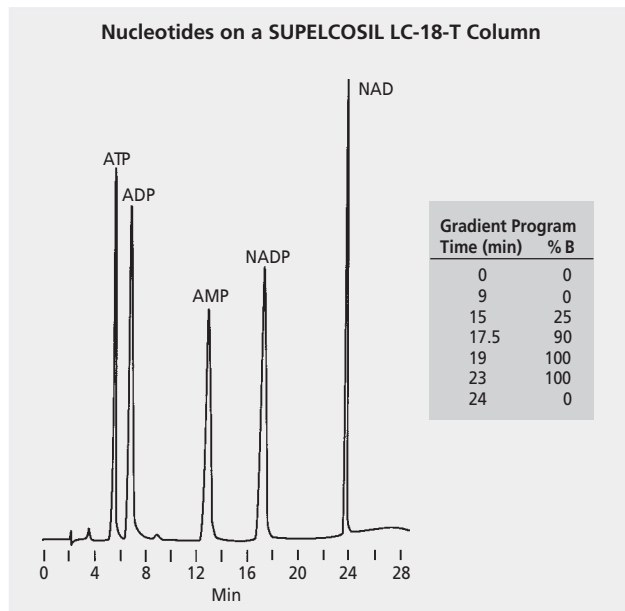
SUPELCOSIL™: *Nucleotides*

SUPELCOSIL™ LC-18-T Supelguard™ Cartridge

use to protect LC-18-T, LC-DABS

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
3.0	2	59621C30	1 ea
4.0	2	59621	2 ea
4.0	2	59620	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, two nuts and ferrules.



column: SUPELCOSIL LC-18-T, 25 cm × 4.6 mm I.D., 5 µm particles 58971
 mobile phase: A = 0.1 M KH₂PO₄, pH 6.0; B = A:methanol, 90:10
 flow rate: 1.3 mL/min
 det.: UV, 254 nm

Polyaromatic Hydrocarbons

SUPELCOSIL™ LC-PAH HPLC Column

SUPELCOSIL LC-PAH columns were designed specifically for analyses of the priority pollutant PAHs listed in US EPA Method 610. 2.1 mm and 3.0 mm columns save solvent and improve sensitivity when sample mass is limited. 3 µm columns provide extremely rapid, highly efficient analyses, while retaining the durability of porous silicas. They are excellent and economical substitutes for 1.5 µm nonporous silicas.

particle platform silica gel, spherical
 phase octadecyl
 pore size 120 Å

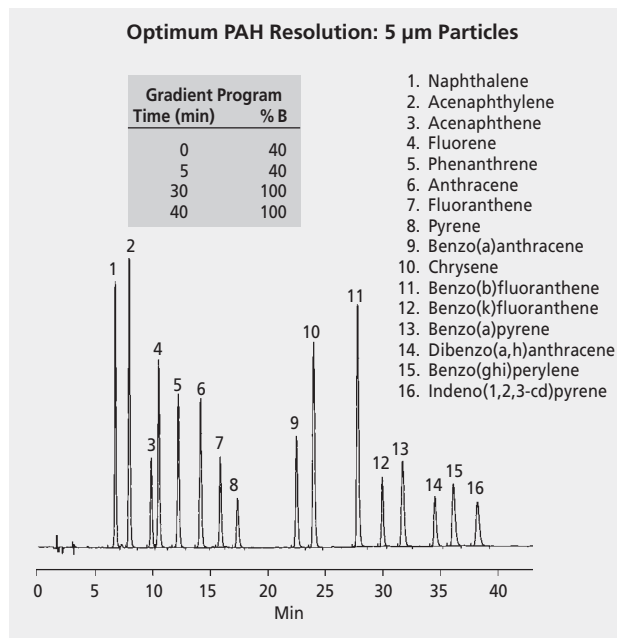
I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
3.0	10	59134C30	1 ea
4.6	5	59133	1 ea
4.6	10	59134	1 ea
particle size 5 µm			
2.1	25	57945	1 ea
3.0	15	58318C30	1 ea
4.6	15	58318	1 ea
4.6	25	58229	1 ea
3.0	25	59187	1 ea

SUPELCOSIL™ LC-18 Supelguard™ Cartridges

use to protect LC-18, LC-PAH

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	2	59613	2 ea
2.1	2	59612	1 kit
3.0	2	59564C30	2 ea
4.0	2	59564	2 ea
4.0	2	59554	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.



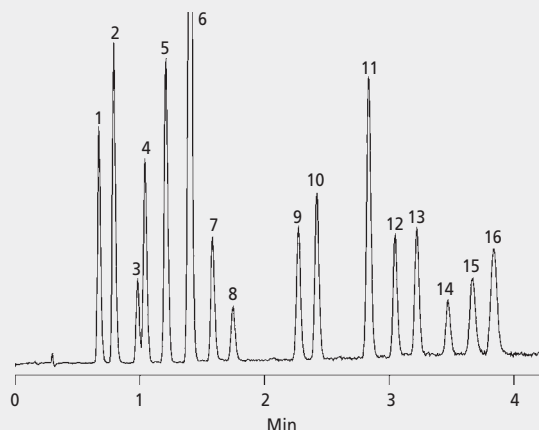
column: SUPELCOSIL LC-PAH, 25 cm × 4.6 mm I.D., 5 µm particles (58229)
 mobile phase: A = water; B = CH₃CN
 flow rate: 1.5 mL/min
 det.: UV, 254 nm
 injection: 3 µL LC-PAH Test Mix (48743), diluted 1:10 with acetonitrile

HPLC for Small Molecules

SUPELCOSM: Polyaromatic HydrocarbonsRapid Analyses: 3 μ m Particles

Gradient Program Time (min)	% B
0	60
0.3	60
3	100
4	100

- | | |
|-------------------|----------------------------|
| 1. Naphthalene | 9. Benz(a)anthracene |
| 2. Acenaphthylene | 10. Chrysene |
| 3. Acenaphthene | 11. Benzo(b)fluoranthene |
| 4. Fluorene | 12. Benzo(k)fluoranthene |
| 5. Phenanthrene | 13. Benzo(a)pyrene |
| 6. Anthracene | 14. Dibenzo(a,h)anthracene |
| 7. Fluoranthene | 15. Benzo(ghi)perylene |
| 8. Pyrene | 16. Indeno(1,2,3-cd)pyrene |



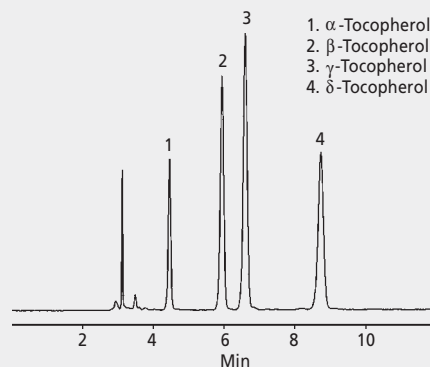
column: SUPELCOSM LC-PAH, 5 cm \times 4.6 mm I.D.,
3 μ m particles (59133)
mobile phase: A = water; B = CH₃CN
flow rate: 3.0 mL/min
det.: UV, 254 nm

SUPELCOSM LC-NH₂-NP SupelguardSM Cartridge

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
4.0	2	59516	2 ea
4.0	2	59515	1 kit

Kit includes one cartridge, a stand-alone holder, a piece of tubing, 2 nuts and ferrules.

Tocopherols



1. α -Tocopherol
2. β -Tocopherol
3. γ -Tocopherol
4. δ -Tocopherol

column: SUPELCOSM LC-NH₂-NP, 25 cm \times 4.6 mm I.D., 5 μ m particles
59132
mobile phase: hexane:ethyl acetate, 70:30
flow rate: 1.0 mL/min
temp.: 30 $^{\circ}$ C
det.: UV, 295 nm
injection: 1.0 μ L hexane, 1.0 mg/mL each analyte

Dedicated Normal-Phase

SUPELCOSM LC-NH₂-NP HPLC Column

An amino phase dedicated to normal-phase chromatography. By employing special bonding technology, and avoiding water in manufacturing and testing the column, we have dramatically reduced the retention variation that is characteristic of normal-phase chromatography. Normal-phase chromatography is especially useful when the analytes are not water soluble – for example, the fat-soluble vitamins A, D, E, and K.

These columns should be used with non-aqueous mobile phases only.

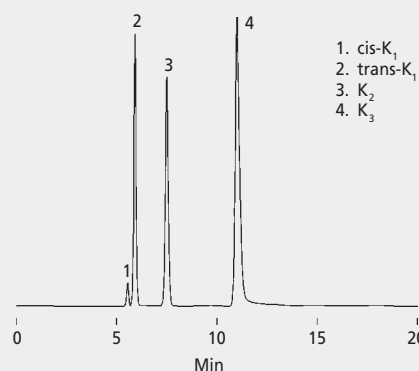
Features and Benefits

- show stable retention in normal-phase separations
- are less sensitive to small or varying amounts of water in mobile phases, relative to unmodified silica
- provide excellent separations of fat-soluble vitamins suitable for L8 per USP

loading 3% Carbon
particle platform silica gel, spherical
phase aminopropyl
surface coverage 5.1 μ mol/m²
surface area 170 m²/g
endcapped Yes
pore size 120 Å
pH range 2 - 7.5
temp. range ≤ 70 $^{\circ}$ C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
4.6	25	59132	1 ea

Vitamin K Isomers



1. cis-K₁
2. trans-K₁
3. K₂
4. K₃

column: SUPELCOSM LC-NH₂-NP, 25 cm \times 4.6 mm I.D., 5 μ m particles
59132
mobile phase: hexane:ethyl acetate, 99:1
flow rate: 1.5 mL/min
temp.: 30 $^{\circ}$ C
det.: UV, 254 nm
injection: 1.0 μ L hexane, 0.3 mg/mL each analyte

HPLC for Small Molecules

SUPELCOSIL™: Amino Acids

Amino Acids

SUPELCOSIL LC-DABS columns feature a specially treated and tested octadecylsilane bonded phase, for reversed-phase separations of precolumn derivatized dabsyl amino acids. More than 30 amino acids and ammonia can be separated in less than one hour.

Refer to Application Note 124 (T397124) for details on the dabsylation of amino acids.



Related Information

Literature References

Stocchi, V., et al., *Anal. Biochem.* **178**: 107–117 (1989).

Stocchi, V., et al., *Amino Acids* **3**: 303–309 (1992).

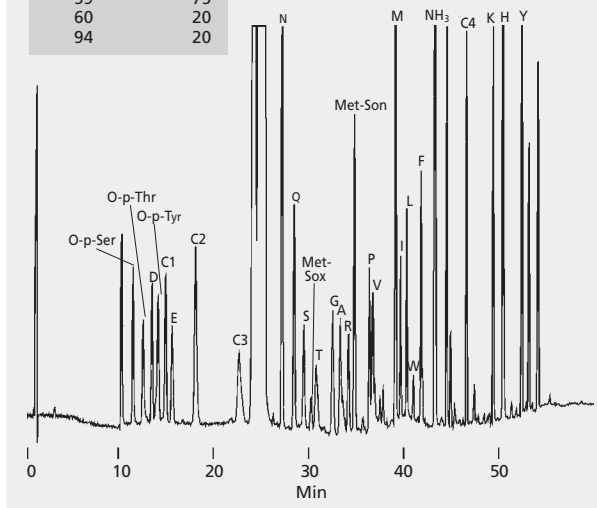
References not available from Supelco.

Dabsyl Amino Acid

O-p-Ser	o-Phosphoserine	Met-Sox	Methionine sulfoxide
O-p-Thr	o-Phosphothreonine	T	Threonine
D	Aspartic acid	G	Glycine
O-p-Tyr	o-Phosphotyrosine	A	Alanine
C1	Cysteic acid	R	Arginine
E	Glutamic acid	Met-Son	Methionine sulfone
C2	S-Carboxymethylcysteine	P	Proline
C3	S-Sulfocysteine	V	Valine
N	Asparagine	M	Methionine
Q	Glutamine	I	Isoleucine
S	Serine	L	Leucine
		W	Tryptophan
		F	Phenylalanine
		NH ₃	Ammonia
		C4	Cystine
		K	Lysine
		H	Histidine
		Y	Tyrosine

Gradient Program

Temp. (min)	% B
0	20
9	25
23	25
24	32
30	32
37	40
46	60
54	75
59	75
60	20
94	20



column: SUPELCOSIL LC-DABS, 15 cm × 4.6 mm I.D.,
3 μm particles (59137)
mobile phase: A = 25 mM KH₂PO₄, pH 7.0;
B = acetonitrile:methanol (70:30)
flow rate: 1.5 mL/min
det.: VIS, 436 nm
temp.: 30 °C
injection: 5 μL, approx. 50 pM each derivative

Columns for Amino Acid Separations

Derivatized Amino Acid	SUPELCOSIL HPLC	Dimension (cm × mm I.D.)	Cat. No.	Supelguard Guard Column	Cat. No.
Dabsyl-AA	LC-DABS (3 μm)	15 × 2.1	59137	LC-18-T	59621
DABTH-AA	LC-18 (3 μm)	15 × 4.6	58985	LC-18	59564
OPA-AA	LC-18 (5 μm)	15 × 4.6	58230-U	LC-18	59564
PTC-AA	LC-18-DB (5 μm)	25 × 4.6	58355-U	LC-18-DB	59565
PTH-AA	LC-18-DB (3 μm)	25 × 2.1	57943	LC-18-DB	59565
	LC-18-DB (5 μm) ¹	25 × 4.6	58355-U	LC-18-DB	59565

¹Alternative to 3 μm LC-18-DB

Amino Acid Separations - HPLC Column Selection

Compatible	L × I.D.	Cat. No.	Qty
SUPELCOSIL™ LC-DABS HPLC Column			
for use with Dabsyl-AA	15 cm × 4.6 mm	59137	1 ea
SUPELCOSIL™ LC-18 HPLC Column			
for use with DABTH-AA	15 cm × 4.6 mm	58985	1 ea
for use with OPA-AA	15 cm × 4.6 mm	58230-U	1 ea
SUPELCOSIL™ LC-18-DB HPLC Column			
for use with PTH-AA	25 cm × 2.1 mm	57943	1 ea
for use with PTC-AA	25 cm × 4.6 mm	58355-U	1 ea

Amino Acid Separations - Guard Column Selection

Compatible	L × I.D.	Cat. No.	Qty
SUPELCOSIL™ LC-18-T Supelguard™ Cartridge			
use to protect LC-18-T, LC-DABS	2 cm × 4.0 mm	59621	2 ea
SUPELCOSIL™ LC-18 Supelguard™ Cartridge			
use to protect LC-18, LC-PAH	2 cm × 4.0 mm	59564	2 ea
SUPELCOSIL™ LC-18-DB Supelguard™ Cartridge			
use to protect LC-18-DB	2 cm × 4.0 mm	59565	2 ea

HPLC for Small Molecules

SUPELCOGEL™

SUPELCOGEL™



Supelco microbore HPLC columns

For reversed-phase separations at high pH or low pH, we offer SUPELCOGEL TPR-100 and SUPELCOGEL ODP-50 resin-based HPLC columns. SUPELCOGEL resin-based ion exclusion HPLC columns contain sulfonated divinylbenzene resins in six cationic forms, each offering a unique selectivity for analyses of saccharides or organic acids.

Carbohydrates

SUPELCOGEL C-611 columns contain a unique ion exchange resin containing two divalent cations, rather than one. This provides different selectivities for separating monosaccharides and sugar alcohols. As with resins containing a single cation, di-, tri-, and oligosaccharides are separated by class. Galactose and mannose are well separated.

SUPELCOSIL LC-NH₂ column is often employed for the separation of mono- and disaccharides.

SUPELCOGEL Ca columns separate monosaccharides and sugar alcohols. Di-, tri-, and oligosaccharides are separated by class. A frequent application for this column is the separation of sugars in high fructose corn syrup (HFCS).

SUPELCOGEL Pb columns provide the highest resolution and best selectivity for monosaccharides. SUPELCOGEL Pb columns provide excellent separation of xylose, galactose, and mannose, which are not completely resolved on calcium-form resin columns.

Carbohydrate Column Applications and Mobile Phases

Column	Application	Form	Typical Mobile Phase	Max. Temp. (°C)
SUPELCOGEL K	beet sugar, cane sugar, molasses, corn syrup	potassium	10 mM K ₂ HPO ₄	90
SUPELCOGEL Pb	monosaccharides, xylose/galactose/mannose	lead	deionized water (DH ₂ O)	90
SUPELCOGEL Ca	high fructose corn syrup, monosaccharides, sugar alcohols, oligosaccharides	calcium	deionized water	90
SUPELCOGEL C-610H	organic acids	hydrogen	0.1% H ₂ SO ₄ or H ₃ PO ₄	60
SUPELCOGEL H	organic acids	hydrogen	0.1% H ₂ SO ₄ or H ₃ PO ₄	90
SUPELCOGEL C-611	mono-, di-, and trisaccharides, galactose/mannose	2 divalent cations	10 ⁻⁴ N NaOH	85
SUPELCOGEL Ag1	beer, dark corn syrup	silver	deionized water	90
SUPELCOGEL Ag2	oligosaccharides, glycerol/ethanol, corn syrup, hydrolyzed starch	silver	deionized water	90
SUPELCOSIL LC-NH ₂	mono-, di-, some trisaccharides	aminopropyl silica	75% CH ₃ CN in water	70

SUPELCOGEL K columns are useful for separating raffinose, sucrose, glucose, fructose, and betaine.

SUPELCOGEL C-610H and SUPELCOGEL H columns are ideal for separating carbohydrates, alcohols, and organic acids present in the same sample: wines and other fermentation products, fruit juices, and biological samples.

SUPELCOGEL Ag columns provide rapid separation of oligosaccharides. Glycerol and ethanol are well resolved.

Within the different classes of sugars, chemical and physical properties vary only slightly. HPLC separations of carbohydrates depend on differences in conformation, configuration, and column type. Because of this complexity, no single HPLC column or method is capable of separating every carbohydrate.

SUPELCOGEL Carbohydrate Column Characteristics

Particles:	sulfonated polystyrene/divinylbenzene, spherical, 9 μm
Counter Ion:	varies (see following table)
pH Range:	1–13
Organic Compatibility:	<10% in mobile phase
Maximum Temperature:	varies (see following table)
Maximum Flow Rate:	7.8 mm I.D. columns: 1.5 mL/min 4.6 mm I.D. columns: 0.4 mL/min
Maximum Pressure:	1000 psi (70 bar)

SUPELCOSIL LC-NH₂ Column Characteristics

Particles:	spherical silica, 5 μm
Bonded Phase:	aminopropylsilyl
pH Range:	2–7.5
Organic Compatibility:	no limits (avoid aldehydes and ketones)
Maximum Flow Rate:	2 mL/min (4.6 mm I.D. columns)
Maximum Pressure:	4,000 psi (420 bar)

HPLC for Small Molecules

SUPELCOGEL™: Carbohydrates

Retention Time Index for Carbohydrate Columns

Cat. No.	SUPELCOGEL Columns					C-611 59310-U	K 59342	Ag2 59315	SUPELCOSIL LC-NH ₂ 58338
	Ca 59305-U	C-610H 59320-U	H 59304-U	H 59346	Pb 59343				
Dimensions (mm)	300 × 7.8	300 × 7.8	300 × 7.8	250 × 4.6	300 × 7.8	300 × 7.8	300 × 7.8	300 × 7.8	250 × 4.6
Temp	80 °C	30 °C	30 °C	30 °C	85 °C	60 °C	85 °C	85 °C	ambient
Mobile Phase	DH ₂ O	0.1% H ₃ PO ₄	0.1% H ₃ PO ₄	0.1% H ₃ PO ₄	DH ₂ O	10 ⁻⁴ N NaOH	15 mM K ₂ HPO ₄	DH ₂ O	ACN:DH ₂ O(3:1)
Flow Rate (mL/min)	0.5	0.5	0.5	0.17	0.5	0.5	0.5	0.5	1.0
Det.	refractive index								
Compound Retention Times (min)									
Arabinose	15.3	13.9	14.3	13.8	19.2	19.6	16.8	17.1	7.5
Arabitol	19.8	14.1	14.9	14.3	32.3	22.8	13.5	16.0	7.2
Betaine	ND	ND	ND	ND	NR	ND	13.0	ND	ND
Dulcitol	22.3	13.4	14.2	13.7	43.4	25.7	12.9	15.9	9.0
Erythritol	17.7	15.0	15.6	14.8	24.5	20.2	14.0	16.1	5.9
Ethanol	19.4	25.6	ND	ND	ND	21.0	ND	18.4	NR
Fructose	14.9	13.1	13.3	12.9	20.8	20.7	15.2	16.0	8.3
Galactose	13.4	12.9	13.0	12.6	17.6	17.6	15.1	15.8	10.3
Glucose	12.0	12.1	11.9	11.7	14.9	15.8	14.0	14.6	9.8
Glycerol	18.7	16.8	17.6	16.6	23.8	20.9	15.2	17.1	NR
Inositol	14.9	12.6	12.7	12.4	24.5	20.1	15.7	17.4	ND
Isomaltose	9.6	10.3	ND	ND	ND	13.8	ND	11.6	19.4
Isomaltotriose	8.5	9.5	ND	ND	ND	12.6	ND	9.8	NR
Lactitol	ND	ND	11.1	11.0	26.6	ND	10.6	ND	ND
Lactose	10.2	10.8	10.2	10.2	13.5	14.3	10.9	11.8	19.5
Maltitol	13.6	11.0	10.7	10.7	23.8	17.7	10.2	15.0	15.5
Maltoheptaose	7.5	8.8	7.6	7.9	9.2	11.6	7.2	7.3	NR
Maltohexaose	7.7	8.9	7.7	8.1	9.7	12.0	7.4	7.6	NR
Maltopentaose	7.9	9.1	7.9	8.2	10.5	12.6	7.8	8.1	NR
Maltose	9.8	10.5	9.9	9.9	13.0	14.2	10.7	11.5	17.4
Maltotetraose	8.3	9.3	8.2	8.5	11.2	13.2	8.4	8.8	NR
Maltotriose	8.8	9.7	8.8	9.0	12.0	13.6	9.2	9.8	31.0
Mannitol	19.2	13.2	13.7	13.2	32.5	22.1	12.6	15.2	9.2
Mannose	13.7	12.8	12.9	12.5	19.8	18.9	15.6	15.9	9.1
Melezitose	8.7	9.7	8.8	9.0	10.8	12.4	8.6	9.3	24.5
Psicose	22.5	13.4	14.5	13.9	36.5	32.9	15.5	17.2	6.6
Raffinose	8.7	9.7	8.7	8.9	11.2	12.6	8.7	9.6	29.7
Ribitol	16.7	13.7	14.2	13.6	25.1	19.5	13.1	15.3	ND
Ribose	24.3	14.2	15.8	15.0	40.7	34.6	17.7	19.1	6.0
Sorbitol	23.4	13.4	14.4	13.9	46.9	28.3	13.3	16.3	9.0
Stachyose	8.1	9.3	8.1	8.4	10.4	11.9	7.9	8.5	67.3
Sucrose	9.8	10.6	9.9	9.9	12.2	13.6	10.1	11.2	14.0
Xylitol	23.3	14.4	15.7	15.0	42.1	28.0	14.2	17.1	7.3
Xylose	13.2	12.8	12.8	12.6	16.1	17.2	15.3	15.6	6.8

NR—not recommended

ND—no data available

HPLC for Small Molecules

SUPELCOGEL™: HPLC Columns

HPLC Columns

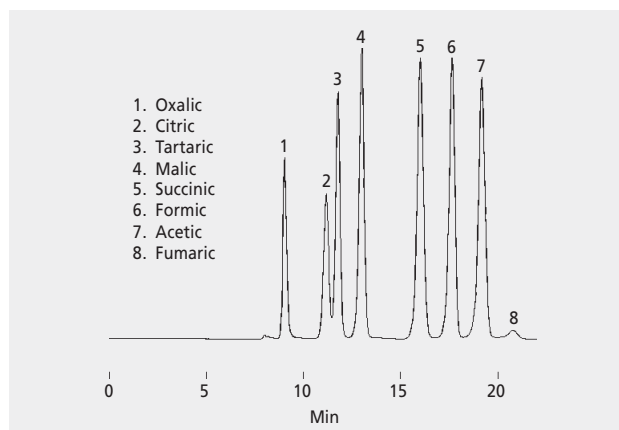
Particle Size (µm)	L × I.D.	Cat. No.	Qty
SUPELCOGEL™ K HPLC Column			
9	30 cm × 7.8 mm	59342	1 ea
SUPELCOGEL™ Pb HPLC Column			
9	30 cm × 7.8 mm	59343	1 ea
SUPELCOGEL™ Ca HPLC Column			
9	30 cm × 7.8 mm	59305-U	1 ea
SUPELCOGEL™ C-610H HPLC Column			
9	30 cm × 7.8 mm	59320-U	1 ea
SUPELCOGEL™ H HPLC Column			
9	25 cm × 4.6 mm	59346	1 ea
9	30 cm × 7.8 mm	59304-U	1 ea
SUPELCOGEL™ C-611 HPLC Column			
9	30 cm × 7.8 mm	59310-U	1 ea
SUPELCOGEL™ Ag1 HPLC Column			
9	30 cm × 7.8 mm	59318-U	1 ea
SUPELCOGEL™ Ag2 HPLC Column			
9	30 cm × 7.8 mm	59315	1 ea
SUPELCOGEL™ LC-NH₂ HPLC Column			
5	25 cm × 4.6 mm	58338	1 ea
SUPELCOGEL™ Pb HPLC Column			
9	10 cm × 7.8 mm	59335-U	1 ea

Supelguard Cartridges

The 5 cm × 4.6 mm guard columns do not include tubing, nuts or ferrules.

Compatible	L × I.D.	Cat. No.	Qty
SUPELCOGEL™ K Guard Column			
use to protect SUPELCOGEL K	5 cm × 4.6 mm	59344	1 ea
SUPELCOGEL™ Pb Guard Column			
use to protect SUPELCOGEL Pb	5 cm × 4.6 mm	59345	1 ea
SUPELCOGEL™ Ca Guard Column			
use to protect SUPELCOGEL Ca and SUPELCOGEL C-611	5 cm × 4.6 mm	59306-U	1 ea
SUPELCOGEL™ H Guard Column			
use to protect SUPELCOGEL C-610H and SUPELCOGEL H	5 cm × 4.6 mm	59319	1 ea
SUPELCOGEL™ Ag1 HPLC Column			
use to protect SUPELCOGEL Ag1	5 cm × 4.6 mm	59317-U	1 ea
SUPELCOGEL™ Ag2 HPLC Column			
use to protect SUPELCOGEL Ag2	5 cm × 4.6 mm	59316	1 ea
SUPELCOGEL™ LC-NH₂ Supelguard™ Cartridge			
use to protect LC-NH ₂	2 cm × 4.0 mm	59568	2 ea
use to protect LC-NH ₂	2 cm × 4.0 mm	59558	1 kit

Organic Acids



column: SUPELCOGEL C-610H, 30 cm × 7.8 mm I.D.
59320
mobile phase: 0.1% H₃PO₄
flow rate: 0.5 mL/min
temp.: 30 °C
det.: UV, 210 nm
injection: 1.0 µL

SUPELCOGEL™ C-610H HPLC Column

SUPELCOGEL C-610H columns are ideal for separating carbohydrates, alcohols, and organic acids present in the same sample: wines and other fermentation products, fruit juices, biological samples, etc.

suitable for L17 per USP

particle platform sulfonated polystyrene/divinylbenzene, spherical
pH range 1 - 13

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 9 µm			
7.8	30	59320-U	1 ea

SUPELCOGEL™ H HPLC Column

SUPELCOGEL H columns are ideal for separating carbohydrates, alcohols, and organic acids present in the same sample: wines and other fermentation products, fruit juices, biological samples, etc.

suitable for L17 per USP

particle platform sulfonated polystyrene/divinylbenzene, spherical
operating pH range 1 - 13

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 9 µm			
4.6	25	59346	1 ea
7.8	30	59304-U	1 ea

SUPELCOGEL™ H Guard Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 9 µm			
4.6	5	59319	1 ea

HPLC for Small Molecules

SUPELCOGEL™: Organic Acids

Typical Retention Times for Organic Acids on SUPELCOGEL C-610H and H Columns

Column: Length (cm): ID (mm): Cat. No.:	C-610H 30 7.8 59320-U	H 30 7.8 59304-U	H 25 4.6 59346
Acetic	19.0	19.6	17.6
Adipic	22.5	24.0	21.3
Ascorbic	13.1	13.3	12.1
Benzoic ¹	42.4	44.3	37.9
Butyric	28.0	28.3	24.9
Citric	11.0	10.9	10.1
Formic	17.5	18.1	16.3
Fumaric	19.8	20.9	18.2
Gluconic	12.0	12.0	11.1
Isobutyric	25.6	25.9	22.9
Isocitric	11.2	11.0	10.2
Lactic	16.0	16.9	15.2
Maleic	10.4	10.1	9.0
Malic	12.9	13.2	12.0
Malonic	13.4	13.7	12.5
Oxalic	9.0	7.9	7.3
Phytic	8.3	7.0	6.8
Propionic	22.5	23.1	20.5
Quinic	13.3	14.0	12.8
Shikimic	15.5	16.5	14.9
Succinic	15.7	16.4	14.9
Tartaric	11.7	11.7	10.7
Maleic	10.4	10.1	9.0

Mobile Phase: 0.1% H₃PO₄, 0.5 mL/min (0.17 mL/min for 25 cm x 4.6 mm column),
Temperature: 30 °C, Detection: UV, 210 nm

¹As sodium benzoate

Kromasil® HPLC Columns

NEW PRODUCTS

Kromasil® HPLC Columns

Kromasil® premium silica-based HPLC columns and chromatography packings are developed for analytical up to process scale applications. Kromasil has superior mechanical and chemical stability, high available surface area, and a narrow pore size distribution. This results in long lifetime and high loading capacity. In addition the surface properties are excellent, making it possible to run even basic compounds without the use of additives.

Kromasil® C18 HPLC Column

available only in USA, Canada and Puerto Rico

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
particle size 3.5 µm				
2.1	20	100	K08670634	1 ea
2.1	30	100	K08670635	1 ea
4.6	30	100	K08670642	1 ea
2.1	50	100	K08670352	1 ea
3	50	100	K08971207	1 ea
4	50	100	K08670640	1 ea
4.6	50	100	K08670643	1 ea
4.6	75	100	K08670644	1 ea
2.1	100	100	K08670350	1 ea
3	100	100	K08670636	1 ea
4	100	100	K08670638	1 ea
4.6	100	100	K08670353	1 ea

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
4.6	125	100	K08670641	1 ea
2.1	150	100	K08670351	1 ea
3	150	100	K08670637	1 ea
4	150	100	K08670639	1 ea
4.6	150	100	K08670354	1 ea
particle size 5 µm				
4.6	30	100	K08670666	1 ea
2.1	50	100	K08670650	1 ea
3	50	100	K08670647	1 ea
4	50	100	K08970908	1 ea
4.6	50	100	K08670358	1 ea
21.2	50	100	K08670654	1 ea
4.6	60	100	K08670668	1 ea
2.1	100	100	K08670355	1 ea
3	100	100	K08670645	1 ea
4	100	100	K08970909	1 ea
4.6	100	100	K08670664	1 ea
21.2	100	100	K08670651	1 ea
30	100	100	K08670655	1 ea
4	125	100	K08670658	1 ea
2.1	150	100	K08670649	1 ea
3	150	100	K08670646	1 ea
4	150	100	K08670659	1 ea
4.6	150	100	K08670356	1 ea
21.2	150	100	K08670652	1 ea
30	150	100	K08670656	1 ea
4	200	100	K08670660	1 ea
4.6	200	100	K08670665	1 ea
4	250	100	K08670661	1 ea
4.6	250	100	K08670357	1 ea
10	250	100	K08670648	1 ea
21.2	250	100	K08670653	1 ea
30	250	100	K08670657	1 ea
4	300	100	K08670662	1 ea
4.6	300	100	K08670667	1 ea
2.1	50	300	K08670675	1 ea
3	50	300	K08670671	1 ea
4.6	50	300	K08670679	1 ea
2.1	100	300	K08670673	1 ea

Kromasil® C8 HPLC Column

available only in USA, Canada and Puerto Rico

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
particle size 3.5 µm				
2.1	20	100	K08670742	1 ea
2.1	50	100	K08670743	1 ea
4.6	50	100	K08670746	1 ea
2.1	100	100	K08670740	1 ea
4.6	100	100	K08670744	1 ea
2.1	150	100	K08670741	1 ea
3	150	100	K08670739	1 ea
4.6	150	100	K08670745	1 ea
4.6	75	100	K08670747	1 ea
particle size 5 µm				
2.1	50	100	K08670754	1 ea
3	50	100	K08670750	1 ea
4.6	50	100	K08670768	1 ea
21.2	50	100	K08670758	1 ea
2.1	100	100	K08670752	1 ea
3	100	100	K08670748	1 ea
4.6	100	100	K08670764	1 ea

HPLC for Small Molecules

Kromasil® HPLC Columns: Kromasil® HPLC Columns

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
21.2	100	100	K08670755	1 ea
30	100	100	K08670759	1 ea
4	125	100	K08670761	1 ea
4.6	125	100	K08670765	1 ea
2.1	150	100	K08670753	1 ea
3	150	100	K08670749	1 ea
4	150	100	K08670762	1 ea
4.6	150	100	K08670766	1 ea
21.2	150	100	K08670756	1 ea
30	150	100	K08670760	1 ea
4.6	200	100	K08670767	1 ea
4	250	100	K08670763	1 ea
4.6	250	100	K08670369	1 ea
10	250	100	K08670751	1 ea
21.2	250	100	K08670757	1 ea
30	250	100	K08971214	1 ea
2.1	50	300	K08670775	1 ea
3	50	300	K08670771	1 ea
4.6	50	300	K08670780	1 ea
2.1	100	300	K08670773	1 ea
3	100	300	K08670769	1 ea
4.6	100	300	K08670777	1 ea
2.1	150	300	K08670774	1 ea
3	150	300	K08670770	1 ea
4.6	150	300	K08670778	1 ea
4.6	250	300	K08670779	1 ea
10	250	300	K08670772	1 ea
21.2	250	300	K08670776	1 ea
particle size 7 µm				
4.6	150	100	K08970964	1 ea
4.6	250	100	K08970969	1 ea
particle size 10 µm				
21.2	100	100	K08670726	1 ea
30	100	100	K08670729	1 ea
4.6	150	100	K08670731	1 ea
21.2	150	100	K08670727	1 ea

Kromasil® C4 HPLC Column

available only in USA, Canada and Puerto Rico

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
particle size 3.5 µm				
2.1	50	100	K08670363	1 ea
4.6	50	100	K08670365	1 ea
2.1	100	100	K08670361	1 ea
4.6	100	100	K08670364	1 ea
2.1	150	100	K08670362	1 ea
3	150	100	K08670693	1 ea
4.6	150	100	K08670694	1 ea
4.6	75	100	K08670695	1 ea
particle size 5 µm				
4.6	30	100	K08670712	1 ea
2.1	50	100	K08670703	1 ea
3	50	100	K08670698	1 ea
4.6	50	100	K08670713	1 ea
21.2	50	100	K08670707	1 ea
2.1	100	100	K08670701	1 ea
3	100	100	K08670696	1 ea
4.6	100	100	K08670711	1 ea
21.2	100	100	K08670704	1 ea
30	100	100	K08670708	1 ea
2.1	150	100	K08670702	1 ea

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
3	150	100	K08670697	1 ea
4	150	100	K08670710	1 ea
4.6	150	100	K08670366	1 ea
21.2	150	100	K08670705	1 ea
30	150	100	K08670709	1 ea
4.6	250	100	K08670367	1 ea
10	250	100	K08670700	1 ea
21.2	250	100	K08670706	1 ea
30	250	100	K08971213	1 ea
2.1	50	300	K08670720	1 ea
3	50	300	K08670716	1 ea
4.6	50	300	K08670724	1 ea
2.1	100	300	K08670718	1 ea
3	100	300	K08670714	1 ea
4.6	100	300	K08670722	1 ea
2.1	150	300	K08670719	1 ea
3	150	300	K08670715	1 ea
4.6	150	300	K08670723	1 ea
4.6	250	300	K08670368	1 ea
10	250	300	K08670717	1 ea
21.2	250	300	K08670721	1 ea
particle size 7 µm				
4.6	150	100	K08970963	1 ea
4.6	250	100	K08970968	5 ea
particle size 10 µm				
21.2	100	100	K08670681	1 ea
30	100	100	K08670684	1 ea
4.6	150	100	K08670686	1 ea
21.2	150	100	K08670682	1 ea
30	150	100	K08670685	1 ea
10	250	100	K08670680	1 ea
21.2	250	100	K08670683	1 ea

Kromasil® HILIC-D HPLC Column

available only in USA, Canada and Puerto Rico

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
particle size 5 µm				
2.1	50	60	K08971260	1 ea
2.1	100	60	K08971261	1 ea
2.1	150	60	K08971262	1 ea
3.0	50	60	K08971263	1 ea
3.0	100	60	K08971264	1 ea
3.0	150	60	K08971265	1 ea
4.6	50	60	K08971266	1 ea
4.6	100	60	K08971267	1 ea
4.6	150	60	K08971268	1 ea
4.6	250	60	K08971269	1 ea
10	250	60	K08971270	1 ea
21.2	250	60	K08971271	1 ea
30	250	60	K08971272	1 ea

HPLC for Small Molecules

Kromasil® HPLC Columns: *Kromasil® HPLC Columns***Kromasil® Silica HPLC Column**

available only in USA, Canada and Puerto Rico

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
particle size 3.5 µm				
4.6	50	100	K08670441	1 ea
2.1	100	100	K08670437	1 ea
4.6	100	100	K08670439	1 ea
3	50	100	K08971222	1 ea
2.1	150	100	K08670438	1 ea
4.6	150	100	K08670440	1 ea
particle size 5 µm				
2.1	50	60	K08670476	1 ea
3	50	60	K08670472	1 ea
4.6	50	60	K08670483	1 ea
2.1	100	60	K08670474	1 ea
3	100	60	K08970903	1 ea
4.6	100	60	K08670480	1 ea
30	100	60	K08670470	1 ea
2.1	150	60	K08670475	1 ea
3	150	60	K08670471	1 ea
4.6	150	60	K08670481	1 ea
21.2	150	60	K08670477	1 ea
4.6	250	60	K08670482	1 ea
10	250	60	K08670473	1 ea
21.2	250	60	K08670478	1 ea
30	250	60	K08971209	1 ea
2.1	50	100	K08670448	1 ea
3	50	100	K08670444	1 ea
4.6	50	100	K08670461	1 ea
21.2	50	100	K08670452	1 ea
2.1	100	100	K08670446	1 ea
3	100	100	K08670442	1 ea
4.6	100	100	K08670457	1 ea
21.2	100	100	K08670449	1 ea
2.1	150	100	K08670447	1 ea
3	150	100	K08670443	1 ea
4.6	150	100	K08670458	1 ea
21.2	150	100	K08670450	1 ea
4	200	100	K08670455	1 ea
4	250	100	K08670456	1 ea
4.6	250	100	K08670381	1 ea
10	250	100	K08670445	1 ea
21.2	250	100	K08670451	1 ea
30	250	100	K08971212	1 ea
4.6	300	100	K08670460	1 ea
2.1	50	300	K08670497	1 ea
3	50	300	K08670493	1 ea
4.6	50	300	K08670417	1 ea
2.1	100	300	K08670495	1 ea
3	100	300	K08670491	1 ea
4.6	100	300	K08670499	1 ea
2.1	150	300	K08670496	1 ea
3	150	300	K08670492	1 ea
4.6	150	300	K08670415	1 ea
4.6	250	300	K08670416	1 ea

Kromasil® Cyano HPLC Column

available only in USA, Canada and Puerto Rico

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
particle size 5 µm				
2.1	50	60	K08670815	1 ea
3	50	60	K08670811	1 ea
4.6	50	60	K08670824	1 ea
21.2	50	60	K08670818	1 ea
2.1	100	60	K08670813	1 ea
3	100	60	K08670809	1 ea
4.6	100	60	K08670821	1 ea
21.2	100	60	K08670816	1 ea
2.1	150	60	K08670814	1 ea
3	150	60	K08670810	1 ea
4.6	150	60	K08670377	1 ea
21.2	150	60	K08971205	1 ea
30	150	60	K08670820	1 ea
4.6	200	60	K08670822	1 ea
4.6	250	60	K08670823	1 ea
10	250	60	K08670812	1 ea
21.2	250	60	K08670817	1 ea
30	250	60	K08670819	1 ea
particle size 10 µm				
4.6	150	60	K08670802	1 ea
4.6	250	60	K08670803	1 ea
10	250	60	K08670800	1 ea
21.2	250	60	K08670801	1 ea
30	250	60	K08970988	1 ea
50	250	60	K08670804	1 ea
particle size 16 µm				
4.6	150	60	K08670806	1 ea
4.6	250	60	K08670807	1 ea
10	250	60	K08670805	1 ea
50	250	60	K08670808	1 ea
Kromasil® Diol HPLC Column				
available only in USA, Canada and Puerto Rico				
I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
particle size 5 µm				
2.1	50	60	K08670841	1 ea
3	50	60	K08670837	1 ea
4.6	50	60	K08670846	1 ea
2.1	100	60	K08670839	1 ea
3	100	60	K08670835	1 ea
4.6	100	60	K08670844	1 ea
2.1	150	60	K08670840	1 ea
3	150	60	K08670836	1 ea
4.6	150	60	K08670378	1 ea
21.2	150	60	K08670842	1 ea
4.6	250	60	K08670845	1 ea
10	250	60	K08670838	1 ea
21.2	250	60	K08670843	1 ea
30	250	60	K08971208	1 ea
particle size 10 µm				
4.6	150	60	K08670827	1 ea
4.6	250	60	K08670828	1 ea
10	250	60	K08670825	1 ea
21.2	250	60	K08670826	1 ea
30	250	60	K08970990	1 ea
50	250	60	K08670829	1 ea

HPLC for Small Molecules

Kromasil® HPLC Columns: *Kromasil® HPLC Columns*

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
particle size 16 µm				
4.6	150	60	K08670832	1 ea
4.6	250	60	K08670833	1 ea
10	250	60	K08670830	1 ea
21.2	250	60	K08670831	1 ea
50	250	60	K08670834	1 ea

Kromasil® NH₂ HPLC Column

available only in USA, Canada and Puerto Rico

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
particle size 3.5 µm				
4.6	100	100	K08670858	1 ea
4.6	150	100	K08670859	1 ea
particle size 5 µm				
2.1	50	100	K08670866	1 ea
3	50	100	K08670862	1 ea
4.6	50	100	K08670870	1 ea
2.1	100	100	K08670864	1 ea
3	100	100	K08670860	1 ea
4.6	100	100	K08670868	1 ea
2.1	150	100	K08670865	1 ea
3	150	100	K08670861	1 ea
4.6	150	100	K08670869	1 ea
4.6	250	100	K08670343	1 ea
10	250	100	K08670863	1 ea
21.2	250	100	K08670867	1 ea
30	250	100	K08971210	1 ea
particle size 10 µm				
4.6	150	100	K08670850	1 ea
4.6	250	100	K08670851	1 ea
10	250	100	K08670847	1 ea
21.2	250	100	K08670848	1 ea
30	250	100	K08970989	1 ea
50	250	100	K08670852	1 ea
particle size 16 µm				
4.6	150	100	K08670855	1 ea
4.6	250	100	K08670856	1 ea
10	250	100	K08670853	1 ea
21.2	250	100	K08670854	1 ea
50	250	100	K08670857	1 ea

Kromasil® Phenyl HPLC Column

available only in USA, Canada and Puerto Rico

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
particle size 5 µm				
2.1	50	100	K08670887	1 ea
3	50	100	K08670883	1 ea
4.6	50	100	K08670893	1 ea
2.1	100	100	K08670885	1 ea
3	100	100	K08670881	1 ea
4.6	100	100	K08670891	1 ea
21.2	100	100	K08670888	1 ea
2.1	150	100	K08670886	1 ea
3	150	100	K08670882	1 ea
4	150	100	K08670890	1 ea
4.6	150	100	K08670892	1 ea
21.2	150	100	K08970924	1 ea
4.6	250	100	K08670379	1 ea
10	250	100	K08670884	1 ea
21.2	250	100	K08670889	1 ea

I.D. (mm)	L (mm)	Pore Size (Å)	Cat. No.	Qty
30	250	100	K08971211	1 ea
particle size 10 µm				
4.6	150	100	K08670873	1 ea
4.6	250	100	K08670874	1 ea
10	250	100	K08670871	1 ea
21.2	250	100	K08670872	1 ea
30	250	100	K08970991	1 ea
50	250	100	K08670875	1 ea
particle size 16 µm				
4.6	150	100	K08670878	1 ea
4.6	250	100	K08670879	1 ea
10	250	100	K08670876	1 ea
21.2	250	100	K08670877	1 ea
50	250	100	K08670880	1 ea

Kromasil® Guard Cartridges, Starter Kits, Holders, and Couplers**Kromasil® C18 Guard Cartridge**

L 10 mm
 particle size 5 µm
 pore size 100 Å

Description	Cat. No.	Qty
use to protect 2.1 mm I.D. columns	K08970942	5 ea
use to protect 3.0 - 4.6 mm I.D. columns	K08970943	5 ea
use to protect 10 mm I.D. columns	K08970944	5 ea
use to protect 21.2 mm I.D. columns	K08970945	5 ea

Kromasil® C8 Guard Cartridge

L 10 mm
 particle size 5 µm
 pore size 100 Å

Description	Cat. No.	Qty
use to protect 2.1 mm I.D. columns	K08970936	1 ea
use to protect 3.0 - 4.6 mm I.D. columns	K08970937	1 ea
use to protect 10 mm I.D. columns	K08970938	1 ea
use to protect 21.2 mm I.D. columns	K08970939	1 ea

Kromasil® C4 Guard Cartridge

L 10 mm
 particle size 5 µm
 pore size 100 Å

Description	Cat. No.	Qty
use to protect 2.1 mm I.D. columns	K08970930	5 ea
use to protect 3.0 - 4.6 mm I.D. columns	K08970931	5 ea
use to protect 10 mm I.D. columns	K08970932	5 ea
use to protect 21.2 mm I.D. columns	K08970933	5 ea

Kromasil® HILIC-D Guard Cartridge

L 10 mm
 particle size 5 µm

Description	Cat. No.	Qty
use to protect 2.1mm ID columns	K08971273	5 ea
use to protect 3.0 - 4.6 mm ID columns	K08971275	5 ea
use to protect 10 - 21.2 mm ID columns	K08971277	5 ea

HPLC for Small Molecules

Kromasil® HPLC Columns: *Kromasil® Guard Cartridges, Starter Kits, Holders, and Couplers*

Kromasil® HILIC-D Guard Cartridge Starter Kit

Kit includes 5 guard cartridges, guard cartridge holder, and coupler
 phase HILIC-D
 L 10 mm
 particle size 5 µm

Description	Cat. No.	Qty
use to protect 2.1 mm I.D. columns	K08971274	5 ea
use to protect 3.0 - 4.6 mm I.D. columns	K08971276	5 ea

Kromasil® Silica Guard Cartridge

L 10 mm
 particle size 5 µm
 pore size 100 Å

Description	Cat. No.	Qty
use to protect 2.1 mm I.D. columns	K08970948	5 ea
use to protect 3.0 - 4.6 mm I.D. columns	K08970949	5 ea
use to protect 10 mm I.D. columns	K08970950	5 ea
use to protect 21.2 mm I.D. columns	K08970951	5 ea

Kromasil® Guard Cartridge Starter Kit

Kit includes 5 guard cartridges, guard cartridge holder, and coupler
 L 10mm
 particle size 5 µm

Description	Cat. No.	Qty
phase C18, use to protect 2.1 mm I.D. columns	K08970946	1 kit
phase C18, use to protect 3.0 - 4.6 mm I.D. columns	K08970947	1 kit
phase C4, use to protect 2.1 mm I.D. columns	K08970934	1 kit
phase C4, use to protect 3.0 - 4.6 mm I.D. columns	K08970935	1 kit
phase C8, use to protect 2.1 mm I.D. columns	K08970940	1 kit
phase C8, use to protect 3.0 - 4.6 mm I.D. columns	K08970941	1 kit
phase Chiral CelluCoat®, use to protect 3.0 - 4.6 mm I.D. columns	K08971109	1 kit
phase Silica, use to protect 2.1 mm I.D. columns	K08970952	1 kit
phase Silica, use to protect 3.0 - 4.6 mm I.D. columns	K08970953	1 kit
phase Chiral AmyCoat®, use to protect 3.0 - 4.6 mm I.D. columns	K08971105	1 kit

Kromasil® Guard Cartridge Holder

Description	Cat. No.	Qty
for use with 2.1 - 4.6 mm I.D. x 10 mm L guard cartridge	K08970954	1 ea
for use with 10 - 21.2 mm I.D. x 10 mm L guard cartridge	K08970956	1 ea

Kromasil® Guard Cartridge Coupler

Description	Cat. No.	Qty
for use with 2.1 - 4.6 mm I.D. x 10 mm L guard cartridge	K08970955	1 ea
for use with 10 - 21.2 mm I.D. x 10 mm L guard cartridge	K08970957	1 ea

Kromasil® Eternity HPLC Columns

Kromasil Eternity™ is the new platform for chromatography with extended chemical stability at any pH between pH 1 and pH 12. Kromasil Eternity is the natural choice for the separation of ionic substances.

Kromasil® Eternity™ PhenylHexyl HPLC Column

suitable for L11 per USP
 available only in USA, Canada and Puerto Rico
 loading 12% Carbon
 phase 6-phenylhexyl
 surface area 330 m²/g
 pH-range 2 - 12

I.D. (mm)	L (mm)	Cat. No.	Qty
particle size 2.5 µm			
2.1	50	K08971231	1 ea
4.6	50	K08971233	1 ea
2.1	100	K08971232	1 ea
4.6	100	K08971234	1 ea
particle size 5 µm			
2.1	50	K08971235	1 ea
3.0	50	K08971237	1 ea
4.6	50	K08971241	1 ea
10	50	K08971245	1 ea
21.2	50	K08971248	1 ea
30	50	K08971251	1 ea
3.0	100	K08971238	1 ea
4.6	100	K08971242	1 ea
2.1	150	K08971236	1 ea
3.0	150	K08971239	1 ea
4.6	150	K08971243	1 ea
10	150	K08971246	1 ea
21.2	150	K08971249	1 ea
30	150	K08971252	1 ea
3.0	250	K08971240	1 ea
4.6	250	K08971244	1 ea
10	250	K08971247	1 ea
21.2	250	K08971250	1 ea
30	250	K08971253	1 ea

Kromasil® Eternity™ PhenylHexyl Guard Cartridge

L 10 mm
 particle size 5 µm
 pore size 100 Å

Description	Cat. No.	Qty
use to protect (2.1mm id column)	K08971254	5 ea
use to protect (3.0-4.6mm id column)	K08971256	5 ea
use to protect (2.1mm id column)	K08971255	5 ea
use to protect (3.0-4.6mm id columns)	K08971257	5 ea
use to protect (10-21.2mm id columns)	K08971258	5 ea
use to protect (30mm id columns)	K08971259	5 ea

Kromasil® Eternity™ C18 HPLC Column

suitable for L1 per USP
 available only in USA, Canada and Puerto Rico
 loading 14% Carbon
 phase C18
 surface area 330 m²/g
 pH-range 1 - 12

HPLC for Small Molecules

Kromasil® HPLC Columns: *Kromasil® Eternity HPLC Columns*

I.D. (mm)	L (mm)	Cat. No.	Qty
particle size 5 µm			
2.1	50	K08670898	1 ea
3	50	K08971110	1 ea
4.6	50	K08670900	1 ea
10	50	K08670420	1 ea
21.2	50	K08670423	1 ea
30	50	K08670426	1 ea
3	100	K08971111	1 ea
4.6	100	K08670901	1 ea
2.1	150	K08670899	1 ea
3	150	K08971112	1 ea
4.6	150	K08670902	1 ea
10	150	K08670421	1 ea
21.2	150	K08670424	1 ea
30	150	K08670427	1 ea
3	250	K08971113	1 ea
4.6	250	K08670903	1 ea
10	250	K08670422	1 ea
21.2	250	K08670425	1 ea
30	250	K08670428	1 ea
particle size 2.5 µm			
2.1	50	K08670894	1 ea
4.6	50	K08670896	1 ea
2.1	100	K08670895	1 ea
4.6	100	K08670897	1 ea

Kromasil® Eternity™ C18 Guard Cartridge

L 10 mm
 particle size 5 µm
 pore size 100 Å

Description	Cat. No.	Qty
use to protect 2.1mm ID columns	K08971215	5 ea
use to protect 2.1mm id columns	K08971216	5 ea
use to protect 3.0 - 4.6mm id columns	K08971217	5 ea
use to protect 3.0 - 4.6 mm id columns	K08971218	5 ea
use to protect 10mm id columns	K08971219	5 ea
use to protect 21.2mm id columns	K08971220	5 ea
use to protect 30mm id columns	K08971221	5 ea

Kromasil® Bulk Silica

High performance Kromasil bulk products can be used in all commercial industrial HPLC, SFC, and SMB systems. Obtain the same mechanical stability, chemical stability, selectivity, superior loadability and scaling ability whether using Kromasil packed in an analytical column or process scale column.

Kromasil® C18, Bulk

available only in USA, Canada and Puerto Rico

Particle Size (µm)	Pore Size (Å)	Cat. No.	Qty
10	100	K08670382	500 g
		K08971149	1 kg
		K08971180	2 kg
10	300	K08971124	500 g
		K08971155	1 kg
		K08971186	2 kg
13	100	K08971129	500 g
		K08971160	1 kg
		K08971191	2 kg
16	100	K08971136	500 g
		K08971167	1 kg
		K08971198	2 kg
16	300	K08971142	500 g
		K08971173	1 kg
		K08971204	2 kg

Kromasil® C8, Bulk

available only in USA, Canada and Puerto Rico

Particle Size (µm)	Pore Size (Å)	Cat. No.	Qty
10	100	K08971118	500 g
		K08971148	1 kg
		K08971179	2 kg
10	300	K08971123	500 g
		K08971154	1 kg
		K08971185	2 kg
13	100	K08971128	500 g
		K08971159	1 kg
		K08971190	2 kg
16	100	K08971135	500 g
		K08971166	1 kg
		K08971197	2 kg
16	300	K08971141	500 g
		K08971172	1 kg
		K08971203	2 kg

Kromasil® Silica, Bulk

available only in USA, Canada and Puerto Rico

Particle Size (µm)	Pore Size (Å)	Cat. No.	Qty
10	60	K08670383	500 g
		K08971143	1 kg
		K08971174	2 kg
10	100	K08971116	500 g
		K08971146	1 kg
		K08971177	2 kg
10	300	K08971121	500 g
		K08971152	1 kg
		K08971183	2 kg
13	60	K08971125	500 g
		K08971156	1 kg
		K08971187	2 kg
13	100	K08971126	500 g
		K08971157	1 kg
		K08971188	2 kg
16	60	K08971130	500 g
		K08971161	1 kg
		K08971192	2 kg
16	100	K08971133	500 g
		K08971164	1 kg
		K08971195	2 kg

HPLC for Small Molecules

Kromasil® HPLC Columns: *Kromasil® Bulk Silica*

Kromasil® Silica, Bulk (continued)

Particle Size (µm)	Pore Size (Å)	Cat. No.	Qty
16	300	K08971139	500 g
		K08971170	1 kg
		K08971201	2 kg

Kromasil® C4, Bulk

available only in USA, Canada and Puerto Rico

Particle Size (µm)	Pore Size (Å)	Cat. No.	Qty
10	100	K08971117	500 g
		K08971147	1 kg
		K08971178	2 kg
10	300	K08971122	500 g
		K08971153	1 kg
		K08971184	2 kg
13	100	K08971127	500 g
		K08971158	1 kg
		K08971189	2 kg
16	100	K08971134	500 g
		K08971165	1 kg
		K08971196	2 kg
16	300	K08971140	500 g
		K08971171	1 kg
		K08971202	2 kg

Kromasil® NH₂, Bulk

available only in USA, Canada and Puerto Rico

Particle Size (µm)	Pore Size (Å)	Cat. No.	Qty
10	100	K08971119	500 g
		K08971150	1 kg
		K08971181	2 kg
16	100	K08971137	500 g
		K08971168	1 kg
		K08971199	2 kg

Kromasil® Phenyl, Bulk

available only in USA, Canada and Puerto Rico

Particle Size (µm)	Pore Size (Å)	Cat. No.	Qty
10	100	K08971120	500 g
		K08971151	1 kg
		K08971182	2 kg
16	100	K08971138	500 g
		K08971169	1 kg
		K08971200	2 kg

Kromasil® Cyano, Bulk

available only in USA, Canada and Puerto Rico

Particle Size (µm)	Pore Size (Å)	Cat. No.	Qty
10	60	K08971114	500 g
		K08971144	1 kg
		K08971175	2 kg
16	60	K08971131	500 g
		K08971162	1 kg
		K08971193	2 kg

Kromasil® Diol, Bulk

available only in USA, Canada and Puerto Rico

Particle Size (µm)	Pore Size (Å)	Cat. No.	Qty
10	60	K08971115	500 g
		K08971145	1 kg
		K08971176	2 kg
16	60	K08971132	500 g
		K08971163	1 kg
		K08971194	2 kg

Guard Cartridge Accessories

Guard Column Holders



Clockwise, Upper Left: 55205, 504254, 567499-U, 54987, 59660-U

Use these guard column holders with the 2 cm guard cartridges listed on the previous pages.

The direct-connect holders allow a guard cartridge to attach to a Supelco modular column with no dead volume.

The direct-connect holders can only be used with Supelco modular columns.

The swivel-type holders allow the tubing to move independently of the holder, reducing the risk of leaks caused by crimped tubing.

The stand-alone holders include the necessary tubing, nuts, and ferrules for connecting to any analytical column.

Holders for Supelco® Guard Cartridges

Use these guard column holders with Supelguard™ cartridges. The Direct-Connect holders allow a guard cartridge to attach to a Supelco modular column with no dead volume. The Direct-Connect holders can only be used with Supelco modular columns. The Swivel-type holders allow the tubing to move independently of the holder, reducing the risk of leaks caused by crimped tubing. The Stand-Along holders include the necessary tubing, nuts and ferrules for connecting to any analytical columns

Compatibility	Cat. No.	Qty
Supelguard™ Guard Cartridge Holder		
Supelguard cartridges (2 cm L. x 2.1 mm I.D.)	504262	1 ea
Supelguard cartridges (2 cm L. x 3 to 4.6 mm I.D.)	504254	1 ea
Supelguard cartridge (2 cm L. x 3 to 4.6 mm I.D.)	55205	1 ea
Supelguard cartridges (2 cm L. x 2.1 to 4.6 mm I.D.)	59660-U	1 ea
Supelguard cartridges (1 cm L. x 10.0 mm I.D.)	567499-U	1 ea
Stand-Along Holder		
Pelliguard Cartridges	500054	1 ea
Supelguard™ Guard Cartridge Holder		
Supelguard cartridges (1 cm L. x 21.2 mm I.D.)	581392-U	1 ea

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Guard Cartridge Accessories: *Guard Column Holders*

Holders for TSKgel® Guard Cartridges

Compatibility	Cat. No.	Qty
Holder for TSKgel® Super Series Guardfilters		
-	818206	1 ea

Discovery® ZR Column Holder

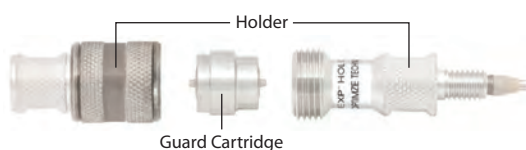
Compatibility	Cat. No.	Qty
Discovery® ZR Column Holder		
Discovery ZR Columns	65621-U	1 ea



Helpful Hints

Before flushing a reversed-phase HPLC column that contains a buffer (salt), flush with warm (60 °C) DI H₂O thoroughly to remove salts. Not following this general rule may result in salt precipitation when returned to 100% organic for long-term storage. For more information, refer to literature T401012, Buffered Mobile Phases in Reversed-Phase Liquid Chromatography.

Ascentis® Express Guard Cartridge Holder



Ascentis® Express Guard Cartridge Holder

Guard cartridge not included with holder

Compatibility	Cat. No.	Qty
Ascentis® Express Guard Cartridge Holder		
Ascentis Express Guard Columns	53500-U	1 ea

Pelliguard™ Guard Cartridges

Pelliguard™ Cartridge Kit

For 5 µm, 10 µm, or 12 µm SUPELCOSIL and other silica-based HPLC columns, where samples are especially dirty, and a small loss of efficiency is acceptable. Each kit contains one cartridge (2 cm × 4.6 mm I.D.) filled with 40 µm Pelliguard packing, a reusable stand-alone column holder, and hardware for connecting the holder to 1/16 inch tubing.

diameter 40 µm

Description	For Use With	Cat. No.	Pkg
LC-Si	Silica	59641	1 kit
LC-8	C8	59643	1 kit
LC-18	C18	59644	1 kit
LC-NH ₂	Amino	59646	1 kit



Pelliguard™ Cartridge

For 5 µm, 10 µm, or 12 µm SUPELCOSIL and other silica-based HPLC columns, where samples are especially dirty, and a small loss of efficiency is acceptable. Cartridges come in packages of four.

L × I.D. 2 cm × 4.6 mm

Description	For Use With	Cat. No.	Pkg
LC-Si	Silica	59651	4 ea
LC-NH ₂	Amino	59656	4 ea
LC-8	C8	59653	4 ea
LC-18	C18	59654	4 ea

Stand-Alone Holder

	Cat. No.	Qty
Stand-Alone Holder		
-	500054	1 ea

Bulk Pellicular Packing Kits

Pellicular Packing

Reusable 5 cm × 4.6 mm I.D. guard column hardware and 40 µm pellicular packing, for protecting 10 µm columns. Each column kit contains an empty 5 cm × 4.6 mm I.D. column, 10 g of Pelliguard packing, 10 frits, and hardware for connecting the column to 1/16 in. tubing. About 1.3 grams of packing is needed to pack one 5 cm × 4.6 mm column.

diameter 40 µm



Description	Use To Protect	Cat. No.	Pkg
LC-8	C8	58222-U	1 kit
LC-8	C8	58293	10 g
LC-18	C18	58232	1 kit
LC-18	C18	58294	10 g

Guard Column Hardware Kit

Guard Column Hardware Kit, Frits, Funnel and Tubing

Kit includes 5 cm × 4.6 mm I.D. column, end fittings, 2 frits (2.0 µm pores), and 2 in./5 cm of 0.01 in. I.D. × 1/16 in. O.D. SS tubing. Funnel connects to column with tygon tubing (included) for easier column filling.

Description	Cat. No.	Qty
Guard Column Hardware Kit	58319	1 kit
Column Frits	58264	10 ea
Funnel and Tubing	20390-U	1 ea



Guard Column Hardware kit

HPLC for Small Molecules

Legacy Columns

Legacy Columns

alphaBond™ HPLC Column

Particle Size (µm)	L × I.D.	Cat. No.	Qty
alphaBond™ C18			
10	15 cm × 3.9 mm	57488	1 ea
10	30 cm × 3.9 mm	57489	1 ea
alphaBond™ C18 Guard			
10	1 cm × 4.6 mm	57490-U	4 ea

Exsil™ HPLC Column

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase ODS			
5	25 cm × 4.6 mm	50101-U	1 ea

Inertsil® HPLC Column

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase ODS2			
5	12.5 cm × 4.0 mm	50102-U	1 ea
5	15 cm × 4.6 mm	50103-U	1 ea
5	25 cm × 4.6 mm	50108-U	1 ea

LiChrospher® HPLC Column

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase RP-18			
5	15 cm × 3.2 mm	54775	1 ea
5	25 cm × 3.2 mm	54777	1 ea
5	15 cm × 4.6 mm	54774	1 ea
5	25 cm × 4.6 mm	54776	1 ea
5	12.5 cm × 4.6 mm	50136-U	1 ea
5	25 cm × 4.0 mm	50137-U	1 ea
5	25 cm × 4.6 mm	50139-U	1 ea
phase RP-8			
5	15 cm × 4.6 mm	54778	1 ea
5	25 cm × 4.6 mm	54780	1 ea
5	12.5 cm × 4.6 mm	50140-U	1 ea
5	12.5 cm × 4.0 mm	50141-U	1 ea
5	25 cm × 4.0 mm	50143-U	1 ea
phase CN			
5	25 cm × 4.6 mm	54788	1 ea
5	12.5 cm × 4.0 mm	50131-U	1 ea
phase NH2			
5	25 cm × 3.2 mm	54785	1 ea
5	15 cm × 4.6 mm	54782	1 ea
5	25 cm × 4.6 mm	54784	1 ea
5	30 cm × 4.0 mm	50132-U	1 ea
phase Si-60			
5	25 cm × 4.6 mm	54792	1 ea
5	15 cm × 4.6 mm	54790-U	1 ea
phase 60RP-Select B			
5	12.5 cm × 4.0 mm	50146-U	1 ea
5	25 cm × 4.6 mm	50148-U	1 ea

LiChrospher® Guard Cartridge

For all guard cartridges listed here use holder 54987

Description	Cat. No.	Qty
phase RP18, particle size 5 µm, L 1 cm × I.D. 4.6 mm	54794	4 ea
phase CN, particle size 5 µm, L 1 cm × I.D. 4.6 mm	54798	4 ea
phase NH2, particle size 5 µm, L 1 cm × I.D. 4.6 mm	54796-U	4 ea
phase Si60, particle size 5 µm, L 1 cm × I.D. 4.6 mm	54797-U	4 ea

LiChrosorb® HPLC Column

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase RP-18			
5	15 cm × 3.2 mm	54952	1 ea
5	25 cm × 4.6 mm	54949	1 ea
5	10 cm × 4.6 mm	50124-U	1 ea
10	20 cm × 4.6 mm	50125-U	1 ea
phase C18			
5	15 cm × 4.6 mm	54951	1 ea
phase RP-8			
5	15 cm × 4.6 mm	54955-U	1 ea
5	25 cm × 4.6 mm	54953-U	1 ea
7	25 cm × 4.6 mm	50130-U	1 ea
10	25 cm × 4.6 mm	50129-U	1 ea
phase CN			
10	25 cm × 4.0 mm	50121-U	1 ea
10	25 cm × 4.6 mm	50117-U	1 ea
phase Diol			
5	25 cm × 4.0 mm	50122-U	1 ea
phase Si60			
5	25 cm × 4.6 mm	50112-U	1 ea

LiChrosorb® Guard Cartridges

For all guard cartridges listed here use holder 54987

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase RP18			
5	1 cm × 4.6 mm	54965-U	4 ea
phase RP8			
5	1 cm × 4.6 mm	54966	4 ea

Nucleosil® HPLC Column

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase C18			
3	10 cm × 3.2 mm	54917	1 ea
3	10 cm × 4.0 mm	50178-U	1 ea
3	7.5 cm × 4.6 mm	50179-U	1 ea
3	10 cm × 4.6 mm	Z226165	1 ea
3	15 cm × 4.6 mm	50159-U	1 ea
5	15 cm × 3.2 mm	54918	1 ea
5	25 cm × 3.2 mm	54919	1 ea
5	12.5 cm × 4.0 mm	50165-U	1 ea
5	10 cm × 4.6 mm	50161-U	1 ea
5	10 cm × 4.6 mm	50181-U	1 ea
5	12.5 cm × 4.6 mm	50164-U	1 ea
5	12.5 cm × 4.6 mm	50184-U	1 ea
5	15 cm × 4.6 mm	50188-U	1 ea
5	25 cm × 4.6 mm	Z226181	1 ea

HPLC for Small Molecules

Legacy Columns

Particle Size (µm)	L × I.D.	Cat. No.	Qty
5	25 cm × 4.6 mm	50189-U	1 ea
5	25 cm × 4.0 mm	50166-U	1 ea
phase C18 EXCEL			
5	15 cm × 4.0 mm	50191-U	1 ea
phase C18			
10	20 cm × 4.0 mm	50151-U	1 ea
5	15 cm × 4.6 mm	Z226173	1 ea
10	25 cm × 4.6 mm	50152-U	1 ea
10	25 cm × 4.6 mm	50177-U	1 ea
phase C8			
3	10 cm × 4.6 mm	Z226203	1 ea
5	25 cm × 3.2 mm	54922	1 ea
5	15 cm × 4.6 mm	Z226211	1 ea
5	25 cm × 4.6 mm	Z226238	1 ea
10	25 cm × 4.0 mm	50154-U	1 ea
phase Phenyl			
7	25 cm × 4.6 mm	Z226246	1 ea
phase CN			
5	15 cm × 3.2 mm	54924	1 ea
5	15 cm × 4.6 mm	Z226254	1 ea
5	25 cm × 4.6 mm	Z226262	1 ea
5	10 cc × 4.6 mm	50171-U	1 ea
phase Si			
5	15 cm × 4.6 mm	Z226149	1 ea
5	25 cm × 4.6 mm	Z226157	1 ea
phase NH2			
5	15 cm × 3.2 mm	54926	1 ea
5	25 cm × 4.6 mm	Z226289	1 ea
phase SA			
5	10 cm × 2.1 mm	50172-U	1 ea
5	15 cm × 4.6 mm	50173-U	1 ea
5	25 cm × 4.6 mm	50174-U	1 ea
10	25 cm × 4.6 mm	50157-U	1 ea
phase SB			
5	25 cm × 4.6 mm	50175-U	1 ea
5	5 cm × 4.6 mm	50176-U	1 ea

Nucleosil® Guard Column

For all guard cartridges listed here use holder 54987

Particle Size (µm)	L × I.D.	Cat. No.	Qty
5	1 cm × 4.6 mm	Z227137	4 ea
Nucleosil® C8			
5	1 cm × 4.6 mm	Z227145	4 ea
Nucleosil® C18			
5	1 cm × 4.6 mm	Z227129	4 ea
7	1 cm × 4.6 mm	Z227153	4 ea

Partisil™ HPLC Column

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase 5 ODS3			
5	10 cm × 4.6 mm	50204-U	1 ea
phase 5 ODS			
5	15 cm × 4.6 mm	50207-U	1 ea
5	25 cc × 4.6 mm	50208-U	1 ea
phase 10 ODS			
10	25 cm × 4.6 mm	50192-U	1 ea
phase 10 SAX			
10	25 cm × 4.6 mm	50193-U	1 ea
phase 10 SCX			
10	25 cm × 4.6 mm	50197-U	1 ea

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Silica			
5	25 cm × 4.6 mm	50201-U	1 ea

Spherisorb® HPLC Column

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase ODS1			
5	12.5 cm × 4.6 mm	50231-U	1 ea
5	15 cm × 4.6 mm	50233-U	1 ea
5	25 cm × 4.6 mm	50234-U	1 ea
5	25 cm × 3.2 mm	50235-U	1 ea
10	25 cm × 4.6 mm	50221-U	1 ea
10	25 cc × 4.0 mm	50222-U	1 ea
phase ODS2			
5	10 cm × 4.6 mm	50236-U	1 ea
5	15 cm × 4.0 mm	50237-U	1 ea
3	10 cm × 3.2 mm	54903	1 ea
3	10 cm × 4.6 mm	Z226033	1 ea
3	15 cm × 4.6 mm	50223-U	1 ea
5	15 cm × 3.0 mm	54904	1 ea
5	25 cm × 3.2 mm	54905	1 ea
5	15 cm × 4.6 mm	Z226041	1 ea
5	25 cm × 4.6 mm	Z226068	1 ea
phase ODS2 EXCEL			
5	25 cm × 4.6 mm	50238-U	1 ea
phase C8			
5	10 cm × 4.6 mm	54908	1 ea
5	15 cm × 4.6 mm	Z226084	1 ea
5	25 cm × 4.6 mm	Z226092	1 ea
phenyl			
5	25 cm × 4.6 mm	Z226106	1 ea
phase CN			
5	25 cm × 4.6 mm	Z226114	1 ea
5	10 cm × 4.6 mm	50228-U	1 ea
10	25 cm × 4.6 mm	50211-U	1 ea
Silica			
5	15 cm × 3.2 mm	54901	1 ea
5	25 cm × 3.2 mm	54902	1 ea
5	25 cm × 4.6 mm	Z226025	1 ea
phase NH2			
5	25 cm × 3.2 mm	54911-U	1 ea
5	25 cm × 4.6 mm	Z226122	1 ea
phase SAX			
5	25 cm × 4.6 mm	Z226130	1 ea
phase SCX			
5	10 cm × 2.1 mm	50244-U	1 ea
phase C6			
5	15 cm × 4.6 mm	50226-U	1 ea

Spherisorb® Guard Cartridges

For all guard cartridges listed here use holder 54987

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase C18			
5	1 cm × 4.6 mm	Z226971	4 ea
phase C8			
5	1 cm × 4.6 mm	Z226998	4 ea
phase CN			
5	1 cm × 4.6 mm	Z227013	4 ea
phase NH2			
5	1 cm × 4.6 mm	Z227021	4 ea

HPLC for Small Molecules

Legacy Columns

Superspher HPLC Column

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase RP-18			
4	25 cm × 4.0 mm	50245-U	1 ea
phase RP Select B			
4	12.5 cm × 4.0 mm	50248-U	1 ea

Zorbax® HPLC Column

Particle Size (µm)	L × I.D. (cm)	Cat. No.	Qty
phase C8			
7	15 × 4.6	50249-U	1 ea
phase NH2			
5	25 cm × 4.6 mm	50251-U	1 ea
phase ODS			
5	25 cm × 4.6 mm	50254-U	1 ea

Holder and Coupler for Legacy Guard Columns



Compatibility	Cat. No.	Qty
Holder and Coupler for Legacy Guard Columns		
non-Supelco guard cartridges (not TSKgel guard cartridges)	54987	1 ea

Coupler for Legacy Guard Column Holder



Compatibility	Cat. No.	Qty
Coupler for Legacy Guard Column Holder		
Also a replacement connector for stand-alone guard holder (54987) for use with HPLC columns with 1/16", 10-32 thread end-fittings (Used with all Supelco and Astec columns, plus other brands that have the same thread dimensions.)	54986	1 ea

HPLC for Large Molecules

Separation Techniques for Biomolecules

Biomolecules and the matrixes in which they are analyzed are often complex. To accommodate the complexity and maintain biological activity, if required, many different chromatographic techniques have been employed. We have chosen to include in our product offering select columns and media from the major separation modes, including:

- Reversed-phase (RP)
- Size exclusion chromatography (SEC) - Gel filtration chromatography (GFC)
- Size exclusion chromatography (SEC) - Gel permeation chromatography (GPC)
- Ion-exchange chromatography (IEX)
- Hydrophobic interaction chromatography (HIC)
- Affinity chromatography
- Hydrophilic interaction chromatography (HILIC)

Each of these modes and our corresponding products are described in their respective sections that follow.

Look to Supelco for TSKgel columns and Toyopearl packings

In addition to our own proprietary products and other famous brands for bioseparations, we are pleased to be able to offer the well-respected TSKgel columns and Toyopearl packings from Tosoh Corp. If you do not see the Tosoh product you need in this catalog, please contact us.

HPLC for Large Molecules

Column Selection for Biomolecule Separations

Column Selection for Biomolecule Separations

Type of Analyte Molecule	Separation Mode	Supelco Columns	TSKgel Columns
Amino Acids	Reversed-phase	Ascentis or Ascentis Express C18	
	Hydrophilic interaction (HILIC)	Ascentis or Ascentis Express Silica	Amide-80
	Enantiomer separation (chiral)	Astec CHIROBIOTIC®	
DNA/RNA	Gel filtration (GFC)	Discovery BIO GFC	G-DNA-PW
	Ion-exchange	Discovery BIO PolyMA-WAX	DNA-STAT, DEAE-NPR
Nucleotides	Reversed-phase	Ascentis or Ascentis Express C18, SUPELCOSIL LC-18-T	
	Ion-exchange	SUPELCOSIL SAX1	DNA-STAT, DEAE-2SW
Nucleosides	Reversed-phase	Ascentis or Ascentis Express C18, SUPELCOSIL LC-18-S	
Nucleobases	Reversed-phase	Ascentis or Ascentis Express C18	
	Ion-exchange	SUPELCOSIL LC-SCX	DNA-STAT, DEAE-2SW
Oligonucleotides	Ion-exchange	Discovery BIO PolyMA-WAX	DNA-STAT, DEAE-5PW
	Reversed-phase	Discovery BIO Wide Pore C18 Ascentis Express Peptide ES C18	Oligo-DNA RP
PCR Fragments	Ion-exchange	Discovery BIO PolyMA-WAX	DNA-STAT, DEAE-NPR
Polymers (Organic-soluble)	Gel permeation (GPC)		H _{HR} and H _{XL} series
Polymers (Water-soluble)	Gel filtration (GFC)		SuperMultiporePW, PW _{XL} , PW, SuperAW, Alpha series
Polymers (Polar organic-soluble)	Gel filtration (GFC)		SuperAW, Alpha series
Proteins, Peptides	Gel filtration (GFC)	Discovery BIO GFC	SuperSW, SW, SW _{XL} , PW, PW _{XL} series
	Desalting		BioAssist DS
	Reversed-phase	Discovery BIO Wide Pore C18, C8, C5 Ascentis Express Peptide ES C18	Phenyl-5PW, Octadecyl-4PW, Octadecyl-NPR, ODS-140HTP
	Anion-exchange (strong)		Q-STAT
	Anion-exchange (weak)	Discovery BIO PolyMA-WAX	DEAE-5PW, DEAE-NPR
	Cation-exchange (strong)		SP-NPR, SP-STAT, SP-5PW
	Cation-exchange (weak)	Discovery BIO PolyMA-SCX	CM-STAT, CM-5PW
	Hydrophobic interaction (HIC)		Butyl-NPR, Ether-5PW, Phenyl-5PW
	Hydrophilic interaction (HILIC)	Ascentis or Ascentis Express Silica	Amide-80
	Affinity		Boronate-5PW, Chelate-5PW, Heparin-5PW, Tresyl-5PW

Discovery® BIO

Introduction to the Discovery® BIO Product Family

Discovery® BIO Wide Pore reversed-phase HPLC columns and capillaries provide sensitive, stable, efficient, reproducible separations of proteins and peptides. The different phase chemistries and separation modes provide unique selectivity, increasing your resolution options. Separations are completely scalable from analytical to preparative. The low-bleed feature along with microbore and capillary dimensions, make them ideal for proteomics and other LC-MS applications.

Discovery BIO PolyMA columns provide efficient, high-recovery, non-denaturing ion-exchange separations of proteins and peptides.

Discovery BIO GFC columns provide high separation capacity size exclusion separations across an extremely wide molecular weight range.

Choosing a Discovery BIO Phase for Samples and Separation Modes

Sample or Usage	Separation Mode	Discovery BIO Product
Proteomics	Reversed-phase	Discovery BIO Wide Pore C18 in 0.18 to 0.5 mm I.D. capillaries
Peptide Mapping/ Proteolytic Digests	Reversed-phase	Discovery BIO Wide Pore C18 Discovery BIO Wide Pore C8
Hydrophobic Peptides	Reversed-phase	Discovery BIO Wide Pore C5
Proteins	Reversed-phase	Discovery BIO Wide Pore C5
Proteins/Peptides	Cation-Exchange	Discovery BIO PolyMA-SCX
Proteins/Peptides	Anion-Exchange	Discovery BIO PolyMA-WAX
Proteins/Peptides	Size Exclusion	Discovery BIO GFC



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T408076	Discovery® BIO: Solutions for Biotechnology Purification & Separation Challenges

HPLC for Large Molecules

Discovery® BIO: *The Challenges of Protein and Peptide Separations*

The Challenges of Protein and Peptide Separations

Many of the challenges facing researchers in the proteomics and biopharmaceutical fields are related to the need to obtain as much information as possible on very limited samples. Supelco designed the Discovery® BIO HPLC columns to address these challenges.

Separate Complex Protein or Peptide Mixtures

The selectivity and efficiency offered by Discovery® BIO gives maximum power for resolving complex mixtures of proteins, natural and synthetic peptides, and peptide maps. Exceptional pH stability allows full use of mobile phase pH to adjust the separation.

Small Sample Volumes and Proteins at Low Concentrations or Low Copy Numbers

The efficiency of Discovery® BIO provides sensitive analyses. Many Discovery® BIO products are available in capillary and microbore dimensions.

The Need for Detailed Characterization

Because of the sample complexity, many biomolecule separations are multi-dimensional. Discovery® BIO columns are designed to be compatible with secondary separation or detection methods. If purified sample is required for further characterization, most Discovery® BIO phases are scalable from capillary to preparative, and exhibit high sample recovery.

Large Number of Samples to Analyze

High sample throughput is achievable with the short analysis times provided by Discovery® BIO in small particles and short columns.

Trouble-Free Operation

The stability and reproducibility of Discovery® BIO phases permit reliable, trouble-free routine and long term operation.

Improved Selectivity

Discovery® BIO Wide Pore phases have different selectivity than other reversed-phase columns, which can increase the resolution of natural and synthetic peptide mixtures.

Solid phase synthesis is a common method to obtain novel peptides quickly and efficiently. Unintended side reactions are common and the RP-HPLC method must be capable of separating the peptides from unwanted by-products. Discovery® BIO Wide Pore columns are ideal for this application. The figure below illustrates the improved resolution of a mixture of synthetic peptides on a Discovery® BIO Wide Pore C18 column versus a competitive C18 column.

Improved Selectivity of Discovery® BIO Wide Pore RP Phases

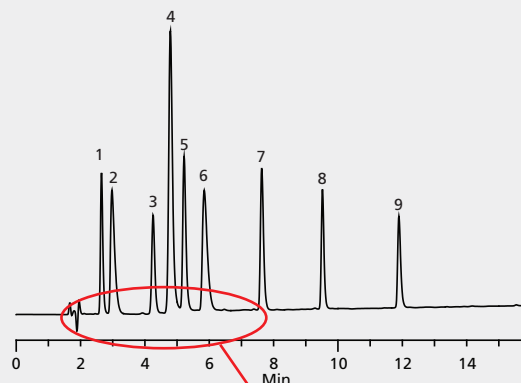
► application for HPLC

compound class: peptides
 column Discovery BIO Wide Pore C18, 15 cm x 4.6 mm I.D., 5 µm particles (568222-U) vs. competitive wide pore C18 column of same dimensions
 mobile phase A: 0.1% TFA in 80:20 water:acetonitrile
 B: 0.1% TFA in 66:34 water:acetonitrile
 Gradient of 0 to 100% B in 14 min. after 1 min. delay
 flow rate 1 mL/min
 column temp. 30 °C
 detector UV at 220 nm
 injection 10 µL
 sample peptide mixture (Sigma P2693), ~0.25 µg each peptide in 0.1% TFA
 Application No. G004415

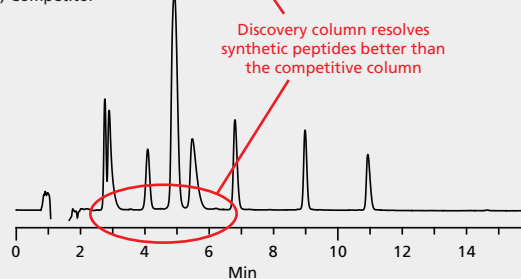
Peak Peptide	Amino Acid Sequence
1. Arg ⁸ -vassopressin	CYFQNCPRG-amide; disulfide
2. Bradykinin, fragment 1-5	RPPGF
3. Oxytocin	CYIQNCPLG-amide; disulfide
4. LHRH*	pEHWSYGLRPG-Amide**
5. Met-enkephalin	YGGFM
6. Bradykinin	RPPGFSPFR
7. Leu-enkephalin	YGGFL
8. Bombesin	pEQLGNQWAVGHLM-amide**
9. Substance P	RPKPQQFFGLM-amide

*Luteinizing Hormone Releasing Hormone
 **pE is pyroglutamate

(A) Discovery Bio Wide Pore C18



(B) Competitor



Discovery column resolves synthetic peptides better than the competitive column

HPLC for Large Molecules

Discovery® BIO: LC-MS Sensitivity: No TFA Needed

LC-MS Sensitivity: No TFA Needed

Discovery® BIO Wide Pore phases improve sensitivity by giving symmetrical, efficient peaks without TFA-containing mobile phases.

TFA (trifluoroacetic acid) is a commonly used mobile phase additive for reversed-phase HPLC (RP-HPLC) separations of proteins and peptides. However, TFA interferes with and significantly reduces the LC-MS signal, lowering sensitivity. The ideal column for modern LC-MS analysis should provide symmetrical peak shape without TFA in the mobile phase. The highly inert surface of Discovery® BIO silica results in columns that give symmetrical and efficient peaks for peptides without TFA for maximum LC-MS sensitivity.

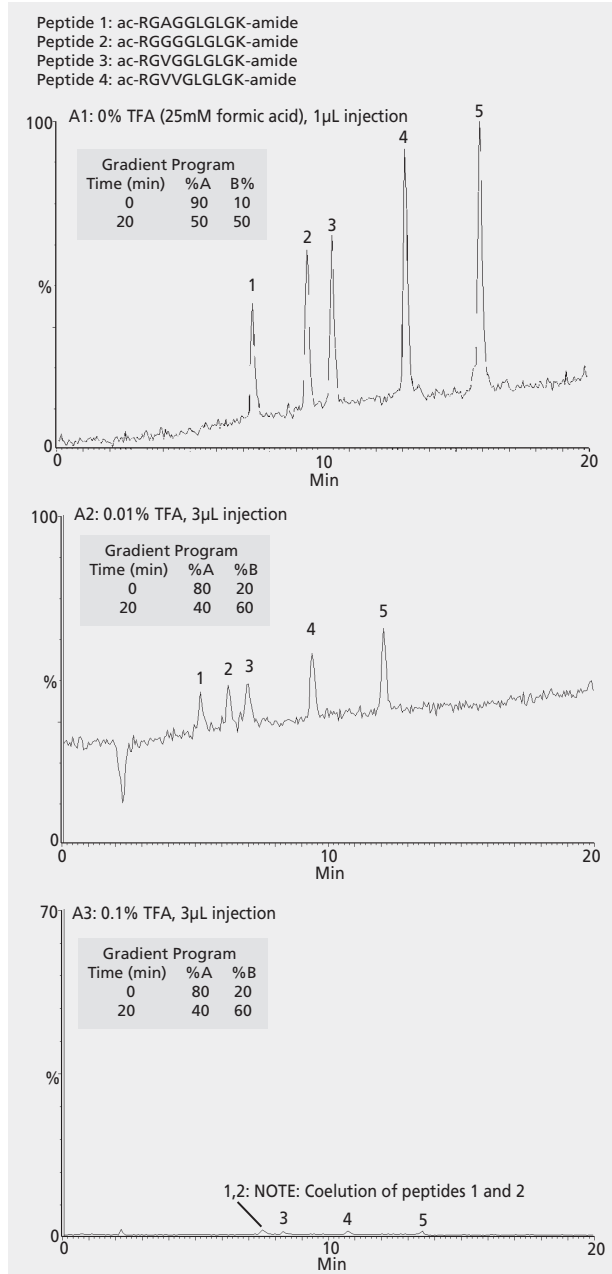
While TFA has little effect on UV detection, it has serious disadvantages for LC-MS detection. First, typical concentrations of TFA (0.1% v/v) have high surface tension and prevent efficient spray formation (nebulization). Second, TFA ions in the gas phase to run ion-pairs with the basic groups on the peptide suppressing their ionization and reducing sensitivity.

A demonstration of the adverse effect of TFA on LC-MS sensitivity is shown in the following figure. Without TFA, the MS is able to detect much lower concentrations of these peptides. An added benefit is that at low TFA concentrations, resolution is improved because small differences in peptide retention are not masked. This is shown in the increased separation of peptides 1 and 2 as the TFA concentration is decreased. At 0.1% TFA, they co-elute. Therefore, from the mobile phase standpoint, the best LC-MS method employs ionic additives other than TFA that are still volatile, can provide pH control, and do not strongly ion-pair with the peptides.

Effect of TFA Concentration on Peptide MS Signal

► application for HPLC

column Discovery® BIO Wide Pore C18, 15 cm x 2.1 mm I.D., 3 µm particles (567202-U)
 mobile phase A: aqueous component (25 mM formic acid, 0.01% TFA or 0.1% TFA)
 B: (50:50) water:acetonitrile containing same ionic additives as aq. component
 flow rate 0.208 mL/min
 column temp. ambient
 detector (+)ESI
 injection 1-3 µL
 sample RP Peptide Performance Standard (Alberta Peptide Inst., Cat. No. RPS-P0010)
 Application No. G004414



HPLC for Large Molecules

Discovery® BIO: Capillary and Microbore Dimensions

Capillary and Microbore Dimensions

The Benefits of Reducing Column I.D.

With regard to HPLC separations, smaller is often better. Columns with narrow I.D. can enhance sensitivity when dealing with a limited sample size. This makes them ideal for applications where detection at very low concentration in small sample volumes is required. The low flow rates also make narrow I.D. columns ideal for LC-MS applications. Proteomics and other areas of modern biological research often generate large numbers of samples containing very small volumes that need to be analyzed in a minimal amount of time. Additionally, compounds of interest in these samples may exist at very low concentrations.

When sample concentrations and volumes are sufficiently small, injection onto conventional I.D. columns (4.6 mm), and even narrowbore (2.1 mm), immediately reveals that current means of detection lack adequate sensitivity for satisfactory analysis. This may be the case whether detection is by UV absorption or mass spectrometry. This problem of sensitivity with conventional I.D. columns is a simple result of sample dilution within the relatively large volume comprised by the column and tubing.

A direct approach to reducing the extent of dilution and to increase sensitivity is to reduce the column volume. As long as the linear velocity is constant, and for a given limiting sample mass, peak volumes are correspondingly reduced for narrower I.D. columns. Detection levels can be orders of magnitude lower by decreasing the column I.D. These principles, which relate to each other by relative cross-sectional areas of the various column dimensions, are illustrated in the tables below.



Supelco microbore HPLC columns

Effect of Column Dimension on Required Sample Mass for a Given Sensitivity

Column I.D. (mm)	Relative Volumetric Flow*	Relative Sample Mass	Relative Sensitivity
4.6	1	1	1
3.0	0.42	0.42	1
2.1	0.21	0.21	1
1.0	0.047	0.047	1
0.50	0.012	0.012	1
0.32	0.0048	0.0048	1
0.18	0.0015	0.0015	1

*Assumes constant linear velocity, equivalent column length and efficiency (plates/meter), and no significant extra-column volume

Effect of Column Dimension on Sensitivity for a Limiting Sample Mass

Column I.D. (mm)	Relative Volumetric Flow*	Relative Sample Mass	Relative Sensitivity
4.6	1	1	1
3.0	0.42	1	2
2.1	0.21	1	5
1.0	0.047	1	21
0.50	0.012	1	85
0.32	0.0048	1	207
0.18	0.0015	1	653

*Assumes constant linear velocity, equivalent column length and efficiency (plates/meter), and no significant extra-column volume

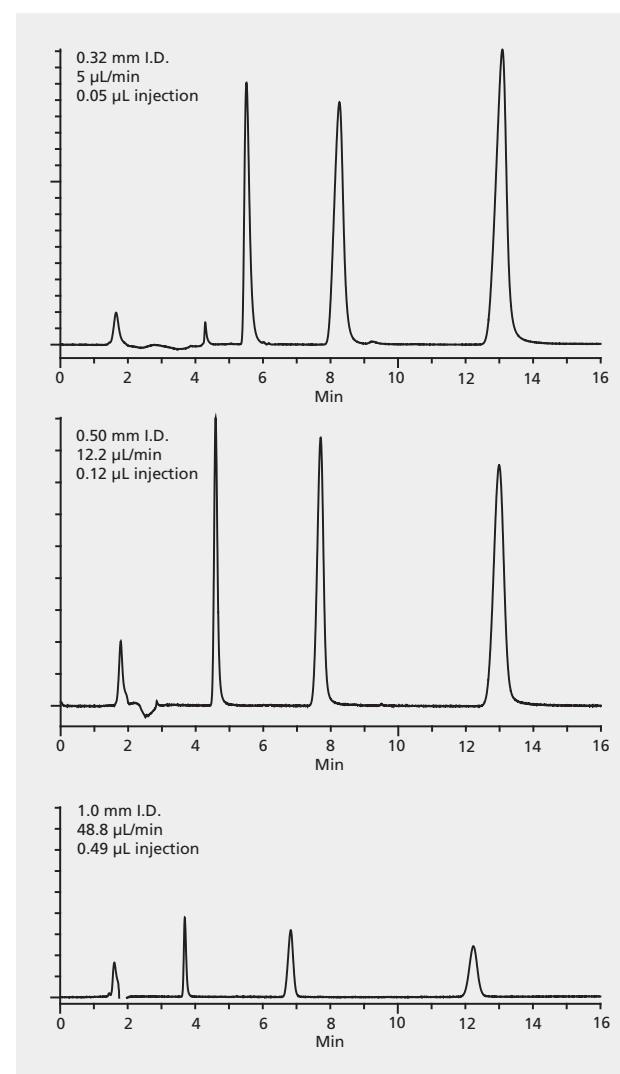
Increased Sensitivity Demonstrated

The following figure shows the improvement in sensitivity upon reducing column I.D. The same sample mass was injected onto Discovery® BIO Wide Pore C18 columns of equal length (10 cm) but varying I.D. from 1.0 mm down to 0.32 mm on the same chromatographic system.

Effect of HPLC Column I.D. on Sensitivity

► application for HPLC

column Discovery BIO Wide Pore C18, 10 cm x various I.D., 3 µm particles
mobile phase A: water
B: acetonitrile
Ratio: 65:35 (A:B)
flow rate as indicated
column temp. ambient
detector UV at 254 nm
injection as indicated
sample acetophenone (0.1 µg), benzene (1 µg), toluene (1 µg)
Application No. G004416



Discovery® BIO Wide Pore and many other Supelco HPLC phases are available in capillary dimensions. Please consult the respective section of this catalog.

HPLC for Large Molecules

Discovery® BIO: Preparative Scale HPLC

Preparative Scale HPLC



Supelco preparative HPLC column

Separations developed on Discovery® BIO Wide Pore are completely scalable between 3, 5, and 10 μm particles, and capillary to preparative column dimensions.

Analytical separations that are developed on Discovery® 3 or 5 micron particles are completely scalable to preparative separations on Discovery® 10 micron particles and larger columns. Additionally, separations developed on 5 or 10 micron particles can be scaled down for fast analysis on 3 micron particles.

- Discovery® BIO Wide Pore 10 micron particles in large column dimensions are ideal for isolating and purifying mg to gram amounts of substances for further characterization.
- Discovery® 3 or 5 micron particles in short columns are ideal for rapid analysis and LC-MS applications.
- Discovery® BIO Wide Pore 3 or 5 micron particles in long columns provide maximum resolution of complex mixtures compounds.

Preparative dimensions of Discovery® BIO phases are listed in the respective sections of this catalog.

Determining Sample Capacities for Preparative Columns

Column Type	I.D. (mm)	Optimum Flow Rate (mL/min)	Optimum Capacity	Max. Analytical Capacity	Max. Purification Multiplier*
Analytical	4.6	0.7	200 μg	1 mg	1
Semi-Prep	10	3.4	1 mg	5 mg	4.8
Preparative	21.2	14.8	4.2 mg	21 mg	21.2
Preparative	50.0	85.4	24 mg	122 mg	122

*Relative to 4.6 mm I.D. column

Reversed-Phase Chromatography

Reversed-phase (RP) is commonly used with low molecular weight compounds (amino acids, vitamins, drug substances, etc.) and peptides. It is popular in proteomics experiments where it is used to provide high-resolution peptide maps. Separation in RP is based on the analyte's partitioning between a hydrophilic, aqueous mobile phase and a non-polar stationary phase. The common alkyl stationary phases (C18, C8, C5, C4) provide different retention, and selectivity can be imparted by using non-alkyl phases, like amide or phenyl. For biomolecule separations, the pore size of the support particle is an important consideration. Because retention can be strong and the mobile phases contains organic modifiers, RP is usually avoided with proteins that are needed to be recovered in their active forms.

Reversed-phase columns for biomolecule separation offered by Supelco:

- Ascentis Express Peptide ES C18
- Discovery® BIO Wide Pore C18, C8 and C5
- TSKgel silica- and polymer-based phases

Discovery® BIO Wide Pore RP Columns

Highly efficient, reversed-phase separations of proteins and peptides for proteomics, biotherapeutics, peptide mapping, and isolation and purification of natural and synthetic peptides.

Discovery® BIO Wide Pore satisfies the needs of efficiency, selectivity, LC-MS sensitivity, stability, scalability, and reproducibility for reversed-phase HPLC analyses of proteins, peptides, and small biomolecules. Three phase chemistries, C18, C8, and C5, give unmatched selectivity and performance. Separations are completely scalable from analytical to preparative. The low-bleed feature, inert surface chemistry, and microbore and capillary dimensions make them ideal for proteomics and LC-MS applications.

Significant benefits of Discovery® BIO Wide Pore include:

- Increased resolution of proteins and peptides compared to leading RP-HPLC phases
- Ideal for peptide mapping
- Complementary selectivity choices with C5, C8, and C18 phase chemistries
- C5 has enhanced stability and lifetime compared to conventional C4 phases
- Excellent, no-bleed LC-MS properties
- TFA is not required
- Column dimensions from capillary to prep to cover all of your separation needs
- Excellent reproducibility run-to-run, column-to-column, and batch-to-batch

Discovery BIO Wide Pore Properties

	Discovery BIO Wide Pore C18	Discovery BIO Wide Pore C8	Discovery BIO Wide Pore C5
Phase	Octadecyl	Octyl	Pentyl
Endcap (yes/no)	Yes	Yes	Yes
Particle Platform	Silica	Silica	Silica
Particle Shape	Spherical	Spherical	Spherical
Particle Purity	<10 ppm metals	<10 ppm metals	<10 ppm metals
Particle Sizes (μm)	3, 5, 10	3, 5, 10	3, 5, 10
Pore Size (\AA)	300	300	300
Surface Area (m^2/g)	100	100	100
%C	9	5	3.5
Coverage ($\mu\text{moles}/\text{m}^2$)	3.6	4	4.5
pH Range	2-8	2-8	2-8
Temperature Range	$\leq 70^\circ\text{C}$	$\leq 70^\circ\text{C}$	$\leq 70^\circ\text{C}$

HPLC for Large Molecules

Reversed-Phase Chromatography: *Discovery® BIO Wide Pore RP Columns*

Suggestions for Choosing a Discovery BIO Wide Pore Column

Application	Bonded Phase
Proteins	BIO Wide Pore C5
Hydrophobic peptides or proteins (e.g., membrane proteins)	BIO Wide Pore C5
Peptide mapping	BIO Wide Pore C18
Proteomics	BIO Wide Pore C18
Scouting	BIO Wide Pore C8 (because of its intermediate hydrophobicity between a C18 and C5)

Application	Silica Particle Sizes
LC-MS	3 micron or 5 micron
Fast analysis, or high-throughput applications	3 micron
Peptide mapping	3 micron or 5 micron
Analytical HPLC	3 micron or 5 micron
Preparative	5 micron or 10 micron

Application	Column I.D.
LC-MS	2.1 mm or smaller
Peptide mapping	4.6 mm, 4.0 mm, 2.1 mm
Analytical HPLC	4.0 mm, 4.6 mm
Preparative	10 mm, 21.2 mm
Low-level detection or limited sample volume	0.18 mm, 0.32 mm, 0.5 mm, 1.0 mm

Discovery® BIO Wide Pore C18 HPLC Column

Peptide maps generated by RP-HPLC provide valuable information about protein structure, stability, and purity. To be effective, the RP-HPLC column must be able to resolve a high percentage of the peptides in the sample. The more peptides, the better the information. Discovery BIO Wide Pore C18 gives unsurpassed RP-HPLC resolution of peptide maps from enzymatic digests. The improvements in silica and bonded-phase chemistry we have incorporated into the Discovery BIO Wide Pore line improve resolution by increasing efficiency and reducing the peak tailing. An added benefit to this is the ability to analyze peptides without TFA in the mobile phase, thereby increasing the LC-MS signal.

suitable for L1 per USP

particle platform silica
 phase octadecyl
 pore size 300 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
0.18	5	65603-U	1 ea
0.32	5	65526-U	1 ea
0.32	10	65527-U	1 ea
0.5	5	65517-U	1 ea
0.5	10	65518-U	1 ea
1.0	5	65504-U	1 ea
1.0	10	65506-U	1 ea
2.1	5	567200-U	1 ea
2.1	10	567201-U	1 ea
2.1	15	567202-U	1 ea
4.6	10	567204-U	1 ea
4.6	15	567205-U	1 ea
particle size 5 µm			
0.18	5	65606-U	1 ea
0.18	15	65608-U	1 ea
0.32	15	65529-U	1 ea
0.5	15	65519-U	1 ea
1.0	15	65508-U	1 ea
1.0	25	65509-U	1 ea
2.1	5	568200-U	1 ea
2.1	10	568201-U	1 ea
2.1	15	568202-U	1 ea

I.D. (mm)	L (cm)	Cat. No.	Qty
2.1	25	568203-U	1 ea
4	15	568212-U	1 ea
4	25	568213-U	1 ea
4.6	5	568220-U	1 ea
4.6	10	568221-U	1 ea
4.6	15	568222-U	1 ea
4.6	25	568223-U	1 ea
10	25	568230-U	1 ea
particle size 10 µm			
4.6	25	567206-U	1 ea
10	5	567207-U	1 ea
10	15	567208-U	1 ea
10	25	567209-U	1 ea
21.2	5	567210-U	1 ea
21.2	15	567211-U	1 ea
21.2	25	567212-U	1 ea

Discovery® BIO Wide Pore C18 Supelguard™ Cartridge

Kits include one cartridge, a stand-alone holder, a piece of tubing, and 2 nuts and ferrules. Guard cartridges require holders that are sold separately. The 2.1 and 4 mm I.D. cartridges use 21150AST or 59660-U (both stand-alone) or 504254 or 55205 (both integral). The 10 mm I.D. cartridges use 567499-U. The 21.2 mm I.D. cartridges use 581392-U.

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	2	567270-U	2 ea
2.1	2	567271-U	1 kit
4.0	2	567272-U	2 ea
4.0	2	567273-U	1 kit
particle size 5 µm			
2.1	2	568270-U	2 ea
2.1	2	568271-U	1 kit
4.0	2	568272-U	2 ea
4.0	2	568273-U	1 kit
particle size 10 µm			
10	1	567282-U	1 ea

Discovery® BIO Wide Pore C8 HPLC Column

Discovery BIO Wide Pore C8 exhibits hydrophobicity intermediate between the Discovery BIO Wide Pore C5 and the Discovery BIO Wide Pore C18. The difference in hydrophobicity gives it unique selectivity relative to these other phases. It is ideal for peptide mapping because it provides complementary information compared to a C18 separation. Because of its intermediate hydrophobicity, we also recommend it for method development or scouting work. As with all Discovery BIO Wide Pore phases, the C8 phase gives efficient, symmetrical peaks, exceptional stability, long column lifetime, and LC-MS compatibility.

suitable for L7 per USP

particle platform silica
 phase octyl
 pore size 300 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	5	567213-U	1 ea
2.1	10	567214-U	1 ea
2.1	15	567215-U	1 ea
4.6	10	567217-U	1 ea
4.6	15	567218-U	1 ea

HPLC for Large Molecules

Reversed-Phase Chromatography: *Discovery® BIO Wide Pore RP Columns*

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	5	568300-U	1 ea
2.1	10	568301-U	1 ea
2.1	15	568302-U	1 ea
4	15	568312-U	1 ea
4	25	568313-U	1 ea
4.6	5	568320-U	1 ea
4.6	10	568321-U	1 ea
4.6	15	568322-U	1 ea
4.6	25	568323-U	1 ea
10	25	568330-U	1 ea
particle size 10 µm			
4.6	25	567219-U	1 ea
10	25	567222-U	1 ea
21.2	25	567225-U	1 ea

Discovery® BIO Wide Pore C8 Supelguard™ Cartridge

Kits include one cartridge, a stand-alone holder, a piece of tubing, and 2 nuts and ferrules. Guard cartridges require holders that are sold separately. The 2.1 and 4 mm I.D. cartridges use 21150AST or 59660-U (both stand-alone) or 504254 or 55205 (both integral). The 10 mm I.D. cartridges use 567499-U. The 21.2 mm I.D. cartridges use 581392-U.

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	2	567274-U	2 ea
2.1	2	567275-U	1 kit
4.0	2	567276-U	2 ea
4.0	2	567277-U	1 kit
particle size 5 µm			
2.1	2	568370-U	2 ea
2.1	2	568371-U	1 kit
4.0	2	568372-U	2 ea
4.0	2	568373-U	1 kit
particle size 10 µm			
10	1	567284-U	1 ea

Discovery® BIO Wide Pore C5 HPLC Column

Discovery BIO Wide Pore C5 was designed for the efficient and reliable separation of proteins and peptides, especially hydrophobic peptides, by RP-HPLC. Long-chain phases, like C8 or C18, are often too hydrophobic for proteins and can cause excessively long retention time or even irreversible binding to the column. For this reason short-chain phases, typically C3 or C4, are often used for RP-HPLC of proteins. However, these short-chain phases are susceptible to hydrolysis, resulting in short column lifetime, especially at low pH. The Discovery BIO Wide Pore C5 gives elution order similar to a conventional C4, yet has enhanced pH stability for longer column lifetime. Generally, higher efficiency separations are achievable on the Discovery BIO Wide Pore C5 because of the improvements we have made to the silica and bonded-phase chemistry.

particle platform silica
 phase pentyl
 pore size 300 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
0.32	10	65532-U	1 ea
1.0	5	65511-U	1 ea
1.0	10	65512-U	1 ea
2.1	10	567227-U	1 ea
2.1	15	567228-U	1 ea
4.6	5	567229-U	1 ea
4.6	10	567230-U	1 ea
4.6	15	567231-U	1 ea

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
0.18	10	65613-U	1 ea
0.32	15	65533-U	1 ea
1.0	15	65513-U	1 ea
2.1	5	568400-U	1 ea
2.1	10	568401-U	1 ea
2.1	15	568402-U	1 ea
2.1	25	568403-U	1 ea
4	10	568411-U	1 ea
4	15	568412-U	1 ea
4	25	568413-U	1 ea
4.6	5	568420-U	1 ea
4.6	10	568421-U	1 ea
4.6	15	568422-U	1 ea
4.6	25	568423-U	1 ea
10	25	568430-U	1 ea
particle size 10 µm			
4.6	25	567232-U	1 ea
10	5	567233-U	1 ea
10	15	567234-U	1 ea
10	25	567235-U	1 ea
21.2	5	567236-U	1 ea
21.2	15	567237-U	1 ea
21.2	25	567238-U	1 ea

Discovery® BIO Wide Pore C5 Supelguard™ Cartridge

Kits include one cartridge, a stand-alone holder, a piece of tubing, and 2 nuts and ferrules. Guard cartridges require holders that are sold separately. The 2.1 and 4 mm I.D. cartridges use 21150AST or 59660-U (both stand-alone) or 504254 or 55205 (both integral). The 10 mm I.D. cartridges use 567499-U. The 21.2 mm I.D. cartridges use 581392-U.

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3 µm			
2.1	2	567278-U	2 ea
2.1	2	567279-U	1 kit
4.0	2	567280-U	2 ea
4.0	2	567281-U	1 kit
particle size 5 µm			
2.1	2	568470-U	2 ea
2.1	2	568471-U	1 kit
4.0	2	568472-U	2 ea
4.0	2	568473-U	1 kit
particle size 10 µm			
10	1	567286-U	1 ea

HPLC for Large Molecules

Reversed-Phase Chromatography: *Ascentis® Express Peptide ES-C18 HPLC Columns*

Ascentis® Express Peptide ES-C18 HPLC Columns

Ascentis Express Peptide ES-C18 columns and capillaries are specifically engineered to separate higher molecular weight compounds such as peptides and small proteins. These columns contain advanced Fused-Core particles that have larger pores (160 Å versus 90 Å in standard Ascentis Express), bonded with sterically-protected C18 ligands to provide extra stability (ES) at very low pH (< 1) and high temperatures (up to 100°C). This greatly expands the application range for Ascentis Express columns.

NEW PRODUCTS

Ascentis® Express Peptide ES-C18, 2.7 Micron HPLC Column

Ascentis Express Peptide ES-C18 columns are specifically engineered to separate higher molecular weight compounds such as peptides and small proteins. These columns contain advanced Fused-Core particles that have larger pores (160 Å versus 90 Å in standard Ascentis Express), bonded with sterically-protected C18 ligands to provide extra stability (ES) at very low pH (< 1) and high temperatures (up to 100°C). This greatly expands the application range for Ascentis Express columns.

suitable for L1 per USP

particle platform Fused-Core
 metals <5 ppm
 endcapped No
 pore size 160 Å
 operating pH range 1 - 9
 temp. range ≤100 °C

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	3	53299-U	1 ea
2.1	5	53301-U	1 ea
2.1	7.5	53304-U	1 ea
2.1	10	53306-U	1 ea
2.1	15	53307-U	1 ea
3.0	3	53308-U	1 ea
3.0	5	53311-U	1 ea
3.0	7.5	53312-U	1 ea
3.0	10	53313-U	1 ea
3.0	15	53314-U	1 ea
4.6	3	53316-U	1 ea
4.6	5	53318-U	1 ea
4.6	7.5	53323-U	1 ea
4.6	10	53324-U	1 ea
4.6	15	53328-U	1 ea

Ascentis® Express Peptide ES-C18, 2.7 Micron Capillary HPLC Column

suitable for L1 per USP

particle platform Fused-Core
 metals <5 ppm
 endcapped No
 pore size 160 Å
 pH-range 1 - 9
 temp. range ≤100 °C

I.D.	L (cm)	Cat. No.	Qty
particle size 2.7 µm			
75 µm	5	53543-U	1 ea
100 µm	5	53544-U	1 ea
200 µm	5	53545-U	1 ea
300 µm	5	53546-U	1 ea

I.D.	L (cm)	Cat. No.	Qty
500 µm	5	53547-U	1 ea
1.0 mm	5	53548-U	1 ea
75 µm	15	53549-U	1 ea
100 µm	15	53552-U	1 ea
200 µm	15	53553-U	1 ea
300 µm	15	53554-U	1 ea
500 µm	15	53558-U	1 ea
1.0 mm	15	53561-U	1 ea

Ascentis® Express Peptide ES-C18, 2.7 Micron Guard Cartridge

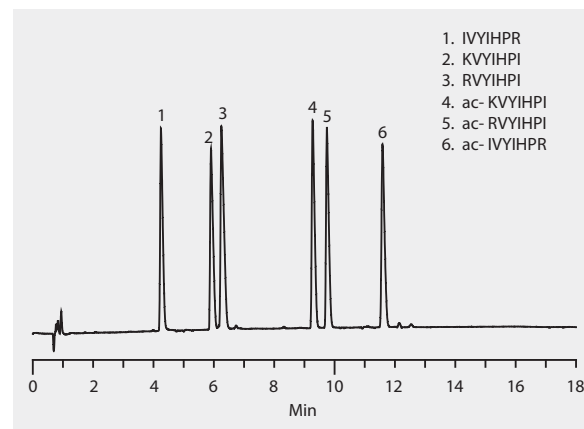
Ascentis Express Guard Columns provide physical (filtration) and chemical protection for costly analytical columns without compromising the very high performance of Ascentis Express columns. These Ascentis Express guard columns are capable of continuous use at pressures up to 9000 psi (600 bar) with only hand-tightening. Guard cartridges are easily replaced without removing the guard column holder from the flow path. The cartridges are packed with Ascentis Express Fused-Core® particles. Order guard column holder (53500-U) separately.

I.D. (mm)	L (mm)	Cat. No.	Qty
particle size 2.7 µm			
2.1	5	53536-U	3 ea
3.0	5	53537-U	3 ea
4.6	5	53542-U	3 ea

HPLC Analysis of Basic Peptides (Angiotensin Analogs) on Ascentis® Express Peptide ES-C18

► application for HPLC

column Ascentis Express Peptide ES-C18, 10 cm x 3 mm I.D., 2.7µm (53313-U)
 mobile phase A: 0.1% (v/v) formic acid, pH 4.0 (titrated with ammonium hydroxide)
 B: 50:50, (0.175% formic acid in water, pH 4.0) : acetonitrile
 Gradient: 20 to 50% B in 15 min
 gradient 20 to 50% B in 15 min
 flow rate 0.6 mL/min
 pressure 207 bar
 column temp. 35 °C
 detector UV at 215 nm
 injection 2.0 µL
 sample 0.5 g/L ea. peptide
 Application No. G005379



HPLC for Large Molecules

Reversed-Phase Chromatography: TSKgel® Reversed-Phase Columns

TSKgel® Reversed-Phase Columns

Tosoh Corp. offers reversed-phase columns packed with silica or methacrylate particles. Each TSKgel silica column features high purity Type B silica, high efficiency, excellent recovery, and low MS bleed. The polymer-based TSKgel reversed-phase columns are synthesized from polymethacrylate particles in a range of pore and particle sizes. The hydrophilic backbone improves recovery and reduces secondary interactions. The polymethacrylate particles are also stable from pH 1 to 12 and do not swell in organic solvents. They can withstand rigorous cleaning with either acid or base. NPR (non-porous resin) columns are packed with non-porous methacrylate particles of uniform 2.5 micron size. They offer high efficiency separations and fast analyses of peptides and proteins. The non-porous particle structure limits product isolation to sub-microgram loads. We recommend using TSKgel guard filters to protect these columns.

TSKgel® Reversed-Phase HPLC Columns (Silica-based)

TSKgel® Reversed Phase HPLC Column (Silica-based)

Reversed-phase liquid chromatography (RPLC) is the preferred method for analysis and purification of polar and nonpolar compounds that are soluble in mixtures of water and organic solvents.

particle platform silica

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase CN-80Ts			
5	15 cm × 4.6 mm	817348	1 ea
5	25 cm × 4.6 mm	817349	1 ea
phase Octyl-80Ts			
5	15 cm × 4.6 mm	817344	1 ea
5	25 cm × 4.6 mm	817345	1 ea
phase ODS-100V			
5	15 cm × 4.6 mm	821455	1 ea
5	25 cm × 4.6 mm	821456	1 ea
phase ODS-120A			
5	15 cm × 4.6 mm	807636	1 ea
5	25 cm × 4.6 mm	807124	1 ea
phase ODS-120T			
5	15 cm × 2 mm	818152	1 ea
5	25 cm × 2 mm	818153	1 ea
5	15 cm × 4.6 mm	807637	1 ea
5	25 cm × 4.6 mm	807125	1 ea
phase ODS-80Tm			
5	15 cm × 4.6 mm	808148	1 ea
5	25 cm × 4.6 mm	808149	1 ea
10	30 cm × 21.5 mm	814002	1 ea
phase ODS-80Ts			
5	15 cm × 2 mm	818150	1 ea
5	25 cm × 2 mm	818151	1 ea
5	15 cm × 4.6 mm	817201	1 ea
5	25 cm × 4.6 mm	817202	1 ea
10	30 cm × 21.5 mm	817380	1 ea
phase Super-Octyl			
2	5 cm × 4.6 mm	818275	1 ea
phase OligoDNA RP			
5	15 cm × 4.6 mm	813352	1 ea
5	15 cm × 7.8 mm	813353	1 ea
phase Super-Octyl			
2	10 cm × 4.6 mm	818276	1 ea

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Super-ODS			
2	5 cm × 2 mm	819541	1 ea
2	10 cm × 2 mm	819542	1 ea
2	5 cm × 4.6 mm	818154	1 ea
2	10 cm × 4.6 mm	818197	1 ea
phase Super-Phenyl			
2	5 cm × 4.6 mm	818277	1 ea
2	10 cm × 4.6 mm	818278	1 ea
phase TMS-250			
10	7.5 cm × 4.6 mm	807190	1 ea

TSKgel® Reversed-Phase HPLC Columns (Polymer-based)

TSKgel® Reversed Phase HPLC Column (Polymer-based)

Polymer-based particles for reversed-phase (RP) HPLC generally have two benefits over silica-based particles: They are more tolerant of high and low pH operating conditions and they do not have the silanol interactions that cause peak tailing of some basic analytes. Also, some silicas have an intrinsic metal content that may cause chelation problems with sensitive biomolecules, leading to poor recovery. Polymeric TSKgel columns come in C18 and phenyl functional groups and a range of particle porosities. Very fast kinetics and quantitative protein recovery at submicrogram loading are characteristic of nonporous resin-based TSKgel C18-NPR columns.

- 2PW particles have 125Å pores
- 4PW particles have 500Å pores
- 5PW particles have 1000Å pores
- NPR particles are nonporous

particle platform polymer

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase C18-NPR			
2.5	3.5 cm × 4.6 mm	814005	1 ea
phase Octadecyl-2PW			
5	15 cm × 4.6 mm	817500	1 ea
5	15 cm × 6 mm	817501	1 ea
5	15 cm × 2 mm	818754	1 ea
phase Octadecyl-4PW			
13	15 cm × 21.5 mm	816257	1 ea
7	15 cm × 2 mm	818755	1 ea
7	15 cm × 4.6 mm	813351	1 ea
phase Phenyl-5PW RP			
13	15 cm × 21.5 mm	816260	1 ea
10	7.5 cm × 2 mm	818756	1 ea
10	7.5 cm × 4.6 mm	808043	1 ea

TSKgel® Reversed Phase HPLC Guard Column

TSKgel Guard Columns are stand-alone and do not require separate holders.

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Octadecyl-2PW			
5	1 cm × 4.6 mm	817502	1 ea
5	1 cm × 6 mm	817503	1 ea
phase ODS-80Tm			
10	7.5 cm × 21.5 mm	814098	1 ea
phase ODS-80Ts			
10	7.5 cm × 21.5 mm	817385	1 ea

HPLC for Large Molecules

Reversed-Phase Chromatography: *TSKgel® Reversed-Phase HPLC Columns (Polymer-based)*

TSKgel® Reversed Phase HPLC Guardgel Kit

Kit includes one cartridge, one stand-alone holder, 5 mL packing, 5 cm of 1/16 in. tubing, two nuts, and two ferrules.

Particle Size	L × I.D. (mm)	Cat. No.	Qty
phase Octadecyl-4PW			
20	3.5 × 10	816749	1 kit

TSKgel® Reversed Phase HPLC Guardgel Cartridge

TSKgel Guard cartridges require a holder, which is sold separately. For 2 mm cartridges, the holder is Part No. **819308**. For the 3.2 mm cartridges used to protect 4.6 mm columns, the holder is Part No. **819018**.

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase CN-80Ts			
5	1.5 cm × 3.2 mm	819013	3 ea
phase Octadecyl-2PW			
5	1 cm × 2 mm	842161	3 ea
phase Octadecyl-4PW			
7	1 cm × 2 mm	842160	3 ea
7	1.5 cm × 3.2 mm	819008	3 ea
phase Octyl-80Ts			
5	1.5 cm × 3.2 mm	819012	3 ea
phase ODS-100V			
5	1.5 cm × 3.2 mm	821453	3 ea
phase ODS-120A			
5	1.5 cm × 3.2 mm	819005	3 ea
phase ODS-120T			
5	1.5 cm × 3.2 mm	819006	3 ea
phase ODS-80Tm			
5	1.5 cm × 3.2 mm	819004	3 ea
phase ODS-80Ts			
5	1 cm × 2 mm	819325	3 ea
5	1.5 cm × 3.2 mm	819011	3 ea
phase Phenyl-5PW RP			
10	1 cm × 2 mm	842159	3 ea
10	1.5 cm × 3.2 mm	819007	3 ea
phase Super-ODS			
2	1 cm × 2 mm	819672	3 ea

Gel Filtration Chromatography (GFC)

Gel filtration chromatography (GFC) is a form of size exclusion chromatography (SEC) and is used to separate biomolecules according to differences in their molecular size. The pores of the matrix are comparable in size to the molecules being separated. Relatively small analytes can diffuse into the pores, while relatively large molecules cannot enter the pores (and thus elute more rapidly).

Gel filtration columns for biomolecule separations offered by Supelco:

- TSKgel SW and PW series
- Discovery BIO GFC

TSKgel® Gel Filtration (GFC) Columns

TSKgel GFC columns are available in two particle formats: silica and methacrylate. Both have particle and pore sizes chosen to optimize particular aspects of the separation. TSKgel BioAssist columns are made of PEEK housing material to reduce sample absorption to stainless steel or glass.

TSKgel® Size Exclusion (SW-Type) HPLC Column

TSKgel SW and TSKgel SW_{XL} columns contain silica-based, hydrophilic bonded phase packings that minimize interaction with proteins. A 30 cm TSKgel SW_{XL} column and a 60 cm TSKgel SW column provide similar resolution, but the SW_{XL} column requires half the analysis time. Sample capacity increases in proportion with column length.

Because TSKgel SW_{XL} and TSKgel SW columns are silica-based, they must be operated within the recommended pH range of 2.5 - 7.5. Detailed operating conditions are described in the information accompanying the columns. We recommend protecting these columns with the appropriate SW_{XL} or SW guard column.

TSK-GEL Column	Particle Size (µm)	Pore Size (Å)	Sample MW (Globular Proteins)
SuperSW2000	4	125	5–150 × 10 ³
G2000SW _{XL}	5	125	5–150 × 10 ³
G2000SW	10	125	5–100 × 10 ³
SuperSW3000	4	250	10–500 × 10 ³
G3000SW _{XL}	5	250	10–500 × 10 ³
G3000SW	10	250	10–500 × 10 ³
G4000SW _{XL}	8	450	20–10,000 × 10 ³
G4000SW	13	450	20–10,000 × 10 ³

Mobile Phase: 0.03 M NaCl in 0.1 M phosphate buffer, pH 7.0

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase BioAssist G2SWxl PEEK			
5	30 cm × 7.8 mm	820027	1 ea
phase BioAssist G3SWxl PEEK			
5	30 cm × 7.8 mm	820026	1 ea
phase BioAssist G4SWxl PEEK			
8	30 cm × 7.8 mm	820025	1 ea
phase G2000SW			
10	30 cm × 7.5 mm	805788	1 ea
10	60 cm × 7.5 mm	805102	1 ea
13	30 cm × 21.5 mm	806727	1 ea
13	60 cm × 21.5 mm	805146	1 ea
phase G2000SWxl			
5	30 cm × 7.8 mm	808540	1 ea

HPLC for Large Molecules

Gel Filtration Chromatography (GFC): TSKgel® Gel Filtration (GFC) Columns

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase G3000SW			
10	30 cm × 7.5 mm	805789	1 ea
10	60 cm × 7.5 mm	805103	1 ea
13	30 cm × 21.5 mm	806728	1 ea
13	60 cm × 21.5 mm	805147	1 ea
phase G3000SWxl			
5	30 cm × 7.8 mm	808541	1 ea
phase G4000SW			
13	30 cm × 7.5 mm	805790	1 ea
13	60 cm × 7.5 mm	805104	1 ea
17	30 cm × 21.5 mm	806729	1 ea
17	60 cm × 21.5 mm	805148	1 ea
phase G4000SWxl			
8	30 cm × 7.8 mm	808542	1 ea
phase QC-PAK GFC 200			
5	15 cm × 7.8 mm	816215	1 ea
phase QC-PAK GFC 300			
5	15 cm × 7.8 mm	816049	1 ea
phase SuperSW2000			
4	30 cm × 4.6 mm	818674	1 ea
phase SuperSW3000			
4	30 cm × 4.6 mm	818675	1 ea
4	30 cm × 1.0 mm	821485	1 ea
4	30 cm × 2.0 mm	821845	1 pkg

NEW PRODUCTS**Narrow Bore TSKgel® SuperSW3000 Columns**

All other conditions the same, when reducing the column diameter, a lower flow rate is required to elute your sample from the column within the same time window as on a wider ID column. In aqueous size exclusion chromatography (GFC) the benefit of pumping less solvent through the column may not amount to significant savings. The benefit of smaller ID columns comes in when considering sample mass and volume.

Let's assume that initial work on the industry-leading 30cm x 7.8mm ID TSKgel G3000SWxl (5µm particles) column was promising but you are looking for better resolution and thus selected a 30cm x 4.6mm ID TSKgel SuperSW3000 (4µm particles) column. Off the bet, you obtained the benefit of running the column at a lower flow rate (0.35 mL/min vs. 1.00 mL/min), and you also observe better resolution, roughly by a factor of 1.1 (square root of 5/4). And, if you injected the same sample volume and you were not overloading the column in terms of volume and mass, you also improved the sensitivity of your analysis as the compounds eluted from the column in narrower (taller) peaks. While this closely resembled a win-win situation: better efficiency, higher sensitivity and lower solvent use, you are not completely satisfied and wonder what an even narrower ID column may do for your sample.

Now consider being limited in sample volume, not mass. Sample dilution and injecting a larger volume seem the obvious solution to this problem. However, in GFC one cannot concentrate the sample on top of the column as one can, e.g., in reversed-phase HPLC. Instead, you need to first determine the maximum injection volume (V_{max}), or the volume at which the efficiency of the column starts to decline. Since V_{max} is directly proportional to the volume of the column it only pays to use a smaller diameter column if your sample is mass limited, as we will discuss next.

When limited in sample mass in GFC, and assuming that you are injecting V_{max} , decreasing the column diameter (and sample volume) is the simplest way to detect your component of interest as the peaks elute in even narrower bands as discussed above for the 4.6 mm ID column. Although smaller ID columns are not always as efficient as wider bore columns, narrow bore columns, such as the 2mm ID and 1mm ID TSKgel SuperSW3000 columns, are sure ways to obtain better sensitivity in sample mass limited cases when injecting the maximum injection volume.

TSKgel® Size Exclusion (SW-Type) HPLC Guard Column

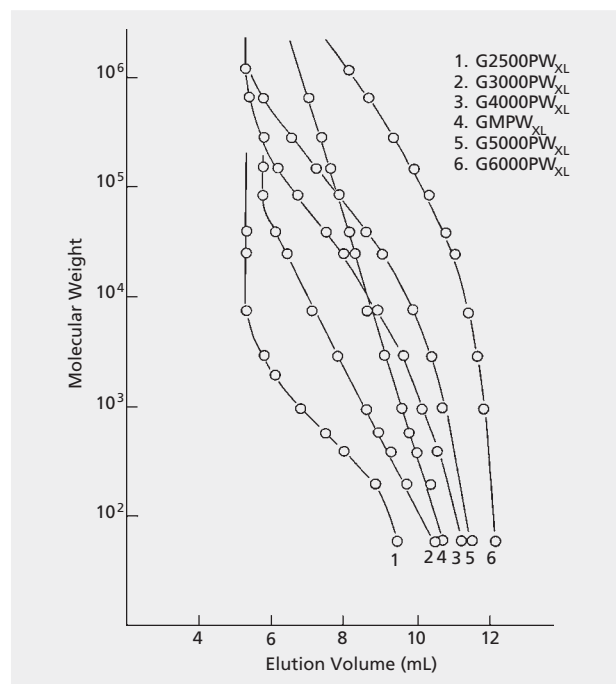
TSKgel Guard Columns are stand-alone and do not require separate holders. particle platform silica

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase BioAssist SWxl PEEK			
7	4 cm × 6 mm	818008	1 ea
phase G2000SW-G4000SW			
10	7.5 cm × 7.5 mm	805371	1 ea
13	7.5 cm × 21.5 mm	805758	1 ea
phase SuperSW2000 & SuperSW3000			
4	3.5 cm × 4.6 mm	818762	1 ea
phase G2000SWxl-G4000SWxl and QC-PAK GFC			
7	4 cm × 6 mm	808543	1 ea

**Related Information**

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T494076	TSKgel® SW and SW _{XL} Columns

PEG/PEO Calibration Curves on TSKgel PW_{XL} Columns

Column 1:	G2500PW _{XL} , 30 cm x 7.8 mm ID, 6 µm particles (808020)
Column 2:	G3000PW _{XL} , 30 cm x 7.8 mm ID, 6 µm particles (808021)
Column 3:	G4000PW _{XL} , 30 cm x 7.8 mm ID, 10 µm particles (808022)
Column 4:	GMPW _{XL} , 30 cm x 7.8 mm ID, 13 µm particles (808025)
Column 5:	G5000PW _{XL} , 30 cm x 7.8 mm ID, 10 µm particles (808023)
Column 6:	G6000PW _{XL} , 30 cm x 7.8 mm ID, 13 µm particles (808024)
Mobile Phase:	DI Water
Flow Rate:	1 mL/min
Det.:	refractaive index
Injection:	polyethylene glycols and polyethylene oxides

HPLC for Large Molecules

Gel Filtration Chromatography (GFC): TSKgel® Gel Filtration (GFC) Columns

TSKgel® Size Exclusion (PW-Type) HPLC Column

TSKgel PW and TSKgel PW_{XL} columns are used in high performance gel filtration separations of water-soluble polymers and oligosaccharides. The hydrophilic polymer matrix has excellent chemical and mechanical stability. Although commonly used with aqueous solvents, the polymer is compatible with up to 50% organic solvent.

We recommend using a TSKgel PW guard columns with G2500PW - G6000PW columns. Use a TSKgel PW_{XL} guard column with any PW_{XL} column.

Bulk packing can be ordered to repack PW columns and guard columns. → particle platform polymer

Column	Particle Size (µm)	Pore Size (Å)	Sample MW PEGS/PEOs	Sample MW Dextrans
G-Oligo-PW	6	125	<2,000	
G2000PW	10	125	<2,000	
G2500PW _{XL}	6	<200	<3,000	
G2500PW	10	<200	<3,000	
G3000PW _{XL}	6	200	<50,000	<60,000
G3000PW	10	200	<50,000	<60,000
G4000PW _{XL}	10	500	2,000–300,000	1,000–700,000
G4000PW	17	500	2,000–300,000	1,000–700,000
G5000PW _{XL}	10	1,000	4,000–1,000,000	50,000–7,000,000
G5000PW	17	100	4,000–1,000,000	4,000–1,000,000
G6000PW _{XL}	13	>1,000	40,000–8,000,000	500,000–50,000,000
G6000PW	17	>1,000	40,000–8,000,000	500,000–50,000,000
G-DNA-PW	10	4,000	40,000–8,000,000	
GMPW _{XL}	13	<100–1000	500–8,000,000	<50,000,000
GMPW	17	<100–1000	500–8,000,000	<50,000,000

Mobile Phase: Polyethylene glycols/polyethylene oxides—distilled water

Mobile Phase: Dextrans—0.2 M phosphate buffer, pH 6.8

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Alpha-2500			
7	30 cm × 7.8 mm	818339	1 ea
phase Alpha-3000			
7	30 cm × 7.8 mm	818340	1 ea
phase Alpha-4000			
10	30 cm × 7.8 mm	818341	1 ea
phase Alpha-5000			
10	30 cm × 7.8 mm	818342	1 ea
phase Alpha-6000			
13	30 cm × 7.8 mm	818343	1 ea
phase Alpha-M			
13	30 cm × 7.8 mm	818344	1 ea
phase G2000PW			
12	60 cm × 7.5 mm	805105	1 ea
12	30 cm × 7.5 mm	805761	1 ea
phase G2500PW			
12	60 cm × 7.5 mm	808029	1 ea
17	30 cm × 21.5 mm	816248	1 ea
17	60 cm × 21.5 mm	808030	1 ea
phase G2500PWxl			
7	30 cm × 7.8 mm	808020	1 ea
phase G3000PW			
12	30 cm × 7.5 mm	805762	1 ea
12	60 cm × 7.5 mm	805106	1 ea
17	30 cm × 21.5 mm	816249	1 ea
phase G3000PWxl			
7	30 cm × 7.8 mm	808021	1 ea

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase G3000PWxl-CP			
7	30 cm × 7.8 mm	821873	1 ea
phase G4000PW			
17	30 cm × 7.5 mm	805763	1 ea
17	60 cm × 7.5 mm	805107	1 ea
phase G4000PWxl			
10	30 cm × 7.8 mm	808022	1 ea
phase G5000PW			
17	30 cm × 7.5 mm	805764	1 ea
17	60 cm × 7.5 mm	805108	1 ea
phase G5000PWxl			
10	30 cm × 7.8 mm	808023	1 ea
phase G5000PWxl-CP			
10	30 cm × 7.8 mm	821874	1 ea
phase G6000PW			
17	30 cm × 7.5 mm	805765	1 ea
17	60 cm × 7.5 mm	805109	1 ea
phase G6000PWxl			
13	30 cm × 7.8 mm	808024	1 ea
phase BioAssist G6PW PEEK			
17	30 cm × 7.8 mm	820024	1 ea
phase G6000PWxl-CP			
13	30 cm × 7.8 mm	821875	1 ea
phase G-DNA-PW			
10	30 cm × 7.8 mm	808032	1 ea
phase GMPW			
17	30 cm × 7.5 mm	808026	1 ea
17	60 cm × 7.5 mm	808027	1 ea
phase GMPWxl			
13	30 cm × 7.8 mm	808025	1 ea
phase G-Oligo-PW			
7	30 cm × 7.8 mm	808031	1 ea
phase SuperAW2500			
4	15 cm × 6 mm	819315	1 ea
phase SuperAW3000			
4	15 cm × 6 mm	819316	1 ea
phase SuperAW4000			
6	15 cm × 6 mm	819317	1 ea
phase SuperAW5000			
7	15 cm × 6 mm	819318	1 ea
phase SuperAW6000			
9	15 cm × 6 mm	819319	1 ea
phase SuperAWM-H			
9	15 cm × 6 mm	819320	1 ea

HPLC for Large Molecules

Gel Filtration Chromatography (GFC): TSKgel® Gel Filtration (GFC) Columns

TSKgel® Size Exclusion (PW-Type) HPLC Guard Column

TSKgel Guard Columns are stand-alone and do not require separate holders.
particle platform polymer

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Alpha			
13	4 cm × 6 mm	818345	1 ea
phase G1000PW-G2000PW			
13	7.5 cm × 7.5 mm	806763	1 ea
phase G2500PW-G3000PW			
17	7.5 cm × 21.5 mm	806758	1 ea
phase G2500PW-GMPW			
13	7.5 cm × 7.5 mm	806762	1 ea
phase Oligo-PW			
13	4 cm × 6 mm	808034	1 ea
phase G2500PWxl-GMPWxl			
12	4 cm × 6 mm	808033	1 ea
phase G3000-G6000PWXL-CP			
13	4 cm × 6 mm	821876	1 ea
phase SuperAW5000-AWM-H			
23	3.5 cm × 4.6 mm	819322	1 ea
phase SuperAW2500-4000			
7	3.5 cm × 4.6 mm	819321	1 ea

TSKgel® Bulk Packing for GFC

Bottles containing 1 gram of bulk packing to top off and or repack TSKgel® columns and guard columns.

TSKgel® Size Exclusion (SW-Type) HPLC Packing

▶ TSKgel® SWxl Top-Off, 5µm, for TSKgel® SWxl and QC-PAK columns, 1g phase SWxl, particle size 5 µm
particle platform silica
808544 1 g

TSKgel® Size Exclusion (PW-Type) HPLC Packing

▶ TSKgel® Top-Off for TSKgel® PWxl and G-DNA-PW columns, 10µm, 1g phase PWxl, particle size 10 µm
particle platform polymer
808035 1 g



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T494075	TSKgel® PW and PW _{xl} Columns

HPLC for Large Molecules

Gel Filtration Chromatography (GFC): *Discovery® BIO GFC Gel Filtration Columns*

Discovery® BIO GFC Gel Filtration Columns

Discovery® BIO GFC particles are made of a uniform, nanometer thick hydrophilic film chemically bonded to high purity silica. The specially-designed large pore volume provides high separation capacity and high resolving power. Discovery® BIO GFC phases perform size exclusion/gel filtration separations over a wide molecular weight range, from small biomolecules to virus particles. By eliminating non-specific adsorption, the unique hydrophilic surface treatment and ultra high-purity silica combine to allow reproducibly high recovery of active proteins. The narrow pore and particle size distributions ensure high column efficiency and reproducibility.

The 5 micron spherical silica particles of the Discovery® BIO GFC packings for 100, 150, 300, 500, 1000 and 2000 have nominal pore sizes at 100, 150, 300, 500, 1000 and 2000 Å, respectively.

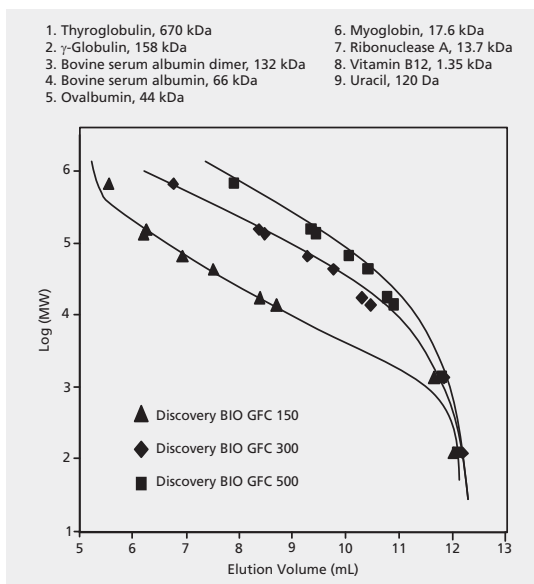
Features:

- Wide molecular weight separation range
- Long column lifetimes
- Extended pH stability
- Inert, hydrophilic surface for high recovery

BIO GFC Pore Size vs. Molecular Weight Cutoff

Description	dp (µm)	Pore Diam. (Å)	mw (min.)	mw (max.)	N (pl/m)	pH Range	Salt Conc.	Max. Temp. (°C)	Typical Pressure (psi) (30 cm × 7.8 mm column)
Discovery BIO GFC 100	5	100	100	100,000	>100,000	2–8.5	20 mM–2 M	80	700
Discovery BIO GFC 150	5	150	500	150,000	>90,000	2–8.5	20 mM–2 M	80	700
Discovery BIO GFC 300	5	300	5,000	1,250,000	>90,000	2–8.5	20 mM–2 M	80	700
Discovery BIO GFC 500	5	500	15,000	5,000,000	>85,000	2–8.5	20 mM–2 M	80	700
Discovery BIO GFC 1000	5	1,000	50,000	7,500,000	>90,000	2–8.5	20 mM–2 M	80	700
Discovery BIO GFC 2000	5	2,000		>10,000,000	>85,000	2–8.5	20 mM–2 M	80	700

Protein MW Calibration Curves for Discovery® BIO GFC Columns



columns: Discovery® BIO GFC, 30 cm x 7.8 mm I.D., 5 µm particles
mobile phase: 150 mM potassium phosphate monobasic, pH 7 (adjusted with KOH)

flow rate: 1 mL/min.

detection: UV at 214 nm

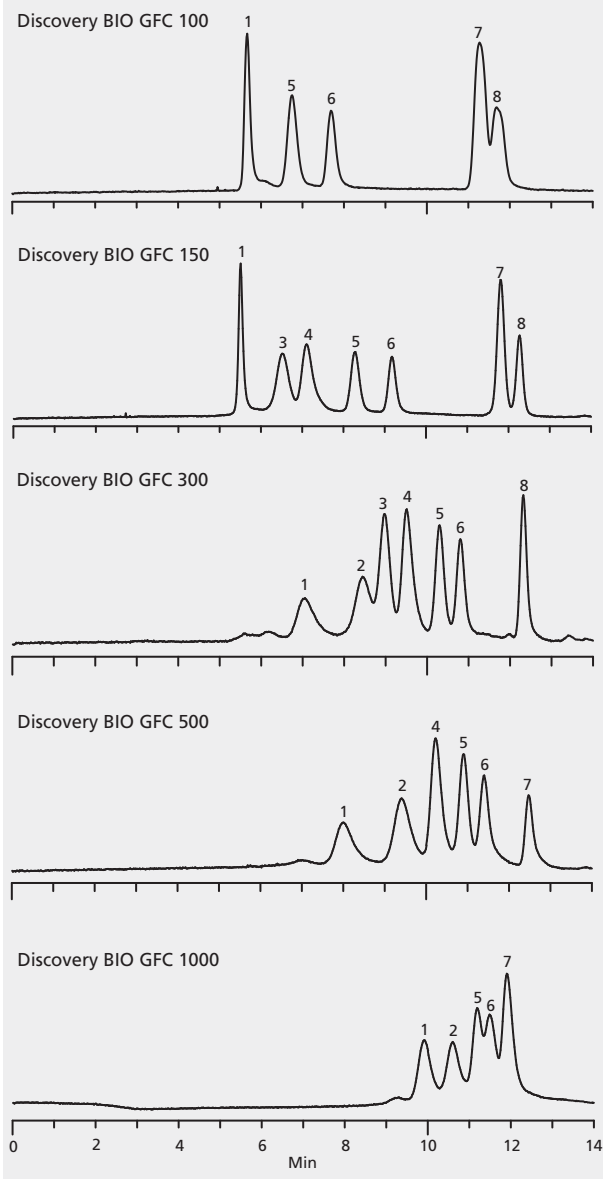
injection: 10 µL

HPLC for Large Molecules

Gel Filtration Chromatography (GFC): *Discovery® BIO GFC Gel Filtration Columns*

Comparison of Protein Separation on Various Discovery® BIO GFC Pore Sizes (100 - 1000 Å)

1. Thyroglobulin, 670 kDa
2. Ferritin, 440 kDa
3. Alcohol Dehydrogenase, yeast, 150 kDa
4. Bovine serum albumin, 66 kDa
5. Carbonic Anhydrase, bovine erythrocytes, 29 kDa
6. Aprotinin, bovine lung, 6.5 kDa
7. Vitamin B12, 1.35 kDa
8. *p*-Aminobenzoic acid, 137 Da



columns: Discovery® BIO GFC, 30 cm x 7.8 mm I.D., 5 µm particles
 mobile phase: 150 mM potassium phosphate monobasic, pH 7 (adjusted with KOH)
 flow rate: 1 mL/min.
 detection: UV at 280 nm
 injection: 10 µL

Discovery® BIO GFC Columns

In addition to the columns listed here, other Discovery® BIO GFC column dimensions are available, please inquire. The 5 cm length columns are used as guard columns to protect the analytical column of corresponding particle and I.D.

Discovery® BIO GFC 100 HPLC Column

for analyte group 100 to 100,000 mw

pore size 100 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	5	567299-U	1 ea
4.6	30	567297-U	1 ea
7.8	5	567298-U	1 ea
7.8	30	567296-U	1 ea

Discovery® BIO GFC 150 HPLC Column

for analyte group 500 to 150,000 mw

pore size 150 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	5	567303-U	1 ea
4.6	30	567301-U	1 ea
7.8	5	567302-U	1 ea
7.8	30	567300-U	1 ea

Discovery® BIO GFC 300 HPLC Column

for analyte group 5,000 to 1,250,000 mw

pore size 300 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	5	567307-U	1 ea
4.6	30	567305-U	1 ea
7.8	5	567306-U	1 ea
7.8	30	567304-U	1 ea

Discovery® BIO GFC 500 HPLC Column

for analyte group 15,000 to 5,000,000 mw

pore size 500 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	5	567311-U	1 ea
4.6	30	567309-U	1 ea
7.8	5	567310-U	1 ea
7.8	30	567308-U	1 ea

Discovery® BIO GFC 1000 HPLC Column

for analyte group 50,000 to 7,500,000 mw

pore size 1000 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	5	567315-U	1 ea
4.6	15	567313-U	1 ea
4.6	30	567287-U	1 ea
7.8	5	567314-U	1 ea
7.8	30	567312-U	1 ea

HPLC for Large Molecules

Gel Filtration Chromatography (GFC): *Discovery® BIO GFC Gel Filtration Columns*

Discovery® BIO GFC 2000 HPLC Column

for analyte group >10,000,000 mw
pore size 2000 Å

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	5	567319-U	1 ea
4.6	15	567317-U	1 ea
4.6	30	567288-U	1 ea
7.8	5	567318-U	1 ea
7.8	30	567316-U	1 ea

Note: Other BIO GFC column dimensions are available, please inquire. The 5 cm length columns are used as guard columns to protect the analytical column of corresponding particle and I.D.



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T408076	<i>Discovery® BIO: Solutions for Biotechnology Purification & Separation Challenges</i>

Ion Exchange Chromatography

Ion exchange chromatography (IEX) is based on interaction between the charged biomolecules and oppositely charged functional groups covalently linked to the matrix. Widespread applicability, high resolving power, high capacity, and controllability make ion exchange the technique most frequently used for separating biomolecules.

Ion exchange columns for biomolecule separations offered by Supelco:

- Discovery® BIO PolyMA SCX and WAX
- New! STAT and other ion exchange from Tosoh Bioscience

Discovery® BIO PolyMA Ion Exchange Columns

Discovery® BIO PolyMA polymer-based ion exchange particles have discriminating hydrophilic surface chemistry making them ideally suited for separating proteins, peptides, and other biotechnology-derived products. Differing from reversed-phase separations, ion exchange separates proteins and peptides that may have similar hydrophobic characteristics, but have different degrees of ionization (charge). Two ion exchangers, Discovery® BIO PolyMA-SCX for cation exchange, and Discovery® BIO PolyMA-WAX for anion exchange, complement the Discovery® BIO silica-based materials. The proprietary hydrophilic surface chemistry of Discovery® PolyMA ion exchange particles offers subtle ionic selectivity characteristics that are not available from the typical polystyrene-divinylbenzene (PS-DVB) and standard polymethacrylate based ion exchange resins currently on the market. In contrast to silica-based packings, Discovery® BIO PolyMA is resistant to chemical degradation at acidic and basic pH extremes.

Significant benefits include:

- Excellent separations of protein isoforms
- High resolution at low sample load
- Quantitative recovery – a hydrophilic surface eliminates protein adsorption
- High efficiency
- Wide pH range

Benefits of Polymethacrylic Polymers Over Other HPLC Particles

Competitive Particle	Benefits of Hydrophilic-coated Polymethacrylate (BIO PolyMA)
Polystyrene	BIO PolyMA is less hydrophobic, reducing the amount of secondary, non-specific interactions that can cause low protein recovery
Cross-linked Polysaccharides	BIO PolyMA is more mechanically stable, increasing column lifetime and operating flow rates
Silica	BIO PolyMA is more chemically stable, increasing the range of pH available to alter selectivity, or regenerate with base
Standard Polymethacrylate	BIO PolyMA hydrophilic coating gives better protein recovery

Discovery® BIO PolyMA-WAX Column

For use at pH greater than the protein isoelectric point (pI), usually at pH 7 or higher

mode of use anion-exchange

particle platform polymethacrylate, spherical, monodispersed
phase DEAE (diethylaminoethyl), Cl⁻ counter ion
surface coverage 0.3 meq/g
pore size 1,000 Å
operating pH range 2 - 11
temp. range 4-50 °C
max. pressure 735 psi

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	5	59602-U	1 ea

Discovery® BIO PolyMA-SCX Column

For use at pH less than the protein isoelectric point (pI), usually at pH less than 7

mode of use cation-exchange

particle platform polymethacrylate, spherical, monodispersed
phase sulfopropyl, Na⁺ counter ion
surface coverage 0.3 meq/g
pore size 1,000 Å
operating pH range 1 - 13
temp. range 4-50 °C
max. pressure 735 psi

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	5	59601-U	1 ea

HPLC for Large Molecules

Ion Exchange Chromatography: TSKgel® Ion Exchange Columns

TSKgel® Ion Exchange Columns

TSKgel columns are highly efficient and combine sample purification with excellent recovery. Anion exchange and cation exchange columns are available packed with porous polymer, silica, and nonporous resin (NPR) particles. The various column types are described in the table below.

TSKgel 5PW and NPR ion exchange columns are stable between pH 2 - 12. TSKgel SW columns can be used from pH 2 - 7.5.

TSKgel 2SW ion exchange columns (125 Å pores) are best suited for small molecular weight solutes, such as nucleotides. Larger biomolecules, including peptides and small proteins, can be analyzed on TSKgel 3SW ion-exchange columns (250 Å pores). The wide-pore (1,000 Å), polymer-based 5PW columns are suitable for analyses and purifications of large proteins and nucleic acids. Sample capacity for a 7.5 cm x 7.5 mm 5PW ion exchange column is approximately 1 mg. Proteins and nucleic acids can be analyzed 3-5 times faster on a nonporous TSKgel NPR column. The sample capacity of these columns for proteins is, however, 50-100 times smaller. TSKgel DEAE-NPR columns are commonly used to separate DNA fragments, particularly those obtained from the polymerase chain reaction (PCR). We strongly recommend using a DEAE-NPR guard column to protect the analytical column when analyzing PCR fragments. SP-NPR columns can provide fast results in hemoglobin A1c screening. Due to their small particle size (2.5 µm), packings in TSKgel NPR columns must be protected by using a precolumn filter containing a 0.5 µm frit (Supelco precolumn filter Cat. No. Z227323). The new TSKgel STAT Series columns are packed with non-porous resin particles and enable high speed and high resolution analysis and isolation of biomolecules. Also, TSKgel BioAssist columns are made of PEEK housing material to reduce sample absorption to stainless steel or glass.

TSKgel Anion Exchange Columns

	Q-STAT	DNA-STAT	DEAE-5PW	DEAE-3SW	DEAE-2SW	DEAE-NPR
Matrix	hydrophilic resin	hydrophilic resin	hydroxylated methacrylic polymer	hydrophilic silica	hydrophilic silica	hydroxylated methacrylic polymer
Particle Size (µm)	7, 10 (monodisperse)	5 (monodisperse)	10, 13, 20	10	5	2.5
Pore Size (Å)	non-porous	non-porous	1,000	250	125	non-porous
Functional Group	Quaternary	Quaternary	-CH ₂ CH ₂ N ⁺ (C ₂ H ₅) ₃	-CH ₂ CH ₂ N ⁺ (C ₂ H ₅) ₃	-CH ₂ CH ₂ N ⁺ (C ₂ H ₅) ₃	-CH ₂ CH ₂ N ⁺ (C ₂ H ₅) ₃
Counter Ion	Cl ⁻	Cl ⁻	Cl ⁻	Cl ⁻	H ₂ PO ₄ ⁻	Cl ⁻
pH Range	3-10	3-10	2-12	2-7.5	2-7.5	2-12
Exclusion Limit (PEG, Daltons)	not suitable for analytes <500 Da	not suitable for analytes <500 Da	1,000,000	30,000	10,000	500
Capacity (mg BSA/mL)	~25 (7 µm), ~20 (10 µm)	~35	30	120	not available	5
Small Ion Capacity	270 µeq/g dry gel	270 µeq/g dry gel	0.1 meq/mL	>0.3 meq/mL	>0.3 meq/mL	>0.1 meq/mL
pKa	10.5	10.5	11.5	11.2	11.2	11.2

TSKgel Cation Exchange Columns

	CM-STAT	SP-STAT	SP-5PW	SP-NPR	CM-5PW	CM-2SW	CM-3SW
Matrix	hydrophilic resin	hydrophilic resin	hydroxylated methacrylic polymer	hydroxylated methacrylic polymer	hydroxylated methacrylic polymer	spherical silica	spherical silica
Particle Size (µm)	7, 10 (monodisperse)	7, 10 (monodisperse)	10, 13, 20	2.5	10, 13	5	10
Pore Size (Å)	non-porous	non-porous	1,000	non-porous	1,000	125	250
Functional Group	Carboxymethyl	Sulfopropyl	-(CH ₂) ₃ SO ₃ ⁻	-(CH ₂) ₃ SO ₃ ⁻	-CH ₂ COO ⁻	-CH ₂ COO ⁻	-CH ₂ COO ⁻
Counter Ion	Na ⁺	Na ⁺	Na ⁺	Na ⁺	Na ⁺	Na ⁺	Na ⁺
pH Range	3-10	3-10	2-12	2-12	2-12	2-7.5	2-7.5
Exclusion Limit (PEG, Daltons)	not suitable for analytes <500 Da	not suitable for analytes <500 Da	1,000,000	500	1,000,000	10,000	30,000
Capacity (mg Lysozyme/mL)	~20 (7 µm), ~15 (10 µm)	~15 (7 µm), ~10 (10 µm)	40	5	45	110	not available
Small Ion Capacity	100 µeq/g dry gel	23 µeq/g dry gel	>0.1 meq/mL	>0.1 meq/mL	>0.1 meq/mL	>0.3 meq/mL	>0.3 meq/mL
pKa	4.9	2.6	2.3	2.3	4.2	4.2	4.2



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T494077	TSKgel® Ion Exchange Columns
T109862	TSKgel® NPR Columns

HPLC for Large Molecules

Ion Exchange Chromatography: TSKgel® Ion Exchange Columns

TSKgel® Anion Exchange HPLC Column

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase BioAssist Q PEEK			
10	5 cm × 4.6 mm	819685	1 ea
13	10 cm × 10 mm	821410	1 ea
phase DEAE-2SW			
5	25 cm × 4.6 mm	807168	1 ea
5	25 cm × 2 mm	818761	1 ea
phase DEAE-3SW			
10	7.5 cm × 7.5 mm	807163	1 ea
phase DEAE-5PW			
10	7.5 cm × 7.5 mm	807164	1 ea
13	15 cm × 21.5 mm	807574	1 ea
10	7.5 cm × 2 mm	818757	1 ea
phase DEAE-NPR			
2.5	3.5 cm × 4.6 mm	813075	1 ea
phase DNA-NPR			
2.5	7.5 cm × 4.6 mm	818249	1 ea
phase DNA-STAT			
5	10 cm × 4.6 mm	821962	1 ea
phase Q-STAT			
7	10 cm × 4.6 mm	821961	1 ea
10	3.5 cm × 3.0 mm	821960	1 ea
phase SuperQ-5PW			
10	7.5 cm × 7.5 mm	818257	1 ea
13	15 cm × 21.5 mm	818387	1 ea

TSKgel® Anion Exchange HPLC Guard Column

TSKgel Guard Columns are stand-alone and do not require separate holders.

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase DEAE-NPR			
5	0.5 cm × 4.6 mm	817088	1 ea
phase DNA-NPR			
2.5	0.5 cm × 4.6 mm	818253	1 ea



TSKgel Guard, 0.5 cm × 4.6 mm I.D. (DEAE-NPR, Cat. No. 817088 shown)

TSKgel® Anion Exchange HPLC Guardgel Kit

Kit includes one cartridge, one stand-alone holder, 5 mL packing, 5 cm of 1/16 in. tubing, two nuts, and two ferrules.

particle platform polymer

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase DEAE-5PW			
20	2.5 cm × 6.0 mm	807210	1 kit
20	3.5 cm × 10 mm	816092	1 ea
phase SuperQ-5PW			
20	2.5 cm × 6 mm	818388	1 ea



TSKguardgel Kit, containing 5 mL packing, cartridge, frits, 1/16" tubing, nuts and ferrules (807210 is shown).

TSKgel® Anion Exchange HPLC Guardgel Cartridge

TSKgel Guard cartridges require a holder, which is sold separately. For 2 mm cartridges, the holder is Part No. 819308. For the 3.2 mm cartridges used to protect 4.6 mm columns, the holder is Part No. 819018.

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase DEAE-2SW			
5	1 cm × 2 mm	842154	3 ea
phase DEAE-5PW			
10	1 cm × 2 mm	842152	3 ea

TSKgel® Cation Exchange HPLC Column

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase BioAssist S PEEK			
7	5 cm × 4.6 mm	819686	1 ea
13	10 cm × 10 mm	821411	1 ea
phase CM-2SW			
5	25 cm × 4.6 mm	807167	1 ea
phase CM-3SW			
10	7.5 cm × 7.5 mm	807162	1 ea
phase CM-5PW			
10	7.5 cm × 7.5 mm	813068	1 ea
phase CM-STAT			
7	10 cm × 4.6 mm	821966	1 ea
10	3.5 cm × 3.0 mm	821965	1 ea
phase SP-2SW			
5	25 cm × 4.6 mm	807165	1 ea
phase SP-5PW			
10	7.5 cm × 7.5 mm	807161	1 ea
10	7.5 cm × 2 mm	818758	1 ea
13	15 cm × 21.5 mm	807575	1 ea
phase SP-NPR			
2.5	3.5 cm × 4.6 mm	813076	1 ea
phase SP-STAT			
7	10 cm × 4.6 mm	821964	1 ea
10	3.5 cm × 3.0 mm	821963	1 ea

HPLC for Large Molecules

Ion Exchange Chromatography: TSKgel® Ion Exchange Columns

TSKgel® Cation Exchange HPLC Guardgel Kit

Kit includes one cartridge, one stand-alone holder, 5 mL packing, 5 cm of 1/16 in. tubing, two nuts, and two ferrules.

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase CM-5PW			
10	2.5 cm × 6 mm	813069	1 kit
phase CM-SW			
10	2.5 cm × 6 mm	807650	1 kit
phase SP-2SW			
5	2.5 cm × 6 mm	807644	1 kit
phase SP-5PW			
20	2.5 cm × 6 mm	807211	1 kit
20	3.5 cm × 10 mm	816093	1 kit

TSKgel® Cation Exchange HPLC Guardgel Cartridge

TSKgel Guard cartridges require a holder, which is sold separately. For 2 mm cartridges, the holder is Part No. 819308. For the 3.2 mm cartridges used to protect 4.6 mm columns, the holder is Part No. 819018.

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase SP-5PW			
10	1 cm × 2 mm	842153	3 ea

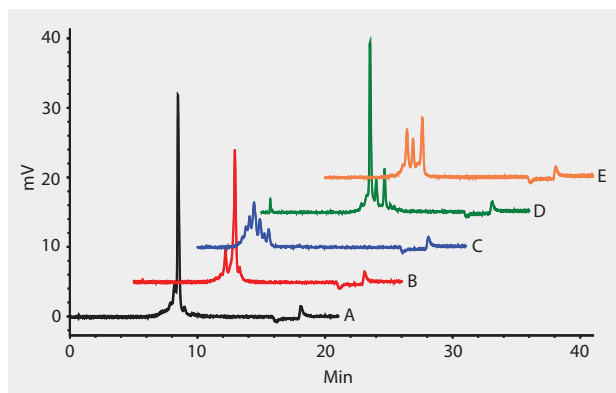
HPLC Analysis of mAb Charge Variants on TSKgel® CM-STAT

► application for HPLC

A TSKgel CM-STAT weak cation exchange (WCX) column was applied to separate charge variants of several monoclonal antibodies. The typical analysis time on conventional 25 cm long WCX columns of about eighty minutes could be significantly reduced when separation was performed on a 10 cm TSKgel CM-STAT column, filled with 7 µm particles. The analysis profiles for five antibodies show that high resolution analysis can be obtained in about 20 minutes analysis time.

From "Ion Exchange Chromatography for the Characterization of Biotherapeutics" in The Supelco Reporter, Vol. 29.3, page 20.

..... compound class: peptides
 column TSKgel CM-STAT, 10 cm × 4.6 mm I.D., 7 µm particles (821966)
 mobile phase A: 20 mM MES buffer, pH 6.0
 B: 0.5 M NaCl in buffer A, pH 6.0
 gradient: 10% B (0 min.), 30% B (15 min.), 100% B (15 min.),
 0% B (17 min.), 10% B (17 min.), 10% B (21 min.)
 flow rate 1 mL/min
 column temp. ambient
 detector UV at 280 nm
 injection 20 µL
 sample monoclonal antibodies (mAb A through E)
 Application No. G005458



Hydrophobic Interaction Chromatography (HIC)

Hydrophobic interaction chromatography (HIC) recognizes differences in protein surface hydrophobicity to achieve separation. Biomolecules adsorb to a hydrophobic surface at high salt concentrations and are eluted by a decreasing salt gradient. As a result, hydrophobic interaction chromatography combines the gentleness of salt precipitation with the precision of chromatography, for excellent recovery of protein activity.

Hydrophobic Interaction (HIC) columns for biomolecule separation offered by Supelco:

- TSKgel Ether-5PW, Phenyl-5PW, Butyl-NPR

TSKgel® Hydrophobic Interaction Chromatography (HIC) Column

Both hydrophobic interaction chromatography (HIC) and reversed-phase liquid chromatography separate on the basis of protein hydrophobicity and allow selective binding and desorption of proteins. However, HIC operates at significantly lower binding energy and uses aqueous mobile phases. These characteristics provide a gentle technique that is less likely to disturb protein conformation. As a result, HIC generally provides better activity recovery.

TSKgel Ether-5PW, Phenyl-5PW, and Butyl-NPR resin-based columns provide a range of hydrophobicities for chromatographic optimization. Ammonium sulfate concentration can be minimized by using a very hydrophobic packing (e.g., butyl). We recommend an Ether-5PW column for purifying very hydrophobic proteins. Ether-5PW and Phenyl-5PW packings are based on TSKgel G5000PW resin - 10 µm particles with 1000 Å pores. Butyl-NPR packing is prepared from 2.5 µm nonporous particles, allowing rapid analyses. All three column types can be cleaned with 0.2 M NaOH. Scale-up can be performed by using corresponding Toyopearl bulk resins.

particle platform polymer

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase BioAssist Phenyl PEEK			
10	5 cm × 7.8 mm	820023	1 ea
phase Butyl-NPR			
2.5	3.5 cm × 4.6 mm	814947	1 ea
phase Ether-5PW			
10	7.5 cm × 2 mm	818760	1 ea
10	7.5 cm × 7.5 mm	808641	1 ea
phase Phenyl-5PW			
10	7.5 cm × 2 mm	818759	1 ea
10	7.5 cm × 7.5 mm	807573	1 ea
13	15 cm × 21.5 mm	807656	1 ea

TSKgel® Hydrophobic Interaction Chromatography (HIC) Guardgel Cartridge

TSKgel Guard cartridges require a holder, which is sold separately. For 2 mm cartridges, the holder is Part No. 819308. For the 3.2 mm cartridges used to protect 4.6 mm columns, the holder is Part No. 819018.

particle platform polymer

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Ether-5PW			
10	1 cm × 2 mm	842156	3 ea
phase Phenyl-5PW			
10	1 cm × 2 mm	842155	3 ea

HPLC for Large Molecules

Hydrophobic Interaction Chromatography (HIC)

TSKgel® Hydrophobic Interaction Chromatography (HIC) Guardgel Kit

Kit includes one cartridge, one stand-alone holder, 5 mL packing, 5 cm of 1/16 in. tubing, two nuts, and two ferrules.

particle platform polymer

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Phenyl-5PW			
20	2.5 cm × 6.0 mm	807652	1 kit
20	3.5 cm × 10 mm	816095	1 kit

Affinity Chromatography

Affinity chromatography allows purification of biomolecules on the basis of biological function or structure. The molecule to be purified is specifically and reversibly adsorbed by a complementary binding ligand immobilized on a matrix. The natural specificities of the interacting molecules offer high selectivities that can greatly reduce the time needed to purify the molecule.

Affinity columns or packings for biomolecule separation offered by Supelco:

- TSKgel Boronate-5PW, Chelate-5PW, Tresyl-5PW

TSKgel Boronate-5PW

- Immobilized Ligand: m-aminophenyl boronic acid
- Adsorption Capacity (per mL Gel): 40 µmol sorbitol
- Typical Uses: glycoproteins, nucleases, nucleotides, catecholamines, carbohydrates, transfer RNAs

TSKgel Chelate-5PW

- Immobilized Ligand: iminodiacetic acid
- Adsorption Capacity (per mL Gel): ~20 µmol Cu⁺² or Zn⁺²
- Typical Uses: serum proteins, interferon, collagenase, granule protein, plasminogen activator, lactoferrin

TSKgel Tresyl-5PW

- Immobilized Ligand: 2,2,2-trifluoroethanesulfonyl (requires activation with a user-selected ligand containing amino, thiol, phenol, or imidazole groups)
- Adsorption Capacity (per mL Gel): > 60mg/g dry resin (coupling capacity w/soybean trypsin inhibitor)
- Typical Uses: "custom" affinity ligand, glycoproteins, antigens

TSKgel® Affinity HPLC Column

particle platform polymer

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Boronate-5PW			
10	7.5 cm × 7.5 mm	813066	1 ea
phase Chelate-5PW			
10	7.5 cm × 7.5 mm	808645	1 ea
phase BioAssist Chelate PEEK			
10	5 cm × 7.8 mm	820022	1 ea
phase Heparin-5PW			
10	7.5 cm × 7.5 mm	813064	
phase Tresyl-5PW			
10	4 cm × 6 mm	814455	

TSKgel® Affinity HPLC Guardgel Kit

Kit includes one cartridge, one stand-alone holder, 5 mL packing, 5 cm of 1/16 in. tubing, two nuts, and two ferrules.

mode of use affinity HPLC

particle platform polymer

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Boronate-5PW			
20	2.5 cm × 6 mm	813125	1 kit
phase Chelate-5PW			
20	2.5 cm × 6 mm	808647	1 kit

TSKgel® Affinity HPLC Packing

▶ phase Tresyl-5PW, particle size 10 µm

TSKgel Tresyl-5PW Guardgel, 10µm, 2g

particle platform polymer

816208 2 g

Hydrophilic Interaction Chromatography (HILIC)

Highly suited for polar compounds, like amino acids, metabolites, biogenic amines, phosphates and sugars, hydrophilic interaction chromatography (HILIC) separates compounds on polar stationary phases using highly organic mobile phases. For this reason, it is often considered a normal phase method. Retention in HILIC is thought to be a combination of hydrophilic, ion-exchange and reversed-phase interactions.

Hydrophilic Interaction (HILIC) columns offered by Supelco:

- Ascentis Silica and Ascentis Express Silica (described in the HPLC for Small Molecule section of this catalog)
- TSKgel Amide-80, NH₂-100

TSKgel® Normal Phase/Hydrophilic Interaction (HILIC) Column

particle platform silica

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Amide-80			
3	5 cm × 2 mm	821864	1 ea
3	15 cm × 2 mm	821865	1 ea
3	5 cm × 4.6 mm	821866	1 ea
3	15 cm × 4.6 mm	821867	1 ea
5	5 cm × 1 mm	820009	1 ea
5	10 cm × 1 mm	820010	1 ea
5	15 cm × 1 mm	821486	1 ea
5	25 cm × 1 mm	821487	1 ea
5	5 cm × 2 mm	819694	1 ea
5	10 cm × 2 mm	819695	1 ea
5	15 cm × 2 mm	819696	1 ea
5	25 cm × 2 mm	819697	1 ea
5	5 cm × 4.6 mm	819532	1 ea
5	10 cm × 4.6 mm	819533	1 ea
5	25 cm × 4.6 mm	813071	1 ea
10	30 cm × 7.8 mm	814459	1 ea
10	30 cm × 21.5 mm	814460	1 ea

HPLC for Large Molecules

Hydrophilic Interaction Chromatography (HILIC)

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Amide-80 HR			
5	25 cm × 4.6 mm	821982	1 ea
phase NH2-100			
3	5 cm × 4.6 mm	821969	1 ea
3	15 cm × 4.6 mm	821970	1 ea
3	5 cm × 2 mm	821967	1 ea
3	15 cm × 2 mm	821968	1 ea

TSKgel® Normal Phase/Hydrophilic Interaction (HILIC) Guard Column

TSKgel Guard Columns are stand-alone and do not require separate holders.
particle platform silica

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Amide-80			
5	1 cm × 4.6 mm	819021	1 ea
10	7.5 cm × 21.5 mm	814461	1 ea

TSKgel® Normal Phase/Hydrophilic Interaction (HILIC) Guardgel Cartridge

TSKgel Guard cartridges require a holder, which is sold separately. For 2 mm cartridges, the holder is Part No. 819308. For the 3.2 mm cartridges used to protect 4.6 mm columns, the holder is Part No. 819018.
particle platform silica

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase Amide-80			
3	1 cm × 2 mm	821862	3 ea
3	1.5 cm × 3.2 mm	821863	3 ea
5	1 cm × 2 mm	821941	3 ea
5	1.5 cm × 3.2 mm	819010	3 ea
phase NH2-100			
3	1.0 cm × 2 mm	821971	3 ea
3	1.5 cm × 3.2 mm	821972	3 ea

Gel Permeation Chromatography (GPC)

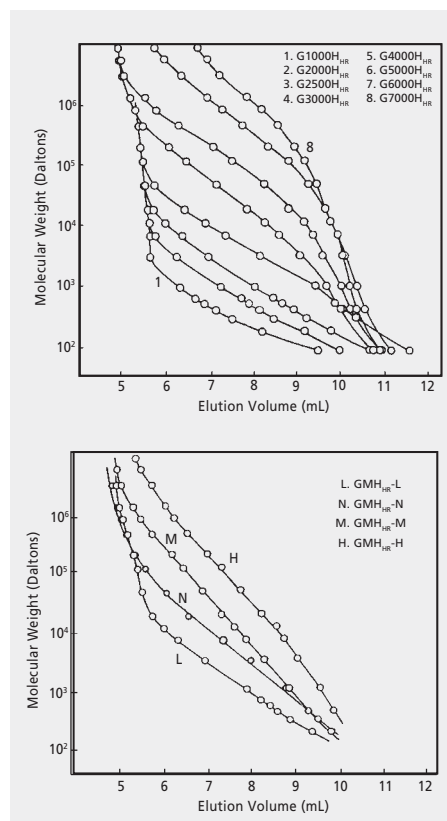
Gel permeation chromatography (GPC) is a form of size exclusion. It is often used for molecular weight determination of synthetic organic polymers. Unlike GFC, mobile phases are totally organic.

Gel Permeation (GPC) columns for polymer separation offered by Supelco:

- TSKgel H, SuperH, H_{HR}, and H_{XL} series

Using Calibration Curves

GPC is widely used for fingerprinting molecular weights of industrial polymers. For compounds of similar molecular shape, a sigmoidal calibration curve is obtained by plotting the logarithm of molecular weight (MW) versus the elution volume (V_e) for molecules of known weight. The optimal separation range is defined by the linear portion of this curve. Once a calibration curve is prepared, the elution volume for a polymer of similar shape, but unknown weight, can be used to determine the MW. Results are most accurate when the investigator prepares the calibration curve and determines the molecular weight of the unknown molecule on the same day, with the same mobile phases, etc.



Sample elution by molecular weight on TSKgel H_{HR} GPC columns

columns: TSKgel H_{HR} Series, 30 cm × 7.8 mm I.D., 5 µm particles
mobile phase: THF
flow rate: 1 mL/min.
temp.: ambient
det.: UV at 254 nm
sample: polystyrene standards

HPLC for Large Molecules

Gel Permeation Chromatography (GPC): TSKgel® Gel Permeation (GPC) Columns

TSKgel® Gel Permeation (GPC) Columns

Column	Analyte Molecular Weight Range (Daltons)
G1000H	<1,500
G2000H	<4,000
G2500H	<1.2 × 10 ⁴
G3000H	<3.0 × 10 ⁴
G4000H	<5.5 × 10 ⁵
G5000H	<1.5 × 10 ⁶
G6000H	<~1 × 10 ⁷
G7000H	<~5 × 10 ⁷
GMH-H	<~1 × 10 ⁷
GMH-L	<1.0 × 10 ⁴
GMH-M	<1.0 × 10 ⁶

TSKgel® Size Exclusion (H-Type) HPLC Column

TSKgel H series gel permeation columns are stable in solvents having a wide range of polarities. The particles do not swell or shrink as the solvent is changed from toluene through methanol. However, these columns cannot be used with polar solvents, such as water or water:methanol mixtures. Spherical 5 µm polystyrene/divinylbenzene particles provide a minimum of 16,000 plates per 30 cm × 7.8 mm I.D. column. Eight pore sizes are available, ranging from an exclusion limit of about 2,000 Daltons for G1000H_{HR} columns to more than 10,000,000 Daltons for G7000H_{HR} columns. The four mixed bed columns (H, L, M, N) feature extended linear molecular weight operating ranges for sample screening or more formal analyses.

particle platform polymer

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase G1000Hhr			
5	30 cm × 7.8 mm	817352	1 ea
phase G1000Hxl			
5	30 cm × 7.8 mm	816131	1 ea
phase G2000Hhr			
5	30 cm × 7.8 mm	817353	1 ea
phase G2000Hxl			
5	30 cm × 7.8 mm	816134	1 ea
phase G2500Hhr			
5	30 cm × 7.8 mm	817354	1 ea
phase G2500Hxl			
5	30 cm × 7.8 mm	816135	1 ea
phase G3000Hhr			
5	30 cm × 7.8 mm	817355	1 ea
phase G3000Hxl			
6	30 cm × 7.8 mm	816136	1 ea
phase G4000Hhr			
5	30 cm × 7.8 mm	817356	1 ea
phase G4000Hxl			
6	30 cm × 7.8 mm	816137	1 ea
phase G5000Hhr			
5	30 cm × 7.8 mm	817357	1 ea
phase G5000Hxl			
9	30 cm × 7.8 mm	816138	1 ea
phase G6000Hhr			
5	30 cm × 7.8 mm	817358	1 ea

Particle Size (µm)	L × I.D.	Cat. No.	Qty
phase G6000Hxl			
9	30 cm × 7.8 mm	816139	1 ea
phase G7000Hxl			
9	30 cm × 7.8 mm	816140	1 ea
phase GMHhr-H(S) HT			
13	30 cm × 7.8 mm	818393	1 ea
phase GMHhr-L			
5	30 cm × 7.8 mm	817362	1 ea
phase GMHhr-M			
5	30 cm × 7.8 mm	817392	1 ea
phase GMHxl-L			
6	30 cm × 7.8 mm	816652	1 ea
phase Multipore Hxl-M			
5	30 cm × 7.8 mm	818403	1 ea
phase SuperH1000			
3	15 cm × 6 mm	817990	1 ea
phase SuperH2000			
3	15 cm × 6 mm	817991	1 ea
phase SuperH2500			
3	15 cm × 6 mm	817992	1 ea
phase SuperH3000			
3	15 cm × 6 mm	817993	1 ea
phase SuperH4000			
3	15 cm × 6 mm	817994	1 ea
phase SuperH5000			
3	15 cm × 6 mm	817995	1 ea
phase SuperH6000			
5	15 cm × 6 mm	817996	1 ea
phase SuperH7000			
5	15 cm × 6 mm	817997	1 ea
phase SuperHM-H			
3	15 cm × 6 mm	818001	1 ea
phase SuperHM-L			
3	15 cm × 6 mm	817998	1 ea
phase SuperHM-M			
3	15 cm × 6 mm	818000	1 ea
phase SuperHM-N			
3	15 cm × 6 mm	817999	1 ea
phase SuperH-RC			
4	15 cm × 4.6 mm	818004	1 ea
phase SuperHZ1000			
3	15 cm × 4.6 mm	819309	1 ea
3	15 cm × 6 mm	819302	1 ea
phase SuperHZ2000			
3	15 cm × 4.6 mm	819310	1 ea
3	15 cm × 6 mm	819303	1 ea
phase SuperHZ2500			
3	15 cm × 4.6 mm	819311	1 ea
3	15 cm × 6 mm	819304	1 ea
phase SuperHZ3000			
3	15 cm × 4.6 mm	819312	1 ea
3	15 cm × 6 mm	819305	1 ea
phase SuperHZ4000			
3	15 cm × 4.6 mm	819313	1 ea
3	15 cm × 6 mm	819306	1 ea

HPLC for Large Molecules

Gel Permeation Chromatography (GPC): TSKgel® Gel Permeation (GPC) Columns

Particle Size (µm)	L x I.D.	Cat. No.	Qty
phase SuperH2M-H			
10	15 cm x 6 mm	819665	1 ea
phase SuperH2M-N			
3	15 cm x 4.6 mm	819660	1 ea
3	15 cm x 6 mm	819661	1 ea
phase SuperMultiporeH2-H			
6	15 cm x 4.6 mm	821885	1 ea
phase SuperMultiporeH2-M			
4	15 cm x 4.6 mm	821488	1 ea
phase SuperMultiporeH2-N			
3	15 cm x 4.6 mm	821815	1 ea

TSKgel® Size Exclusion (H-Type) HPLC Guard Column

TSKgel Guard Columns are stand-alone and do not require separate holders.
particle platform polymer

Particle Size (µm)	L x I.D.	Cat. No.	Qty
phase GMH			
30	7.5 cm x 7.5 mm	818397	1 ea
phase HHR-H			
5	4 cm x 6 mm	817369	
phase HHR-L			
5	4.0 cm x 6.0 mm	817368	1 ea
phase Hxl-H			
13	4.0 cm x 6.0 mm	813727	1 ea
phase Hxl-L			
6	4.0 cm x 6.0 mm	807113	1 ea
phase Multipore			
5	4 cm x 6 mm	818404	1 ea
phase SuperH-H			
3	3.5 cm x 4.6 mm	818003	1 ea
phase SuperH-L			
3	3.5 cm x 4.6 mm	818002	1 ea
phase SuperHZ			
3	3.5 cm x 4.6 mm	819666	1 ea
phase SuperHZ-L			
3	2 cm x 4.6 mm	819314	1 ea

H_{HR}-L guard used to protect G1000H_{HR} to G4000H_{HR} and GMH_{HR}-L columns.

**Related Information**

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T494085	TSKgel® H _{HR} Columns

TSKgel® Hardware and Accessories

Hardware for TSKgel columns is available from Supelco. Photographs of these items can be found on our website.

Description	Cat. No.	Qty
Endfitting with fixed 1 µm frit for TSKgel® Super Series columns	818255	1 ea
Endfitting with fixed 1 µm frit for TSKgel® NPR columns	813998	1 ea
Endfitting with fixed 2 µm frit for all 4.6 mm I.D. TSKgel® stainless steel columns	807619	1 ea
Endfitting with fixed 2 µm frit for all 6 mm I.D. TSKgel® stainless steel columns	808092	1 ea
Endfitting with fixed 2 µm frit for all 7.8 mm I.D. TSKgel® stainless steel columns	808095	1 ea
Endfitting with fixed 10 µm frit for all 7.5 mm I.D. TSKgel® stainless steel columns	805748	1 ea
Replacement 0.5 µm stainless steel frits for 2 mm I.D. TSKgel® columns	803411	10 ea
Replacement 2 µm stainless steel frits for 7.5 mm I.D. TSKgel® Guardgel holder	803430	10 ea
Low dead volume precolumn filter with 0.5 µm stainless steel frit	803410	1 ea
Guardfilter for 4.6 mm I.D. TSKgel® Super Series columns	818207	3 ea
Holder for TSKgel® Super Series Guardfilters	818206	1 ea
Holder for 2 mm I.D. TSKgel® Guardgel cartridges	819308	1 ea
Holder for 3.2 mm I.D. TSKgel® Guardgel cartridges	819018	1 ea
Holder for 7.5 mm I.D. TSKgel® Guardgel cartridges	807093	1 ea
Holder for 21.5 mm I.D. TSKgel® Guardgel cartridges	816106	1 ea

Note: 807093 replaces 803432.

HPLC Column Test Mixes

Performance Evaluation

HPLC Column Test Mixes

Performance Evaluation

Well-defined test mixes enable you to troubleshoot chromatographic problems, optimize system efficiency, and evaluate columns under conditions where their performance is understood. We ship these test mixes in amber ampules to prevent photodegradation, and we include instructions for proper use and interpretation of results. Choose from column-specific or application-specific mixes. All mixes except the amino phase test mix (Cat. No. 58424) call for UV detection; the amino phase test mix (sugars) calls for refractive index detection. We recommend our HPLC Troubleshooting Guide (Bulletin 826) for additional information about using test mixes.

HPLC Column Test Mixes

LC-NH₂ Test Mix

▶ in acetonitrile: water (25:75), analytical standard

use to QA LC-NH₂ columns

Components

D-(-)-Fructose 25 mg/mL
 α-D-Glucose 25 mg/mL
 Lactose 25 mg/mL
 Maltose 25 mg/mL
 Sucrose 25 mg/mL

58424

1 mL

LC-CN/LC-PCN Test Mix

▶ in acetonitrile: water (varied conc.), solution, analytical standard

use to QA LC-CN, LC-PCN columns, any weakly hydrophobic phase

Components

Acetophenone 7 µg/mL
 Benzene 750 µg/mL
 Toluene 775 µg/mL
 Uracil 7 µg/mL

58299

1 mL

Normal Phase Test Mix

▶ in methylene chloride (varied conc.), analytical standard

use to QA LC-Si (silica) columns

Components

Acetanilide 20 µg/mL
 Benzanilide 20 µg/mL
 Benzene 600 µg/mL

58281

1 mL

Normal Phase Mix 2

▶ 1000 µg/mL each component in ethanol:hexane (05:95), analytical standard

use to QA LC-Si, LC-CN, LC-NH₂ columns

Components

Diethyl phthalate
 Dimethyl phthalate
 Toluene
 store at: 2-8°C

47640-U

1 mL

Nucleosides Test Mix

▶ in 1% sodium formate (varied conc.), analytical standard

use to QA LC-18-S columns

Components

Cytidine 50 µg/mL
 Guanosine 25 µg/mL
 Inosine 25 µg/mL
 1-Methyladenosine 25 µg/mL
 5-Methylcytidine 50 µg/mL
 2'-O-Methylcytidine 20 µg/mL
 3-Methylcytidine methosulfate 100 µg/mL
 7-Methylguanosine 25 µg/mL
 5-Methyluridine 100 µg/mL
 β-Pseudouridine 25 µg/mL
 2-Thiocytidine 10 µg/mL
 Uridine 25 µg/mL
 store at: 2-8°C

47310-U

1 mL

HPLC peptide standard mixture

Peptide standard

use to QA Reversed phase columns

composition

angiotensin II
 Gly-Tyr
 Leu enkephalin
 Met enkephalin
 Val-Tyr-Val

Amber vials containing a dried film composed of approx. 0.5 mg each of Gly-Tyr, Val-Tyr-Val, methionine enkephalin, leucine enkephalin and angiotensin II.

concentration ~0.5 mg each component (dried film)

store at: -20°C

H2016-1VL

1 vial

Reversed Phase Test Mix 1

▶ in methanol: water (3:2) (varied conc.), analytical standard

use to QA hydrophobic reversed phase columns

Components

Acetophenone 7 µg/mL
 Benzene 750 µg/mL
 Toluene 775 µg/mL
 Uracil 7 µg/mL

58278

1 mL

Reversed Phase Test Mix 2

▶ in acetonitrile: water (varied conc.), solution, analytical standard

use to QA hydrophobic reversed phase columns

Components

N,N-Diethyl-m-toluamide 600 µg/mL
 Phenol 700 µg/mL
 Toluene 4000 µg/mL
 Uracil 5 µg/mL
 store at: 2-8°C

47641-U

1 mL

HPLC Column Test Mixes

Performance Evaluation

Amide Test Mixture

► in acetonitrile: water (1:1) (varied conc.), analytical standard

use to QA hydrophobic reversed phase columns

Components

Uracil 7 µg/L
Acetophenone 7 µg/L
Benzene 750 µg/L
Toluene 775 µg/L

47084-U 1 mL

Chiral Test Mix for Astec CHIROBIOTIC®

5-Methyl-5-phenylhydantoin

C₁₀H₁₀N₂O₂ FW 190.20

► analytical standard

5-Methyl-5-phenylhydantoin is used to evaluate the performance of Astec CHIROBIOTIC® chiral HPLC columns. The mobile phase is 100% methanol and detection is by UV at 254 nm. The test mix is supplied as a racemic mixture of two enantiomers in methanol.

Components

5-Methyl-5-phenylhydantoin 5000 µg/mL

40095-U 1 mL

Chiral Normal Phase Test Mix

► 30 µg/mL each component in hexane, analytical standard

Trans-stilbene oxide (TSO) is used to evaluate the performance of Astec Cellulose DMP and other polysaccharide-based chiral HPLC columns. The recommended mobile phase is 10:90 IPA:hexane and detection is by UV at 220 nm. The test mix is supplied as a racemic mixture of the two TSO enantiomers with 1,3,5-tri-tert-butylbenzene as a void volume marker. The solvent is hexane.

Components

trans-Stilbene oxide
1,3,5-tri-t-Butylbenzene

40119-U 1 mL

Custom Test Mixes

For information on made-to-order standards and test mixes, call our Technical Service chemists, or request our Custom Chemical Reference brochure (Publication No. 196905).

System Diagnostics

System diagnostics: test kits and column regeneration solutions.

Silica Column Regeneration Solution

This solution effectively regenerates a silica column that has come into contact with very strongly polar solvents, such as water or alcohols. Simply flush the column with regeneration solution for 10 minutes, then re-equilibrate with mobile phase for 10 minutes. Column performance usually is restored to that obtained before exposure to the polar solvent.

System Diagnostic Kit

Take a systematic approach to diagnosing problems in an HPLC system. This kit consists of:

- 5 cm × 4.6 mm SUPELCOSIL LC-18 column
- 6 × 1 mL Isocratic Evaluation Mix
- 6 × 1 mL Gradient Evaluation Mix

When you need to determine the cause of a problem, install the 5 cm column, prepare a simple methanol:water mobile phase, and inject 10 µL of Isocratic Evaluation Mix onto the column.

Compare your chromatogram with that from a properly performing system and use the information sheet included with the kit to help isolate the source of the problem. If necessary, make injections with the gradient mix.

We recommend our HPLC Troubleshooting Guide (Bulletin 826, available free on request) to help you interpret the results you obtain.

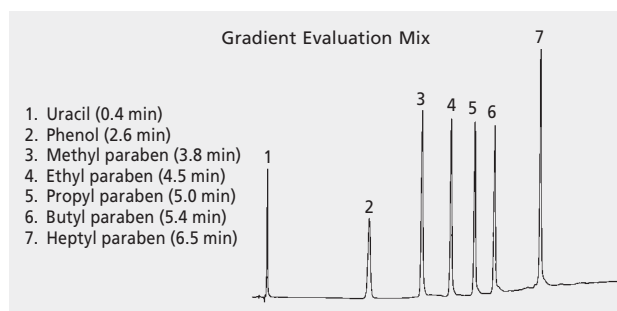
Evaluation Test Mixes

Six 1 mL ampules of test compounds in methanol:water (60:40).

These formulations are designed for evaluating how reliably a chromatographic system is providing such fundamentally important parameters as flow rate, proportioning, and mixing.

HPLC Column Evaluation Test Mix

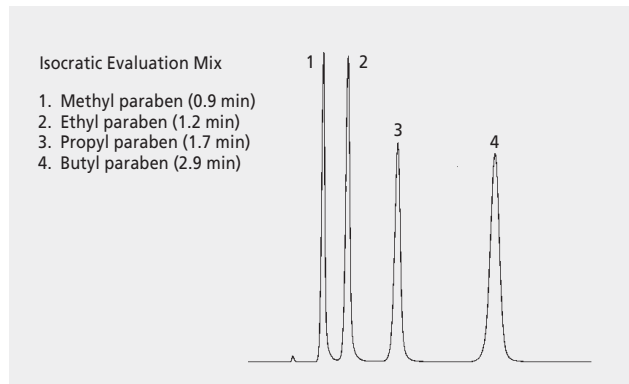
Description	Cat. No.	Qty
HPLC Gradient System Diagnostics Mix	48271	6 × 1 mL
HPLC Isocratic Systems Diagnostics Mix	48270-U	6 × 1 mL
LC-18SD System Diagnostic Kit	58543	1 ea
Silica Column Regeneration Solution	33175	200 mL



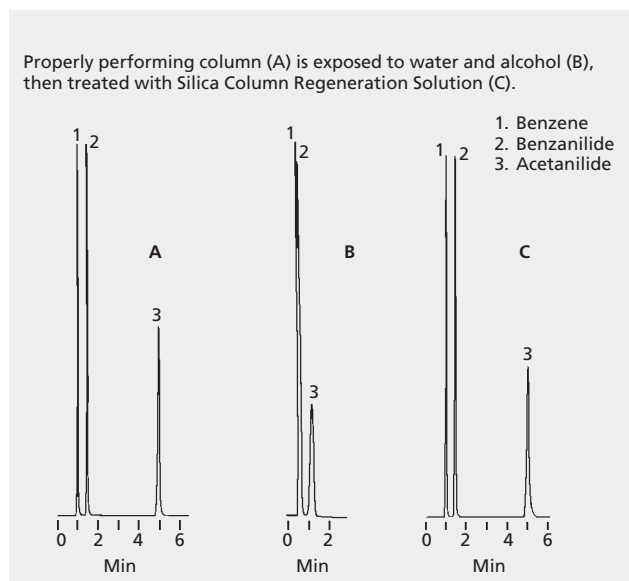
flow rate: 2 mL/min methanol:water, 10:90 to 90:10 in 5 min
det.: UV, 254 nm
injection: 10 µL

HPLC Column Test Mixes

System Diagnostics



flow rate: 2 mL/min
 det.: UV, 254 nm
 injection: 10 μ L



column: SUPELCOGEL LC-Si, 15 cm \times 4.6 mm I.D., 3 μ m particles 58981
 mobile phase: A = methylene chloride:methanol:water (99.4:0.5:0.1)
 B = 2-propanol:water (50:50)
 C = Silica Column Regeneration Solution, 4 mL/min for 10 min,
 then methylene chloride:methanol:water (99.4:0.5:0.1),
 2 mL/min for 10 min
 det.: UV, 254 nm
 injection: 10 μ L



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T100826	HPLC Troubleshooting Guide
T196905	Custom Chemicals Brochure

HPLC Accessories

Supel™Connect High Performance Fittings

The use of HPLC systems to achieve faster analyses and increased resolution pushes systems toward higher operating pressures. Our selection of Supel™Connect High Performance Interconnects and Fittings will assist the chromatographer in maximizing system performance and reliability.

Double Ended Interconnects

These high pressure HPLC fittings/interconnects help eliminate dead volume, a leading contributor of peak broadening and decreased resolution. The fittings, made of 316 stainless steel, incorporate a sliding ferrule design for use in any port. Two degrees of freedom in compressing the ferrule provide ease of use. Partial separation of radial and axial tightening forces allows the fitting to withstand pressures greater than 15,000 psi. Available in both rigid and flexible versions, these high performance fittings will not damage HPLC ports even if over-tightened.



Top to Bottom: 53684-U, 53683-U, 53682-U, 53681-U, 53689-U, 53688-U, 53686-U

Length (cm)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
10	1/32	0.005	53681-U	1 ea
20	1/32	0.005	53682-U	1 ea
30	1/32	0.005	53683-U	1 ea
40	1/32	0.005	53684-U	1 ea
20	1/32	0.010	53685-U	1 ea
10	1/16	0.005	53686-U	1 ea
10	1/16	0.005	53687-U	1 ea
10	1/16	0.010	53688-U	1 ea
20	1/16	0.010	53689-U	1 ea
55	1/16	0.005	54252-U	1 ea
55	1/16	0.007	54253-U	1 ea

HPLC Accessories

Supel™Connect High Performance Fittings: *Single Ended Interconnects*

Single Ended Interconnects

High Performance Fittings are available in single ended configurations. The single ended fitting is useful when only a single end will have frequent connections and the other end will be permanently connected.



Left to Right: 53628-U, 53627-U, 53625-U, 53617-U, 53614-U, 53613-U

Length (cm)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
10	1/32	0.005	53613-U	1 ea
20	1/32	0.005	53614-U	1 ea
30	1/32	0.005	53617-U	1 ea
40	1/32	0.005	53625-U	1 ea
55	1/32	0.007	53627-U	1 ea
55	1/32	0.005	53628-U	1 ea

Agilent® 1100/1200 Interconnect

For Agilent 1100/1200

The high performance fitting is now available for the Agilent 1100/1200 HPLC system. Semi-rigid 316 stainless steel tubing connects one end to the heater outlet, and allows use of columns by any manufacturer with confidence that the high performance UHPLC fitting is completely seated in the column inlet port. An important feature of this fitting is the 'service loop', which allows the column to be semi-rigidly supported.



Length (cm)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
15	1/16	0.005	53629-U	1 ea

Ferrules

Replacement Ferrules for High Performance HPLC Fittings

for use with 1/16 in. O.D. tubing
black PEEK (with stainless steel lock rings)



[53690-U](#)

10 ea

Supel™Connect Fittings

- Fitting are for use with PEEK/PEEKsil or stainless steel tubing
- Used at pressures to 15,000 psi
- SupelConnect Better Nut allows use in tighter places

SupelConnect Long and Short High Performance fitting adjust to any port depth



Bottom, 51368-U. Counter clockwise left to right, 51361-U, 51389-U, 51367-U, 51369-U, 51366-U, 51380-U, 51365-U

Description	Cat. No.	Qty
Better Nut, 1/16 in.	51359-U	10 ea
Better Nut with stainless steel ferrule	51361-U	2 ea
Better Nut with PEEK ferrule	51365-U	2 ea
Better Nut, XL (extra long) with stainless steel ferrule, 1/16 in.	51389-U	2 ea
Better Nut, XL (extra long) with PEEK ferrule, 1/16 in.	51380-U	2 ea
Short Fitting with Ferrules	51366-U	2 ea
Long Fitting with Ferrules	51367-U	2 ea
UHPLC fitting	51368-U	1 ea
UHPLC fitting ferrule crimping tool	51369-U	1 ea
stainless steel ferrule	51392-U	10 ea
PEEK ferrule	51394-U	10 ea

HPLC Accessories

Upchurch Scientific Fittings and Accessories: *Ultra-High Performance Fingertight Fittings*

Upchurch Scientific Fittings and Accessories

Ultra-High Performance Fingertight Fittings

Ultra-High Performance Fingertight Fittings

The innovative line of Upchurch Ultra High Performance fittings are designed to withstand extreme temperature and pressures. This line of fittings is perfect for use within the increasingly demanding requirements for today's high performance analytical systems. The fittings are a 10/32 fingertight style for use with 1/16" and 1/32" OD tubing.



51256-U



51263-U



51262-U

Description	Cat. No.	Qty
PEEK (LiteTouch® Nut (Black), 10-32), for use with 1/32" tubing	51256-U	10 ea
PEEK (LiteTouch micro ferrule (black), 1/32 in.), for use with (1/32" tubing)	51257-U	10 ea
PEEK (LiteTouch ferrule assembly 1/16" (black)), for use with (1/16" tubing)	51258-U	10 ea
PEEK (FingerTight nut (black) 10-32), for use with (1/16" tubing)	51262-U	10 ea
PEEK (SealTight Short fitting (black) with ferrule, 10-32), for use with (1/16" tubing)	51263-U	10 ea

Ultra-High Pressure Stainless Steel Fittings

Description	Cat. No.	Qty
for use with (1/16" tubing)	51264-U	10 ea
for use with (1/32" tubing)	51265-U	10 ea

Ultra-High Pressure Stainless Steel Adapter

Description	Cat. No.	Qty
configured for (for adapting 1/16" OD to 1/32" tubing)	51267-U	1 ea

Upchurch Ultra Low Volume Precolumn Filter

Upchurch Ultra-Low Volume Precolumn Filter

These precolumn filters have a .020" diameter through hole, a stainless steel body, and are pressure rated to 9000 psi (620 bar). They will accept 1/16" tubing and standard 10-32 threaded high pressure fittings.

Description	Cat. No.	Qty
2 µm	51231-U	1 ea
0.5 µm, Solvent filter assembly with frit (1.3µL swept volume)	51232-U	1 ea

Upchurch Ultra-Low Volume Precolumn Filter

With a .010" diameter thru-hole, this filter has one of the lowest swept volumes of any HPLC precolumn filter available, ensuring maximum protection with very little band broadening. It is pressure rated to 9,000 psi (620 bar).

Description	Cat. No.	Qty
0.5 µm	51233-U	1 ea

Frits for Upchurch Ultra-Low Volume Precolumn Filter

stainless steel

Description	Cat. No.	Qty
2 µm	51234-U	10 ea
0.5 µm	51235-U	10 ea

Upchurch Mini MicroFilter Assembly

Upchurch Mini MicroFilter Assembly

Ultra-low swept volume - 0.85 µL. Use with Microtight tubing sleeves for capillary tubing. Available with 1 µm or 2 µm frit capsules (stainless steel frit in color-coded PEEK capsule). 57421-U includes 5, 2µm filter capsules, 2 microferrules, and 2 female natural PEEK nuts and catalog number 54722-U includes 5, 1µm filter capsules, 2 microferrules, and 2 female natural PEEK nuts. 51242-U includes 5, 1 µm nano filter capsule (PEEK with stainless steel frit), 2, microferrule for 360 µm O. D. tubing, 2 female nuts. 51243-U includes 5, 1 µm nano filter capsule (PEEK with titanium frit), 2, microferrule for 360 µm O. D. tubing, 2 female nuts.



Description	Cat. No.	Qty
1 µm, stainless steel screen	54722-U	1 ea
2 µm, stainless steel screen	54721-U	1 ea
1 µm, stainless steel frit	51242-U	1 ea
1 µm, titanium frit	51243-U	1 ea

Capsules for Mini MicroFilter Assembly

Description	Cat. No.	Qty
2.0 µm, PEEK natural	54723-U	2 ea
1.0 µm, red PEEK	54724-U	2 ea

HPLC Accessories

Upchurch Scientific Fittings and Accessories: *Nonmetallic Check Valves*

Nonmetallic Check Valves

Nonmetallic 1/4-28 and Inline Cartridge Check Valves

These check valves function well in both low and high pressure applications. Low internal volume also allows them to be used in areas where flow path volume is important; however, higher flows can pass through with minimal pressure drop. Metal-free composition makes the check valve perfect for use with corrosive fluids or biological samples.

Description	Cat. No.	Qty
inlet check valve, 1/4"-28 male to 1/4"-28 female	51245-U	1 ea
inlet/outlet check valve, 1/4"-28 female to 1/4" female	51246-U	1 ea

Nonmetallic Micro-Volume Inlet Check Valve

Micro-Volume check valve is ideal for applications where low flow path volume is critical, such as micro or nano LC post-column derivitization. It is made of biocompatible and chemically resistant PEEK material.

Description	Cat. No.	Qty
inlet/outlet check valve, 10/32 female to 10-32 female	51247-U	1 ea

Disposable Filters

Disposable Sample Filters

The disposable sample filters are designed to remove particles from analytical HPLC samples. The polypropylene holder incorporates a 1/32" thick, 1/8" diameter stainless steel frit, which causes very little back pressure. To use, attach the filter onto the end of any standard luer syringe.

Description	Cat. No.	Qty
2 µm	51249-U	100 ea
0.5 µm	51252-U	100 ea

Low Pressure Valves, Micro Valves

Upchurch Micro-Valves

- Inert PEEK construction
- Flow rates as low as 3.5 µL/minute (water)
- 1/4-28 or 10-32 1/16 in. fittings



Micro-Metering Valve (Low Pressure)



Micro-Splitter Valve (Low Pressure)



Micro-Splitter Valve (High Pressure)

Specifications

Internal Volume	1/4-28 valves	4/13 µL fully opened; 2.1 µL closed
	10-32 valves:	2.8 µL fully opened; 1.2 µL closed
	10-32/6-32 valves:	2.5 µL fully opened; 1.2 µL closed
Thru-Hole	54720-U:	0.010 in.
	All others:	0.020 in.
Pressure Rating	Low pressure valves:	800 psi (54 bar)
	High pressure valves:	5,000 psi (338 bar)

Description	Cat. No.	Qty
Micro-Metering Valve (Low Pressure), 1/4-28 flangeless fittings	502367	1 ea
Micro-Metering Valve (Low Pressure), 10-32 fingertight fittings	502375	1 ea
Micro-Splitter Valve (Low Pressure), 1/4-28 flangeless fittings	502383	1 ea
Micro-Splitter Valve (Low Pressure), 10-32 fingertight fittings	502391	1 ea
Micro-Splitter Valve (High Pressure), 10-32 fingertight fitting	54719-U	1 ea
Micro-Splitter Valve (High Pressure), 10-32 for × 2, 6-32 for × 1 fingertight fitting	54720-U	1 ea

Upchurch Micro-Valve Replacement Fittings

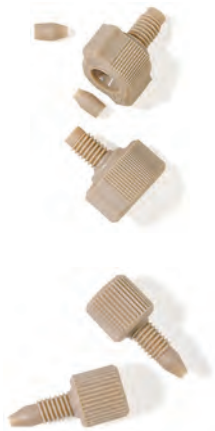
Description	Cat. No.	Qty
Flangeless Fitting, nut and ferrule: 1/4-28 male Upchurch, for tubing 1/16 in. O.D.	58685	5 ea
Ferrules, 1/4-28 Upchurch for tubing 1/16 in. O.D. (requires Flangeless nut), ferrule only	56700-U	10 ea
MicroFingertight I Fitting, one-piece design	502405	10 ea

HPLC Accessories

Upchurch Scientific Fittings and Accessories: *Low Pressure Valves, Micro Valves*

Upchurch PEEK Fingertight Fitting

The one-piece fitting, 55067-U, is convenient to use because the ferrule will not stick in a receiving port and can be easily found if dropped onto the floor. The two-piece fitting features a separate ferrule so you can replace just the ferrule instead of the entire unit. The Upchurch PEEK Fingertight fittings are for use with 1/16" O.D. tubing and can be used to 6,000 psi (420 kg/cm²).
I.D. 0.0625 in. (1.5875 mm)



Description	Cat. No.	Qty
fitting: 10-32 (one-piece)	55067-U	10 ea
nut and ferrule: 10-32	57654	10 ea
nut and ferrule: 1/4-28	57656	10 ea

Upchurch Precolumn MicroFilter

PEEK housing with in-line filter connects capillary tubing (using Microtight tubing sleeves) or 1/16 in. O.D. tubing to female 10-32 fitting. Swept volume of 0.3 µL. Includes 5 × 0.5 µm frits (one installed).



Left to right-502669, 502693

Description	Cat. No.	Qty
for use with 0.025 in. O.D. tubing, PEEK frit	502677	1 ea
for use with 0.025 in. O.D. tubing, stainless steel frit	502669	1 ea
for use with 1/16 in. O.D. tubing, PEEK frit	502693	1 ea
for use with 1/16 in. O.D. tubing, stainless steel frit	502685	1 ea

Frits for Precolumn MicroFilter

Description	Cat. No.	Qty
PEEK, 0.5 µm	502790	10 ea
stainless steel, 2.0 µm	502723	10 ea
stainless steel, 0.5 µm	502731	10 ea

Upchurch PEEK Micro-Fittings

Upchurch PEEK Microtight Fittings

These fittings are designed for connecting fused silica or other capillary tubing, using Upchurch PEEK Microtight tubing sleeves. For the appropriate sized tubing sleeve, choose one that has an I.D. 0.002 - 0.003 in. greater than the O.D. of your tubing.

MicroFingertight I Fitting

▶ one-piece design

The 6-32 fitting connects capillary tubing to Microtight union, adapter, or filter.



MicroFingertight I Fitting

502405	10 ea
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MicroTight Unions

Description	Cat. No.	Qty
PEEK, for use with 1/32" tubing	51268-U	1 ea
PEEK (.006" thru-hole), for use with (360 µm tubing)	51271-U	1 ea

Upchurch PEEK Microtight® Connector

Description	Cat. No.	Qty
Connects 1/16" capillary tubing	502421	1 ea
Butt connects 2 pieces of capillary. True zero dead volume design	502413	1 ea

MicroTight Adapters

These adapters will help create a true zero dead volume (ZDV) connection between 1/16" I.D. tubing and capillary tubing. MicroTight Adapters allow connection of 1/16" O.D. tubing directly to 1/32" O.D. and 360 µm tubing.

Description	Cat. No.	Qty
PEEK, for use with (1/16" to 1/32" tubing)	51272-U	1 ea
PEEK, for use with (1/16" to 320 µm tubing)	51273-U	1 ea

Upchurch PEEK Microtight® Connector

Description	Cat. No.	Qty
Connects 1/16" capillary tubing	502421	1 ea
Butt connects 2 pieces of capillary. True zero dead volume design	502413	1 ea

Ultra-High Performance Micro Fingertight Unions

PEEK fittings and stainless steel body

Description	Cat. No.	Qty
for use with 1/32" Tubing	51274-U	1 ea
for use with 360 µm tubing	51277-U	1 ea
for use with 1/32" O.D. tubing	51279-U	1 ea
for use with 1/16" O.D. and 1/32" O.D. tubing	51281-U	1 ea

HPLC Accessories

Upchurch Scientific Fittings and Accessories: *Upchurch PEEK Micro-Fittings***MicroTee**

Connects 3 capillary tubes, using MicroFingertight II fittings. Includes 3 MicroFerrules for 0.025 in. O.D. tubing, 3 female nuts.

Description	Cat. No.	Qty
for use with MicroTight Sleeves	502472	1 ea
for use with 1/32" O.D. tubing	51283-U	1 ea
for use with 360 µm O.D. tubing	51285-U	1 ea
for use with 1/16" O.D. tubing	51286-U	1 ea

MicroCross

Description	Cat. No.	Qty
for use with MicroTight sleeves	502480	1 ea
for use with 1/32" O. D. tubing	51288-U	1 ea
for use with 360 µm O.D. tubing	51293-U	1 ea
for use with 1/16" O.D. tubing	51294-U	1 ea

Upchurch Microtight® Fittings Kit

Description	Cat. No.	Qty
-	502804	1 ea

Upchurch Microtight® Tubing Sleeves

Use these PEEK sleeves with all Microtight fittings, to connect capillary tubing. All are 0.025 in. O.D.; normally, choose an I.D. that is 0.002-0.003 in. larger than the O.D. of the capillary tubing. Color-coded.



I.D. (in.)	Material	Cat. No.	Qty
0.005 (125 µm)	red	502510	10 ea
0.007 (178 µm)	yellow	502561	10 ea
.009 (230 µm)	natural	51296-U	10 ea
0.013 (330 µm)	orange	502618	10 ea
0.015 (380 µm)	green	502626	10 ea
.011 (280 µm)	blue	51297-U	10 ea
0.018 (460 µm)	black	502634	10 ea
.021 (535 µm)	natural	51298-U	10 ea
.006 (152 µm)	purple	51303-U	10 ea

Upchurch Microtight® Tubing Sleeve Kit

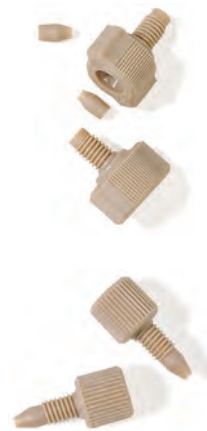
Contains six each of the five PEEK Microtight tubing sleeves (Cat Nos. 502510, 502561, 502618, 502626, 502634)

Kit of 5 sizes

502650	1 ea
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Upchurch PEEK Fingertight Fitting

The one-piece fitting, 55067-U, is convenient to use because the ferrule will not stick in a receiving port and can be easily found if dropped onto the floor. The two-piece fitting features a separate ferrule so you can replace just the ferrule instead of the entire unit. The Upchurch PEEK Fingertight fittings are for use with 1/16" O.D. tubing and can be used to 6,000 psi (420 kg/cm²).
I.D. 0.0625 in. (1.5875 mm)



Description	Cat. No.	Qty
fitting: 10-32 (one-piece)	55067-U	10 ea
nut and ferrule: 10-32	57654	10 ea
nut and ferrule: 1/4-28	57656	10 ea
long 2 piece	51395-U	10 ea

Column End Plugs

Description	Cat. No.	Qty
1/4-28 male UNF	58745	5 ea
for 10-32 coned ports, red Delrin®	59031	10 ea
for 10-32 coned ports, blue ETFE	51342-U	10 ea

Column End Plugs for M6 Male

Column End Plugs

Description	Cat. No.	Qty
Domed nut	54865	4 ea

PEEK Inline Microfilter

Install between 2 pieces of capillary tubing, using Microtight tubing sleeves. PEEK housing with special PEEK fitting that encases the 0.5 µm PEEK frit. Through hole 0.006 in., swept volume 0.24 µL. Includes 2 MicroFingertight nuts, and 5 frits (1 installed).



502707	1 ea
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Frits for PEEK Inline MicroFilter

for use with In-Line MicroFilter (502707)

502715	10 ea
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HPLC Accessories

Optimize Technologies®

Optimize Technologies®

EXP® Fitting System

The EXP® Fitting System is the premier adjustable nut and ferrule compression fitting for extreme high-pressure connections between 1/16 inch tubing and any 10-32 port. The Titanium Hybrid ferrule provides a perfect seal with every connection, yet can be released without tools to adjust to the different port depths of various hardware. With this fitting system there is no longer the need to clip off and replace ferrules from tubing.

- Auto-adjusting Zero Dead Volume (ZDV) connection
- Intended for many repeat uses
- Rated to 20,000 psi



Description	Cat. No.	Qty
hand tight nut and titanium hybrid ferrule	51384-U	1 ea
hand tight nut and titanium hybrid ferrule	51385-U	10 ea

EXP® Titanium Hybrid Ferrule

Description	Cat. No.	Qty
1/16 in.	51391-U	10 ea

EXP® Pre-Column Filter

The OPTI-SOLV® EXP® hand tight pre column filters are ideal for extreme high pressure applications. They protect columns with small particle material employing ultra high pressure techniques. The OPTI-SOLV® EXP® help extend and protect the life of your columns without sacrificing performance.

Note: cartridges not included with holder



Description	Cat. No.	Qty
holder with EXP titanium hybrid ferrule	51163-U	1 ea
0.5µm cartridge	51164-U	5 ea
0.5µm cartridge	51165-U	10 ea
0.2µm cartridge	51166-U	5 ea
0.2µm cartridge	51167-U	10 ea

OPTI-SOLV® Mini, Micro, and Nano Filter

The OPTI-SOLV® Mini Filter provides low-impact filtering in a package no longer than a finger tight fitting. Use them to prolong the life of your analytical column, or before your mass spectrometer as a last line of defense against debris.

The OPTI-SOLV® Micro Filter is based on the same design as the Mini Filter and cuts the internal volume to less than 200 nL. It retains the Mini Filter's ease of use and functionality. The OPTI-SOLV® Micro Filter features a zero-dead volume connection utilizing Optimize Technologies® patented floating stem technology.



Description	Cat. No.	Qty
mini filter, 0.5µm	51168-U	5 ea
mini filter, 2µm	51170-U	5 ea
mini filter, 5.0µm	51171-U	5 ea
micro filter, 1.0µm	51172-U	5 ea
micro filter, 2.0µm	51173-U	5 ea
micro filter, biocompatible, 0.5µm	51174-U	5 ea
micro filter, 10µm	51175-U	5 ea
nano filter, biocompatible, 0.5µm	51176-U	5 ea

OPTI-GUARD® 1mm Guard Column

OPTI-GUARD® sets the standard for low-impact, easy to use pre-column protection. Designed for use with analytical (4.6 mm, 3.0 mm I.D.) and narrow bore (2.1 mm, 1.0 mm) columns, the patented floating stem design automatically adjusts to any manufacturer's tube stop depth for a zero-dead volume connection every time. The OPTI-GUARD® 1 mm requires no special connecting hardware or tools for installation.

particle size 40 µm



Description	Cat. No.	Qty
C18 (violet label)	51177-U	5 ea
silica (orange label)	51178-U	5 ea
CN (blue label)	51179-U	5 ea
anion exchange (black label)	51180-U	5 ea
cation exchange (white label)	51181-U	5 ea
C18, biocompatible	51183-U	5 ea
C8	51184-U	5 ea
phenyl	51185-U	5 ea
amino NH ₂	51187-U	5 ea

HPLC Accessories

Optimize Technologies®

OPTI-GUARD® 3mm Guard Column

The OPTI-GUARD® 3 mm maintains the tool free connectivity of the OPTI-GUARD® 1 mm, but incorporates a cartridge-based format to allow for a larger bed with more capacity. The two part holder is designed for use with any analytical column providing vital protection from dirty samples and strongly retained contaminants. An auto adjusting stem conforms perfectly to any tube stop depth resulting in a perfect zero-volume connection.

Note: cartridges not included with holder.



Description	Cat. No.	Qty
PEEK/stainless steel holder	51188-U	1 ea
C18 cartridge	51191-U	3 ea
C8 cartridge	51193-U	3 ea
Amino NH ₂ cartridge	51194-U	3 ea
Silica cartridge	51196-U	3 ea

HPLC Dispersion Measurement

HPLC Dispersion Measurement Kit

Kit for reliable measurement of HPLC instrument bandwidth.

Kit contains:

- 2 - NanoTight Unions with 0.007" thru-hole
- 1 - 20 cm x 1/32" O. D. x 0.005" I. D. High Performance Doubled Ended Fitting
- Instruction Sheet

52806-U	1 kit
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Nano Tight Union, ZDV, with 0.007in Thru-Hole

52807-U	1 ea
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PEEK HPLC Fittings

Upchurch PEEK LiteTouch® Fitting

Unique design prevents twisting of PEEK tubing. The fitting consists of a special PEEK ferrule, a stainless steel ring, and a PEEK or stainless steel nut for 1/16 in. tubing. The fitting will not leak at pressures to 5000 psi/340 bar with the PEEK nut, 2500 psi/175 bar with the stainless steel nut finger-tightened or 7000 psi/480 bar with wrench tightening. After wrench-tightening the stainless steel nut, subsequent finger-tightening will hold to 5000 psi. Compatible with all manufacturers' stainless steel nuts. Order nuts and ferrules separately.



57651

Description	Cat. No.	Qty
natural PEEK nut	57651	10 ea
-	57650-U	10 ea
PEEK with stainless steel lock ring ferrule (for 1/8" tubing)	57652-U	10 ea
natural PEEK nut double-winged	57653	10 ea

PEEK Nuts & Ferrules

PEEK (polyetheretherketone) fingertight fittings are convenient, inert, and bio-compatible. Use these fittings with 1/16 in. O.D. PEEK, stainless steel, titanium, Tefzel, or PTFE tubing. PEEK fittings are compatible with all HPLC solvents (avoid concentrated sulfuric and nitric acids), and can be used at temperatures to 150 °C. Unlike stainless steel ferrules, PEEK ferrules do not permanently lock into place on the tubing. This allows you to interchange fittings with tubing and columns, from manufacturer to manufacturer (e.g., from Agilent to Waters), and still form a zero dead volume, leak-free connection. All fittings on these pages can be used with internal fittings provided by most major suppliers.

Supelco® PEEK Fitting

Biocompatible fittings for all 1/16 in. tubing connections.



Description	Cat. No.	Qty
One-piece fingertight	Z227250	5 ea
Two-piece with ferrule	Z227269	5 ea
Two-piece with ferrule, fingertight/wrenchtight	Z227285	5 ea
Hex-head nut, short, wrenchtight	Z226874	5 ea
Hex-head nut, long, wrenchtight	Z226866	5 ea

HPLC Accessories

PEEK HPLC Fittings: *PEEK Nuts & Ferrules*

Ferrules for Supelco® PEEK Fittings

PEEK

Description	Cat. No.	Qty
Single-taper, for use with Z227269	Z227277	5 ea
Double-tapered, for use with Z227285, Z226874, Z226866	Z226858	5 ea

Upchurch PEEK Fingertight HPLC Fittings

The one-piece fitting, 55067-U, is convenient to use because the ferrule will not stick in a receiving port and can be easily found if dropped onto the floor. The two-piece fitting features a separate ferrule so you can replace just the ferrule instead of the entire unit. The Upchurch PEEK Fingertight fittings are for use with 1/16" O.D. tubing and can be used to 6,000 psi (420 kg/cm²).



Description	Cat. No.	Qty
fitting: 10-32 (one-piece)	55067-U	10 ea
nut and ferrule: 10-32	57654	10 ea
ferrule: 10-32	57655-U	10 ea
nut and ferrule: 1/4-28	57656	10 ea
ferrule: 1/4-28	57657	10 ea

Upchurch Two-Piece Stainless Steel/PEEK Fitting

This 10-32 fitting for 1/16 in. tubing will hold to 6000 psi (420 kg/cm²) when finger-tightened, or 10,000 psi (700 kg/cm²) when wrench-tightened.



Description	Cat. No.	Qty
stainless steel nut, PEEK ferrule	58478-U	1 ea
PEEK ferrule	58479	5 ea

Upchurch Sealtight™ Fittings



Description	Cat. No.	Qty
Extra-long nut, 10-32, with ferrule	55006-U	10 ea
ferrule pack	55007-U	10 ea
Long nut, M6, with ferrule	55004-U	10 ea
Long nut, 10-32, with ferrule	55003-U	10 ea
Short nut, 10-32, with ferrule	55002-U	10 ea

Dynaseal™ Fittings

These hand-tight fittings will seal against pressures to over 7,000 psi (490 kg/cm²). Each fitting consists of a reusable nut (10-32 for 1/16 in. O.D. tubing), collet, and ferrule. The polymer ferrule will not deform stainless steel seats and can be reused. They are compatible with all 1/16 in. compression-type 10-32 fittings now used on HPLC columns (but not with Rheodyne valves).



Description	Cat. No.	Qty
Set of nuts, collet, and ferrule	58462	2 ea
ferrule (polymer)	58463	5 ea
Kel-F™ ferrule	58468	10 ea
stainless steel	58464	2 ea
-	58679	2 ea

Upchurch Fingertight Fittings Kit

High pressure fittings with 10-32 threads for 1/16 in. O.D. tubing. Kit includes:

- Delrin Fingertight nut, good to 4,000 psi (280 kg/cm²), 5 ea
- Stainless steel Fingertight nut, good to 6,000 psi (420 kg/cm²), wrench-tight to 10,000 psi (700 kg/cm²), 5 ea
- PEEK gripping ferrule, 20 ea.



[58632](#)

1 ea

HPLC Accessories

PEEK HPLC Fittings: PEEK Nuts & Ferrules

Upchurch PEEK Fingertight Connections

Upchurch PEEK Fingertight Union

Operate the PEEK zero dead volume unions to 5,000 psi (352 kg/cm²), the PEEK tees and crosses to 4,000 psi (281 kg/cm²). All items include Fingertight III nuts and ferrules.



Description	Cat. No.	Qty
Union, bore 0.010 in., thread: 10-32	57658	1 ea
Union, bore 0.020 in., thread: 10-32	57659	1 ea
Union, bore 0.020 in., thread: 1/4-28	57660-U	1 ea
Cross, bore 0.020 in., thread: 10-32	57663	1 ea
Tee, bore 0.020 in., thread: 10-32	57661	1 ea
Tee, bore 0.020 in., thread: 1/4-28	57662-U	1 ea

RheFlex® PEEK Fittings

For Rheodyne valves. Hold to 5000 psi/350kg/cm².



Long fitting set (57690-U)

Description	Cat. No.	Qty
Short fitting set, configured for 1/16 in. tubing	57691	5 ea
Long fitting set, configured for 1/16 in. tubing	57690-U	5 ea
Ferrule pack, configured for 1/16 in. tubing	57692	5 ea
Fitting set, configured for 1/8 in. tubing	57477	1 ea

Stainless Steel Fittings

Rheodyne® Fittings



from left to right: 58258, 58256, 58257

Description	Cat. No.	Qty
long nut, for 1/16 in. tubing	58257	10 ea
ferrule, for 1/16 in. tubing	58258	10 ea
nut, for 1/16 in. tubing	58256	10 ea
nut and ferrule, for 1/8 in. tubing	57479	1 ea

Each connection requires one ferrule and one male nut.

Valco® Fittings



From left to right: 22990-U, 22989

Description	Cat. No.	Qty
ferrule, configured for 1/16 in. tubing	22988	10 ea
ferrule, configured for 1/8 in. tubing	22989	10 ea
ferrule, for 1/4 in. tubing	58245-U	10 ea
nut, for for 1/16 in. tubing	22990-U	10 ea
nut, for for 1/8 in. tubing	22991	10 ea

Waters® fittings



58458

Description	Cat. No.	Qty
1/16 in.	58458	5 ea

SSI™ Fittings



From left to right: 58760-U, 58766

Description	Cat. No.	Qty
cap: 1/4-28, stainless steel	58766	1 ea
for 1/16 in. tubing	58764	1 ea
nut: 1/4-28	58760-U	10 ea
ferrule, for for 1/16 in. tubing	58762	10 ea

HPLC Accessories

Stainless Steel Fittings

SSI™ Fittings Kit

Save time when looking for the fitting you need. This kit contains everything you need to connect most columns to a $\frac{1}{16}$ in. tubing system, regardless of the column manufacturer. It is designed for easy storage and easy parts identification – everything is clearly labeled to help you quickly locate what you need.

The kit contains:

- SSI ferrules (5)
- E-Z Grip gland nuts (3)
- SSI gland nuts (5)
- CPI fittings, KEL-F (2)
- CPI ferrules (5)
- SSI coupling, 0.10 in. I.D. (1)
- CPI gland nuts (5)
- SSI to CPI couplings (2)
- E-Z Grip ferrules (3)



59280-U

1 ea

Ferrule Saver Tool

- Quickly and simply dislodges swaged ferrule from $\frac{1}{16}$ in. O.D. (0.010-0.030 in. I.D.) tubing
- Saves time, money, and needless aggravation

Removes high pressure CPI-type stainless steel ferrules without the need for disassembling your HPLC system plumbing or cutting the tubing. Eliminates the need for opening, filing, and passivating tubing before installing a new ferrule. Opens and permits reuse of the removed ferrule. Not recommended for self-locking SSI and Rheodyne ferrules (could damage ferrule or tool).



58647

1 ea

Upchurch Fittings Kit

If you have ever been caught without the fitting you need to install a column, new plumbing line, etc., you will appreciate these kits. They contain all the fittings and tubing you normally need to operate your HPLC system, conveniently stored in a plastic case.



For Use With	Cat. No.	Qty
Agilent/HP	58635-U	1 ea
Beckman/Rheodyne	58634	1 ea
PerkinElmer	58636	1 ea
Spectra-Physics/Rheodyne	58637	1 ea
Varian/Rheodyne	58638	1 ea
Waters	58639	1 ea
Bio-Rad/Rheodyne	58640-U	1 ea

HPLC Accessories

Stainless Steel Fittings

HPLC System/Cat. No. of Kit

Component	Agilent/HP	Beckman/ Rheodyne	PerkinElmer	Spectra-Physics/ Rheodyne	Varian/Rheodyne	Waters	BioRad/ Rheodyne
Cat. No.	58635-U	58634	58636	58637	58638	58639	58640-U
S.S. ZDV Union, 0.020 in.	2	2	2	2	2	2	2
S.S. ZDV Union, 0.050 in.	–	–	–	–	–	–	2
S.S. Waters ZDV Union, 0.020 in.	–	–	–	–	–	2	–
PerkinElmer Male Nut (SSI)	–	–	5	–	–	–	–
PerkinElmer Ferrule (SSI)	–	–	5	–	–	–	–
Rheodyne Short Male Nut	–	4	4	4	4	–	4
Rheodyne Long Male Nut	–	2	2	2	2	–	2
Rheodyne Extra-Long Male Nut	–	2	2	2	2	–	2
Rheodyne Ferrule	–	10	10	10	10	–	10
Waters Male Nut	–	–	–	–	–	10	–
Waters Ferrule	–	–	–	–	–	10	–
S.S. Male Nut	10	5	5	5	5	5	5
S.S. Female Nut	10	5	5	5	5	5	5
S.S. Ferrule	20	10	10	10	10	–	10
Tefzel Cap	2	2	2	2	2	2	2
Delrin Plug	2	2	2	2	2	2	2
Fingertight II Male Nut (Delrin)	2	2	2	2	2	2	–
Fingertight I Male Nut (one piece)	–	–	–	–	–	–	2
PEEK Replacement Ferrule	4	4	4	4	4	4	–
1/16 in. Flangeless Male Nut, Black, Delrin	6	6	6	6	6	6	–
1/16 in. Flangeless Ferrule, Tefzel	6	6	6	6	6	6	–
Stainless Steel Tubing							
5 cm × 0.01 in. I.D.	4	4	4	4	4	4	4
10 cm × 0.01 in. I.D.	4	4	4	4	4	4	4
20 cm × 0.01 in. I.D.	4	4	4	4	4	4	4
5 cm × 0.02 in. I.D.	4	4	4	4	4	4	4
10 cm × 0.02 in. I.D.	4	4	4	4	4	4	4
20 cm × 0.02 in. I.D.	4	4	4	4	4	4	4

In-Line Filters

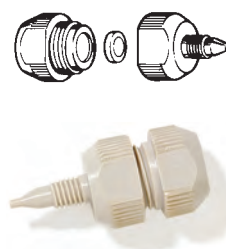
A precolumn filter is essential for protecting HPLC columns against particulate matter which can accumulate on the column frit, leading to split peaks and high backpressure. Sources of particles include mobile phases (especially when buffers are mixed with organic solvents), leaking pump and injector seals, and samples. Use a 2.0 µm frit to protect columns containing 5 µm or larger particles, or a 0.5 µm frit for columns with particles smaller than 5 µm.

Supelco® Precolumn Filter

▶ Direct-connect, PEEK

Direct-connect; protects analytical and guard columns. Our precolumn filter can be connected directly, hand-tightened, into any HPLC column or guard column that has Valco-compatible end fittings. PEEK cap and body, 2 µm stainless steel frit. For a metal-free system, order PEEK (biocompatible) replacement frits (57430-U).

bore 0.015 in.
 max. temp. 100 °C
 max. pressure 5000 psi



Z227323

1 ea

Frit for Supelco® Filter

Description	Cat. No.	Qty
stainless steel, 0.5 µm	Z290874	5 ea
stainless steel, 2.0 µm	Z227331	5 ea
PEEK, 2.0 µm	57430-U	5 ea

HPLC Accessories

In-Line Filters

Supelco® ColumnSaver Precolumn Filter

- Economical protection for your guard or analytical HPLC column
- No wrenches or tools required to install, fingertight to 5,000 psi
- Lower dead volume than conventional filters with holders
- Universal connection is compatible with all manufacturers fittings

The Supelco ColumnSaver offers all of the protection of conventional precolumn filters at much less the cost. With its convenient direct connect design, changeover time is measured in seconds, and requires no wrenches or tools to install.

The PEEK filter body contains a HiFlo filter element and is designed for maximum filtration of particulate matter with minimal dead volume or backpressure. As soon as an increase in backpressure is observed, simply remove and dispose of the Supelco ColumnSaver and install a new one. The direct connect design is compatible with all $\frac{1}{16}$ in., 10-32 internal fitting ports regardless of the manufacturer.



Description	Cat. No.	Qty
0.5 μm	55214-U	10 ea
2.0 μm	55215-U	10 ea

SSI™ High Pressure Preinjector Filter

Place between the pump and injector to provide final filtration for the mobile phase. Includes 316 stainless steel filter element (0.5 μm pores) that is easy to replace. Maximum operating pressure: 15,000 psi (105 MPa). For $\frac{1}{16}$ in. O.D. tubing, 10-32 threads.



Description	Cat. No.	Qty
stainless steel	59262-U	1 ea

SSI™ High Pressure Precolumn Filter

In-line installation. The 316 stainless steel filter disc (0.5 μm pores) is easily replaced without removing the column end fitting. For $\frac{1}{16}$ in. tubing. Maximum operating pressure: 15,000 psi (1,054 kg/cm²).



Description	Cat. No.	Qty
thread: 10-32 Valco compatible	59269	1 ea
thread: 10-32 Waters	59271	1 ea

Filter Element for SSI™ Filter Unit

Select 0.5 μm or 2.0 μm stainless steel filter elements for your SSI High Pressure Filter Unit.

Description	Cat. No.	Qty
Preinjector, 0.5 μm	59264	2 ea
Preinjector, 2.0 μm	59265	2 ea
Precolumn, 0.5 μm	59273	10 ea
Precolumn, 2.0 μm	59272	10 ea

Isolation Technologies Precolumn Filter

In-line installation. High capacity inlet filter, with 0.5 μm stainless steel frit. Minimizes dead volume and band broadening, to prevent loss of column efficiency while protecting your column. Includes two each of tubing, nut, and ferrule.



Description	Cat. No.	Qty
use to protect 4.6 mm I.D. HPLC column, frit diam. 3 mm	57675-U	1 ea
use to protect 2.1 mm I.D. HPLC column, frit diam. 1.5 mm	57676-U	1 ea

Frits for Isolation Technologies Precolumn Filter

pore size 0.5 μm

Description	Cat. No.	Qty
frit diam. 3 mm	57677	10 ea
frit diam. 1.5 mm	57678	10 ea

Upchurch Biocompatible Precolumn Filter

In-line installation. Stainless steel body with inert polyetherether-ketone (PEEK) end fittings. Choose either a 0.5 μm or 2 μm PEEK frit in one endfitting.



Description	Cat. No.	Qty
2.0 μm	55078	1 ea
0.5 μm	55079	1 ea

Frits for Upchurch Biocompatible Precolumn Filter

PEEK

Description	Cat. No.	Qty
2.0 μm	55081	10 ea
0.5 μm	55080-U	10 ea

HPLC Accessories

In-Line Filters

Valco® Pre-Column Filter

In-line installation. Efficient, low dead volume filters protect your columns from particles without reducing column performance. The replaceable $\frac{1}{8}$ in. frit has 0.5 μm pores to protect 3 μm or 5 μm column packings, the replaceable screen has 2 μm pores. Choose the frit filter for higher filtration capacity (most applications) or the screen filter for less dead volume (e.g., with microbore columns). Use with $\frac{1}{16}$ in. O.D. tubing; $\frac{1}{16}$ in. fittings included.

Frits and screens should not be interchanged in these filters.



Description	Cat. No.	Qty
Frit Filter, $\frac{1}{8}$ in., 0.5 μm	58420-U	1 ea
Screen Filter, 2.0 μm	58279-U	1 ea

Frits for Valco® Pre-Column Frit Filter

Description	Cat. No.	Qty
diam. $\frac{1}{8}$ in., 0.5 μm	59037	10 ea
diam. $\frac{1}{8}$ in., 2.0 μm	59129	10 ea

Screen for Valco® Pre-Column Screen Filter

Description	Cat. No.	Qty
2.0 μm , stainless steel	58284	10 ea

Frits and screens should not be interchanged in these filters.

In-Line Filter Assembly 21.2mm, 2 μm

52588-U	1 ea
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In-Line Frit 21.2mm, 2 μm

52589-U	5 ea
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Back-Pressure Regulators

SSI™ Flow-Through Back-Pressure Regulator

Designed to apply constant pressure to an HPLC detector outlet, over a wide range of mobile phase flows and viscosities. Can be used with flowmeters. Minimizes bubble formation in the detector cell, improves baseline stability. Flow-through design minimizes band spreading. Immune to clogging. Adjustable from 0.3 to 5 atmospheres (factory set at 4 atmospheres), for compatibility with any detector. Small, inert to common HPLC solvents, biocompatible flow path.



59284	1 ea
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SSI™ Back-Pressure Regulator

Prevents bubbles and improves baseline stability. This $\frac{1}{16}$ in. flange-type unit (4 × 1.3 cm) has a unique mechanism that ensures constant back-pressure over a wide range of mobile phase flows and viscosities. It is immune to clogging and other problems common to restrictor-type devices. Easily adjusts from 1-4 atm.(15-60 psi/1-4 kg/cm²).

58788	1 ea
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Upchurch In-Line Cartridge Check Valve

The inline Cartridge Check Valve is designed to limit flow to one direction. The cartridge and flangeless fitting is for use with 1/16" O.D. tubing. The internal volume of the check valve is less than 150 μL . Place in the flow system where you wish to restrict fluid flow to one direction. These assemblies withstand system pressures of 1,000 psi (69 bar). Complete with wrench.



55085-U	1 ea
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Stainless Steel Unions, Tubing

SSI™ Unions

Stainless steel, 1/4-28 threads



From left to right: 58768, 58780-U

Coupling	Cat. No.	Qty
1/4-28 $\frac{1}{16}$ in. O.D., bore diam. 0.043 in.	58768	1 ea
1/4-28 $\frac{1}{16}$ in. O.D., bore diam. 0.015 in.	58769	1 ea
1/4-28 $\frac{1}{16}$ in. O.D., bore diam. 0.010 in.	58770	1 ea
Tee		
bore diam. 0.043 in.	58780-U	1 ea
bore diam. 0.015 in.	58781	1 ea

Nuts and ferrules included with all of the above except 58774-U.

HPLC Accessories

Stainless Steel Unions, Tubing

Valco® Unions

Stainless steel, unless noted otherwise. Nuts and ferrules included. All items include nuts and ferrules.



Clockwise from bottom left: 22949, Z226807, 58283, Z227242, 22997-U, 58625-U

	Cat. No.	Qty
Valco® Unions		
internal reducing, for connecting $\frac{1}{16}$ to $\frac{1}{32}$ in., bore 0.25 mm	59026	1 ea
internal reducing, bore 0.75 mm, for connecting $\frac{1}{8}$ to $\frac{1}{16}$ in.	22999	1 ea
internal reducing, configured for $\frac{1}{4}$ to $\frac{1}{16}$ in., bore 0.75 mm	58249	1 ea
external reducing, configured for $\frac{1}{4}$ to $\frac{1}{16}$ in., bore 0.25 mm	59110-U	1 ea
Union		
for connecting $\frac{1}{16}$ in., bore 0.75 mm	22997-U	1 ea
for connecting $\frac{1}{16}$ in., bore 0.25 mm	58627	1 ea
Union, reducing		
for connecting $\frac{1}{16}$ to $\frac{1}{32}$ in., bore 0.25 mm	59025-U	1 ea
zero dead volume, for connecting $\frac{1}{8}$ to $\frac{1}{16}$ in., bore 0.25 mm	22949	1 ea
Tee		
zero dead volume, for connecting $\frac{1}{16}$ in., bore 0.75 mm	58283	1 ea
zero dead volume, for connecting $\frac{1}{16}$ in., bore 0.25 mm	58626	1 ea
Cross		
for connecting $\frac{1}{16}$ in., bore 0.25 mm	58625-U	1 ea
Union		
PEEK, for connecting $\frac{1}{16}$ in., bore 0.25 mm	Z227242	1 ea
for connecting $\frac{1}{16}$ in., bore 0.25 mm	Z226807	1 ea

Stainless Steel 1/16 in. Capillary Tubing

316 stainless steel, $\frac{1}{16}$ in. O.D. 1 m length is coiled, all other dimensions are straight.

Length	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
5 cm	$\frac{1}{16}$	0.005	56707	1 ea
10 cm	$\frac{1}{16}$	0.005	56708	1 ea
20 cm	$\frac{1}{16}$	0.005	56709	1 ea
30 cm	$\frac{1}{16}$	0.005	56710-U	1 ea
0.5 m	$\frac{1}{16}$	0.005	56711	1 ea
1.0 m	$\frac{1}{16}$	0.005	56712-U	1 ea
5 cm	$\frac{1}{16}$	0.007	56713	1 ea
10 cm	$\frac{1}{16}$	0.007	56714	1 ea
20 cm	$\frac{1}{16}$	0.007	56715-U	1 ea
30 cm	$\frac{1}{16}$	0.007	56716	1 ea
0.5 m	$\frac{1}{16}$	0.007	56717	1 ea
1.0 m	$\frac{1}{16}$	0.007	56718-U	1 ea
5 cm	$\frac{1}{16}$	0.010	56719	1 ea
10 cm	$\frac{1}{16}$	0.010	56720-U	1 ea
20 cm	$\frac{1}{16}$	0.010	56721	1 ea
30 cm	$\frac{1}{16}$	0.010	56722	1 ea

Length	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
0.5 m	$\frac{1}{16}$	0.010	56723	1 ea
1.0 m	$\frac{1}{16}$	0.010	56724	1 ea
20 cm	$\frac{1}{16}$	0.020	56727	1 ea
30 cm	$\frac{1}{16}$	0.020	56728	1 ea
0.5 m	$\frac{1}{16}$	0.020	56729	1 ea
1.0 m	$\frac{1}{16}$	0.020	56730-U	1 ea
5 cm	$\frac{1}{16}$	0.030	56731	1 ea
10 cm	$\frac{1}{16}$	0.030	56732	1 ea
20 cm	$\frac{1}{16}$	0.030	56733-U	1 ea
30 cm	$\frac{1}{16}$	0.030	56734-U	1 ea
1.0 m	$\frac{1}{16}$	0.030	56736	1 ea
5 cm	$\frac{1}{16}$	0.040	56737	1 ea
10 cm	$\frac{1}{16}$	0.040	56738	1 ea
20 cm	$\frac{1}{16}$	0.040	56739	1 ea
30 cm	$\frac{1}{16}$	0.040	56740-U	1 ea
0.5 m	$\frac{1}{16}$	0.040	56741-U	1 ea
1.0 m	$\frac{1}{16}$	0.040	56742-U	1 ea

Stainless Steel Tubing Kits

Ready-to-use lengths. Each kit contains ten 5 cm and ten 10 cm pieces of $\frac{1}{16}$ in. tubing.
stainless steel

O.D. × I.D. (in.)	Cat. No.	Qty
$\frac{1}{16} \times 0.005$	502839	1 ea
$\frac{1}{16} \times 0.007$	502820	1 ea
$\frac{1}{16} \times 0.010$	502812	1 ea
$\frac{1}{16} \times 0.020$	502847	1 ea
$\frac{1}{32} \times 0.005$	58404	1 ea

Waters® Union



Description	Cat. No.	Qty
-	58289	1 ea

PEEK Tubing, PEEKsil™ Tubing, PTFE Tubing



PEEK Tubing

Refer to the table below for maximum operating pressure. Polyetheretherketone (PEEK) tubing has become a popular replacement for stainless steel tubing in various places in the HPLC system. It is especially useful when contact between the sample and metal components must be avoided, such as when working with metal complexing agents or certain biochemical compounds. PEEK tubing also offers other advantages: it is flexible, easy to cut, has excellent mechanical stability and chemical compatibility, and can be used to 100 °C. Tetrahydrofuran (THF), dimethyl sulfoxide (DMSO), methylene chloride, and concentrated nitric and sulfuric acids should not be used with PEEK tubing. Our $\frac{1}{16}$ in. PEEK tubing is color coded for easy identification of the internal diameter. 10 ft./3 m length.

HPLC Accessories

PEEK Tubing, PEEKsil™ Tubing, PTFE Tubing

Max. Pressure (psi)	I.D. (in.)	Color	Cat. No.	Pkg
O.D. 1/16 in.				
8000	0.005	red	Z227307	1 ea
8000	0.007	yellow	Z226688	1 ea
6000	0.010	blue	Z226661	1 ea
6000	0.020	orange	Z227293	1 ea
5000	0.030	green	Z226955	1 ea
1000	0.055	natural	54994	1 ea
O.D. 1/8 in.				
5000	0.062	natural	54995	1 ea

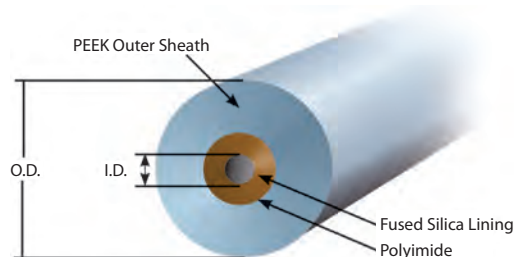
PEEK Tubing

Length (ft)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
10	1/16	0.007	57670-U	1 ea
10	1/16	0.010	57671	1 ea
10	1/16	0.020	57672-U	1 ea

PEEKsil™ Tubing

PEEKsil is fused silica tubing sheathed in PEEK polymer, with an effective outer diameter. The PEEK sheathing is mechanically strong and has ideal characteristics for sealing with metal or polymer fittings. The fused silica core provides a consistent and rigid fluid pathway with very tight tolerances and industry-accepted chemical properties. Like traditional fused silica tubing, PEEKsil has excellent chemical compatibility and extremely low absorption characteristics, especially when compared to stainless steel.

Please note: **Do not cut this tubing.** It should be used as its pre-cut lengths because of permanent damage caused by conventional cutters.



Length (cm)	O.D. (in.)	I.D. (µm)	Cat. No.	Pkg
10	1/32	25 (.001 in.)	51308-U	2 ea
50	1/32	25 (.001 in.)	51316-U	2 ea
10	1/32	50 (.002 in.)	51319-U	2 ea
50	1/32	50 (.002 in.)	51321-U	2 ea
20	1/32	75 (.003 in.)	51324-U	2 ea
50	1/32	75 (.003 in.)	51328-U	2 ea
50	1/32	150 (.006 in.)	51329-U	2 ea
10	1/16	25 (.001 in.)	51333-U	5 ea
50	1/16	25 (.001 in.)	51335-U	2 ea
50	1/16	50 (.002 in.)	51332-U	2 ea
20	1/16	50 (.002 in.)	51334-U	2 ea
50	1/16	100 (.004 in.)	51337-U	2 ea

PTFE Tubing

Economical, flexible PTFE tubing is ideal for use at pressures up to 500 psi (35 kg/cm²). Use in automatic analyzer, postcolumn reaction, preparative scale systems, in-stream sampling devices, and when monitoring physiologically important compounds.

The maximum recommended operating temperature for PTFE is 200 °C, but short term exposure to higher temperatures seldom causes damage.

Length (ft)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
10	1/16	0.031	58700-U	1 ea
10	1/16	0.023	58701	1 ea
10	1/16	0.012	58702	1 ea
10	1/8	0.063	58703	1 ea
50	1/16	0.031	58696-U	1 ea
50	1/16	0.023	58697-U	1 ea
50	1/16	0.012	58698-U	1 ea
50	1/8	0.063	58699	1 ea

FEP Tubing

For connecting pump to reservoirs. Use 1/8 in. O.D. × 0.0625 in. I.D. tubing with most pumps, 0.15 in. O.D. × 0.118 in. I.D. tubing with Waters pumps. 10 ft/3 m length.

PTFE FEP tubing is ideal for use at pressures up to 500 psi (35 kg/cm²).
 max. temp. 50 °C
 max. pressure 500 psi (35 kg)

Length (ft)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
10	1/8	0.0625	58694-U	1 ea
10	0.15	0.118	58695-U	1 ea

Saturator Column Kits

Supelco® Silica and C18 Saturator Columns

To protect your column from alkaline mobile phases which can dissolve silica (pH >7.0), saturate the mobile phase with silica by passing it through a silica saturator column.

To protect your column from acidic mobile phases which can strip bonded phase (pH <2.0), use a C18 saturator column.

Each kit consists of 10 g of packing (12 µm spherical particles, 180 m²/g surface area), a 7.5 cm × 4.6 mm column, two frits, and fittings to connect the column to 1/16 in. tubing.

The optional plastic funnel is helpful for filling these columns (Cat. No. 20390-U).



Description	Cat. No.	Qty
Silica Saturator Column Kit	58410	1 kit
C18 Saturator Column Kit	58418	1 kit

C18 packing

Bulk replacement packing for 58418

surface area	180 m ² /g
particle size	12 µm
58419	10 g

Funnel and Tubing

A small funnel and short piece of tubing simplify the process packing columns.

20390-U	1 ea
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HPLC Accessories

Tubing Cutters

Tubing Cutters

SSI™ TC-20 Tubing Cutter

The SSI Model TC-20 electric stainless steel tube cutter assures a zero dead volume connection. Because the tubing is held securely in a clamp vise on the vertical swing arm, a square cut is produced when the swing arm is lowered against the abrasive cutting wheel, which produces a finished end. No lubricant or cutting fluid is required. The unit, which is CE marked, will cut most common tubing used in chromatography. Tubing with $\frac{1}{16}$ in., $\frac{1}{8}$ in., and $\frac{1}{4}$ in. outside diameter, can be smooth-cut and dressed without distortion.

The precision ground dressing tool for the $\frac{1}{16}$ in. O.D. tubing is included and is attached directly to the swing arm: it cannot be misplaced or lost. A dressing tool (deburring tool - Cat. No. 58804) for $\frac{1}{8}$ in. diameter can be ordered separately.



58539-U

Description	Cat. No.	Qty
SSI™ TC-20 Tubing Cutter, 110 V / 220 V, 50-60 Hz (voltage selectable), CE compliant	58539-U	1 ea

TC-20 Replacement Parts

Description	Cat. No.	Qty
Cutting Wheel for TC-20	58540-U	3 ea
Deburring Tool, configured for $\frac{1}{16}$ in. tubing	58804	1 ea
Deburring Tool, configured for $\frac{1}{8}$ in. tubing	58806	1 ea
Needle Insert for Dressing Tool, configured for $\frac{1}{16}$ in.	58805	1 ea
Needle Insert for Dressing Tool, configured for $\frac{1}{8}$ in.	58807	1 ea

Cutting Wheel for TC-10

Replacement cutting wheel for SSI Model TC-10 tubing cutter. Will not fit Model TC-20.

Description	Cat. No.	Qty
Cutting Wheel for TC-10	58803	3 ea

Replacement cutting wheels for SSI Model TC-10 tubing cutter. It will not fit Model TC-20.

Manual Cutting Tool Accessories

	Cat. No.	Qty
Cutting Wheel for 22410-U and 58692-U for use with IMP Cutting Tool	22411	2 ea
Deburring Kit for use with $\frac{1}{16}$ in. tubing	58691-U	1 ea

	Cat. No.	Qty
Deburring Tool configured for $\frac{1}{16}$ in. tubing	58804	1 ea

Straightening Pliers

	Cat. No.	Qty
Straightening Pliers	58646	1 ea

Manual Cutting Tool

Easily cut $\frac{1}{16}$ in. stainless steel tubing, then deburr the cut end to ensure a uniform flow of gas or liquid. Order tubing cutter and deburring kit (Cat. No. 58691-U) separately.



58692-U

58692-U	1 ea
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PEEK Tubing Cutter

Makes burr-free, perpendicular cuts through polymer tubing with outside diameters from $\frac{1}{16}$ in. to $\frac{1}{8}$ in.. Designed for cutting PEEK tubing, but also easily slices through PTFE and Tefzel capillary tubing. Compact design includes a safety locking mechanism. One spare blade included.



Z290882-1EA	1 ea
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Replacement Blade

for use with PEEK Tubing Cutter

Z290947-1EA	1 ea
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Upchurch Polymer Tubing Cutter

Upchurch designed this reliable and durable device specifically for cutting 1/8" - 1/16" PEEK, PTFE, and Tefzel tubing. Includes 4 replacement blades. sufficient for, for cutting 1/8-1/16" polymer tubing



57665-U	1 ea
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Replacement Blades

for use with Polymer Tubing Cutter

57666-U	5 ea
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HPLC Accessories

Column Hardware

Column Hardware

Column Blank Kit for HPLC

Each column blank kit includes a precision-bore polished 316 stainless steel column blank, two zero dead volume external reducing unions (internal unions with 10 mm I.D. blanks) with nuts and ferrules for 1/16 in. O.D. tubing, and two 2 µm frits.



I.D. × O.D. × L	Cat. No.	Qty
2.1 mm × 1/4 in. × 25 cm	59127	1 ea
4.6 mm × 1/4 in. × 15 cm	59101	1 ea
4.6 mm × 1/4 in. × 25 cm	59102-U	1 ea
10.0 mm × 1/2 in. × 25 cm	58217	1 ea

HPLC Column Blank Replacement Frits

Choose frits with 0.5 µm pores to retain packings prepared from 3 µm particles, frits with 2 µm pores to retain larger particles.



From left to right: 59038, 59129, 59037

Diam. (in.)	Cat. No.	Qty
1/8	59037	10 ea
1/8	59129	10 ea
1/4	59038	10 ea
1/4	58264	10 ea
1/2	58255	10 ea

Frit Cap Assemblies for Supelco® Column Hardware

PEEK with stainless steel frit



From left to right: 55204, 55203, 55207

Size (mm)	Pore Size (µm)	Cat. No.	Pkg
2.1	0.5	55203	2 ea
3.0	2	55208	2 ea
4.0-4.6	0.5	55209	2 ea
4.0-4.6	2	55210	2 ea



Helpful Hints

Supelco modular columns contain the following markings:

- 4.6 mm ID = 3/8" OD tubing with 2 lines
- 4.0 mm ID = 3/8" OD tubing with no lines
- 3.0 mm ID = 3/8" OD tubing with 1 line
- 2.1 mm ID = 1/4" OD tubing with 2 lines

Supelco frit assemblies are color-coded as follows:

- Gray = 2.0 µm pores
- Black = 0.5 µm pores

Frit Removing Tool for Supelco® Analytical Columns

Removes frits from 2.1 mm I.D. to 4.6 mm I.D. Supelco Discovery and SUPELCOSIL analytical columns.



55216	1 ea
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HPLC Column Coupler

for use with Discovery and SUPELCOSIL columns, 3.0, 4.0, 4.6 mm I.D.

55213	1 ea
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▶ PEEK, I.D. 0.007 in. × O.D. 1/16 in. × Overall L 1 in.

This guard column coupler may be used with all Astec and CHIRALPAK® AGP, CBH, and HSA columns of 2 or 3 mm I.D. For 4 mm I.D. columns, use coupler 54986.

10-32 male (Valco compatible)

for use with HPLC columns with 1/16", 10-32 thread end-fittings (Used with all Supelco and Astec columns, plus other brands that have the same thread dimensions.)

58162AST	1 ea
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HPLC Column Endfitting

stainless steel

Configured For	Cat. No.	Qty
3.0 mm, 4.0 mm, and 4.6 mm I.D. hardware Ascentis, Discovery, and SUPELCOSIL columns	55200-U	2 ea
2.1 mm I.D. hardware Ascentis, Discovery, and SUPELCOSIL columns	55201-U	2 ea

Column End Plugs for M6 Male

Column End Plugs

▶ Domed nut

This Amersham Biosciences fitting is made of inert Delrin construction, and is compatible with most common HPLC solvents.

54865	4 ea
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HPLC Accessories

Column Hardware

Column End Plugs

► for 10-32 coned ports, red Delrin®

Use column end plugs with all female 10-32 compression type end fittings, compatible with any common HPLC solvent.

10-32 male



59031

10 ea

TSKgel® Hardware and Accessories

Supelco's offering of Tosoh Bioscience's TSKgel columns and packings can be found in the "HPLC for Large Molecules" section of this catalog under the corresponding separation mode. Photographs of TSKgel hardware listed here can be found on our website.

Note: Catalog number 807093 replaces catalog number 803432.

Description	Cat. No.	Qty
Endfitting with fixed 1 µm frit for TSKgel® Super Series columns	818255	1 ea
Endfitting with fixed 1 µm frit for TSKgel® NPR columns	813998	1 ea
Endfitting with fixed 2 µm frit for all 4.6 mm I.D. TSKgel® stainless steel columns	807619	1 ea
Endfitting with fixed 2 µm frit for all 6 mm I.D. TSKgel® stainless steel columns	808092	1 ea
Endfitting with fixed 2 µm frit for all 7.8 mm I.D. TSKgel® stainless steel columns	808095	1 ea
Endfitting with fixed 10 µm frit for all 7.5 mm I.D. TSKgel® stainless steel columns	805748	1 ea
Replacement 0.5 µm stainless steel frits for 2 mm I.D. TSKgel® columns	803411	10 ea
Replacement 2 µm stainless steel frits for 7.5 mm I.D. TSKgel® Guardgel holder	803430	10 ea
Low dead volume precolumn filter with 0.5 µm stainless steel frit	803410	1 ea
Guardfilter for 4.6 mm I.D. TSKgel® Super Series columns	818207	3 ea
Holder for TSKgel® Super Series Guardfilters	818206	1 ea
Holder for 2 mm I.D. TSKgel® Guardgel cartridges	819308	1 ea
Holder for 3.2 mm I.D. TSKgel® Guardgel cartridges	819018	1 ea
Holder for 7.5 mm I.D. TSKgel® Guardgel cartridges	803432	1 ea
Holder for 7.5 mm I.D. TSKgel® Guardgel cartridges	807093	1 ea
Holder for 21.5 mm I.D. TSKgel® Guardgel cartridges	816106	1 ea

Whatman® Syringe & Syringeless Filters

Whatman® Mini-UniPrep® syringeless filters with slit septa

The Whatman® Mini-UniPrep® Syringeless Filters provide a faster and easier way to remove particulates from samples being prepared for High Performance Liquid Chromatography (HPLC)/ Ultra High Performance Liquid Chromatography (UHPLC) analysis. In fact, Mini-UniPrep lets you prepare samples in 1/3 the time required by other methods. Add up the time savings, plus the money saved from cutting multiple consumables out of the sample preparation process and you'll see huge benefits for your laboratory.

Mini-UniPrep is a preassembled filtration device consisting of a 0.4 mL capacity chamber and a plunger. The plunger contains a filtration membrane at one end and a preattached cap/septum at the other. The plunger is pressed through the sample in the outer chamber and positive pressure forces the filtrate into the reservoir of the plunger. Air escapes through the vent hole until the locking ring is engaged providing an airtight seal. Within seconds the Mini-UniPrep can be placed into any device able to contain 2 mL vials for injection into your instrument.

The device can be used either manually or with a compressor unit. The multi-compressor can process up to 6 samples at one time, further improving sample processing time and reducing the risk of hand stress. The Mini-UniPrep device is designed to fit into any autosampler accommodating 12 x 32 mm vials. Alternatively the septum can be pierced with a needle and the sample drawn off for manual injection into an analyzer.

Features and Benefits:

- All-in-one filtration process allows you to process sample loads in 1/3 the time
- Wide range of membrane choices from 0.2 and 0.45 µm pore sizes
- Compatible with most major autosamplers
- Fewer consumables required. Reduce costs by up to 40%

Applications:

- Routine HPLC/UHPLC analysis
- Composite assays
- Content uniformity
- Protein precipitation
- Solubility testing
- Dissolution testing
- Sample filtration

Continuous Improvement and Innovation:

Whatman has listened to customers and created a whole family of Mini-UniPrep filters to meet specific needs. Customers who need to filter light sensitive samples can use the Amber Mini-UniPrep, customers using robotics to maximize throughput can use Slit Septa Mini-UniPrep.

Amber Mini-UniPrep Syringeless Filter

Features and Benefits:

- Amber color prevents photodegradation of light sensitive samples
- Same colorant used in pharmaceutical containers designed to meet USP specifications for light resistance
- Translucent amber chamber and plunger enable easy visual inspection

Applications:

- Use with any compound that requires protection from light, such as catecholamines or vitamins

HPLC Accessories

Whatman® Syringe & Syringeless Filters

Slit Septa Mini-UniPrep® Syringeless Filter

Features and Benefits:

- Slit septum cap enables use with current robotics on HPLC instruments for high throughput automation
- Durable yet flexible slit septum cap has been specially designed for instruments with sensitive sampling needs. Sample evaporation is minimal

Applications:

- Use with standard robotics on HPLC instruments with sensitive needles, allowing for higher throughput

suitable for (standard robotics on HPLC instruments with sensitive needles, allowing for higher throughput; high throughput applications) polypropylene housing and slit-septa cap (compatible with all major autosamplers)

vial size 12 mm × 32 mm
 filter capacity 400 µL
 feature approximately 18 lb / 8.2 kg



Pore Size (µm)	Cat. No.	Qty
membrane Nylon		
0.2	Z557935-100EA	100 ea
	Z557935-1000EA	1000 ea
0.45	Z557943-100EA	100 ea
	Z557943-1000EA	1000 ea
membrane PTFE		
0.2	Z557951-100EA	100 ea
	Z557951-1000EA	1000 ea
0.45	Z557978-100EA	100 ea
	Z557978-1000EA	1000 ea
membrane polypropylene		
0.2	Z557986-100EA	100 ea
	Z557986-1000EA	1000 ea
0.45	Z557994-100EA	100 ea
	Z557994-1000EA	1000 ea
membrane PVDF		
0.2	Z558001-100EA	100 ea
	Z558001-1000EA	1000 ea
0.45	Z558028-100EA	100 ea
	Z558028-1000EA	1000 ea
membrane polyethersulfone		
0.2	Z558036-100EA	100 ea
	Z558036-1000EA	1000 ea
0.45	Z558044-100EA	100 ea
	Z558044-1000EA	1000 ea
membrane polypropylene (polypropylene depth filter: Depth PP or dpPP)		
0.45	Z558052-100EA	100 ea
	Z558052-1000EA	1000 ea
membrane glass fiber (glass microfiber: GMF)		
0.45	Z558060-100EA	100 ea
	Z558060-1000EA	1000 ea

Whatman® 6-place compressor

Manual station for processing six Whatman® Mini-UniPrep® syringeless filters at the same time, reducing hand stress and speeding workflow.

Whatman Article No., 28421456 (US reference)

product of Whatman, CR0000006

Field of Use : For internal research use only. Products are not intended for diagnostic use or resale.



Z558079-1EA

1 ea

Syringe Tip Filters

Minisart-Plus filters

Minisart-Plus Filters - An integral glass fiber prefilter greatly reduces the clogging associated with typical disposable syringe filtration units. Cellulose acetate filters, 26mm in diameter, with 0.2 µm, or 0.45 µm pores. The Minisart-Plus have a hold-up volume of 0.1mL. Sterile; individually packaged. product of Sartorius Minisart



Description	Cat. No.	Qty
0.2 µm	17823K	50 ea
0.45 µm	17829K	50 ea

Minisart filters

Minisart filters have a Luer Lock inlet and outlet, for positive attachment to the syringe. The filter is 26 mm in diameter with a hold-up volume of 0.1 mL. Suitable for clear aqueous solutions not requiring preliminary filtration. cellulose acetate/surfactant-free membrane product of Sartorius Minisart



Description	Cat. No.	Qty
0.2 µm	16534K	50 ea
0.45 µm	16555K	50 ea
0.8 µm	16592K	50 ea
1.2 µm	17593K	50 ea
5.0 µm	17594K	50 ea

Iso-Disc™ Syringe Tip Filter Unit

Sample filtration can prolong column life and minimize downtime. Use Iso-Disc syringe filters to protect your HPLC column and instrument. Filters are available in Nylon, PTFE, and PVDF.

HPLC Accessories

Syringe Tip Filters

Iso-Disc™ Syringe Tip Filter Unit (continued)



Specifications

Housing: Polypropylene

Connectors: Female luer lock inlet; Male luer outlet

Pressure Rating

	PTFE	Nylon	PVDF
25 mm	100 psi	90 psi	50 psi
13 mm	100 psi	100 psi	50 psi
4 mm	75 psi	75 psi	n/a

Typical Sample Volume (depends on condition of sample)

25 mm: <100 mL

13 mm: <10 mL

4 mm: <2 mL

Typical Holdup Volume (with air purge)

25 mm: <100 µL

13 mm: <10 µL

4 mm: <10 µL

Recommendations

Nylon Membrane:	General filtration, especially for aqueous or other hydrophilic samples. Not recommended for use with acids.
PTFE Membrane:	General filtration for hydrophobic samples. High solvent resistance.
PVDF Membrane:	Similar to PTFE, but recommended where low protein binding is important.
0.45 µm Pores:	Most HPLC applications.
0.2 µm Pores:	Use when using 3 µm HPLC columns or when suspended particles must be minimized.

Membrane	Part Diam. (mm)	Pore Size (µm)	Color	Cat. No.	Qty
PTFE	25	0.2	green	54120-U	50 ea
PTFE	25	0.45	green	54121-U	50 ea
PTFE	25	1	green	54128-U	50 ea
PTFE	13	0.2	green	54131-U	50 ea
PTFE	13	0.45	green	54132-U	50 ea
PTFE	4	0.2	natural	54143-U	100 ea
PTFE	4	0.45	white/red	54144-U	100 ea
Nylon	25	0.2	orange	54122-U	50 ea
Nylon	25	0.45	orange	54123-U	50 ea
Nylon	13	0.2	orange	54133-U	50 ea
Nylon	13	0.45	orange	54134-U	50 ea
Nylon	4	0.2	natural	54145-U	100 ea
PVDF	25	0.2	red	54124-U	50 ea
PVDF	25	0.45	red	54125-U	50 ea
PVDF	13	0.2	red	54135-U	50 ea
PVDF	13	0.45	red	54136-U	50 ea

Rheodyne® Injectors

Rheodyne® Model 3725i Preparative Sample Injectors

Model 3725i sample injectors for 1-10 cm I.D. HPLC columns combine the ease of use and versatility of Rheodyne's analytical scale injectors with the ability to handle large samples and high flow rates. Rugged and easily maintained, in a choice of stainless steel or PEEK flowpaths. Includes 10 mL sample loop, 1/8 in. fittings for all ports, 5 cm large-bore syringe needle (16 gauge/0.65 in. O.D.) for rapid injection of large samples, needle port cleaner, two vent tubes, wrenches, mounting screws, and instructions.

Specifications

Tubing and Fittings:	1/8 in.
Valve Flow Passages:	1 mm/0.04 in.
Flow Rates:	10–800 mL/min
Pressure Rating:	Model 3725i: 276 bar/4,000 psi* Model 3725i-038: 345 bar/5,000 psi

*Usable pressure depends of sample loop ID, organic solvent concentration, and organic solvent exposure time



Description	Cat. No.	Qty
PEEK	57461	1 ea
stainless steel	57463	1 ea

HPLC Accessories

Rheodyne® Injectors

Rheodyne® Model 3725i Replacement Components

	Cat. No.	Qty
Rheodyne® 3725i Rotor Seal		
for use with 3725i Injector	57473	1 ea
Stator Face Assembly		
for use with model 3725 injector	57474	1 ea
Needle for Model 3725i Prep Sample Injector		
PEEK	57475	1 ea
stainless steel, needle size 16 ga	57476	1 ea
RheFlex® PEEK Fittings		
Fitting set, configured for 1/8 in. tubing	57477	1 ea
Rheodyne® Fittings		
nut and ferrule, for 1/8 in. tubing	57479	1 ea
RheBuild® Kit		
for use with 3725/3725i/3725-038/3725i-038	55043	1 ea

Sample Loop for Rheodyne® Injector Model 3725i

Supplied with unswaged fittings for connection to Model 3721i injector.

Two 1/8 in. x 1/16 in. reducing unions (Cat. No. 22999), two short pieces of 1/16 in. capillary tubing, and 1/16 in. nuts and ferrules are needed to connect a preparative sample loop to a valve with 1/16 in. ports.

Volume (mL)	Material	Cat. No.	Qty
2	PEEK	57464-U	1 ea
5	PEEK	57465	1 ea
10	PEEK	57466-U	1 ea
20	PEEK	57467	1 ea
2	stainless steel	57468-U	1 ea
5	stainless steel	57469	1 ea
10	stainless steel	57470-U	1 ea
20	stainless steel	57471	1 ea

Rheodyne® Model 7000 Stream Switching Valve

Designed specifically for column selection, sample clean-up and enrichment, column programming, backflushing, and other stream switching operations. Six peripheral ports (no center port) are interconnected through a two-position rotor. Low volume flow passages (0.6 mm I.D.) minimize dead volume that can affect column switching analyses. The pressure limit is factory set at 5000 psi (350 kg/cm²), but can be adjusted to 7000 psi (490 kg/cm²).

The flat-face seal is easy to adjust.



58920-U

1 ea

Rheodyne® Model 7000L Stream Switching Valve, Large Bore

The 2-position 7000L Stream Switching Valve has a flow passage of 1 mm (0.040").

54479

1 ea

Rheodyne® Model 7000 Replacement Components

	Cat. No.	Qty
Vespel™ Rotor Seal		
for use with 7010 Injector	58831	1 ea
RheBuild® Kit		
for use with 7000/7010	55044	1 ea
Tefzel® Rotor Seal		
for use with 7000L	54647	1 ea

Rheodyne® Model 7010 Injector

The original Rheodyne HPLC injector, Model 7010 introduces 5 µL - 5 mL samples onto a column with excellent reproducibility (intended for complete loop filling only). Six clustered ports allow compact interconnections, minimizing tubing volume. The flat-face seal is easy to adjust and service. Operates at pressures to 7000 psi (490 kg/cm²). Supplied with a 20 µL loop; order fill port separately.



58827

1 ea

Rheodyne® Model 7010 Replacement Components

	Cat. No.	Qty
Loop Fill Port		
for use with 7010 Injector	58825-U	1 ea
Vespel™ Rotor Seal		
for use with 7010 Injector	58831	1 ea
RheBuild® Kit		
for use with 7000/7010	55044	1 ea
Tefzel® rotor seal		
for use with 7010	54656	1 ea

Sample Loop for Rheodyne® Injector Models 7010

Note: Use Vespel seals to pH 10, Tefzel seals to pH 14. stainless steel sample loop and fittings

Volume	Cat. No.	Qty
5 µL	58840-U	1 ea
10 µL	58832	1 ea
20 µL	58833-U	1 ea
50 µL	58834	1 ea
100 µL	58835	1 ea
200 µL	58836	1 ea
500 µL	58837	1 ea
1 mL	58838	1 ea
2 mL	58839	1 ea
5 mL	57637	1 ea

HPLC Accessories

Rheodyne® Injectors

Rheodyne® Model 7060 Selection Valve

For column or mobile phase selection. Instead of frequently connecting and disconnecting columns to your system, connect the injector outlet to the common center port of a Model 7060 valve, and connect up to 6 columns to the peripheral ports. (We recommend allowing one port for bypass/flushing operations.) The common port can be sequentially connected to each of the 6 peripheral ports by manually rotating the handle in either direction. Connect the column outlets to a second Model 7060 valve to direct the flow from the columns to the detector. Low dispersion 0.41 mm/0.016 in. I.D. passages and an internal volume of less than 2 µL ensure minimal extra-column band broadening.



58817

1 ea

Rheodyne® Model 7520 Microsample (Syringe Loading) Injector

Designed specifically for use with narrow bore HPLC columns. 0.13 mm/0.005 in. I.D. passages and a built-in needle port (0.3 µL hold-up volume) minimize dispersion of small samples. A 0.5 µL sample rotor is included; order other rotors separately.

max. pressure 7000 psi



58819

1 ea

Rheodyne® Model 7520 Replacement Components

RheBuild® Kit

These kits include all of the tools and parts you need to repair your Rheodyne injector. The parts included are those most likely to be damaged, worn, or lost. Kits for front-loading injectors include: rotor seal, stator face assembly, isolation seal, needle guide, needle port cleaner, 2 hex keys, operating instructions, and a mini-manual. Parts may vary, depending on valve model.

For Use With	Cat. No.	Qty
7520/7526	55048	1 ea

Sample Rotor for Model 7520 Microsample Injector

Size (µL)	Cat. No.	Qty
0.2	58820	1 ea
1.0	58822-U	1 ea

Rheodyne® Model 7125 Injector

The Rheodyne Model 7125 syringe loading injector allows injection of the entire contents of the syringe into the sample loop – you will not have to flush the valve between injections, unless you are conducting trace analyses. It also injects samples from a partially filled loop (you save time by not having to change the sample loop).

The Model 7125 injector can be used at pressures to 7000 psi (490 kg/cm²) and is supplied with a Vespel rotor seal for operation at pH 0-10. A 20 µL sample loop is included; order additional loops separately.



58826

1 ea

Rheodyne® Model 7125 Replacement Components

Description	Cat. No.	Qty
Rotor Seal for Model 7125/7725/7725i Injector, Vespel	58830-U	1 ea
Rotor Seal for Model 7125/7725/7725i Injector, Tefzel®	57633	1 ea
Needle port cleaner	57635	1 ea
Valve angle bracket, for use with all metal Rheodyne valves	57636	1 ea
RheBuild® Kit, for use with 7125/7126 series	55045	1 ea
Thrust Bearing, for use with 7125	54547	1 ea
Stator Face Assembly, for use with (7125)	54675	1 ea

Sample Loop Rheodyne® Injector Model 7125

stainless steel sample loop and fittings

Use Vespel seals to pH 10, Tefzel seals to pH 14.

Volume	Cat. No.	Qty
5 µL	58840-U	1 ea
10 µL	58832	1 ea
20 µL	58833-U	1 ea
50 µL	58834	1 ea
100 µL	58835	1 ea
200 µL	58836	1 ea
500 µL	58837	1 ea
1 mL	58838	1 ea
2 mL	58839	1 ea
5 mL	57637	1 ea

HPLC Accessories

Rheodyne® Injectors

Rheodyne® Model 7725 and 7725i Injectors

The Rheodyne Model 7725 injector allows you to inject 1 μL - 5 mL samples with accuracy and precision. The rugged, easily maintained design offers many advanced features:

- Patented continuous flow design (Figure A) – flow is uninterrupted when you switch from LOAD to INJECT
- Easy seal adjustment using pressure screw on front of injector
- Easy access to fittings (Figure B)

Injector includes a 20 μL sample loop and is supplied with a Vespel rotor seal that can be replaced with a Tefzel rotor seal for operation at pH 0-14. Factory set at 5,000 psi/345 bar, adjustable to 7,000 psi/483 bar. Model 7725i has an internal position sensing switch.

number of ports 6
 number of positions 2
 max. pressure 7000 psi

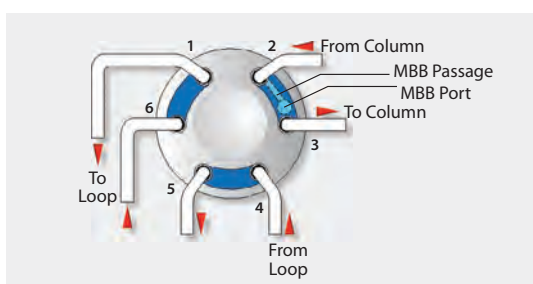


Figure A. A conventional HPLC valve momentarily interrupts flow during sample injection, subjecting your column to repetitive pressure shocks. Rheodyne's patented MBB (make-before-break) design makes the new connection before breaking the old one, providing uninterrupted flow.

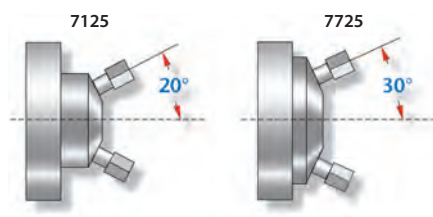


Figure B. Model 7725 injectors also feature a wide port angle (30°), for easy access to the fittings

Description	Cat. No.	Qty
Rheodyne® injector	57620-U	1 ea
Rheodyne® injector	57621	1 ea

Rheodyne® Model 7725 and 7725i Replacement Components

Description	Cat. No.	Qty
Rotor Seal for Model 7125/7725/7725i Injector, Vespel	58830-U	1 ea
Rotor Seal for Model 7125/7725/7725i Injector, Tefzel®	57633	1 ea
Stator face assembly, for use with model 7725 injector	57634	1 ea
Needle port cleaner	57635	1 ea
Valve angle bracket, for use with all metal Rheodyne valves	57636	1 ea
RheBuild® Kit, for use with 7725/7725i/7726	55049	1 ea

Sample Loop for Rheodyne® Injector Model 7725/7725i

Volume	Cat. No.	Qty
5 μL	57623	1 ea
10 μL	57624	1 ea
20 μL	57625	1 ea
50 μL	57626	1 ea
100 μL	57627	1 ea
200 μL	57628-U	1 ea
500 μL	57629-U	1 ea
1 mL	57630	1 ea
2 mL	57631	1 ea
5 mL	57632	1 ea

Rheodyne® Model 8125 Low Dispersion Injector

Inject as little as 0.1 μL of sample with high accuracy and zero waste. Small diameter flow channels in a low-dispersion version of the popular Model 7125 injector. Excellent for use with narrow bore columns (1-3 mm I.D.), but also well suited for larger diameter columns. Resolution is most improved with relatively unretained low peaks, the peaks most affected by extra-column effects.

Additional features include:

- Built-in zero-holdup needle port
- Built-in position switch to signal injection
- Long rotor seal lifetime – make up to 30,000 injections before replacing seal (Vespel)
- User-adjustable to 7000 psi (490 kg/cm²)
- Easy-to-service flat-face rotor design

Supplied with a 5 μL sample loop, fittings for all ports, 22-gauge luer hub needles, needle port cleaner, two vent tubes, wrenches, mounting screws and instructions. Order additional sample loops separately.



57950-U 1 ea

Rheodyne® Model 8125 Replacement Components

Description	Cat. No.	Qty
Rheodyne® 8125 Rotor Seal		
for use with 8125 Injector	57955	1 ea
RheBuild® Kit		
for use with 8125/8126 valves	55050-U	1 ea

HPLC Accessories

Rheodyne® Injectors

Sample Loop for Rheodyne® Injector Model 8125

Volume (μL)	Cat. No.	Qty
5	57951	1 ea
10	57952	1 ea
20	57953	1 ea

All flow passages in the 6-port injectors on this page are inert PEEK (polyetheretherketone) or alumina-ceramic materials. They are unaffected by buffers, acids, bases, or halide salts, including 1 M sodium chloride, over the entire pH range. Both valves are rated for pressures up to 5,000 psi (350 kg/cm²), but the usable operating pressure may be lower, depending on the loop and solvents used.

Rheodyne® Model 9010 Injector

This injector is similar in function to the Model 7010 stainless steel injector, but is constructed of inert PEEK and Tefzel materials for use in the pH range 0-14. It can be used for HPLC, soft gel chromatography, or ion chromatography.

A position-sensing switch closes in the INJECT position and stays closed until the handle is returned to the LOAD position.

Supplied with a 20 μL sample loop; order additional loops separately.



57695

1 ea

Rheodyne® Model 9010 Replacement Components

	Cat. No.	Qty
Tefzel® Rotor Seal		
for use with model 9010 injector	57696	1 ea
Loop Fill Port		
for use with 9010 Injector	57638	1 ea
Needle Port		
for use with 9010 Injector	57639	1 ea
RheBuild® Kit		
for use with 9010/9040 Injector	55052	1 ea

Rheodyne® Model 9725 Injector

The Model 9725 injector is ideal for both HPLC and soft gel LC purification procedures for biomolecules. Performance of this 6-port rotary injector is similar to that of the Model 7725 injector, but no metal contacts the samples. Model 9725 incorporates the patented make-before-break design (see Cat. No. 57620-U).

The 0.25 mm I.D. flow channels provide low dispersion when used with narrow I.D. columns, but prevent excessive flow resistance at flow rates used with larger analytical columns and preparative columns. Use with Rheodyne HPT fittings and high pressure PEEK tubing. Model 9725i includes a position-sensing switch.

Supplied with a 20 μL PEEK sample loop, Tefzel rotor seal, fittings for all ports, 22-gauge luer hub needle, needle port cleaner, two Tefzel vent tubes, wrenches, mounting screws and instructions.

Order additional sample loops separately.



54432

1 ea

Rheodyne® Model 9725i PEEK Injector

The 9725i contains a switch and has the make before break (MBB). With the MBB, flow is not interrupted when switching from load to inject.

54632

1 ea

Rheodyne® Model 9725 Replacement Components

	Cat. No.	Qty
Tefzel® Rotor Seal		
for use with 9725 Injector	57971-U	1 ea
RheBuild® Kit		
for use with 9725/9725i/9726 Injectors	55053	1 ea

Sample Loop for 9010, 9125, and 9725 Injectors

O.D. 1/16 in.

Volume	Cat. No.	Qty
20 μL	57642	1 ea
50 μL	57643	1 ea
100 μL	57644	1 ea
200 μL	57645	1 ea
500 μL	57646	1 ea
1 mL	57647	1 ea
2 mL	57648	1 ea
5 mL	57649	1 ea

HPLC Accessories

Rheodyne® High Pressure Valves



Rheodyne® High Pressure Valves

MXT Valves for Fast Chromatography

The MXT715-000 2-position, 6-port switching valve is ideal for use as a two-column switching valve, enabling the same system to be used with more than one column to easily accommodate multiple users and applications. It can also be used in a traditional injection valve configuration and offers the Rheodyne patented MMB (Make-Before Break) feature for improved reproducibility and system stability.



Description	Cat. No.	Qty
stainless steel	51343-U	1 ea

Sample Loops for MXT Fast Chromatography Valves

stainless steel

Volume (µL)	Cat. No.	Qty
5	51344-U	1 ea
10	51345-U	1 ea
20	51347-U	1 ea
50	51350-U	1 ea
100	51353-U	1 ea

MXP High Pressure Valves for HPLC

The MXP7900-000 valve is the standard 2-position, 6-port switching valve designed for traditional HPLC and related techniques, used for traditional sample injections or to provide dual-column functionality in your system.

The MXP9900-000 valve should be used when the application requires biocompatibility.

Description	Cat. No.	Qty
stainless steel	51354-U	1 ea
PEEK	51356-U	1 ea

Rheodyne® RheBuild® Kits, Fittings, Tools

Rheodyne® Injector RheBuild® Kits

These kits include all of the tools and parts you need to repair your Rheodyne injector. The parts included are those most likely to be damaged, worn, or lost. Kits for front-loading injectors include: rotor seal, stator face assembly, isolation seal, needle guide, needle port cleaner, 2 hex keys, operating instructions, and a mini-manual. Parts may vary, depending on valve model.



For Use With	Cat. No.	Qty
3725/3725i/3725-038/3725i-038	55043	1 ea
7000/7010	55044	1 ea
7010 with Stator	504602	1 ea
7125/7126 series	55045	1 ea
7125-081	55046	1 ea
7520/7526	55048	1 ea
7725/7725i/7726	55049	1 ea
7750 TPMV Series	7750999	1 ea
8125/8126 valves	55050-U	1 ea
9010/9040 Injector	55052	1 ea
9125/9126	55051	1 ea
9725/9725i/9726 Injectors	55053	1 ea
9750 TPMV Series	9750999	1 ea

SupelPRO™ RheBuild® Kits

Features and Benefits

Kits include all of the tools and parts you need to repair your SupelPRO unit. The parts included are those most likely to be damaged, worn, or lost. Parts may vary, depending on valve model.

For Use With	Cat. No.	Qty
2-Position/6-Port	54395-U	1 ea
2-Position/10-Port	54396-U	1 ea

Rheodyne® pH Upgrade Kit

Enables you to use your Rheodyne injector with samples at pH 0-14. Includes Tefzel rotor seal, 2 hex keys, instructions.

operating pH 0 - 14

For Use With	Cat. No.	Qty
Valves 7000/7010/7040	55054	1 ea
Valve 7125/7126	55055	1 ea

HPLC Accessories

Rheodyne® RheBuild® Kits, Fittings, Tools

Rheodyne® Stainless Steel Fittings

The long Rheodyne nut has a longer hex portion for easier wrench access.



from left to right: 58258, 58256, 58257

Description	Cat. No.	Qty
nut, for 1/16 in. tubing	58256	10 ea
long nut, for 1/16 in. tubing	58257	10 ea
ferrule, for 1/16 in. tubing	58258	10 ea
nut and ferrule, for 1/8 in. tubing	57479	1 ea

RheFlex® PEEK Fittings

Features and Benefits

For Rheodyne valves. Hold to 5000 psi (350 kg/cm²).



Long fitting set (57690-U)

Description	Cat. No.	Qty
Long fitting set, configured for 1/16 in. tubing	57690-U	5 ea
Short fitting set, configured for 1/16 in. tubing	57691	5 ea
Ferrule pack, configured for 1/16 in. tubing	57692	5 ea
Fitting set, configured for 1/8 in. tubing	57477	1 ea

Rheodyne® Port Adapter

Use the Port Adapter for connecting 1/16 in. tubing to a 1/8 in. valve port.

57472 1 ea

ValvTool

The ValvTool is a uniquely designed wrench that provides easy access for changing sample loops or replacing fittings on Rheodyne valves. Its slotted socket can be used for working with 1/4 in. stainless steel HPLC fittings, as well.

5/16 in. socket x 1/4 in. open wrench



55087-U 1 ea

Priming Valves, Gauge Kits, SSI™ Valves, Pulse Damper

OPTI-PRIME™ Priming Valve for Waters Pumps

Makes priming Waters pumps a convenient, one hand operation. Replaces Waters priming system.



Description	Cat. No.	Qty
Safety Syringe	59451	1 ea

SSI™ Prime/Purge Valve

The drain port in this valve is incorporated into the valve stem, eliminating the need for extra tubing and fittings. A luer taper on the valve stem accepts a luer syringe for priming. Valve shutoff is provided by a soft-seal tip that withstands back pressures to 8,000 psi (560 kg/cm²). Only PTFE, Tefzel, and 316 stainless steel come in contact with the mobile phase. Order 1/16 in. SSI nuts and ferrules separately.



58690-U 1 ea

Upchurch Prime/ Purge Valve

Upchurch Prime/Purge Valve

Automatic valve operation with a simple twist of the Luer-Lock syringe. Easy installation, long seal life.

Description	Cat. No.	Qty
Prime/Purge Valve for Waters Pump	54716-U	1 ea
Includes 2 Tefzel® Ferrules and 2 PEEK nuts for 1/8" Tubing	54718-U	1 ea
Universal Prime/Purge Valve low pressure		

Pressure Gauge Kits

Components already assembled, ready for easy installation. - Backed by a three-year warranty, these highly accurate (±1.5%), glycerine-filled gauges have a 2-1/2 in./6.4 cm face and 1/4 in. NPT connection. To resist corrosion, the one-piece case and socket and the bourdon tube are made of 316 stainless steel. Stainless steel tee with 1/16 inch fittings is included.

Description	Cat. No.	Qty
0-3000 psi (0-210 bar)	58623-U	1 ea
0-6000 psi (0-420 bar)	58624	1 ea

HPLC Accessories

Priming Valves, Gauge Kits, SSI™ Valves, Pulse Damper

SSI™ Two-Way Shut Off Valve

For $\frac{1}{16}$ in. tubing; 1/4-28 (SSI style) fittings included. Rated to 15,000 psi (1054 kg/cm²).



58789-Left
58793-Right
58794-Not Shown

58789

1 ea

SSI™ Three-Way Stream-Splitting Valve

Each port in this valve can be connected to pressure, as in stream-splitting, or when connecting an in-line pressure gauge (open valve to read pressure, seal off to prevent contamination). The side vent model can replace the injector bypass valve on Altex, LDC, PerkinElmer, Spectra-Physics, or other chromatographs, and is recommended for all general applications. The bottom vent model replaces the bypass valve on a Varian 5000 chromatograph. For $\frac{1}{16}$ in. tubing; 1/4-28 (SSI style) fittings included. Rated to 15,000 psi (1,054 kg/cm²).

number of ports 3
max. pressure 15,000 psi

Description	Cat. No.	Qty
bottom vent	58793	1 ea
side vent	58794	1 ea

SSI™ LO-Pulse™ Damper

A pulse damper controls pump pulsations for a more stable baseline. The LO-Pulse damper is a patented unit compatible with single piston reciprocating HPLC pumps (Altex 110A, Eldex pumps, LDC Mini-Pump VS, SSI Models 200 and 300, etc.). At pressures from 500 psi to 6,000 psi (35-420 kg/cm²), it improves precision of quantitative analyses and detection limits for trace sample components. Fittings and instructions included.

Description	Cat. No.	Qty
with cabinet	58455	1 ea
without cabinet	58442	1 ea

Mobile Phase Degassing/Filtration

Mobile Phase Reservoir System

This convenient system is made entirely of inert parts: glass, Tefzel, PEEK, and PTFE TFE. Includes 10 ft/3 m of $\frac{1}{8}$ in. O.D. PTFE tubing, a PEEK bottom-of-the-bottle filter/sparger, a plug, and a 1-liter or 2-liter safety-coated bottle.



Description	Cat. No.	Qty
bottle 1 L	55060-U	1 ea
bottle 2 L	55061	1 ea

Mobile Phase Reservoir System Replacement Parts

Description	Cat. No.	Qty
Luer Plug	54983	1 ea
Tubing Adapter, 1/4-28 male UNF, male Luer	58722	1 ea
Mobile Phase Replacement Reservoir, 1 L	59324	1 ea
Mobile Phase Replacement Reservoir, 2 L	59323	1 ea
Cap for Mobile Phase Reservoir System, bottle cap: GL 45, number of holes: 3	55062	1 ea
Cap for Mobile Phase Reservoir System, GL 45 solid (no holes)	23170-U	12 ea
PTFE Tubing, L 10 ft x O.D. $\frac{1}{8}$ in. x I.D. 0.063 in.	58703	1 ea
Tube Fitting, Flangeless, nut and ferrule: 1/4-28 male Upchurch, for tubing $\frac{1}{8}$ in. O.D.	58686	5 ea
Shutoff Valve, Low Pressure, natural PEEK, for use with $\frac{1}{8}$ in. tubing	56704	1 ea

HPLC Accessories

Mobile Phase Degassing/Filtration: *Solvent Filtration Systems and Membranes*

Solvent Filtration Systems and Membranes

Protect your instrument and columns by removing particles and gases from solvents and other mobile phase components. Nylon 66 membrane filters are compatible with all solvents commonly used in HPLC. For use with sink aspirator.

Supelco® Mobile Phase Filtration Apparatus 1

Connects to 1000 mL sidearm flask

Includes:

- 250 mL glass reservoir
- Funnel base and stopper
- Clamp
- Stainless steel holder and screen
- 10 PTFE gaskets
- 50 Nylon 66 filters (47 mm, 0.45 µm pores).

Flask not included.



58061

1 ea

Filtration Apparatus 1 Replacement Glass Parts

Description	Cat. No.	Qty
Funnel Base and Stopper	58064	1 ea
Reservoir for Filtration Apparatus 1, volume 250 mL	58063	1 ea
Reservoir for Filtration Apparatus 1, volume 500 mL	58074	1 ea

Supelco® Mobile Phase Filtration Apparatus 2

Connects to aspiration line

Includes:

- 250 mL glass reservoir
- S/T 34/45 funnel base
- S/T 34/45 1000 mL flask and glass cap
- Clamp
- Stainless steel holder and screen
- 10 PTFE gaskets
- 50 Nylon 66 filters (47 mm, 0.45 µm pores).



58062-U

1 ea

Filtration Apparatus 2 Replacement Glass Parts

Description	Cat. No.	Qty
Cap for Flask	58071	1 ea
Tapered Funnel Base	58068	1 ea
Tapered Flask for Filtration Apparatus 2, volume 1000 mL	58070-U	1 ea
Tapered Flask for Filtration Apparatus 2, volume 2000 mL	58075	1 ea

Filtration Apparatus 1 and 2 Replacement Filter Parts

Description	Cat. No.	Qty
Clamp, Spring Action	58053	1 ea
Filter Holder and Screen	58065	1 ea
PTFE Gaskets	58066	10 ea

Nylon 66 Filter Membranes

Diam. (mm)	Pore Size (µm)	Cat. No.	Pkg
47	0.20	58060-U	50 ea
47	0.45	58067	50 ea

PTFE Filter Membranes

PTFE filter membrane

Diam. (mm)	Pore Size (µm)	Cat. No.	Pkg
47	1.5	58086	10 ea
47	1.0	58097	10 ea

Cellulose Filter Membrane

Diam. (mm)	Pore Size (µm)	Cat. No.	Pkg
47	0.22	58188	100 ea

HPLC Accessories

Mobile Phase Degassing/Filtration: *Solvent Filtration Systems and Membranes*

Nylon filter membranes

Nylon filters are naturally hydrophilic and no wetting agents are used in manufacture. With an extractable level <0.0015 mg/cm², they are ideal for HPLC solvent and sample preparation. Because of high non-specific binding, they are not recommended for protein solutions. Compatible with aqueous and most organic solvents. Autoclavable; unaffected by temperatures up to 180 °C.

Diam. (mm)	Pore Size (µm)	Cat. No.	Pkg
25	0.2	Z290823-100EA	100 ea
47	0.22	Z290807-100EA	100 ea
25	0.45	Z290815-100EA	100 ea
47	0.45	Z290793-100EA	100 ea
90	0.45	Z290785-25EA	25 ea

Solvents and Solutions Compatible with Nylon 66 and Nylon 46 Filters

Recommendations

Amyl alcohol	Ethanol	Isopropanol
Benzyl alcohol	Ethylene glycol	Methanol
Butyl alcohol	Glycerine (glycerol)	Methyl Cellosolve
Butyl Cellosolve	Isobutyl alcohol	Propanol

Solvents

Acetone	Dimethylformamide	Methyl ethyl ketone
Acetonitrile	Dimethylsulfoxide	Methyl isobutyl ketone
Amyl acetate	Dioxane	Nitrobenzene
Benzene ¹	Ethyl ether	Methylene chloride ¹
Bromoform	Ethylene dichloride	Pentane
Butyl acetate	Formaldehyde	Perchloroethylene
Carbon tetrachloride ¹	Freon 113	Tetrahydrofuran ¹
Cellosolve (2-ethoxyethanol)	Gasoline	Trichloroethylene
Chloroform ¹	Hexane	Toluene ¹
Cyclohexane	Isopropyl acetate	Trichlorethane
Cyclohexanone	Kerosene	Triethylamine
Diethylacetamide	Methyl acetate	Xylene ¹

Note: Controlled vacuum is recommended to prevent boiling of volatile solvents.

¹Limited stability in neat solvent

Vacuum filtration assembly flasks

Description	Cat. No.	Qty
Side-arm flask, 125 mL	Z290483-1EA	1 ea
Side-arm flask, 1000 mL	Z290459-1EA	1 ea
Collection flask, 1000 mL	Z290610-1EA	1 ea
Collection flask, 4000 mL	Z290637-1EA	1 ea

Aura Mobile Phase Filter/Degasser Unit

Easy-to-use Aura filter/degasser units simultaneously degas solvents and buffers and remove particles. You can eliminate spurious peaks caused by gas bubbles in your detector, and prevent particle damage to check valves and other system components. A clean mobile phase also prolongs column life.

Each unit includes a PTFE filtering/degassing assembly, ten 1.5 µm PTFE filter membranes, 40 in/1 m × ¼ in. O.D. PTFE tubing, and a heavy wall, graduated, borosilicate glass solvent reservoir. Choose either a 1-liter or a 2-liter reservoir. The standard taper PTFE joint on the filtering assembly fits into Ehrlenmeyer flasks and other containers. The filtering assembly accepts any standard 47 mm filter membrane and is compatible with all solvents used in HPLC. Use with appropriate glassware and any vacuum pump.

The Aura filter/degasser is particularly suitable for use with solid phase extraction disks (SPED). It ensures simple disc placement, large filtration area, small restriction to flow from the disk support element, and the convenience and advantages of the liquid inlet tube (allows sediments to be transferred last).

Attaches to any vacuum line.



Description	Cat. No.	Qty
reservoir 1 L	58094	1 ea
reservoir 2 L	58093	1 ea
no reservoir	55023	1 ea

Mobile Phase Replacement Reservoir

Size (L)	Cat. No.	Qty
1	59324	1 ea
2	59323	1 ea

Inlet Filters, Debubbler

10 µm Slip-On Inlet Filter

We recommend this filter for solvent inlet applications. The 10 µm filter protects the HPLC system from contamination while minimizing pump cavitation problems. Compatible with the 1.5 mm I.D. tubing used with many HPLC pumps. Also fits the 2.2 mm I.D. tubing used with Varian pumps and the 3.0 mm I.D. tubing used with Waters pumps. 316 stainless steel tip and filter element connected by a KEL-F collar.



59277

1 ea

2 µm Stainless Steel Inlet Filter

All stainless steel construction with a 2 µm porous filter element, 1½ in./1.7 cm diameter. ⅛ in. pipe.



58267

1 ea

HPLC Accessories

Inlet Filters, Debubbler

Union for 2 µm Inlet Filter

For Connecting	Cat. No.	Qty
1/8 to 1/16 in.	22999	1 ea
1/8 to 1/8 in.	22041	1 ea

Optional PTFE Ferrules for 2 µm Inlet Filter Union

Description	Cat. No.	Qty
PTFE front ferrule, Swagelok for 1/8 in. tubing	22058	10 ea
PTFE back ferrule, Swagelok for 1/8 in. tubing	22059	10 ea
PTFE front ferrule, Swagelok for 1/16 in. tubing	22068	5 ea
PTFE back ferrule, Swagelok for 1/16 in. tubing	22069	5 ea

Mobile Phase Solvent Debubbler with Bracket

Gas bubbles in the mobile phase reduce pump output and cause check valves to malfunction. The mobile phase debubbler removes bubbles from the pump inlet line. Bubbles in the incoming mobile phase rise in the debubbler, displacing an equal volume of liquid from the debubbler reservoir to the pump. When necessary, simply remove the cap and refill the reservoir – the gas-liquid interface is visible through the housing. Compatible with 1.5 mm I.D. and 3.0 mm I.D. PTFE tubing used with Waters and other popular HPLC pumps. KEL-F, PTFE, and 316 stainless steel construction.



58453	1 ea
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Biocompatible Inlet Filters

Bottom-of-the-Bottle™ 2 µm Filters—These Upchurch filters have an integrated 2 µm PEEK sparging frit. Connect to 1/8 in. tubing through push-on connectors.

10 µm Inlet Filter - This metal-free Upchurch unit consists of a replaceable 10 µm ultra-high molecular weight polyethylene filter that screws into a Tefzel holder. The unit connects to the inlet tubing through a flangeless Tefzel fitting (included).

Description	Cat. No.	Qty
Bottom-of-the-Bottle™ filter/sparger, 2 µm	55058	1 ea
Bottom-of-the-Bottle™ filter/sparger, 2 µm	A437	1 ea
Inlet Filter Assembly, 10 µm	56705	1 ea
Filter Cup for UHMWPE Bottom-of-the-Bottle™ solvent filter, 10 µm	56706	5 ea

FEP Tubing for Inlet Filters

L × O.D. × I.D.	Cat. No.	Qty
10 ft × 1/8 in. × 0.0625 in.	58694-U	1 ea
10 ft × 0.15 in. × 0.118 in.	58695-U	1 ea

Vacuum Pumps

KNF Laboport® mini-pump

The ideal pump for vacuum and pressure filtration, solid phase extraction, and blotting. High performance diaphragm vacuum/pressure pumps for moderately corrosive applications and any filtration or procedure that requires clean evacuation, transfer and compression of air, gases, and vapors. Pumps are available with gauges and regulators for precise control of vacuum and pressure.

- Portable
- Oil-free
- Quiet operation
- Maintenance-free, Ryton® pump head
- Molded PTFE diaphragm
- Kalrez® multi-port valves
- Single stage

CE compliant
vacuum ~120 torr
max. pressure 35 psig
pumping speed 5.5 L/min
weight 4.2 lb



Description	Cat. No.	Qty
Pump only, 115 V	Z288284-1EA	1 ea
Pump with vacuum gauge and regulator, 115 V	Z288225-1EA	1 ea
Pump with pressure gauge and regulator, 115 V	Z288306-1EA	1 ea
Pump only, 230 V	Z288292-1EA Z288292EU-1EA Z288292GB-1EA	1 ea 1 ea 1 ea
Pump with vacuum gauge and regulator, 230 V	Z288268-1EA	1 ea
Pump with pressure gauge and regulator, 230 V	Z288314EU-1EA Z288314-1EA	1 ea 1 ea

HPLC Accessories

Vacuum Pumps

KNF Laboport® solid PTFE vacuum pump

Quiet, high performance diaphragm vacuum pumps can be used alone or as the center of a modular laboratory vacuum system. Replaces noisy rotary-vane pumps for vacuum distillation, drying, filtration, rotary evaporation, degassing of liquids, and applications where water aspirators are used.

- Solid PTFE heads
- Molded PTFE diaphragm
- Kalrez® parts eliminate chemical attack to the pump
- Oil-free operation ensures pumped medium will stay pure
- New multi-port valve system with Kalrez disks improves flow and reliability
- Two stages
- 10 mm I.D. hose barbs on ports

CE compliant



Pumping Speed (L/min)	AC	Cat. No.	Qty
vacuum ≤6 torr			
10	115 V	Z262250-1EA	1 ea
10	230 V	Z262285EU-1EA Z262285-1EA	1 ea 1 ea
20	115 V	Z262269-1EA	1 ea
20	230 V	Z262293EU-1EA Z262293-1EA	1 ea 1 ea
34	115 V	Z262277-1EA	1 ea
34	230 V	Z262307-1EA	1 ea
vacuum ≤1.5 torr			
34	115 V	Z288209-1EA	1 ea
34	230 V	Z288217-1EA	1 ea

Temperature Control**Jetstream Plus Column Thermostat**

Features:

- Full management of temperature
- Enhanced separations
- Improves reproducibility
- Increases performance of analysis
- Reliable results
- Increased chiral resolution

Jetstream Plus offers full management of temperature enhanced separations, improving the reproducibility and increasing the performance of your analysis. In addition, Jetstream Plus, a multiple Peltier column thermostat with heating/cooling capability, has two-way forced air circulation. The 5-85°C and 0-80°C temperature range is controlled by new dual reference sensor technology and the auto-calibration feature guarantees reliable results. The setting of fixed temperatures, steps and gradients is done with a simple numerical keypad and a two line character display.

The Jetstream Plus Peltier heating/cooling HPLC column thermostat is fully programmable for isothermal, stepwise and linear ramp calculation. Temperature can be input in Celsius or Fahrenheit. The compact unit holds up to 5 columns in lengths up to 40 cm. It includes an integrated leak detector, adjustable sensitivity and acoustic control column protection by temperature lock feature. An RS-232 computer link is included as part of the control circuitry.

Specifications:

Temp. Range: 5-85 °C or 0-85 °C

Temp. Accuracy: ± 0.2 °C

Temp. Stability: ± 0.1 °C

Power: 100-245 VAC 50/60 Hz 100 W

CE Approved

Dimensions: 135(W) x 310(L) x 450(H) mm

Weight: 8 Kg

W x L x H 135 mm x 310 mm x 450 mm

AC input 100-245 V, 50-60 Hz

power consumption 100 W

weight 11 kg

Description	Cat. No.	Qty
5-85 °C	89810AST	1 ea
0-80 °C	89820AST	1 ea

HPLC Accessories

Temperature Control: *Eppendorf® HPLC Temperature Control Systems*

Eppendorf® HPLC Temperature Control Systems

Column temperature control leads to:

- More reproducible retention times
- More stable baselines
- Faster analyses
- Less system wear

Column temperature control is essential to reproducible retention times and detector baseline stability in reversed-phase, normal-phase, ion-exchange, and size exclusion liquid chromatography. The temperature variation in most labs – a 3-4 °C daily fluctuation – is sufficient to cause errors in quantification or peak identification, particularly in automated systems and systems incorporating temperature-sensitive detectors. To enable you to design a temperature control system that best matches your needs, we offer these Eppendorf® heaters and controllers.

Model CH-500 incorporates both heat and control functions; The CH-30 model heater **MUST** be connected to a separate controller.

Specifications

For Temperature Controllers			
Model:	CH-500 ¹	TC-45	TC-50
Temperature Range:	amb.–150 °C	30–65 °C	amb.–150 °C
Readability:	0.1 °C	5 °C	0.1 °C
Stability:	0.1 °C	5 °C	0.1 °C
Set Control:	10 turn potentiometer	8 DIP switches	10 turn potentiometer
Typical Stability:	±0.1 °C	±0.1 °C	±0.1 °C
Absolute Accuracy:	±1 °C (50 °C)	±1 °C (50 °C)	±1 °C (50 °C)
Display:	3 1/2 digit LED	DIP switches	4 digit LED
Power:	120/240 VAC	120/240 VAC	120/240 VAC
For Column Heaters			
Model:	CH-30, CH-500 ¹		
Temperature Range:	amb.–150 °C		
Length: ²	≤30 cm		
O.D.:	CH-30: ≤1/2 in. OD CH-500: two 1/2 in. OD plus two 1/8 in. OD		
Injector Heating:	No		
Power:	120/240 VAC		
Sensor:	1,000 ohm RTD		
Element:	125 W		

¹Heater/controller (combined)

²Heating channels for 1/8 in. columns can be used to heat solvent before it enters the injector

CH-500 HPLC Column Heater System

This heater/controller essentially combines the features of the CH-30 heater and the TC-50 controller in a single unit. It includes the Eppendorf innovative reversible heating blocks and remote heater on/off capability. Alternatively, the heating channels for 1/8 in. columns can be used to heat solvent before it enters the injector.

CE/CSA/UL approved.



CH-500 Heating Column Combinations

Two 1/4 in. x ≤30 cm and two 1/8 in. x ≤30 cm columns
One 3/8 in. x <30 cm column and 1/4 in. x <30 cm column and one 1/8 in. x <30 cm column
One 1/2 in. x <30 cm column and 1/4 in. x <30 cm column and one 1/8 in. x <30 cm column

CH-500 Heating Column Combinations

Two 3/8 in. x <30 cm columns
Two 1/2 in. x <30 cm columns
One 3/8 in. x <30 cm column and one 1/2 in. x <30 cm column



Description	Cat. No.	Qty
120 V,	500844	1 ea
240 V, Standard European cord	500852	1 ea
240 V, UK cord provided	500860	1 ea
1 in., replacement heating block	500895	2 ea

HPLC Accessories

Temperature Control: *Eppendorf® HPLC Temperature Control Systems*

Eppendorf® TC-45 temperature controller

This low-cost controller will control a CH-30, CH-430, or CH-460 Eppendorf heater from 30-65°C. Temperature is set via DIP switches in 5°C increments.



Description	Cat. No.	Qty
120 V	56760-U	1 ea
240 V	500763	1 ea

Eppendorf® TC-50 temperature controller

Controls a CH-30, CH-430, or CH-460 Eppendorf heater from ambient temperature to 150°C. Temperature is set via a 10 turn potentiometer. The set point and actual temperature are displayed on an LED display. Includes remote heater on/off capability and solid state control.



Description	Cat. No.	Qty
120 V	56762	1 ea
240 V	500771	1 ea

Eppendorf® CH-30 column heater

Holds one column up to 1/2 in. O.D. or two columns up to 3/8 in. O.D. Maximum column length is 30 cm (not including end fittings).



Description	Cat. No.	Qty
120 V	56766	1 ea
240 V	500801	1 ea

Eppendorf® column envelopes



Made To Hold	Cat. No.	Qty
1/2 in. O.D. column	56774-U	1 ea

NEW PRODUCTS

High-Flow Base Plate Purifier Systems for LC-MS Nitrogen

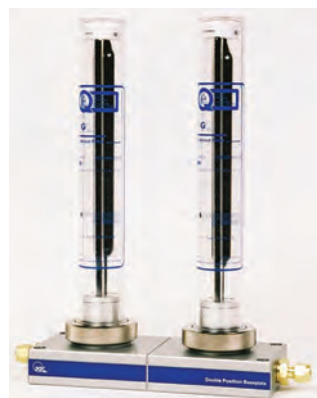
The two cartridge base plate Super Clean™ purifier system is specifically designed to meet the high-flow purity requirements of the LC-MS instrument. Two versions are available, one for hydrocarbon removal, and one for moisture removal.

Features:

- Permanent connections
- Continuous operation
- Quick cartridge change-out and no tools required
- Vertical design requires very little bench space
- Indicator capability for moisture

Super Clean (High-Flow Base-Plate Design) Kit

Super Clean™ high-flow base-plate design purifiers are a unique point-of-use glass/metal, diffusion proof purification system to purify nitrogen for LC-MS units. These high-flow purifiers remove hydrocarbons or moisture (color indicated) to better than 6.0 gas (99.9999%) quality at 2 L/min., independent of the original gas quality. These units can be used at up to 20 L/min. flow rates.



Description	Cat. No.	Qty
hydrocarbon removal kit for high-flow purification (includes SU861029 + 28879-U)	SU861046	1 kit
moisture removal kit for high-flow purification (includes SU861028 + 28879-U)	SU861045	1 kit

HPLC Accessories

High-Flow Base Plate Purifier Systems for LC-MS Nitrogen

Super Clean (High-Flow Base-Plate Design) Gas Purifier

Description	Cat. No.	Qty
hydrocarbon, without indicator	SU861029	2 ea
moisture, with indicator	SU861028	2 ea

Super Clean (High-Flow Base-Plate Design) Base Plate

Description	Cat. No.	Qty
two position, for high-flow purification	28879-U	1 ea

Pump Replacement Parts

Optimize Technologies®, Inc. Pump Replacement Parts

A preventive maintenance program that includes routine replacement of pump parts that are subject to wear will help you avoid costly downtime. These Optimize Technologies check valves, seals, and pistons meet or exceed the pump manufacturers specifications. If you do not see the parts you need, or your instrument model is not listed – just call us.

OPTI-MAX Cartridge Check Valves - An economical and very convenient way to maintain and repair check valves – after initially purchasing the stainless steel inlet or outlet housing (one cartridge is included), simply purchase replacement cartridges in packs of two. We recommend a stainless steel cartridge with a ruby ball/sapphire seat for most applications, but a ceramic ball/seat cartridge offers longer life when you are using high concentrations of acetonitrile. Change every 6 months.

Traditional Check Valves - Direct replacements for the manufacturers original valves, factory assembled in a clean-room environment. Rebuild kits are available. Change every 6 months.

OPTI-SEAL Pump Seals - Made from an inert, ultra-high molecular weight polyethylene material (UHMW-PE). Relative to conventional PTFE seals, these seals show less particle shedding. This reduces the potential for clogged frits, saving you from unscheduled system downtime. We recommend these seals for typical reversed phase mobile phases (aqueous to moderate levels of organic). Not recommended for long-term use with highly organic mobile phases, such as typical normal phase solvents.

UHMW-PE seals are relatively hard, and will not seal well on worn plungers. We recommend that you install a new plunger when you initially switch to using UHMW-PE seals. Change every 3 months.

ITB (PTFE) Seals - Made from PTFE, ITB pump seals are especially recommended for mobile phases with a high organic concentration, such as typical normal phase mobile phases. ITB seals are soft and will not last as long as UHMW-PE seals. Unlike UHMW-PE seals, ITB seals will conform to out-of-round plungers. Change every 3 months.

Plungers (Pistons) - Made to exacting standards, these high quality sapphire plungers reduce seal wear, which means less system down time. Replace once a year, and when you initially switch to using UHMW-PE seals.

Note: Recommendation for general preventive maintenance. Depending on your applications, more frequent replacement could be necessary. Other pump replacement parts are available on request.



Agilent/HP Pump Replacement Parts

Optimize Technologies HPLC Pump Part for Agilent/HP

Description	Replaces Mfr. No.	Cat. No.	Qty
for use with 1050,1100			
Opti-Max® outlet check valve cartridge system	Agilent/HP No.01018-60008	59456	1 ea
OPTI-SEAL pump seal	Agilent/HP No.5062-8516	59409	1 ea
Sapphire plunger	Agilent/HP No.55062-2441	59408	1 ea

Beckman® Pump Replacement Parts

Optimize Technologies HPLC Pump Part for Beckman®

Description	Replaces Mfr. No.	Cat. No.	Qty
for use with 100A, 110A/B, 112, 112M, 114, 114M, 116, 118, 125, 126, 127, 128			
Opti-Max® Inlet Check Valve	Beckman No.240720	59454	1 ea
Opti-Max® outlet check valve	Beckman No.240721	59455	1 ea
for use with 100A, 110A/110B			
OPTI-SEAL pump seal	Beckman No.887138	59405	1 ea

HPLC Accessories

Pump Replacement Parts: Optimize Technologies®, Inc. Pump Replacement Parts

Hitachi® Pump Replacement Parts

Optimize Technologies HPLC Pump Part for Hitachi®

Description	Replaces Mfr. No.	Cat. No.	Qty
for use with 655, L6000, L6200, L6200A			
Opti-Max® inlet check valve	Hitachi No.885-1330	59457	1 ea
Opti-Max® outlet check valve	Hitachi No.885-1331	59458	1 ea
OPTI-SEAL pump seal	Hitachi No.655-1080	59407	1 ea
Piston	Hitachi No.810-1033	59406	1 ea

LDC/Milton Roy Pump Replacement Parts

Optimize Technologies HPLC Pump Part for LDC/Milton Roy

Description	Replaces Mfr. No.	Cat. No.	Qty
for use with all analytical pumps			
Opti-Max® inlet check valve	LDC/Milton Roy No.900947001	59490-U	1 ea
Opti-Max® outlet check valve	LDC/Milton Roy No.900947002	59491	1 ea
OPTI-Seal pump seal	LDC/Milton Roy No.206234	59492	1 ea

PerkinElmer® Pump Replacement Parts

Optimize Technologies HPLC Pump Part for PerkinElmer®

Description	Replaces Mfr. No.	Cat. No.	Qty
for use with 250, Series 4, 200, 400, 410, 620, Integral 4000			
Opti-Max® inlet check valve	PerkinElmer No.0254-0177	59459	1 ea
Opti-Max® outlet check valve	PerkinElmer No.0254-0197	59460	1 ea
for use with 250, Series 4, 200, 400, 410, 620, Integral 4000 for use with Series 1, 2, 3, 3B, 10			
OPTI-SEAL pump seal	PerkinElmer No.0990-7324	59461	1 ea

Shimadzu™ Pump Replacement Parts

Optimize Technologies HPLC Pump Part for Shimadzu™

Description	Replaces Mfr. No.	Cat. No.	Qty
for use with LC-6A, LC-10AS			
Opti-Max® inlet check valve	Shimadzu No.228-12353-91	59465-U	1 ea
Opti-Max® outlet check valve	Shimadzu No.228-09054-93	59466	1 ea
OPTI-SEAL pump seal	Shimadzu No.228-11999-00 228-21975-00	59468	1 ea

Varian® Pump Replacement Parts

Description	Replaces Mfr. No.	Cat. No.	Qty
for use with 2010			
Sapphire Piston	Varian No.00-997-261-08	59482	1 ea

Spectra-Physics® Pump Replacement Parts

Optimize Technologies HPLC Pump Part for Spectra-Physics

Description	Replaces Mfr. No.	Cat. No.	Qty
for use with 8700, 8800, 8810, IsoChrom, P-Series			
Opti-Max® inlet check valve	Spectra-Physics No.A3495-010	59475	1 ea
Opti-Max® inlet check valve	Spectra-Physics No.A3990-010	59493	1 ea
for use with 8800, 8810, Isochrom, P-Series			
Optimize Technologies HPLC Pump Part for Spectra-Physics	Spectra-Physics No.A3102-010	59477	1 ea
OPTI-SEAL pump seal	Spectra-Physics No.A2962-010	59478	1 ea

HPLC Accessories

Pump Replacement Parts: *Optimize Technologies®, Inc. Pump Replacement Parts*

Waters Pump Replacement Parts

Optimize Technologies HPLC Pump Part Waters

Description	Replaces Mfr. No.	Cat. No.	Qty
for use with M45, M45G, M501, 510, 515, 590, 600, 600E, 610, 6K, 6KA			
Inlet check valve repair kit	Waters No.60495	59377	1 ea
ITB black piston seal	Waters No.26613	59422	1 ea
Opti-Max® inlet check valve	Waters No.33679	59484	1 ea
Opti-Max® outlet check valve	Waters No.25216	59485-U	1 ea
OPTI-SEAL pump seal	Waters No.22934	59388	1 ea
OPTI-SEAL pump seal		59389	10 ea
for use with M45, M45G, M501			
Plunger	Waters No.26524	59387	1 ea
for use with 510, 590, 600, 600E, 610, 6K, 6KA			
Plunger	Waters No.25656	59386	1 ea

Opti-Max® Replacement Cartridge-All Manufacturers

Size (in.)	Description	Replaces Mfr. No.	Cat. No.	Qty
PEEK				
1/8	ruby ball/sapphire seat	Optimize Tech	59370-U	2 ea
SS cartridge				
1/16	ruby ball/sapphire seat	All Manufacturers	59494	2 ea
3/16	ruby ball/sapphire seat	All Manufacturers	59495	2 ea
1/8	ruby ball/sapphire seat	All Manufacturers	59496	2 ea

ASI Pump Replacement Parts

Analytical Scientific Instruments (ASI) cartridge check valve design offers self-priming convenience, rugged, crush proof construction, rapid response time (ball seats more quickly, for less pulsation and a more stable flow), and replaceable outlet filters (to protect system from particles). If your pump model is not listed, please call us. UHMW PE - ultra-high molecular weight polyethylene.

Agilent/HP Pump Replacement Parts (ASI)

Description	Cat. No.	Qty
for use with 1090		
Inlet cartridge	504734	1 ea

Bio-Rad® Pump Replacement Parts (ASI)

Description	Cat. No.	Qty
for use with 1330, 1350 Bio-Rad for use with 590,600E,6000 Waters		
Inlet cartridge	501204	1 ea
for use with 1330, 1350 Bio-Rad for use with 200, 220, 222, 300 SSI for use with Extended Flow 510EF, 600EF, 6KEF, 6KAFF Waters for use with M-45, 501, 510, 590, 600E, 6000 Waters		
Outlet cartridge	501905	1 ea
for use with 1330, 1350 Bio-Rad		
UHMW PE pump seal	501921	1 ea

Eldex Pump Replacement Parts (ASI)

Description	Cat. No.	Qty
for use with 55, 10S, 55C, 10SC Elder for use with A, B, E Gilson		
ASI HPLC Pump Part for Gilson	502006	1 ea

SSI™ Pump Replacement Parts (ASI)

Description	Cat. No.	Qty
for use with 1330, 1350 Bio-Rad for use with 200, 220, 222, 300 SSI for use with Extended Flow 510EF, 600EF, 6KEF, 6KAFF Waters for use with M-45, 501, 510, 590, 600E, 6000 Waters		
Outlet cartridge	501905	1 ea

Gilson Pump Replacement Parts (ASI)

Description	Cat. No.	Qty
for use with 55, 10S, 55C, 10SC Elder for use with A, B, E Gilson		
ASI HPLC Pump Part for Gilson	502006	1 ea
for use with Gilson 55, 55C		
UHMW PE Pump Seal	504653	1 ea

Waters Pump Replacement Parts (ASI)

Description	Cat. No.	Qty
for use with M-45, 501, 510, 590, 600E, 6000		
ASI UHMW PE pump seal	505420	1 ea
Inlet check valve (complete assembly)	505277	1 ea
for use with 1330, 1350 Bio-Rad for use with 200, 220, 222, 300 SSI for use with Extended Flow 510EF, 600EF, 6KEF, 6KAFF Waters for use with M-45, 501, 510, 590, 600E, 6000 Waters		
Outlet cartridge	501905	1 ea
for use with M-45, 501, 510, 590, 600E, 6000		
Outlet check valve (complete assembly) all except M501, 600E)	505382	1 ea
for use with M-45, 501 only		
Piston	505439	1 ea

HPLC Accessories

LC-MS Post Column Flow Splitters

LC-MS Post Column Flow Splitters

The LC-MS Post Column Splitter is very elegant in its simplicity. Split ratios are created by two or more fluid resistors that form a parallel flow path. QuickSplit Flow Splitters are available with a fixed or adjustable split ratio. Interchangeable fluid resistors make it easy to change split ratios quickly, eliminating tedious adjustments to capillary tubing. The technology can be applied to all applications where a controlled, reproducible split ratio is required including LC-MS, flow fractionation, pre/post-column flow splitting mass directed fraction collection, and capillary chromatography.

- Ultra low dead volume design
- Easy-to-use interchangeable fluid resistors
- Rugged stainless steel construction

LC-MS Post Column Flow Splitters



Description	Cat. No.	Qty
Fixed, Split Ratio = 20:1	56624-U	1 ea
Fixed, Split Ratio = 10:1	56625-U	1 ea
Fixed, Split Ratio = 5:1	56626-U	1 ea
Fixed, Split Ratio = 3:1	56627-U	1 ea
Adjustable, Split Ratio = 1:1 to 20:1	56629-U	1 ea

LC-MS Post Column Flow Splitter Mounting Bracket



Description	Cat. No.	Qty
Fixed	56630-U	1 ea

LC-MS Post Column Resistor Sets

Set includes one low flow and one high flow cartridge

Description	Cat. No.	Qty
Binary, Split Ratio = 20:1	56631-U	1 ea
Binary, Split Ratio = 10:1	56632-U	1 ea
Binary, Split Ratio = 5:1	56633-U	1 ea
Binary, Split Ratio = 3:1	56634-U	1 ea

Postcolumn Reactors

Postcolumn Reactor Module

Increase detection sensitivity for amino acids, proteins, carbohydrates, pesticides, inorganic ions, other samples.

The heated reactor cartridge in the ASI Model 310 Postcolumn Reactor Module mixes reagent with column effluent efficiently and with minimum peak dispersion. Unlike conventional PTFE tube coil reactors, the rugged reactor cartridge can be used at pressures up to 3000 psi, at 150 °C, without rupturing. We recommend using a low volume static mixer, such as the binary input housing/mixer cartridges listed on this page, with the Model 310 module. Install the mixer in line, prior to the reactor cartridge, to combine the reagent with the column effluent. A pump is required for delivering reagent to the system.

Specifications

Reactor Cartridge Volume:	0.15 mL, 0.50 mL, or 1.0 mL
Sample-Contacting Materials:	PTFE 316 stainless steel
Maximum Pressure:	3,000 psi at 150 °C
Oven Temperature Range:	10 °C above ambient to 150 °C
Temperature Control	solid state controller with LED display
Dimensions:	12 in. × 9 in. × 6 in.
Power:	120 VAC (50–60 Hz), 220 VAC, or 100 VAC

Description	Cat. No.	Qty
120 V, 0.50 mL (Reaktor)	54976	1 ea
120 V, 1.0 mL	54973	1 ea
220 V, module only	54971	1 ea

Postcolumn Reactor Cartridge (fits all heater modules)

Replacement cartridges for all ASI Model 310 postcolumn Reactor Modules.

Description	Cat. No.	Qty
0.15 mL	54978	1 ea
0.50 mL	54979	1 ea
1.0 mL	54980-U	1 ea

ASI Static Mixers

- Reduces baseline noise
- Increases sensitivity
- Increases reaction efficiency in postcolumn derivatization
- Improves accuracy in gradient mixing for microbore analyses

A highly efficient cross-flow shearing mechanism in the ASI static mixer produces vortex mixing over a wide range of flow rates. Use the binary input housing to combine two flowpaths into one, such as in postcolumn or gradient mixing applications. Use the in-line housing when additional mixing is needed in a single flowpath. Within each product series (Micro, Low and High volume) the mixer cartridges are interchangeable. We recommend the 250 µL cartridge for large peak volumes, and the 50 µL or 150 µL sizes for smaller volumes. Use the Micro-Mixer Cartridges only with Micro-Mixer Housings and the Low Volume Mixer Cartridges only with the Low Volume Mixer Housings.

HPLC Accessories

ASI Static Mixers

Component Assemblies:

Choose a Housing and a Cartridge within each volume group. In-Line, Binary or Ternary refers to the number of lines going into the mixer housing.

Micro-Mixer Static Mixers (2 - 25 μ L)

stainless steel

Description	Cat. No.	Qty
stainless steel		
housing, In-Line	56665-U	1 ea
housing, Binary	56666-U	1 ea
2 μ L cartridge	56661-U	1 ea
5 μ L cartridge	56662-U	1 ea
10 μ L cartridge	56663-U	1 ea
25 μ L cartridge	56664-U	1 ea

Low Volume Static Mixer (50-250 μ L)

Description	Cat. No.	Qty
stainless steel		
housing, In-line	57548	1 ea
housing, Binary	57549	1 ea
housing, Ternary	500488	1 ea
50 μ L cartridge	57545	1 ea
150 μ L cartridge	57546	1 ea
250 μ L cartridge	57547	1 ea
PEEK		
housing, In-Line	500496	1 ea
housing, Binary	500518	1 ea
50 μ L cartridge	500445	1 ea
150 μ L cartridge	500453	1 ea
250 μ L cartridge	500461	1 ea

High Volume Static Mixer Complete Assembly

Description	Cat. No.	Qty
stainless steel		
350 μ L in-line	500534	1 ea
500 μ L in-line	500550	1 ea
500 μ L binary	500569	1 ea

ASI mixer cartridge

Description	Cat. No.	Qty
volume 500 μ L	54733-U	1 ea

Postcolumn Reactor

Assemble Your Own System and Save!

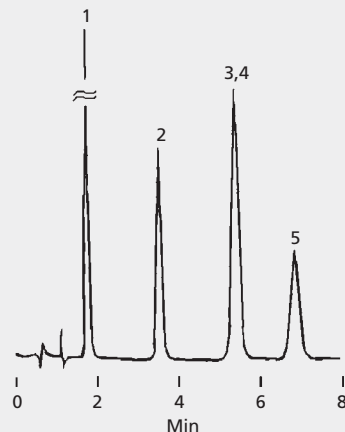
The equipment needed to perform postcolumn reactions can be relatively simple. These components enable you to easily and economically construct your own system. We recommend using a 5 cm \times 4.6 mm column filled with 250 mm beads when peak volumes are large. Our Mixing Column Hardware Kit (Cat. No. 58319), contains a 5 cm \times 4.6 mm I.D. column blank, two fittings, two frits, and 2 in./5 cm of $\frac{1}{16}$ in. tubing. For small peak volumes, use a column filled with 75 mm beads, or a single bead string reactor (30 cm of 0.5 mm I.D. PTFE tubing filled with 250 mm beads).

Use our ready-to-use single bead string reactors, or prepare your own from our PTFE tubing, $\frac{1}{16}$ in. internal unions, and silane treated glass wool (for terminating the reactor). The delay tubes (Cat. Nos. 59206 and 59207) are knitted PTFE tubing.

Improve sensitivity for amino acids, proteins, carbohydrates, inorganic ions, pesticides, and other samples. In postcolumn reactions, column effluent is mixed with a reagent before it enters the detector. The reaction can increase detection sensitivity or enable you to use more selective conditions (e.g., a

different UV wavelength). The reaction can be as simple as changing the pH of the effluent, but the results often are significant. A postcolumn reaction system can be used to perform derivatizations or other reactions. It can be used with fluorescence, electrochemical, conductivity, and UV/visible detectors.

With Postcolumn Reaction



1. Barbitol
2. Butethal
3. Amobarbital
4. Pentobarbital
5. Secobarbital

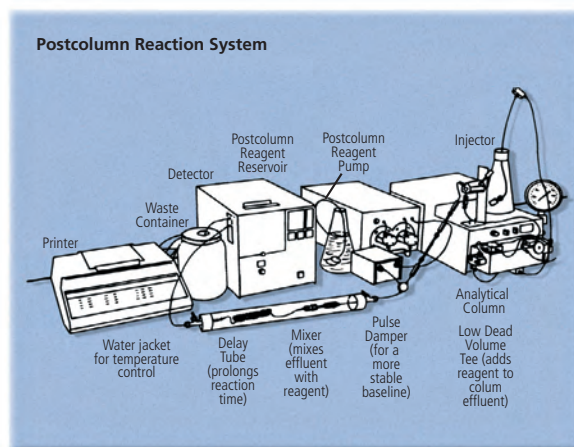
Deprotonization of barbiturates, an instantaneous reaction, gives a twenty-fold increase in sensitivity. The reaction also improves selectivity by shifting the UV absorption maximum from 220 nm to 240 nm.

Without Postcolumn Reaction



1. Barbitol
2. Butethal
3. Amobarbital
4. Pentobarbital
5. Secobarbital

Deprotonization of barbiturates, an instantaneous reaction, gives a twenty-fold increase in sensitivity. The reaction also improves selectivity by shifting the UV absorption maximum from 220 nm to 240 nm.



HPLC Accessories

Postcolumn Reactor

Postcolumn Reaction Single Bead String Reactors

Description	Cat. No.	Qty
Acid Washed	59204	1 ea
Acid Washed/Silanized	59205	1 ea

Postcolumn Reaction Glass Beads

Description	Cat. No.	Qty
75 μ m, acid-washed	59200-U	25 g
250 μ m, acid-washed	59202	25 g
75 μ m, acid-washed/silanized	59201	25 g
250 μ m, acid-washed/silanized	59203	25 g

Postcolumn Reaction Knitted Capillary Delay Tubes

for use with water jacket, 58450-U

Description	Cat. No.	Qty
10 ft (3 m) \times I.D. 0.5 mm	59206	1 ea
10 ft (3 m) \times I.D. 0.8 mm	59207	1 ea

Postcolumn Reaction TFE PTFE Tubing

O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
L 10 ft			
1/16	0.031	58700-U	1 ea
1/16	0.023	58701	1 ea
1/16	0.012	58702	1 ea

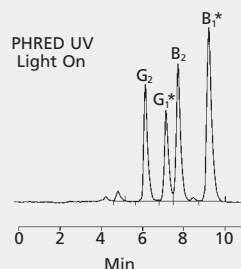
Postcolumn Reaction System Accessories

Description	Cat. No.	Qty
Column Water Jacket	58450-U	1 ea
Union	22997-U	1 ea
Glass Wool	20411	50 g
SSI™ LO-Pulse™ Damper	58455	1 ea
Tee	58283	1 ea
Guard Column Hardware Kit	58319	1 kit

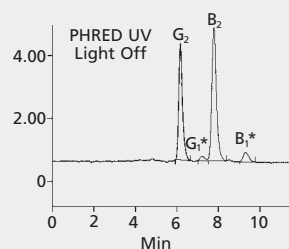
Glass Wool

Description	Cat. No.	Qty
Pesticide Grade (Silanized)	20409	10 g
Pesticide Grade (Silanized)	20409	10 g
	21688-U	100 g
Silanized	20411	50 g
	20410	250 g
Silanized	20411	50 g
Phosphoric Acid Treated	20383	50 g
Non-Treated	20384	50 g

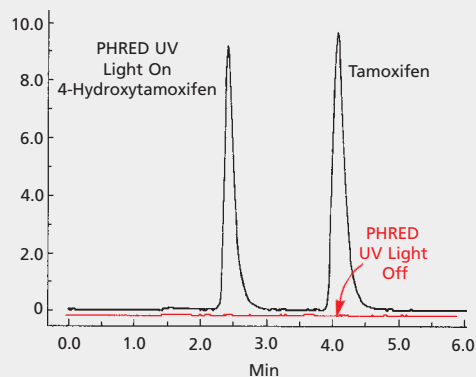
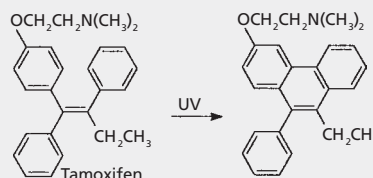
PHRED: Photochemical Reactor Enhanced Detection



* Requires derivatization for fluorescence detection. By replacing chemical derivatization, photochemical derivatization simplifies this procedure.



* Requires derivatization for fluorescence detection. By replacing chemical derivatization, photochemical derivatization simplifies this procedure.



References

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2. L. Dou, I. S. Krull, *Anal. Chem.* **62**: 2599 (1990).
3. W. J. Bachman, J. Stewart, *LC/GC* **7**: 38 (1989).
4. I. S. Krull, C. M. Selavka, M. Lookabaugh, W. R. Childress, *LC/GC* **7**: 758 (1989).
5. *The Reporter* **XII**, #4, pp. 6-7.
6. H. Joshua, *American Laboratory* April 1995, p. 361.
7. *The Reporter* Vol. 16, no 3, p. 9.

References 1-4, 6 not available from Supelco

HPLC Accessories

PHRED: Photochemical Reactor Enhanced Detection

PHRED: Photochemical Reactor and Accessories

Description	Cat. No.	Qty
PHRED Photochemical Reactor, 110 V	57400-U	1 ea
Knitted reactor coil, L 5 m × I.D. 0.25 mm, volume 0.25 mL	57402	1 ea
Knitted reactor coil, L 10 m × I.D. 0.25 mm, volume 0.5 mL	57403	1 ea
Knitted reactor coil, L 15 m × I.D. 0.25 mm, volume 0.75 mL	57404	1 ea
Knitted reactor coil, L 5 m × I.D. 0.50 mm, volume 1.0 mL	57405	1 ea

Description	Cat. No.	Qty
Knitted reactor coil, L 10 m × I.D. 0.50 mm, volume 2.0 mL	57406	1 ea
Knitted reactor coil, L 20 m × I.D. 0.25 mm, volume 1.0 mL	57410-U	1 ea
Knitted reactor coil, L 20 m × I.D. 0.5 mm, volume 4.0 mL	57411	1 ea
Replacement bulb, for use with PHRED Reactor	57401	1 ea
Knitted reactor coil, volume 3.0 mL, L 15 m × I.D. 0.50 mm	57407	1 ea
Reflective support plate, stainless steel, for use with PHRED Reactor	57408	1 ea

Solvents and Reagents

CHROMASOLV® Solvents

In high performance liquid chromatography the speed, quality and reproducibility of the separation depends not only on the properties of the stationary phase, but decisively on the quality of the solvents used. The CHROMASOLV solvent line offers guaranteed quality specially tailored to chromatographic requirements, in conjunction with batch consistency.

The CHROMASOLV solvents are characterized by high UV-transmittance, consistent gradient testing for interfering peaks and baseline drift, guaranteed suitability for fluorescence detection, low non-volatile components, free acid and free alkali, and an exactly defined low water content.

LC-MS Ultra CHROMASOLV® Grade Solvents and Additives for UHPLC



The ultra high performance/pressure liquid chromatography (UHPLC) systems with high speed, efficiency and sensitivity require high purity solvents and additives for mobile phases, sample preparation, and sample dissolution. Fluka's new Ultra Grade CHROMASOLV solvents and additives help in providing reliable data and high performance, and eliminate system down-time. These solvents are carefully developed, prepared and tested for demanding UHPLC conditions under various detection modes.

CAS No.	Compound	Cat. No.	Qty
75-05-8	Acetonitrile, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14261-1L 14261-2L	1 L 2 L
-	Acetonitrile with 0.1% acetic acid, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14273-2L	2 L
148642-19-7	Acetonitrile with 0.1% ammonium acetate, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14274-2L	2 L
-	Acetonitrile with 0.1% formic acid, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14272-2L	2 L
-	Acetonitrile with 0.1% trifluoroacetic acid, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14271-2L	2 L
631-61-8	Ammonium acetate, LC-MS Ultra; eluent additive for UHPLC-MS	14267-25G	25 g
540-69-2	Ammonium formate, LC-MS Ultra; eluent additive for UHPLC-MS	14266-25G	25 g
64-18-6	Formic acid, LC-MS Ultra, eluent additive for UHPLC-MS	14265-1ML 14265-2ML	1 mL 2 mL
67-56-1	Methanol, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14262-1L 14262-2L	1 L 2 L
-	Methanol with 0.1% formic acid, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14276-2L	2 L
-	Methanol with 0.1% trifluoroacetic acid, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14275-2L	2 L
76-05-1	Trifluoroacetic acid, LC-MS Ultra, eluent additive for UHPLC-MS	14264-1ML 14264-2ML	1 mL 2 mL

Solvents and Reagents

LC-MS Ultra CHROMASOLV® Grade Solvents and Additives for UHPLC

CAS No.	Compound	Cat. No.	Qty
7732-18-5	Water, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14263-1L 14263-2L	1 L 2 L
-	Water with 0.05% acetic acid, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14287-2L	2 L
-	Water with 0.05% formic acid, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14291-2L	2 L
-	Water with 0.1% acetic acid, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14282-2L	2 L
-	Water with 0.1% ammonium acetate, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14283-2L	2 L
-	Water with 0.1% formic acid, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14281-2L	2 L
-	Water with 0.1% trifluoroacetic acid, LC-MS Ultra CHROMASOLV®, tested for UHPLC-MS	14279-2L	2 L

LC-MS CHROMASOLV® Solvents

These are high-purity, multipurpose solvents, tested for suitability in: HPLC with gradient analysis, spectroscopy, environmental testing and some LC-MS applications.



CAS No.	Compound	Cat. No.	Qty
75-05-8	Acetonitrile, LC-MS CHROMASOLV®	34967-250ML 34967-1L 34967-6X1L 34967-144X1L 34967-2.5L 34967-4X2.5L 34967-72X2.5L 34967-4L 34967-4X4L 34967-18L-RC 34967-20L 34967-45L	250 mL 1 L 6 × 1 L 144 × 1 L 2.5 L 4 × 2.5 L 72 × 2.5 L 4 L 4 × 4 L 18 L 20 L 45 L
141-78-6	Ethyl acetate, LC-MS CHROMASOLV®	34972-1L-R 34972-2.5L-R	1 L 2.5 L
142-82-5	Heptane, LC-MS CHROMASOLV®	34999-1L 34999-2.5L	1 L 2.5 L
110-54-3	Hexane, LC-MS CHROMASOLV®	34986-1L 34986-2.5L	1 L 2.5 L
67-56-1	Methanol, LC-MS CHROMASOLV®	34966-1L 34966-6X1L 34966-144X1L 34966-2.5L 34966-4X2.5L 34966-72X2.5L 34966-4L 34966-4X4L 34966S-400L-RC	1 L 6 × 1 L 144 × 1 L 2.5 L 4 × 2.5 L 72 × 2.5 L 4 L 4 × 4 L 400 L
67-63-0	2-Propanol, LC-MS CHROMASOLV®	34965-1L 34965-6X1L 34965-2.5L 34965-4X2.5L	1 L 6 × 1 L 2.5 L 4 × 2.5 L
7732-18-5	Water, LC-MS CHROMASOLV®	39253-1L-R 39253-4X4L-R 39253-20L-R	1 L 4 × 4 L 20 L

Solvents and Reagents

CHROMASOLV® Gradient Solvents

CHROMASOLV® Gradient Solvents

These solvents are suitable for sensitive gradient elutions at short wavelengths and with very high requirements on UV-transmittance and fluorescence detection.

CAS No.	Compound	Cat. No.	Qty
75-05-8	Acetonitrile, CHROMASOLV® gradient grade, for HPLC, ≥99.9%	34851-100ML	100 mL
		34851-1L	1 L
		34851-6X1L	6 × 1 L
		34851-2L	2 L
		34851-4X2L	4 × 2 L
		34851-2.5L-PC	2.5 L
		34851-2.5L	2.5 L
		34851-4X2.5L	4 × 2.5 L
		34851-72X2.5L	72 × 2.5 L
		34851-4L	4 L
		34851-4X4L	4 × 4 L
		34851-7L	7 L
		34851-18L	18 L
		34851-20L	20 L
		34851-20L-P2	20 L
		34851-20L-N1	20 L
		34851-45L	45 L
		34851-50L-P2-LS	50 L
		34851-50L-P2	50 L
		34851-56L-P1-LS	56 L
		34851-200L-P2	200 L
		34851-200L-LS-NB	200 L
		34851-200L	200 L
34851-200L-LS	200 L		
34851S-400L-RC	400 L		
34851-50L-P2-4B	1 pkg		
34851-50L-P2-4B-LS	1 pkg		
75-05-8	Acetonitrile, CHROMASOLV® gradient grade, for HPLC, ≥99.9%	439134-1L	1 L
		439134-4L	4 L
		439134-4X4L	4 × 4 L
		439134-2X10L	2 × 10 L
		439134-18L	18 L
		439134-20L	20 L
		439134-50L	50 L
75-05-8	Acetonitrile, CHROMASOLV® (gradient grade +), suitable for PAH analysis, ≥99.9% (GC)	00683-2.5L	2.5 L
67-56-1	Methanol, CHROMASOLV®, gradient grade, for HPLC, ≥99.9%	34885-100ML-R	100 mL
		34885-1L-R	1 L
		34885-6X1L-R	6 × 1 L
		34885-2L-R	2 L
		34885-2.5L-R	2.5 L
		34885-4X2.5L-R	4 × 2.5 L
		34885-4L-R	4 L
		34885-4X4L-R	4 × 4 L
		34885-7L-R	7 L
		34885-18L-R	18 L
		34885-45L-R	45 L
34885-50L-P2-4A-R	1 pkg		
34885-50LP24A-LS-R	1 pkg		
67-56-1	Methanol, CHROMASOLV®, gradient grade, for HPLC, suitable as ACS-grade LC reagent, ≥99.9%	439193-4L	4 L
		439193-4X4L	4 × 4 L
		439193-18L	18 L
		439193-20L-P2	20 L
		439193-20L-N2	20 L
		439193-20L	20 L
		439193-200L-P2	200 L
439193-200L	200 L		
7732-18-5	Water, CHROMASOLV® Plus, for HPLC	34877-1L	1 L
		34877-2.5L	2.5 L
		34877-4X2.5L	4 × 2.5 L
		34877-4L	4 L
		34877-4X4L	4 × 4 L

Solvents and Reagents

LC-MS CHROMASOLV® Pre-Blended Mobile Phase Solvents

LC-MS CHROMASOLV® Pre-Blended Mobile Phase Solvents

LC-MS allows the detection and quantification of many analytes. The minimization of artifacts requires very well specified solvents spiked with ultra pure salts and acids. These additives are used to improve the chromatographic peak shape and to optimize ionization in the MS interface. The most commonly used solvents in LC-MS technique are acetonitrile, methanol and water. Additives can include trifluoroacetic acid, formic acid, acetic acid and ammonium acetate.

CAS No.	Compound	Cat. No.	Qty
75-05-8	Acetonitrile solution, contains 0.1 % (v/v) formic acid, for HPLC	576956-4X4L 576956-18L 576956-200L-LS	4 × 4 L 18 L 200 L
75-05-8	Acetonitrile solution, contains 0.1 % (v/v) trifluoroacetic acid, for HPLC	574732-4L 574732-4X4L 574732-18L 574732-20L 574732-200L-LS	4 L 4 × 4 L 18 L 20 L 200 L
75-05-8	Acetonitrile solution, contains 0.05 % (v/v) trifluoroacetic acid	574724-4L 574724-4X4L 574724-18L 574724-200L	4 L 4 × 4 L 18 L 200 L
75-05-8	Acetonitrile solution, contains 0.035 % (v/v) trifluoroacetic acid, for HPLC	565423-18L	18 L
-	Acetonitrile with 0.1% acetic acid, LC-MS CHROMASOLV®	34678-2.5L-R	2.5 L
148642-19-7	Acetonitrile with 0.1% ammonium acetate, LC-MS CHROMASOLV®	34669-2.5L-R	2.5 L
-	Acetonitrile with 0.1% formic acid, LC-MS CHROMASOLV®	34668-2.5L-R	2.5 L
-	Acetonitrile with 0.1% formic acid and 0.01% trifluoroacetic acid, LC-MS CHROMASOLV®	34676-2.5L-R	2.5 L
-	Acetonitrile with 0.1% trifluoroacetic acid, LC-MS CHROMASOLV®	34976-2.5L-R	2.5 L
67-56-1	Methanol solution, (Methanol:Dimethyl sulfoxide 1:1 (v/v))	650188-4X4L	4 × 4 L
67-56-1	Methanol solution, contains 0.10 % (v/v) formic acid	632546-4X4L 632546-18L	4 × 4 L 18 L
-	Methanol with 0.1% acetic acid, LC-MS CHROMASOLV®	34672-2.5L-R	2.5 L
-	Methanol with 0.1% ammonium acetate, LC-MS CHROMASOLV®	34670-2.5L-R	2.5 L
-	Methanol with 0.1% formic acid, LC-MS CHROMASOLV®	34671-2.5L-R	2.5 L
-	Methanol with 0.1% trifluoroacetic acid, LC-MS CHROMASOLV®	34974-2.5L-R	2.5 L
6100-05-6	Potassium citrate tribasic monohydrate, eluent additive for LC-MS	77843-50G	50 g
67-63-0	Rinsing Solution I, rinsing agent for LC-MS, CHROMASOLV® (rinsing agent for LC-MS)	34689-1L-R	1 L
-	Water solution, for HPLC, contains 0.1 % (v/v) formic acid	576913-4L 576913-4X4L 576913-200L-LS	4 L 4 × 4 L 200 L
-	Water solution, contains 0.1 % (v/v) trifluoroacetic acid, for HPLC	576905-4X4L 576905-18L 576905-20L 576905-200L-LS	4 × 4 L 18 L 20 L 200 L
-	Water with 0.1% acetic acid, LC-MS CHROMASOLV®	34675-2.5L-R	2.5 L
-	Water with 0.1% ammonium acetate, LC-MS CHROMASOLV®	34674-2.5L-R	2.5 L
-	Water with 0.1% formic acid, LC-MS CHROMASOLV®	34673-2.5L-R	2.5 L
-	Water with 0.1% formic acid and 0.01% trifluoroacetic acid, LC-MS CHROMASOLV®, contains 0.093-0.107 % (w/w) formic acid as additive	34677-2.5L-R	2.5 L
-	Water with 0.1% trifluoroacetic acid, LC-MS CHROMASOLV®	34978-2.5L-R	2.5 L
-	Water with 8% formic acid, rinsing agent for LC-MS, formic acid 7.7%	34692-1L	1 L

LC-MS Mobile Phase Additives

It is common practice in LC-MS to add certain chemicals to the mobile phase or introduce them post-column prior to the interface to influence analyte ionization. Most often, an improvement of the analyte signal is the goal. However, some additives may be used to suppress unwanted signals or selectively enhance the signal of particular compounds in a mixture, for example glycosidic species in a mixture of peptides.

Sigma-Aldrich offers a wide range of high purity additives for LC-MS applications in addition to our pure CHROMASOLV solvents and ready-to-use blends. Our offering includes the most commonly used acids, bases, volatile salts and a sodium source. All are of high purity, usually puriss p.a., and are tested for LC-MS application.

CAS No.	Compound	Cat. No.	Qty
64-19-7	Acetic acid, eluent additive for LC-MS	49199-50ML-F	50 mL
631-61-8	Ammonium acetate, for mass spectrometry, eluent additive for LC-MS	73594-25G-F 73594-100G-F	25 g 100 g
1066-33-7	Ammonium bicarbonate, eluent additive for LC-MS	40867-50G-F	50 g
12125-01-8	Ammonium fluoride, eluent additive for LC-MS	52481-50G	50 g
540-69-2	Ammonium formate, eluent additive for LC-MS	55674-50G-F	50 g
1336-21-6	Ammonium hydroxide solution, ≥25% in H ₂ O, eluent additive for LC-MS	44273-10X1ML-F 44273-100ML-F	10 × 1 mL 100 mL
7789-17-5	Cesium iodide, analytical standard for high-resolution mass spectroscopy	21004-1G	1 g

Solvents and Reagents

LC-MS Mobile Phase Additives

CAS No.	Compound	Cat. No.	Qty
64-18-6	Formic acid, eluent additive for LC-MS	56302-10X1ML 56302-10X1ML-F 56302-50ML-F 56302-1L-GL-F 56302-1L-F 56302-1L-GL	10 × 1 mL 10 × 1 mL 50 mL 1 L 1 L 1 L
920-66-1	1,1,1,3,3,3-Hexafluoro-2-propanol, eluent additive for LC-MS	42060-10X1ML 42060-50ML	10 × 1 mL 50 mL
556-63-8	Lithium formate solution, suitable for LC-MS, 10 mM LiOH in isopropanol/water 1:1 (+0.2% HCOOH)	01886-100ML	100 mL
6100-05-6	Potassium citrate tribasic monohydrate, eluent additive for LC-MS	77843-50G	50 g
79-09-4	Propionic acid, eluent additive for LC-MS	49916-50ML-F	50 mL
50-55-5	Reserpine Standard for LC-MS, analytical standard, for LC-MS	43530-4.5ML-F	4.5 mL
121-44-8	Triethylamine, eluent additive for LC-MS	65897-50ML-F	50 mL
76-05-1	Trifluoroacetic acid, eluent additive for LC-MS	40967-10X1ML-F 40967-10ML-F 40967-5X10ML-F 40967-1L-F	10 × 1 mL 10 mL 5 × 10 mL 1 L
75-89-8	2,2,2-Trifluoroethanol, eluent additive for LC-MS	05841-10X1ML 05841-50ML	10 × 1 mL 50 mL

Rinsing Solutions

Rinsing Solution I

2-Propanol solution

CAS No.	Compound	Cat. No.	Qty
67-63-0	Rinsing Solution I, rinsing agent for LC-MS, CHROMASOLV® (rinsing agent for LC-MS)	34689-1L-R	1 L

CHROMASOLV® Plus Solvents

These are high-purity, multipurpose solvents, tested for suitability in: HPLC with gradient analysis, spectrophotometry, environmental testing and some LC-MS applications.

CAS No.	Compound	Cat. No.	Qty
67-64-1	Acetone, CHROMASOLV® Plus, for HPLC, ≥99.9%	650501-1L 650501-6X1L 650501-4L 650501-4X4L	1 L 6 × 1 L 4 L 4 × 4 L
75-05-8	Acetonitrile, CHROMASOLV® Plus, for HPLC, ≥99.9%	34998-1L 34998-6X1L 34998-2.5L 34998-4X2.5L 34998-4L 34998-4X4L 34998-7L 34998-18L 34998-20L 34998-20L-P2 34998-45L 34998-50L-P2 34998-200L-LS-NB 34998-200L-P2 34998-200L	1 L 6 × 1 L 2.5 L 4 × 2.5 L 4 L 4 × 4 L 7 L 18 L 20 L 20 L 45 L 50 L 200 L 200 L 200 L
71-43-2	Benzene, CHROMASOLV® Plus, for HPLC, ≥99.9%	270709-100ML 270709-1L 270709-6X1L 270709-2L 270709-2.5L 270709-4X2.5L 270709-4X4L	100 mL 1 L 6 × 1 L 2 L 2.5 L 4 × 2.5 L 4 × 4 L
71-36-3	1-Butanol, CHROMASOLV® Plus, for HPLC, ≥99.7%	34867-100ML 34867-1L 34867-2L 34867-2.5L 34867-4X2.5L 34867-4L 34867-4X4L	100 mL 1 L 2 L 2.5 L 4 × 2.5 L 4 L 4 × 4 L
123-86-4	Butyl acetate, CHROMASOLV® Plus, for HPLC, 99.7%	270687-100ML 270687-1L 270687-4X4L	100 mL 1 L 4 × 4 L

Solvents and Reagents

CHROMASOLV® Plus Solvents

CAS No.	Compound	Cat. No.	Qty
1634-04-4	<i>tert</i> -Butyl methyl ether, CHROMASOLV® Plus, for HPLC, ≥99.9%	650560-1L	1 L
		650560-6X1L	6 × 1 L
		650560-4L	4 L
		650560-4X4L	4 × 4 L
		650560-20L	20 L
		650560-50L-P2-LS 650560-56L-P1-LS	50 L 56 L
67-66-3	Chloroform, CHROMASOLV® Plus, for HPLC, ≥99.9%, contains amylenes as stabilizer	650498-1L	1 L
		650498-6X1L	6 × 1 L
		650498-4L	4 L
		650498-4X4L	4 × 4 L
67-66-3	Chloroform, CHROMASOLV® Plus, for HPLC, ≥99.9%, contains 0.5-1.0% ethanol as stabilizer	650471-1L	1 L
		650471-6X1L	6 × 1 L
		650471-4L	4 L
		650471-4X4L	4 × 4 L
110-82-7	Cyclohexane, CHROMASOLV® Plus, for HPLC, ≥99.9%	650455-1L	1 L
		650455-6X1L	6 × 1 L
		650455-4L	4 L
		650455-4X4L	4 × 4 L
75-09-2	Dichloromethane, CHROMASOLV® Plus, for HPLC, ≥99.9%, contains 50-150 ppm amylene as stabilizer	650463-1L	1 L
		650463-6X1L	6 × 1 L
		650463-4L	4 L
		650463-4X4L	4 × 4 L
		650463-20L-P2	20 L
		650463-20L-N2	20 L
127-19-5	<i>N,N</i> -Dimethylacetamide, CHROMASOLV® Plus, for HPLC, ≥99.9%	270555-100ML	100 mL
		270555-1L	1 L
		270555-2L	2 L
		270555-2.5L	2.5 L
		270555-4X2.5L	4 × 2.5 L
		270555-4X4L	4 × 4 L
		270555-18L	18 L
68-12-2	<i>N,N</i> -Dimethylformamide, CHROMASOLV® Plus, for HPLC, ≥99.9%	270547-100ML	100 mL
		270547-1L	1 L
		270547-6X1L	6 × 1 L
		270547-2L	2 L
		270547-4X2L	4 × 2 L
		270547-2.5L	2.5 L
		270547-4X2.5L	4 × 2.5 L
		270547-4X4L	4 × 4 L
		270547-10L	10 L
68-12-2	<i>N,N</i> -Dimethylformamide, CHROMASOLV® Plus, for HPLC, ≥99.9%	648531-4X4L	4 × 4 L
67-68-5	Dimethyl sulfoxide, CHROMASOLV® Plus, for HPLC, ≥99.7%	34869-100ML	100 mL
		34869-12X100ML	12 × 100 mL
		34869-500ML	500 mL
		34869-1L	1 L
		34869-6X1L	6 × 1 L
		34869-2L	2 L
		34869-4X2L	4 × 2 L
		34869-2.5L	2.5 L
		34869-4L	4 L
		34869-4X4L	4 × 4 L
		34869-20L	20 L
		34869-50L	50 L
		123-91-1	1,4-Dioxane, CHROMASOLV® Plus, for HPLC, ≥99.5%, contains ~1.5 mg/L 2,6-di- <i>tert</i> -butyl-4-methylphenol as stabilizer (Europe only)
34857-500ML	500 mL		
34857-1L	1 L		
34857-6X1L	6 × 1 L		
34857-2L	2 L		
34857-2.5L	2.5 L		
34857-4X2.5L	4 × 2.5 L		
141-78-6	Ethyl acetate, CHROMASOLV® Plus, for HPLC, 99.9%	650528-1L	1 L
		650528-6X1L	6 × 1 L
		650528-4L	4 L
		650528-4X4L	4 × 4 L
142-82-5	Heptane, CHROMASOLV® Plus, for HPLC, 99%	650536-1L	1 L
		650536-6X1L	6 × 1 L
		650536-4L	4 L
		650536-4X4L	4 × 4 L
		650536-50L-P2	50 L
		650536-200L	200 L
110-54-3	Hexane, CHROMASOLV® Plus, for HPLC, ≥95%	650552-1L	1 L
		650552-6X1L	6 × 1 L
		650552-4L	4 L
		650552-4X4L	4 × 4 L
-	Hexane, mixture of isomers, CHROMASOLV® Plus, for HPLC, ≥98.5%	650544-1L	1 L
		650544-6X1L	6 × 1 L
		650544-4L	4 L
		650544-4X4L	4 × 4 L
		650544-200L-LS-NB	200 L

Solvents and Reagents

CHROMASOLV® Plus Solvents

CAS No.	Compound	Cat. No.	Qty
-	Hexane, mixture of isomers, CHROMASOLV® Plus, for HPLC, ≥98.5%	650420-1L 650420-6X1L 650420-4L 650420-4X4L	1 L 6 × 1 L 4 L 4 × 4 L
67-56-1	Methanol, CHROMASOLV® Plus, for HPLC	646377-1L 646377-6X1L 646377-4X2L 646377-4L 646377-4X4L 646377-20L-N2 646377-20L-P2 646377-50L-P2 646377-50L-P2-LS 646377-56L-P1-LS 646377-200L-P1-NB 646377-200L-LS-NB 646377-200L-P2	1 L 6 × 1 L 4 × 2 L 4 L 4 × 4 L 20 L 20 L 50 L 50 L 56 L 200 L 200 L 200 L
67-56-1	Methanol, CHROMASOLV® Plus, for HPLC, ≥99.9%, poly-coated bottles	650609-4L 650609-4X4L	4 L 4 × 4 L
872-50-4	1-Methyl-2-pyrrolidinone, CHROMASOLV® Plus, for HPLC, ≥99%	270458-100ML 270458-1L 270458-2L 270458-2.5L 270458-4X4L 270458-20L	100 mL 1 L 2 L 2.5 L 4 × 4 L 20 L
67-63-0	2-Propanol, CHROMASOLV® Plus, for HPLC, 99.9%	650447-1L 650447-6X1L 650447-4X2L 650447-4L 650447-4X4L 650447-20L-N2 650447-50L-P2 650447-56L-P1-LS	1 L 6 × 1 L 4 × 2 L 4 L 4 × 4 L 20 L 50 L 56 L
110-86-1	Pyridine, CHROMASOLV® Plus, for HPLC, ≥99.9%	270407-100ML 270407-12X100ML 270407-1L 270407-2L 270407-4X4L	100 mL 12 × 100 mL 1 L 2 L 4 × 4 L
109-99-9	Tetrahydrofuran, inhibitor-free, CHROMASOLV® Plus, for HPLC, ≥99.9%	34865-100ML 34865-12X100ML 34865-1L 34865-6X1L 34865-144X1L 34865-2L 34865-2.5L 34865-4X2.5L 34865-4L 34865-4X4L 34865-7L 34865-18L 34865-20L 34865-45L 34865-200L	100 mL 12 × 100 mL 1 L 6 × 1 L 144 × 1 L 2 L 2.5 L 4 × 2.5 L 4 L 4 × 4 L 7 L 18 L 20 L 45 L 200 L
109-99-9	Tetrahydrofuran, CHROMASOLV® Plus, for HPLC, ≥99.9%, inhibitor-free	439215-4X4L	4 × 4 L
108-88-3	Toluene, CHROMASOLV® Plus, for HPLC, ≥99.9%	650579-1L 650579-6X1L 650579-4L 650579-4X4L	1 L 6 × 1 L 4 L 4 × 4 L
540-84-1	2,2,4-Trimethylpentane, CHROMASOLV® Plus, for HPLC, ≥99.5%	650439-1L 650439-6X1L 650439-4L 650439-4X4L 650439-20L	1 L 6 × 1 L 4 L 4 × 4 L 20 L
7732-18-5	Water, CHROMASOLV® Plus, for HPLC	34877-1L 34877-2.5L 34877-4X2.5L 34877-4L 34877-4X4L	1 L 2.5 L 4 × 2.5 L 4 L 4 × 4 L
95-47-6	o-Xylene, CHROMASOLV® Plus, for HPLC, 98%	295884-100ML 295884-1L 295884-2L	100 mL 1 L 2 L

Solvents and Reagents

Gradient Grade Solvents

Gradient Grade Solvents

CAS No.	Compound	Cat. No.	Qty		
75-05-8	Acetonitrile, CHROMASOLV® gradient grade, for HPLC, ≥99.9%	34851-100ML	100 mL		
		34851-1L	1 L		
		34851-6X1L	6 × 1 L		
		34851-2L	2 L		
		34851-4X2L	4 × 2 L		
		34851-2.5L-PC	2.5 L		
		34851-2.5L	2.5 L		
		34851-4X2.5L	4 × 2.5 L		
		34851-72X2.5L	72 × 2.5 L		
		34851-4L	4 L		
		34851-4X4L	4 × 4 L		
		34851-7L	7 L		
		34851-18L	18 L		
		34851-20L	20 L		
		34851-20L-P2	20 L		
		34851-20L-N1	20 L		
		34851-45L	45 L		
		34851-50L-P2-LS	50 L		
		34851-50L-P2	50 L		
		34851-56L-P1-LS	56 L		
		34851-200L-P2	200 L		
		34851-200L-LS-NB	200 L		
		34851-200L	200 L		
		34851-200L-LS	200 L		
		34851S-400L-RC	400 L		
		34851-50L-P2-4B	1 pkg		
34851-50L-P2-4B-LS	1 pkg				
75-05-8	Acetonitrile, CHROMASOLV® (gradient grade +), suitable for PAH analysis, ≥99.9% (GC)	00683-2.5L	2.5 L		
67-56-1	Methanol, CHROMASOLV®, gradient grade, for HPLC, ≥99.9%	34885-100ML-R	100 mL		
		34885-1L-R	1 L		
		34885-6X1L-R	6 × 1 L		
		34885-2L-R	2 L		
		34885-2.5L-R	2.5 L		
		34885-4X2.5L-R	4 × 2.5 L		
		34885-4L-R	4 L		
		34885-4X4L-R	4 × 4 L		
		34885-7L-R	7 L		
		34885-18L-R	18 L		
		34885-45L-R	45 L		
		34885-50L-P2-4A-R	1 pkg		
		34885-50LP24A-LS-R	1 pkg		
		67-56-1	Methanol, CHROMASOLV®, gradient grade, for HPLC, suitable as ACS-grade LC reagent, ≥99.9%	439193-4L	4 L
				439193-4X4L	4 × 4 L
				439193-18L	18 L
439193-20L-P2	20 L				
439193-20L-N2	20 L				
439193-20L	20 L				
439193-200L-P2	200 L				
439193-200L	200 L				

Other CHROMASOLV® Solvents

CAS No.	Compound	Cat. No.	Qty
67-64-1	Acetone, CHROMASOLV®, for HPLC, ≥99.9%	270725-100ML	100 mL
		270725-1L	1 L
		270725-6X1L	6 × 1 L
		270725-2L	2 L
		270725-4X2L	4 × 2 L
		270725-4X2.5L	4 × 2.5 L
		270725-4L	4 L
		270725-4X4L	4 × 4 L
		270725-18L-P1	18 L
		270725-20L-P2	20 L
		270725-50L-P2	50 L
		270725-50LP2-3A-LS	50 L
		270725-50L-P2-3A	50 L
		270725-56L-P1-LS	56 L
		270725-200L	200 L
		67-64-1	Acetone, CHROMASOLV®, for HPLC, ≥99.8%
34850-6X1L	6 × 1 L		
34850-144X1L	144 × 1 L		
34850-2.5L	2.5 L		
34850-4X2.5L	4 × 2.5 L		
34850-72X2.5L	72 × 2.5 L		
34850-18L	18 L		
34850-45L	45 L		

Solvents and Reagents

Other CHROMASOLV® Solvents

CAS No.	Compound	Cat. No.	Qty		
75-05-8	Acetonitrile, E CHROMASOLV®, for HPLC, for UV, ≥99.9% (GC)	34888-1L	1 L		
		34888-6X1L	6 × 1 L		
		34888-2.5L	2.5 L		
		34888-4X2.5L	4 × 2.5 L		
		34888-7L	7 L		
		34888-18L	18 L		
75-05-8	Acetonitrile, R CHROMASOLV®, for liquid chromatography, ≥99.8% (GC)	34881-1L	1 L		
		34881-6X1L	6 × 1 L		
		34881-2.5L	2.5 L		
		34881-4X2.5L	4 × 2.5 L		
		34881-7L	7 L		
		34881-18L	18 L		
75-05-8	Acetonitrile, AMD CHROMASOLV®, ≥99.9%	34896-1L	1 L		
		34896-6X1L	6 × 1 L		
75-05-8	Acetonitrile solution, contains 0.1 % (v/v) trifluoroacetic acid, for HPLC	574732-4L	4 L		
		574732-4X4L	4 × 4 L		
		574732-18L	18 L		
		574732-20L	20 L		
		574732-200L-LS	200 L		
75-05-8	Acetonitrile solution, contains 0.05 % (v/v) trifluoroacetic acid	574724-4L	4 L		
		574724-4X4L	4 × 4 L		
		574724-18L	18 L		
		574724-200L	200 L		
75-05-8	Acetonitrile solution, contains 0.035 % (v/v) trifluoroacetic acid, for HPLC	565423-18L	18 L		
-	Acetonitrile 50%, Water 47.5 % and Trifluoroacetic acid 2.5%, LC-MS CHROMASOLV®	19182-250ML	250 mL		
100-47-0	Benzonitrile, CHROMASOLV®, for HPLC, 99.9%	270318-100ML	100 mL		
		270318-1L	1 L		
71-36-3	1-Butanol, CHROMASOLV® Plus, for HPLC, ≥99.7%	34867-100ML	100 mL		
		34867-1L	1 L		
		34867-2L	2 L		
		34867-2.5L	2.5 L		
		34867-4X2.5L	4 × 2.5 L		
		34867-4L	4 L		
78-93-3	2-Butanone, CHROMASOLV®, for HPLC, ≥99.7%	34861-100ML	100 mL		
		34861-1L	1 L		
		34861-6X1L	6 × 1 L		
		34861-2L	2 L		
		34861-4X2L	4 × 2 L		
		34861-2.5L	2.5 L		
1634-04-4	<i>tert</i> -Butyl methyl ether, CHROMASOLV®, for HPLC, ≥99.8%	34861-4X2.5L	4 × 2.5 L		
		34861-4L	4 L		
		34861-4X4L	4 × 4 L		
		34861-50L-P2-LS	50 L		
		34861-50L-P2	50 L		
		34875-100ML	100 mL		
		34875-1L	1 L		
		34875-6X1L	6 × 1 L		
		34875-2L	2 L		
		34875-4X2L	4 × 2 L		
75-15-0	Carbon disulfide, CHROMASOLV®, for HPLC, ≥99.9%	34875-2.5L	2.5 L		
		34875P-2.5L-R	2.5 L		
		34875-4X2.5L	4 × 2.5 L		
		34875-72X2.5L	72 × 2.5 L		
		34875-4L	4 L		
		34875-4X4L	4 × 4 L		
		34875-7L	7 L		
		34875-200L	200 L		
		270660-100ML	100 mL		
		270660-1L	1 L		
		270660-2L	2 L		
		56-23-5	Carbon tetrachloride, CHROMASOLV®, for HPLC, ≥99.9%	270652-100ML	100 mL
				270652-1L	1 L
		109-69-3	1-Chlorobutane, CHROMASOLV®, for HPLC, ≥99.8%	34958-1L	1 L
34958-2L	2 L				
34958-4X4L	4 × 4 L				
67-66-3	Chloroform, CHROMASOLV®, for HPLC, ≥99.8%, contains 0.5-1.0% ethanol as stabilizer	366927-100ML	100 mL		
		366927-1L	1 L		
		366927-6X1L	6 × 1 L		
		366927-4L	4 L		
		366927-4X4L	4 × 4 L		

Solvents and Reagents

Other CHROMASOLV® Solvents

CAS No.	Compound	Cat. No.	Qty
67-66-3	Chloroform, CHROMASOLV®, for HPLC, ≥99.8%, amylene stabilized	34854-2ML	2 mL
		34854-100ML	100 mL
		34854-1L	1 L
		34854-6X1L	6 × 1 L
		34854-2L	2 L
		34854-4X2L	4 × 2 L
		34854-2.5L	2.5 L
		34854-4X2.5L	4 × 2.5 L
		34854-4X4L	4 × 4 L
110-82-7	Cyclohexane, CHROMASOLV®, for HPLC, ≥99.7%	34855-100ML	100 mL
		34855-1L	1 L
		34855-6X1L	6 × 1 L
		34855-2L	2 L
		34855-2.5L	2.5 L
		34855-4X2.5L	4 × 2.5 L
		34855-72X2.5L	72 × 2.5 L
		34855-4X4L	4 × 4 L
		34855-7L	7 L
95-50-1	1,2-Dichlorobenzene, CHROMASOLV®, 99%	270598-100ML	100 mL
		270598-1L	1 L
		270598-2L	2 L
		270598-4L	4 L
		270598-4X4L	4 × 4 L
75-09-2	Dichloromethane, CHROMASOLV®, for HPLC, ≥99.8%, contains amylene as stabilizer	34856-100ML	100 mL
		34856-1L	1 L
		34856-6X1L	6 × 1 L
		34856-2L	2 L
		34856-2.5L	2.5 L
		34856-4X2.5L	4 × 2.5 L
		34856-4L	4 L
		34856-4X4L	4 × 4 L
		34856-7L	7 L
		34856-18L	18 L
		34856-18L-P1	18 L
		34856-45L	45 L
		34856-50L-P2	50 L
34856-50L-P2-LS	50 L		
34856-200L	200 L		
60-29-7	Diethyl ether, CHROMASOLV®, for HPLC, ≥99.9%, inhibitor-free	309966-100ML	100 mL
		309966-1L	1 L
		309966-6X1L	6 × 1 L
		309966-25L	25 L
110-71-4	1,2-Dimethoxyethane, CHROMASOLV®, for HPLC, 99.9%	307432-100ML	100 mL
		307432-1L	1 L
		307432-2L	2 L
		307432-2.5L	2.5 L
		307432-4X2.5L	4 × 2.5 L
67-68-5	Dimethyl sulfoxide, CHROMASOLV® Plus, for HPLC, ≥99.7%	34869-100ML	100 mL
		34869-12X100ML	12 × 100 mL
		34869-500ML	500 mL
		34869-1L	1 L
		34869-6X1L	6 × 1 L
		34869-2L	2 L
		34869-4X2L	4 × 2 L
		34869-2.5L	2.5 L
		34869-4L	4 L
		34869-4X4L	4 × 4 L
34869-20L	20 L		
34869-50L	50 L		
141-78-6	Ethyl acetate, CHROMASOLV®, for HPLC, ≥99.7%	34858-100ML	100 mL
		34858-1L	1 L
		34858-6X1L	6 × 1 L
		34858-2L	2 L
		34858-4X2L	4 × 2 L
		34858-2.5L	2.5 L
		34858-4X2.5L	4 × 2.5 L
		34858-4L	4 L
		34858-4X4L	4 × 4 L
		34858-7L	7 L
		34858-18L-P1	18 L
		34858-18L	18 L
		34858-20L-P2	20 L
		34858-45L	45 L
		34858-50L-P2	50 L
		34858-185L	185 L
		34858-200L	200 L
		34858-200L-LS	200 L
		34858-50L-P2-3F	1 pkg
		34858-200L-P2-3F	1 pkg
		34858-200LP2-3F-LS	1 pkg
34858-50L-P2-3F-LS	1 pkg		

Solvents and Reagents

Other CHROMASOLV® Solvents

CAS No.	Compound	Cat. No.	Qty
142-82-5	Heptane, CHROMASOLV®, for HPLC, ≥99%	34873-100ML	100 mL
		34873-1L	1 L
		34873-6X1L	6 × 1 L
		34873-2L	2 L
		34873-4X2L	4 × 2 L
		34873-2.5L	2.5 L
		34873-4X2.5L	4 × 2.5 L
		34873-72X2.5L	72 × 2.5 L
		34873-4X4L	4 × 4 L
		34873-7L	7 L
		34873-18L	18 L
		34873-20L	20 L
		34873-45L	45 L
		34873-50L-P2	50 L
		34873-56L-P1	56 L
110-54-3	Hexane, CHROMASOLV®, for HPLC, ≥97.0% (GC)	34859-1L	1 L
		34859-6X1L	6 × 1 L
		34859-2.5L	2.5 L
		34859-4X2.5L	4 × 2.5 L
		34859-4L	4 L
		34859-7L	7 L
		34859-18L	18 L
		34859-45L	45 L
67-56-1	Methanol, CHROMASOLV®, for HPLC, ≥99.9%	34860-100ML-R	100 mL
		34860-1L-R	1 L
		34860-6X1L-R	6 × 1 L
		34860-2L-R	2 L
		34860-4X2L-R	4 × 2 L
		34860-2.5L-R-PC	2.5 L
		34860-2.5L-R	2.5 L
		34860-4X2.5L-R	4 × 2.5 L
		34860-72X2.5L-R	72 × 2.5 L
		34860-4L-R	4 L
		34860-4X4L-R	4 × 4 L
		34860-7L-R	7 L
		34860-18L-R	18 L
		34860-18L-P1-R	18 L
		34860-20L-P2-R	20 L
34860-45L-R	45 L		
34860-50L-P2-R	50 L		
34860-200L-P2-R	200 L		
67-56-1	Methanol solution, (Methanol:Dimethyl sulfoxide 1:1 (v/v))	650188-4X4L	4 × 4 L
67-56-1	Methanol solution, contains 0.10 % (v/v) formic acid	632546-4X4L	4 × 4 L
		632546-18L	18 L
109-86-4	2-Methoxyethanol, CHROMASOLV®, for HPLC, ≥99.9%	270482-100ML	100 mL
110-49-6	2-Methoxyethyl acetate, CHROMASOLV®, for HPLC, ≥99%	270482-1L	1 L
		270482-2L	2 L
		308269-1L	1 L
308269-2L	2 L		
78-78-4	2-Methylbutane, for HPLC, CHROMASOLV®, ≥99.5%	270342-100ML	100 mL
108-10-1	4-Methyl-2-pentanone, CHROMASOLV®, for HPLC, ≥99.5%	270342-1L	1 L
		270342-6X1L	6 × 1 L
		270342-2L	2 L
		270342-2.5L	2.5 L
		293261-100ML	100 mL
293261-1L	1 L		
293261-2L	2 L		
293261-4X4L	4 × 4 L		
78-83-1	2-Methyl-1-propanol, CHROMASOLV®, for HPLC, 99.5%	270466-100ML	100 mL
75-52-5	Nitromethane, for HPLC, CHROMASOLV®, ≥96%	270466-1L	1 L
		270466-2L	2 L
		270423-100ML	100 mL
270423-1L	1 L		
270423-2L	2 L		
111-87-5	1-Octanol, CHROMASOLV®, for HPLC, ≥99%	293245-100ML	100 mL
109-66-0	Pentane, CHROMASOLV®, for HPLC, ≥99.0%	293245-1L	1 L
		293245-2L	2 L
		293245-2.5L	2.5 L
		34956-1L	1 L
34956-6X1L	6 × 1 L		
34956-2L	2 L		
34956-2.5L	2.5 L		
34956-4X2.5L	4 × 2.5 L		
34956-4L	4 L		
34956-4X4L	4 × 4 L		
34956-18L	18 L		
34956-200L-LS-NB	200 L		
109-66-0	Pentane, AMD CHROMASOLV®, ≥99%	34894-2.5L	2.5 L
		34894-4X2.5L	4 × 2.5 L

Solvents and Reagents

Other CHROMASOLV® Solvents

CAS No.	Compound	Cat. No.	Qty
107-87-9	2-Pentanone, CHROMASOLV®, for HPLC, 99.5%	471194-100ML	100 mL
		471194-1L	1 L
96-22-0	3-Pentanone, CHROMASOLV®, for HPLC, 96%	270334-1L	1 L
		270334-2L	2 L
71-23-8	1-Propanol, CHROMASOLV®, for HPLC, ≥99.9%	34871-100ML	100 mL
		34871-1L	1 L
		34871-6X1L	6 × 1 L
		34871-2L	2 L
		34871-2.5L	2.5 L
		34871-4X2.5L	4 × 2.5 L
67-63-0	2-Propanol, CHROMASOLV®, for HPLC, 99.9%	34863-100ML	100 mL
		34863-1L	1 L
		34863-6X1L	6 × 1 L
		34863-144X1L	144 × 1 L
		34863-2L	2 L
		34863-2.5L	2.5 L
		34863-2.5L-PC	2.5 L
		34863-4X2.5L	4 × 2.5 L
		34863-72X2.5L	72 × 2.5 L
		34863-4L	4 L
		34863-4X4L	4 × 4 L
		34863-7L	7 L
		34863-45L	45 L
		34863-50L-P2-LS	50 L
34863-50L-P2	50 L		
34863-185L	185 L		
108-32-7	Propylene carbonate, CHROMASOLV®, for HPLC, 99.7%	414220-1L	1 L
		414220-2L	2 L
127-18-4	Tetrachloroethylene, CHROMASOLV®, for HPLC, ≥99.9%	270393-100ML	100 mL
		270393-1L	1 L
		270393-2L	2 L
108-88-3	Toluene, CHROMASOLV®, for HPLC, 99.9%	34866-100ML	100 mL
		34866-1L	1 L
		34866-6X1L	6 × 1 L
		34866-2L	2 L
		34866-4X2L	4 × 2 L
		34866-2.5L	2.5 L
		34866-4X2.5L	4 × 2.5 L
		34866-72X2.5L	72 × 2.5 L
		34866-4X4L	4 × 4 L
		34866-10L	10 L
		34866-18L	18 L
34866-20L	20 L		
540-84-1	2,2,4-Trimethylpentane, CHROMASOLV®, for HPLC, ≥99%	34862-100ML	100 mL
		34862-1L	1 L
		34862-6X1L	6 × 1 L
		34862-2L	2 L
		34862-4X2L	4 × 2 L
		34862-2.5L	2.5 L
		34862-4X2.5L	4 × 2.5 L
		34862-72X2.5L	72 × 2.5 L
		34862-4L	4 L
		34862-4X4L	4 × 4 L
7732-18-5	Water, for HPLC	95304-1L	1 L
		95304-6X1L	6 × 1 L
		95304-2.5L	2.5 L
		95304-4X2.5L	4 × 2.5 L
-	Water solution, contains 20 % (v/v) acetonitrile, 0.1 % (v/v) formic acid	633321-4X4L	4 × 4 L
-	Water solution, contains 0.1 % (v/v) ammonium hydroxide	639141-20L	20 L
-	Water solution, for HPLC, contains 0.1 % (v/v) formic acid	576913-4L	4 L
		576913-4X4L	4 × 4 L
		576913-200L-LS	200 L
-	Water solution, contains 0.1 % (v/v) trifluoroacetic acid, for HPLC	576905-4X4L	4 × 4 L
		576905-18L	18 L
		576905-20L	20 L
		576905-200L-LS	200 L
-	Water solution, contains 0.05 % (v/v) trifluoroacetic acid	590142-4X4L	4 × 4 L
		590142-18L	18 L
106-42-3	<i>p</i> -Xylene, CHROMASOLV®, for HPLC, ≥99%	317195-100ML	100 mL
		317195-1L	1 L
		317195-2L	2 L
		317195-2.5L	2.5 L
		317195-4X2.5L	4 × 2.5 L

Solvents and Reagents

HPLC Derivatization Reagents

HPLC Derivatization Reagents

Derivatization is often required to alter retention characteristics, increase response to various detection techniques and/or provide selective response for analytes in complex matrices. Pre-column derivatization is often used to promote improved chromatographic response of the analyte(s) under investigation. The post-column technique is typically utilized for compounds with low or no response to the desired detection scheme or when a particular analyte or set of analytes can be made to selectively respond through chemical alteration. Post-column derivatization often improves sensitivity and selectivity in HPLC analyses.



Related Information

Bulletin 909 contains detailed information on selecting a suitable derivatization reagent for most applications. Request a free copy of Bulletin 909 by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T196909	Derivatization Reagents

Derivatization Reagents for UV/VIS Detection

UV detection is the most commonly used technique in HPLC but it sometimes lacks sensitivity or selectivity for trace analysis of compounds. Chemical derivatization modifies substances with a low UV absorption into highly sensitive products. Colored and UV absorbing derivatives are prepared for chromatography to improve the detectivity of compounds which do not possess a chromophore or fluorophores. Derivatization can also improve chromatographic retention of polar compounds and resolution of closely eluted compounds because the derivatives are typically more hydrophobic than the underivatized analyte.

CAS No.	Compound	Cat. No.	Qty
108-24-7	Acetic anhydride, puriss. p.a., ACS reagent, ≥99.0% (NT)	45830-250ML-F	250 mL
		45830-1L-F	1 L
		45830-2.5L-F	2.5 L
108-24-7	Acetic anhydride, puriss. p.a., ACS reagent, reagent ISO, reagent Ph. Eur., ≥99% (GC)	33214-500ML	500 mL
		33214-1L	1 L
		33214-6X1L	6 × 1 L
		33214-2.5L	2.5 L
		33214-4X2.5L	4 × 2.5 L
15537-71-0	N-Acetyl-D-penicillamine, for HPLC derivatization, ≥99.0% (T)	01423-1G 01423-5G	1 g 5 g
70402-14-1	6-Amino-1-phenalenone, for HPLC derivatization, ≥97.0%	09117-100MG	100 mg
98-09-9	Benzenesulfonyl chloride, 99%	108138-5G	5 g
		108138-100G	100 g
		108138-500G	500 g
		108138-1KG	1 kg
119-53-9	Benzoin, 98%	B8681-5G	5 g
		B8681-100G	100 g
		B8681-500G	500 g
		B8681-2KG	2 kg
100-46-9	Benzylamine, for GC derivatization, ≥99.0%	13180-100ML	100 mL
		13180-500ML	500 mL
70-11-1	2-Bromoacetophenone, for GC derivatization, ≥99.0%	77450-10G 77450-50G	10 g 50 g
35963-20-3	(1R)-(-)-10-Camphorsulfonic acid, 98%	282146-25G	25 g
		282146-100G	100 g
3144-16-9	(1S)-(+)-10-Camphorsulfonic acid, 99%	C2107-5G	5 g
		C2107-100G	100 g
		C2107-500G	500 g
21286-54-4	(1S)-(+)-10-Camphorsulfonyl chloride, 97%	219576-5G	5 g
		219576-25G	25 g
		219576-100G	100 g
39262-22-1	(1R)-(-)-10-Camphorsulfonyl chloride, for chiral derivatization	21382-5G	5 g
524-80-1	9-Carbazoleacetic acid, ≥99.0% (T)	17925-500MG	500 mg
5913-13-3	(R)-(-)-1-Cyclohexylethylamine, 98%	336505-5G	5 g
56512-49-3	Dabsyl chloride, for HPLC derivatization	502219	500 mg
6283-74-5	(+)-O,O'-Diacetyl-L-tartaric anhydride, 97%	358924-50G	50 g
80-11-5	Diazaald®, 99%	D28000-25G	25 g
		D28000-100G	100 g
		D28000-250G	250 g
		D28000-4X250G	4 × 250 g
		D28000-500G	500 g
		D28000-1KG	1 kg
2978-11-2	N,N'-Diisopropyl-O-(4-nitrobenzyl)isourea, for HPLC derivatization	38434-500MG	500 mg
56512-49-3	4-(Dimethylamino)azobenzene-4'-sulfonyl chloride, ≥97.5% (AT)	39068-250MG	250 mg
		39068-1G	1 g
		39068-5G	5 g

Solvents and Reagents

HPLC Derivatization Reagents: *Derivatization Reagents for UV/VIS Detection*

CAS No.	Compound	Cat. No.	Qty
100-10-7	4-(Dimethylamino)benzaldehyde, for the determination of hydroxyproline, ≥99.0% (HPLC)	39070-50G 39070-250G	50 g 250 g
4755-50-4	4-(Dimethylamino)benzoyl chloride, for HPLC derivatization, ≥99.0% (HPLC)	67954-1G	1 g
-	'Dimethylaminopyridine' on polystyrene, loading: ~3.0 mmol/g "DMAP", matrix crosslinked with 2% DVB	39410-5G 39410-25G	5 g 25 g
163927-31-9	(R)-(-)-1-[7-(Dimethylaminosulfonyl)benzofurazan-4-yl]pyrrolidin-3-yl isothiocyanate, for fluorescence, ≥98.0% (HPLC, sum of enantiomers)	60252-10MG	10 mg
99-33-2	3,5-Dinitrobenzoyl chloride, purum, for fluorescence, ≥98.0% (AT)	42030-10G 42030-50G 42030-250G	10 g 50 g 250 g
74927-72-3	(R)-(-)-N-(3,5-Dinitrobenzoyl)-α-phenylglycine, 99%	250031-1G 250031-5G	1 g 5 g
95713-52-3	N _α -(2,4-Dinitro-5-fluorophenyl)-L-alaninamide, powder	D7906-25MG D7906-100MG	25 mg 100 mg
119-26-6	2,4-Dinitrophenylhydrazine, puriss. p.a., moistened with water, ≥99.0% (HPLC)	42210-25G-F 42210-100G-F 42210-6X100G-F 42210-500G-F	25 g 100 g 6 × 100 g 500 g
74124-79-1	N,N'-Disuccinimidyl carbonate, ≥95%	225827-1G 225827-5G 225827-25G	1 g 5 g 25 g
35661-51-9	9-Fluorenylmethyl carbazate, for HPLC derivatization, ≥99.0%	46917-250MG-F	250 mg
70-34-8	1-Fluoro-2,4-dinitrobenzene, purum p.a., ≥98.0% (GC)	42085-50G 42085-250G	50 g 250 g
28920-43-6	Fmoc chloride, ≥99.0% (HPLC), for HPLC derivatization	23186-1G 23186-5G	1 g 5 g
29169-64-0	(R)-(-)-O-Formylmandeloyl chloride, 97%	479284-5G	5 g
5950-69-6	Hydrindantin dihydrate, for Stein-Moore-Chromatography	53940-10G 53940-50G	10 g 50 g
5470-11-1	Hydroxylamine hydrochloride, for AAS, ≥99.0%	55459-50G 55459-250G	50 g 250 g
7612-98-8	4-(4-Isothiocyanatophenylazo)-N,N-dimethylaniline, 97%	317802-250MG 317802-1G	250 mg 1 g
36410-81-8	4-Isothiocyanato-TEMPO, for ESR-spectroscopy, ≥97.0%	76381-250MG-F	250 mg
14602-86-9	(1R)-(-)-Menthyl chloroformate, ee (GLC): 99%	245305-25G 245305-100G	25 g 100 g
7635-54-3	(1S)-(+)-Menthyl chloroformate, ee (GLC): 97%	378712-5ML 378712-25ML	5 mL 25 mL
100-07-2	4-Methoxybenzoyl chloride, 99%	A88476-5G A88476-25G A88476-100G	5 g 25 g 100 g
89-25-8	3-Methyl-1-phenyl-2-pyrazoline-5-one, 99%	M70800-5G M70800-100G M70800-500G	5 g 100 g 500 g
1691-93-6	3-Methyl-1-phenyl-4-trifluoroacetyl-2-pyrazolin-5-one, for HPLC derivatization, ≥98.0%	68752-1G 68752-5G	1 g 5 g
550-44-7	N-Methylphthalimide, 98%	407992-5G	5 g
86-84-0	1-Naphthyl isocyanate, 98%	170518-5G	5 g
551-06-4	1-Naphthyl isothiocyanate, 95%	N4525-10G	10 g
485-47-2	Ninhydrin, ACS reagent	151173-10G 151173-25G 151173-100G	10 g 25 g 100 g
122-04-3	4-Nitrobenzoyl chloride, for HPLC derivatization	73120-25G 73120-100G 73120-500G	25 g 100 g 500 g
100-11-8	4-Nitrobenzyl bromide, 99%	N13054-25G N13054-100G	25 g 100 g
2086-26-2	O-(4-Nitrobenzyl)hydroxylamine hydrochloride, ≥98.5% (AT)	73200-1G 73200-5G	1 g 5 g
100-16-3	4-Nitrophenylhydrazine, 96%	642983-5G 642983-25G	5 g 25 g
108031-79-4	(-)-Noe's reagent, for chiral derivatization	74153-1G	1 g
38609-97-1	9-Oxo-10(9H)-acridineacetic acid, for HPLC derivatization, ≥99.0% (T)	17927-250MG	250 mg
53558-93-3	(R)-(-)-5-Oxo-2-tetrahydrofuran-2-carboxylic acid, 98%	310476-1G 310476-5G	1 g 5 g
21461-84-7	(S)-(+)-5-Oxo-2-tetrahydrofuran-2-carboxylic acid, 98%	301469-1G 301469-5G	1 g 5 g
103-71-9	Phenyl isocyanate, puriss. p.a., for the detection of alcohols and amines, ≥99.0% (GC)	78750-25ML 78750-100ML	25 mL 100 mL
103-72-0	Phenyl isothiocyanate, Sigma Grade, 8.36 M, suitable for solid phase protein sequencing analysis, ≥99% (GC), liquid	P1034-1ML P1034-10X1ML P1034-10ML	1 mL 10 × 1 mL 10 mL

Solvents and Reagents

HPLC Derivatization Reagents: *Derivatization Reagents for UV/VIS Detection*

CAS No.	Compound	Cat. No.	Qty
1565-74-8	(R)-(+)-1-Phenyl-1-propanol, 99%	256331-1ML	1 mL
613-87-6	(S)-(-)-1-Phenyl-1-propanol, 99%	256323-1ML	1 mL
2508-19-2	Picrylsulfonic acid solution, 1 M in H ₂ O	92822-1ML 92822-5ML	1 mL 5 mL
55486-13-0	1-Pyrenebutyric hydrazide, for fluorescence, ≥97.0% (T)	82669-100MG 82669-500MG	100 mg 500 mg
98-59-9	<i>p</i> -Toluenesulfonyl chloride, puriss., ≥99.0% (AT)	89730-100G 89730-500G	100 g 500 g
98-59-9	<i>p</i> -Toluenesulfonyl chloride, <i>ReagentPlus</i> ®, ≥99%	240877-5G 240877-100G 240877-500G	5 g 100 g 500 g
1711-06-4	<i>m</i> -Toluoil chloride, 99%	122254-5G 122254-100G 122254-500G	5 g 100 g 500 g

Derivatization Reagents for Fluorometric Detection

Fluorescence of an analyte, whether natural or induced by derivatization, can be leveraged to increase the sensitivity (detect lower levels) of the analysis. In addition, the uniqueness of fluorescent character can allow for the selective identification of a molecule in a complex mixture. Fluorescence is quantifiable at lower concentrations and usually has a wider linear range of response vs. concentration compared to optical (UV-VIS) absorbance.

CAS No.	Compound	Cat. No.	Qty
24257-93-0	2-Acetylbenzaldehyde, 95%	562912-1G	1 g
189373-41-9	4-(2-Aminoethylamino)-7-(<i>N,N</i> -dimethylsulfamoyl)benzofurazan, for HPLC derivatization	93088-25MG-F	25 mg
504-29-0	2-Aminopyridine, 99%	A77997-5G A77997-100G A77997-500G	5 g 100 g 500 g
861881-76-7	1,2-Benzo-3,4-dihydrocarbazole-9-ethyl- <i>p</i> -toluenesulfonate, for HPLC derivatization, ≥98.0% (HPLC)	75821-100MG	100 mg
119-53-9	Benzoin, 98%	B8681-5G B8681-100G B8681-500G B8681-2KG	5 g 100 g 500 g 2 kg
100-46-9	Benzylamine, for GC derivatization, ≥99.0%	13180-100ML 13180-500ML	100 mL 500 mL
70-11-1	2-Bromoacetophenone, for GC derivatization, ≥99.0%	77450-10G 77450-50G	10 g 50 g
88404-25-5	4-Bromomethyl-6,7-dimethoxycoumarin, 97%	301450-1G	1 g
124522-09-4	3-Bromomethyl-7-methoxy-1,4-benzoxazin-2-one, BioReagent, suitable for fluorescence, ≥97.0%	17631-25MG	25 mg
10199-89-0	4-Chloro-7-nitrobenzofurazan, BioReagent, suitable for fluorescence, ≥97.0% (HPLC)	25455-1G 25455-5G 25455-25G	1 g 5 g 25 g
107-91-5	Cyanoacetamide, 99%	108448-100G 108448-500G	100 g 500 g
605-65-2	Dansyl chloride, BioReagent, suitable for fluorescence, ≥99.0% (HPLC)	39220-1G-F 39220-5G-F 39220-50G-F	1 g 5 g 50 g
33008-06-9	Dansylhydrazine, BioReagent, suitable for fluorescence, ≥90% (HPLC)	30434-250MG 30434-1G 30434-5G	250 mg 1 g 5 g
258516-84-6	Dibenzyl chloromethyl phosphate, for HPLC derivatisation, ≥97.0%	86546-1G 86546-5G	1 g 5 g
99-73-0	2,4'-Dibromoacetophenone, for HPLC derivatization	68082-5G	5 g
99-73-0	2,4'-Dibromoacetophenone, >98%	D38308-10G D38308-50G D38308-100G	10 g 50 g 100 g
21811-74-5	5-([4,6-Dichlorotriazin-2-yl]amino)fluorescein hydrochloride, suitable for fluorescence, BioReagent, ≥99.0% (TLC)	36565-100MG-F	100 mg
913253-56-2	4-[2-(<i>N,N</i> -Dimethylamino)ethylaminosulfonyl]-7-(2-aminoethylamino)-2,1,3-benzoxadiazole, for HPLC derivatization, ≥95.0% (HPLC)	79291-100MG	100 mg
163927-32-0	(S)-(+)-1-[7-(Dimethylaminosulfonyl)benzofurazan-4-yl]pyrrolidin-3-yl isothiocyanate, for fluorescence, ≥98.0% (HPLC, sum of enantiomers)	91609-10MG	10 mg
569355-30-2	2,6-Dimethyl-4-quinolinecarboxylic acid <i>N</i> -hydroxysuccinimide ester, ≥98.0% (HPLC)	49558-100MG	100 mg
139332-64-2	4-(<i>N,N</i> -Dimethylsulfamoyl)-7-piperazino-benzofurazan, for fluorescence, ≥99.0%	93087-50MG-F	50 mg
99-33-2	3,5-Dinitrobenzoyl chloride, purum, for fluorescence, ≥98.0% (AT)	42030-10G 42030-50G 42030-250G	10 g 50 g 250 g
29841-69-8	(1S,2S)-(-)-1,2-Diphenylethylenediamine, 97%	364002-500MG	500 mg
102-54-5	Ferrocene, 98%	F408-5G F408-100G F408-500G	5 g 100 g 500 g

Solvents and Reagents

HPLC Derivatization Reagents: *Derivatization Reagents for Fluorometric Detection*

CAS No.	Compound	Cat. No.	Qty
12152-94-2	Ferroceneboronic acid, for HPLC derivatisation, ≥97.0% (HPLC)	56257-100MG	100 mg
12093-10-6	Ferrocenecarboxaldehyde, for HPLC derivatisation, ≥98.0% (HPLC)	95159-100MG	100 mg
1273-85-4	Ferrocenoyl azide, for HPLC derivatization, ≥98.0% (HPLC)	50203-100MG	100 mg
96483-68-0	N-Ferrocenyl-maleimide, for HPLC derivatisation, ≥97.0% (HPLC)	89111-100MG	100 mg
132098-76-1	3-Ferrocenylpropionic anhydride, for HPLC derivatisation, ≥98.0% (C)	76737-100MG	100 mg
30084-90-3	Fluorene-2-carboxaldehyde, 99%	150142-5G	5 g
38183-12-9	Fluorescamine, ≥98% (TLC), powder, used for detection of primary amines	F9015-100MG F9015-250MG F9015-1G	100 mg 250 mg 1 g
27072-45-3	Fluorescein 5(6)-isothiocyanate, BioReagent, suitable for fluorescence, mixture of 2 components, ≥90% (HPLC)	46950-50MG-F 46950-250MG-F 46950-1G-F	50 mg 250 mg 1 g
84806-27-9	7-Fluorobenzofurazan-4-sulfonic acid ammonium salt, for HPLC derivatization, ≥98.5% (HPLC)	46640-5MG-F 46640-25MG-F	5 mg 25 mg
70-34-8	1-Fluoro-2,4-dinitrobenzene, ≥99%	D1529-10ML D1529-25ML D1529-100ML	10 mL 25 mL 100 mL
29270-56-2	4-Fluoro-7-nitrobenzofurazan, suitable for fluorescence, BioReagent, ≥98.0% (HPLC)	47140-10MG 47140-50MG	10 mg 50 mg
91366-65-3	4-Fluoro-7-sulfamoylbenzofurazan	F3639-10MG F3639-50MG	10 mg 50 mg
38183-12-9	Floram, BioReagent, suitable for fluorescence, ≥99.0% (UV)	47614-25MG-F 47614-100MG-F 47614-1G-F	25 mg 100 mg 1 g
28920-43-6	Fmoc chloride, ≥99.0% (HPLC), for HPLC derivatization	23186-1G 23186-5G	1 g 5 g
22265-37-8	4-Methoxybenzamidine, suitable for fluorescence, ≥96.0% (NT)	64785-100MG-F	100 mg
50632-57-0	2-Methoxy-2,4-diphenyl-3(2H)-furanone, suitable for fluorescence, ≥98.0% (HPLC)	64958-25MG 64958-100MG	25 mg 100 mg
126565-42-2	2-Methoxy-5-(N-phthalimidinyl)benzenesulfonyl chloride, suitable for fluorescence, ≥97.0% (CHN)	91587-50MG-F 91587-250MG-F	50 mg 250 mg
67229-93-0	4-(6-Methyl-2-benzothiazolyl)phenyl isocyanate, suitable for fluorescence, ≥98.0% (HPLC)	65877-100MG 65877-500MG	100 mg 500 mg
81864-15-5	4,5-Methylenedioxy-1,2-phenylenediamine dihydrochloride, suitable for fluorescence, BioReagent, ≥99.0% (HPLC)	66807-10MG 66807-50MG	10 mg 50 mg
214147-22-5	4-(1-Methylhydrazino)-7-nitrobenzofurazan, for HPLC derivatization, ≥97.0%	93524-50MG	50 mg
945623-67-6	N-Methyl-N-(trimethyl-d ₃ -silyl)trifluoroacetamide, for GC derivatization, ≥94.0% (GC)	68768-500UL	500 µL
5415-58-7	1-Naphthaleneacetic anhydride, 96%	438952-1G	1 g
7149-49-7	2,3-Naphthalenedicarboxaldehyde, suitable for fluorescence	70215-100MG 70215-500MG	100 mg 500 mg
521-24-4	1,2-Naphthoquinone-4-sulfonic acid sodium salt, 97%	226017-10G	10 g
141903-34-6	1-(2-Naphthoyl)imidazole, suitable for fluorescence, ≥95.0% (N)	70684-500MG	500 mg
152111-91-6	NIR-797 isothiocyanate, suitable for fluorescence, ≥70% (coupling to amines)	15167-25MG	25 mg
221263-97-4	2-[N-(7-Nitro-4-benzofurazanyl)methylamino]acetylhydrazide, for fluorescence, ≥97.0% (CHN)	89464-50MG-F	50 mg
159717-69-8	N-(7-Nitro-4-benzofurazanyl)-D-prolyl chloride, for fluorescence	88823-50MG-F	50 mg
159717-68-7	N-(7-Nitro-4-benzofurazanyl)-L-prolyl chloride, for fluorescence	84999-50MG-F	50 mg
139332-66-4	4-Nitro-7-piperazinobenzofurazan, for HPLC derivatization, ≥99.0%	92614-100MG-F	100 mg
95-54-5	o-Phenylenediamine, Peroxidase substrate, ≥98.0%, powder	P9029-50G P9029-100G	50 g 100 g
643-79-8	Phthalaldehyde, for fluorescence, ≥99.0% (HPLC)	79760-1G 79760-5G 79760-6X5G 79760-50G	1 g 5 g 6 × 5 g 50 g
3029-19-4	1-Pyrenecarboxaldehyde, 99%	144037-10G 144037-50G	10 g 50 g
65-22-5	Pyridoxal hydrochloride, ≥99.5% (T)	93759-5G 93759-25G 93759-100G	5 g 25 g 100 g
41468-25-1	Pyridoxal 5'-phosphate monohydrate, ≥97.0% (NT)	82870-1G 82870-5G 82870-25G	1 g 5 g 25 g
36877-69-7	Rhodamine B isothiocyanate, mixed isomers, BioReagent, suitable for protein labeling	R1755-100MG R1755-500MG R1755-1G	100 mg 500 mg 1 g
57-56-7	Semicarbazide, : 6 wt. %	363634-25G 363634-100G	25 g 100 g
95197-95-8	Tetramethylrhodamine isothiocyanate mixed isomers, suitable for fluorescence, mixture of isomers	87918-10MG 87918-50MG	10 mg 50 mg

Solvents and Reagents

HPLC Buffers

HPLC Buffers

Selection of a suitable buffer ensures that the ionizable functional group is in a predictable state -whether fully neutralized or fully ionized - to maximize retention reproducibility. The right buffer system to choose depends on the desired pH and the pK_a values of all ionizable species in the analysis, including the mobile phase components. The pK_a is the pH at which the concentrations of the ionized and free forms are equal. When a compound has more than one ionizable functional group, it has more than one pK_a value. It is also important that the buffer has a pK_a close to the desired pH since buffers control pH best at their pK_a. A rule of thumb is to choose a buffer with a pK_a value within 2 units of the desired mobile phase pH (see Table below).

Key to Abbreviations

AT — Argentometric (Silver) Titration*
 GC — Gas Chromatography
 HPLC - High Performance Liquid Chromatography
 KT — Complexometric Titration*
 NT — Nonaqueous Titration*
 RT — Redox-Titration*
 T — Acidimetric Titration*

* Assay indicated in mass % (weight/weight)

HPLC Buffers, pKa Values and Useful pH Range

Buffer	pKa	Useful pH Range
Trifluoroacetic acid (TFA)	0.5	<1.5
Chloroacetate	2.9	1.9–3.9
Sulfonate	1.8 and 6.9	<1–2.8, 5.9–7.9
Phosphate	2.1	1.1–3.1
Formate	3.8	2.8–4.8
Acetate	4.8	3.8–5.8
Phosphate	7.1	6.2–8.2
Ammonia	9.2	8.2–10.2
Phosphate	12.3	11.3–13.3

HPLC Buffers - Solution

CAS No.	Compound	Cat. No.	Qty
64-19-7	Acetic acid solution, for HPLC	45754-100ML-F 45754-500ML-F	100 mL 500 mL
1336-21-6	Ammonium hydroxide solution, ~10% in H ₂ O, for HPLC	17837-100ML 17837-1L	100 mL 1 L
366793-17-1	Dihexylamine acetate solution, for ion chromatography, concentrate, ampule	92467-6X1EA-F 92467-6X25ML-F	6 × 1 ea 6 × 25 mL
114389-69-4	Dipropylamine acetate salt solution, for ion pair chromatography, for HPLC/MS, concentrate	89789-6X1AMP-F 89789-6X25ML-F	6 × 1 amp 6 × 25 mL
64-18-6	Formic acid solution, puriss. p.a., for HPLC, 50% in water, 49-51% (T)	09676-100ML 09676-500ML	100 mL 500 mL
75-75-2	Methanesulfonic acid solution, ~1 M in H ₂ O, for ion chromatography	17834-10ML-F 17834-100ML-F 17834-1L-F	10 mL 100 mL 1 L
7664-38-2	Phosphoric acid, for HPLC, 85-90%	79606-100ML 79606-500ML	100 mL 500 mL
7664-38-2	Phosphoric acid solution, 49-51%, for HPLC	79607-500ML	500 mL
1310-58-3	Potassium hydroxide solution, ~45%, for HPLC	03564-4X25ML 03564-100ML 03564-500ML	4 × 25 mL 100 mL 500 mL
7664-93-9	Sulfuric acid solution, 49-51%, for HPLC	84733-100ML 84733-500ML	100 mL 500 mL
121-44-8	Triethylamine, for HPLC, ≥99.5%	17924-1EA 17924-10X2ML	10 × 2 mL 10 × 2 mL
554-68-7	Triethylamine hydrochloride, for HPLC, ≥99.0%	96249-50G-F 96249-250G-F	50 g 250 g
76-05-1	Trifluoroacetic acid, puriss. p.a., for HPLC, ≥99.0% (GC)	91707-10X1ML 91707-250ML	10 × 1 mL 250 mL
58828-90-3	Trimethylammonium bicarbonate buffer, volatile buffer, for HPLC	17899-100ML	100 mL

HPLC Buffer - Solid

CAS No.	Compound	Cat. No.	Qty
631-61-8	Ammonium acetate, for HPLC, ≥99.0%	17836-50G 17836-250G	50 g 250 g
506-87-6	Ammonium carbonate, for HPLC, 30-33% NH ₃ basis (T)	74415-250G-F	250 g
540-69-2	Ammonium formate, for HPLC, ≥99.0%	17843-50G 17843-250G	50 g 250 g
7722-76-1	Ammonium phosphate monobasic, for HPLC, ≥99.0% (T)	17842-250G	250 g
3336-58-1	Ammonium trifluoroacetate, for HPLC, ≥99.0% (NT)	17839-10G 17839-50G	10 g 50 g
6381-92-6	Ethylenediaminetetraacetic acid disodium salt dihydrate, for HPLC, ≥99.0%	03682-10G 03682-50G	10 g 50 g
7758-11-4	Potassium phosphate dibasic, for HPLC, ≥99.0%	17835-250G	250 g

Solvents and Reagents

HPLC Buffers

CAS No.	Compound	Cat. No.	Qty
7778-77-0	Potassium phosphate monobasic, for HPLC, ≥99.5%	60221-50G 60221-250G 60221-1KG	50 g 250 g 1 kg
877-24-7	Potassium phthalate monobasic, for HPLC, ≥99.5%	96148-50G-F 96148-250G-F	50 g 250 g
15066-28-1	Pyridinium formate buffer, for HPLC	17903-100ML-F	100 mL
127-09-3	Sodium acetate, for HPLC, ≥99.0%	71185-50G 71185-250G	50 g 250 g
144-55-8	Sodium bicarbonate, for HPLC, ≥99.0%	88208-250G-F	250 g
7647-14-5	Sodium chloride, for HPLC, ≥99.5%	73575-250G-F	250 g
141-53-7	Sodium formate, for HPLC, ≥99.0% (NT)	17841-50G 17841-250G	50 g 250 g
7791-07-3	Sodium perchlorate monohydrate, for HPLC, ≥99.0%	89152-50G-F 89152-250G-F	50 g 250 g
10028-24-7	Sodium phosphate dibasic dihydrate, for HPLC, ≥98.5%	71633-250G	250 g
7558-80-7	Sodium phosphate monobasic, for HPLC, ≥99.0%	17844-50G 17844-250G	50 g 250 g
7757-82-6	Sodium sulfate, for HPLC, ≥99.0%	71958	
2923-18-4	Sodium trifluoroacetate, for HPLC, ≥99.0%	17840-10G	10 g
15715-58-9	Triethylammonium bicarbonate buffer, volatile buffer, for HPLC, 1 M	17902-100ML 17902-500ML	100 mL 500 mL
585-29-5	Triethylammonium formate solution, volatile buffer, 1 M pH 6.0, for HPLC	17901-100ML 17901-500ML	100 mL 500 mL
77-86-1	Trizma® base, puriss. p.a., ≥99.7% (T)	93350-100G 93350-500G 93350-1KG	100 g 500 g 1 kg

HPLC Buffer - Concentrate

CAS No.	Compound	Cat. No.	Qty
5204-74-0	Acetic acid – triethylamine solution 1:1, for HPLC, 2M:2M concentrate, in H ₂ O	09748-100ML 09748-500ML	100 mL 500 mL
-	Acetic acid – triethylamine solution 2:1, puriss. p.a., for HPLC, 2M:1M concentrate, in H ₂ O	09749-100ML	100 mL
585-29-5	Formic acid : Triethylamine 1:1 solution, for HPLC, 2M:2M concentrate	09752-100ML	100 mL
7664-38-2	Phosphoric acid solution, for HPLC, ~0.66 M, concentrate	40779-6X10MMOL	6 × 10 mmol
35365-94-7	Phosphoric acid – triethylamine 1:1 solution, for HPLC, 2M:2M concentrate, in H ₂ O	03388-100ML 03388-500ML	100 mL 500 mL
10138-93-9	Phosphoric acid – triethylamine 2:1 solution, for HPLC, 2M:1M concentrate, water, in H ₂ O	03387-100ML 03387-500ML	100 mL 500 mL
-	Potassium phosphate buffer solution, puriss. p.a., for HPLC, concentrate, ampule, pH 1.9	79628-6X15ML 79628-1EA	6 × 15 mL 1 set
-	Sodium phosphate buffer solution, puriss. p.a., for HPLC, concentrate, ampule, pH 4.3	79629-6X1EA 79629-1EA	6 × 1 ea 1 set
7558-79-4	Sodium phosphate dibasic solution, puriss. p.a., for HPLC, concentrate I, ampule	71648-1EA	1 set
7558-79-4	Sodium phosphate dibasic solution, puriss. p.a., for HPLC, concentrate II, ampule	71651-6X1AMP 71651-1EA	6 × 1 amp 1 set
-	Sodium phosphate dibasic – potassium phosphate monobasic solution, puriss. p.a., for HPLC, concentrate, ampule	71653-6X1EA 71653-1EA	6 × 1 ea 1 set
19070-91-8	Dibutylamine acetate Concentrate, ~0.5 M, for ion pair chromatography	73345-6EA	6 ea
-	Trifluoroacetic acid – triethylamine 2M:1M solution, puriss. p.a., for HPLC, concentrate	09746-500ML	500 mL
454-49-9	Trifluoroacetic acid - Triethylamine 2M:2M solution, for HPLC, 2M:2M concentrate, in H ₂ O	09747-100ML	100 mL

Solvents and Reagents

Ion Pair Reagents

Ion Pair Reagents

How to select the right IPC reagent

If you have a mixture of ionic and non-ionic analytes, start by optimizing the method for non-ionic components. Then select the appropriate IPC reagent to provide the necessary counter ion. Alkyl sulfonates are a good first choice for basic solutes, whereas quaternary amines are useful for the acidic analytes. Halogenated IPC reagents are only suitable for isocratic applications and should not be used for gradient systems.

After selecting the appropriate IPC reagent, the method can be further optimized by adjusting the pH and concentration. For short or medium chain length IPC reagents, a 0.005 M solution is suitable for most separations. The optimum concentration of long chain IPC reagents varies from 0.0005 M to 0.002 M. All buffers are tested for suitability for chromatography.

Ion Pair Reagents - Cationic

corresponds to standard for filter test

CAS No.	Compound	Cat. No.	Qty
13419-61-9	Sodium 1-decanesulfonate, for ion pair chromatography, ≥99.0%	30631-10G-F 30631-50G-F	10 g 50 g
142-87-0	Sodium decyl sulfate, for ion pair chromatography, ≥99.0% (T)	71443-10G	10 g
151-21-3	Sodium dodecyl sulfate, for ion pair chromatography, ≥99.0%	71726-10G-F 71726-50G-F	10 g 50 g
5325-43-9	Sodium 1,2-ethanedithiolate, for ion pair chromatography, ≥99.0% (T)	02374-5G	5 g
207300-90-1	Sodium 1-heptanesulfonate monohydrate, for ion pair chromatography, ≥99.0% (T)	51832-10G-F 51832-50G-F	10 g 50 g
22767-50-6	Sodium 1-heptanesulfonate solution, for ion pair chromatography, concentrate, ampule	51834-6X1AMP-F 51834-1EA-F	6 × 1 amp 1 set
207300-91-2	Sodium 1-hexanesulfonate monohydrate, for ion pair chromatography, ≥99.0% (T)	52862-2.5G-F 52862-10G-F 52862-50G-F	2.5 g 10 g 50 g
2832-45-3	Sodium 1-hexanesulfonate solution, for ion pair chromatography, concentrate, ampule	52864-6X1AMP-F 52864-1EA-F	6 × 1 amp 1 set
532-02-5	Sodium 2-naphthalenesulfonate, for ion pair chromatography, ≥99.0% (HPLC)	70289-10G	10 g
35192-74-6	Sodium 1-nonanesulfonate, for ion pair chromatography, ≥99.0% (T)	74316-10G-F	10 g
13893-34-0	Sodium 1-octadecanesulfonate, for ion pair chromatography, ≥99.0% (T)	74734	
207596-29-0	Sodium 1-octanesulfonate monohydrate, for ion pair chromatography, ≥99.0% (T)	74882-10G-F 74882-50G-F	10 g 50 g
5324-84-5	Sodium 1-octanesulfonate solution, for ion pair chromatography, concentrate, ampule	74886-6EA-F 74886-1EA-F	6 ea 1 set
142-31-4	Sodium octyl sulfate, for ion pair chromatography, ≥99.0% (T)	75073-10G	10 g
207605-40-1	Sodium 1-pentanesulfonate monohydrate, for ion pair chromatography, ≥99.0% (T)	76952-2.5G-F 76952-10G-F 76952-25G-F 76952-50G-F	2.5 g 10 g 25 g 50 g
304672-01-3	Sodium 1-propanesulfonate monohydrate, for ion pair chromatography, ≥99.0% (T)	81806-10G-F 81806-50G-F	10 g 50 g
304851-99-8	Sodium 2-propanesulfonate monohydrate, for ion pair chromatography, ≥99.0% (T)	81808-10G-F	10 g
6994-45-2	Sodium 1-tetradecanesulfonate, for ion pair chromatography, ≥99.0% (T)	87191-10G	10 g
22767-49-3	Sodium 1-pentanesulfonate solution, for ion pair chromatography, concentrate, ampule	76954-6AMP-F	6 amp

Set of concentrates available in packages with 6 ampules. Dilute to 1 liter with HPLC grade water (Cat. No. 95304) to obtain a 0.005 M eluent solution.

Solvents and Reagents

Ion Pair Reagents

Ion Pair Reagents - Anionic

CAS No.	Compound	Cat. No.	Qty
541-22-0	Decamethonium bromide, for ion pair chromatography, ≥99.0% (AT)	30518-5G-F	5 g
1119-94-4	Dodecyltrimethylammonium bromide, for ion pair chromatography, ≥99.0% (AT)	44239-10G	10 g
103999-25-3	Dodecyltrimethylammonium hydrogen sulfate, for ion pair chromatography, ≥99.0% (T)	44243-10G	10 g
68214-07-3	Hexadecyltrimethylammonium bisulfate, for ion pair chromatography, ≥99.0% (T)	52371-5G-F	5 g
57-09-0	Hexadecyltrimethylammonium bromide, for ion pair chromatography, ≥99.0%	52367-10G-F 52367-50G-F	10 g 50 g
111412-68-1	Hexadecyltrimethylammonium phosphate monobasic concentrate, concentrate, for ion pair chromatography	52363	
32503-27-8	Tetrabutylammonium bisulfate, for ion pair chromatography, ≥99.0%	86853-10G-F 86853-50G-F	10 g 50 g
1643-19-2	Tetrabutylammonium bromide, for ion pair chromatography, ≥99.0%	86857-10G-F 86857-50G-F	10 g 50 g
1112-67-0	Tetrabutylammonium chloride, for ion pair chromatography, ≥99.0%	86852-10G-F 86852-50G-F	10 g 50 g
2052-49-5	Tetrabutylammonium hydroxide solution, ~40% in H ₂ O, for ion chromatography	86854-100ML 86854-500ML 86854-2.5L	100 mL 500 mL 2.5 L
311-28-4	Tetrabutylammonium iodide, for ion pair chromatography, ≥99.0%	86903-2.5G-F 86903-10G-F	2.5 g 10 g
5574-97-0	Tetrabutylammonium phosphate monobasic solution, for ion pair chromatography, concentrate, ampule	86899-6X1AMP-F 86899-1EA-F	6 × 1 amp 1 set
71-91-0	Tetraethylammonium bromide, for ion pair chromatography, ≥99.0%	86608-10G	10 g
16873-13-5	Tetraethylammonium hydrogen sulfate, for ion pair chromatography, ≥99.0%	86626-5G-F 86626-10G-F 86626-50G-F	5 g 10 g 50 g
4368-51-8	Tetraheptylammonium bromide, for ion pair chromatography, ≥99.0% (AT)	87296-10G-F 87296-50G-F	10 g 50 g
4328-13-6	Tetrahexylammonium bromide, for ion pair chromatography, ≥99.0% (AT)	87297-10G-F	10 g
87700-05-8	Tetrahexylammonium dihydrogen phosphate solution, concentrate, for ion pair chromatography	87313-1EA	1 set
32503-34-7	Tetrahexylammonium hydrogensulfate, for ion pair chromatography, ≥99.0% (T)	87299-5G-F 87299-25G-F	5 g 25 g
14937-42-9	Tetrakis(decyl)ammonium bromide, for ion pair chromatography, ≥99.0% (AT)	87578-10G-F 87578-50G-F	10 g 50 g
80526-82-5	Tetramethylammonium bisulfate, for ion pair chromatography, ≥99.0% (T)	87724-10G-F 87724-50G-F	10 g 50 g
64-20-0	Tetramethylammonium bromide, for ion pair chromatography, ≥99.0% (AT)	87708-10G	10 g
75-57-0	Tetramethylammonium chloride, for ion pair chromatography, ≥99.0% (AT)	74202-50G-F 74202-250G-F	50 g 250 g
14190-16-0	Tetramethylammonium sulfate, for ion pair chromatography, ≥99.0% (T)	02799-2.5G 02799-10G	2.5 g 10 g
14866-33-2	Tetraoctylammonium bromide, for ion pair chromatography, ≥99.0% (AT)	87996-2.5G-F 87996-10G-F 87996-50G-F	2.5 g 10 g 50 g
866-97-7	Tetrapentylammonium bromide, for ion pair chromatography, ≥99.0% (AT)	87997-10G-F	10 g
56211-70-2	Tetrapropylammonium bisulfate, for ion pair chromatography, ≥99.0%	88106-10G	10 g
1941-30-6	Tetrapropylammonium bromide, for ion pair chromatography, ≥99.0% (AT)	88103-10G	10 g
1119-97-7	Myristyltrimethylammonium bromide, for ion pair chromatography, ≥99.0% (AT)	87208-10G	10 g
104903-23-3	Trimethyltetradecylammonium hydrogen sulfate, for ion pair chromatography, ≥99.0% (T)	87215-10G	10 g

Set of concentrates available in packages with 6 ampules. Dilute to 1 liter with HPLC grade water (Cat. No. 95304) to obtain a 0.005 M eluent solution.

Solvents and Reagents

Ion Pair Reagents

Ion Pair Reagents - Anionic Concentrate

CAS No.	Compound	Cat. No.	Qty
1112-67-0	Tetrabutylammonium chloride solution, for ion pair chromatography, concentrate, ampule	86862-6X1AMP 86862-1EA	6 × 1 amp 1 set
32503-27-8	Tetrabutylammonium bisulfate solution, for ion pair chromatography, concentrate, ampule	86847-1EA-F	1 set
2052-49-5	Tetrabutylammonium hydroxide solution, ~40% in H ₂ O, for ion chromatography	86854-100ML 86854-500ML 86854-2.5L	100 mL 500 mL 2.5 L

Set of concentrates available in packages with 6 ampules. Dilute to 1 liter with HPLC grade water (Cat. No. 95304) to obtain a 0.005 M eluent solution.



HPLC APPLICATIONS

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HPLC Applications

Amino Acids

HPLC Applications

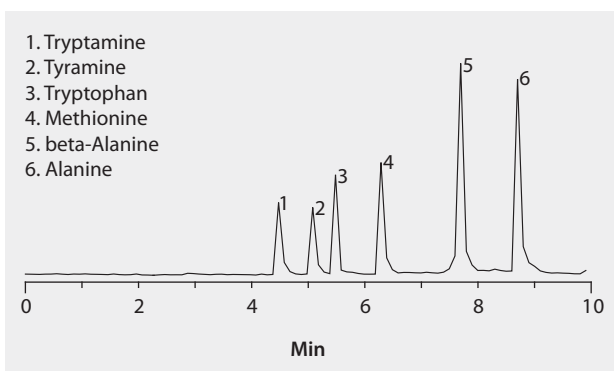
Amino Acids

LC-MS Analysis of Amino Acids on Ascentis® Express HILIC

► application for HPLC

..... compound class: amino acids
 column Ascentis Express HILIC, 15 cm x 4.6 mm I.D., 2.7 µm (53981-U)
 mobile phase (A) 13 mM ammonium acetate in 10:90 (v/v) water: acetonitrile; (B) 13 mM ammonium acetate in water
 gradient held at 0% B for 1 min; 0 to 90% B in 19 min
 flow rate 1.0 mL/min
 column temp. 35 °C
 detector ESI(+)
 injection 10 µL
 sample 10 mg/L in Mobile Phase A
 Application No. G005664

1. Tryptamine
2. Tyramine
3. Tryptophan
4. Methionine
5. beta-Alanine
6. Alanine



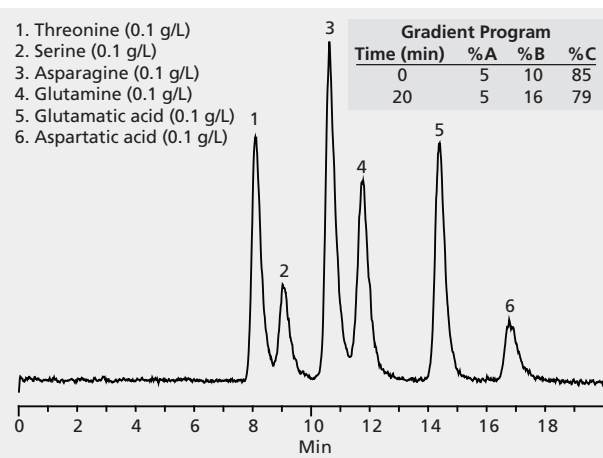
HPLC Analysis of Amino Acids, Polar Neutral and Acidic on Ascentis® Si

► application for HPLC

..... Ascentis Si, 10 cm x 2.1 mm I.D., 5 µm particles (581508-U)
 mobile phase .. A: 100 mM ammonium formate (pH 3.0, with formic acid); B: water; C: acetonitrile
 flow rate 0.3 mL/min.
 column temp. 35 °C
 detector ESI (+), full scan
 injection 2 µL
 sample as indicated, in 10:90, (50 mM ammonium formate/formic acid, (pH 3.0):acetonitrile
 Application No. G003722

1. Threonine (0.1 g/L)
2. Serine (0.1 g/L)
3. Asparagine (0.1 g/L)
4. Glutamine (0.1 g/L)
5. Glutamic acid (0.1 g/L)
6. Aspartic acid (0.1 g/L)

Gradient Program			
Time (min)	%A	%B	%C
0	5	10	85
20	5	16	79



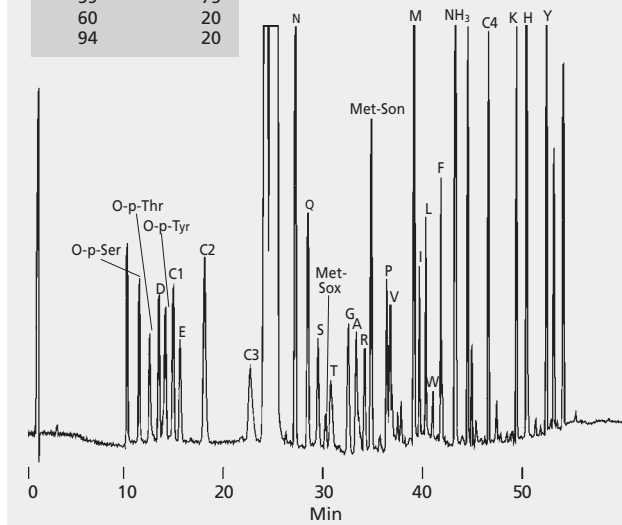
HPLC Analysis of Dabsyl Amino Acids on SUPELCOSIL™ LC-DABS

► application for HPLC

column SUPELCOSIL LC-DABS, 15 cm x 4.6 mm I.D., 3 µm particles (59137)
 mobile phase A: 0.025 M KH₂PO₄, pH 7.0 with potassium hydroxide; B: acetonitrile:methanol (70:30)
 flow rate 1.5 mL/min
 detector VIS, 436 nm
 injection 5 µL; 50pmole each amino acid on-column
 Application No. 712-0135A

Dabsyl Amino Acid			
O-p-Ser	o-Phosphoserine	Met-Sox	Methionine sulfoxide
O-p-Thr	o-Phosphothreonine	T	Threonine
D	Aspartic acid	G	Glycine
O-p-Tyr	o-Phosphotyrosine	A	Alanine
C1	Cysteic acid	R	Arginine
E	Glutamic acid	Met-Son	Methionine sulfone
C2	S-Carboxymethylcysteine	P	Proline
C3	S-Sulfocysteine	V	Valine
N	Asparagine	M	Methionine
Q	Glutamine	I	Isoleucine
S	Serine	L	Leucine
		W	Tryptophan
		F	Phenylalanine
		NH ₃	Ammonia
		C4	Cystine
		K	Lysine
		H	Histidine
		Y	Tyrosine

Gradient Program	
Temp. (min)	% B
0	20
9	25
23	25
24	32
30	32
37	40
46	60
54	75
59	75
60	20
94	20



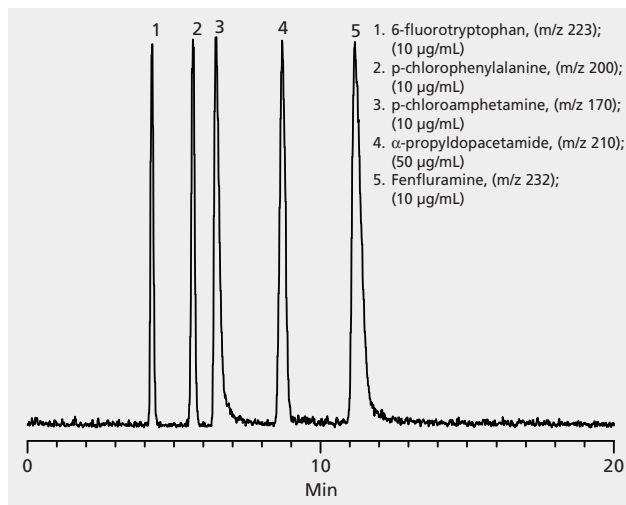
HPLC Applications

Amino Acids

HPLC Analysis of Tryptophan Hydroxylase Inhibitors on Ascentis® C18

▶ application for HPLC

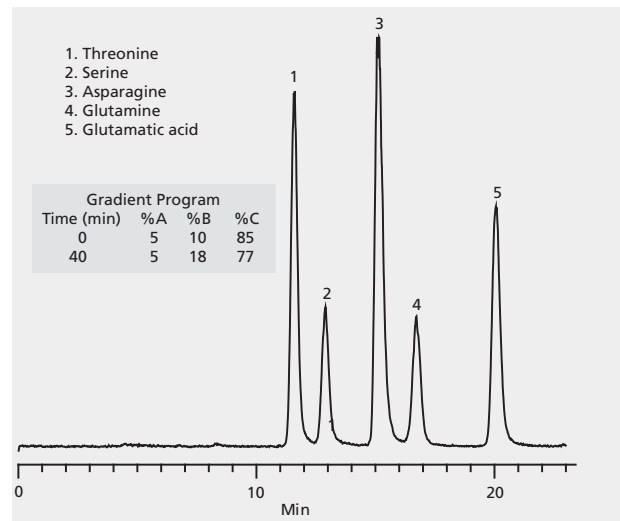
column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 65:35, 40 mM formic acid, (pH ~2.5):methanol
 flow rate 0.7 mL/min.
 column temp. 35 °C
 detector full scan MS; overlay of extracted ion chromatograms of individual (M+H)⁺ species
 injection 10 µL
 sample as indicated in 90:10, 10 mM formic acid:methanol
 Application No. G002453



HPLC Analysis of Amino Acids (separation in HILIC mode) on Ascentis® Silica

▶ application for HPLC

column Ascentis Si, 15 cm x 2.1 mm I.D., 5 µm particles (581509-U)
 mobile phase .. A: 100 mM ammonium formate (pH 3.0, with formic acid), B: water, C: acetonitrile
 flow rate 0.3 mL/min
 column temp. 35 °C
 detector ESI (+), full scan
 injection 2 µL
 sample in 10:90, (50 mM ammonium formate/formic acid, pH 3.0):acetonitrile
 Application No. G004088



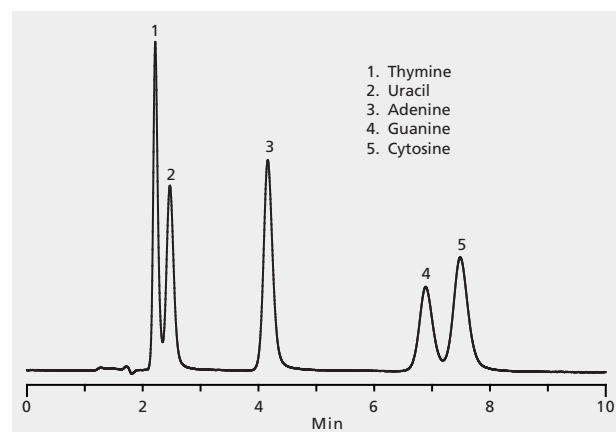
Biomolecules

DNA/RNA

HPLC Analysis of Purines and Pyrimidines of Nucleic Acids on Ascentis® Silica

▶ application for HPLC

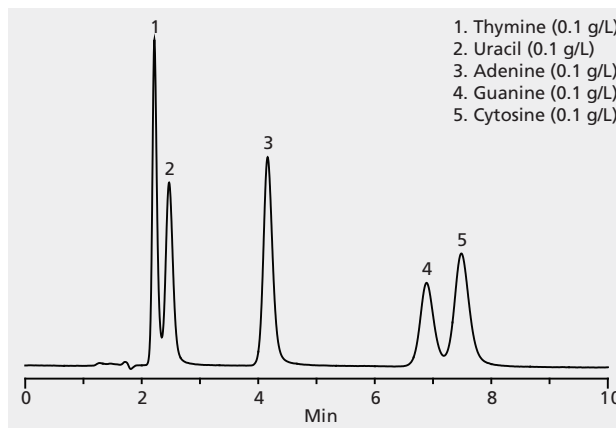
column Ascentis Si, 10 cm x 2.1 mm I.D., 5 µm particles (581508-U)
 mobile phase 10:90, 200 mM ammonium formate (pH 3.0, with formic acid):acetonitrile
 flow rate 0.2 mL/min
 column temp. 35 °C
 detector UV at 270 nm
 injection 1 µL
 sample 100 µg/mL in mobile phase
 Application No. G003683



HPLC Analysis of Nucleic Acid Bases on Ascentis® Si

▶ application for HPLC

column Ascentis Si, 10 cm x 2.1 mm I.D., 5 µm particles (581508-U)
 mobile phase 10:90, 200 mM ammonium formate (pH 3.0, with formic acid):acetonitrile
 flow rate 0.2 mL/min.
 column temp. 35 °C
 detector UV at 270 nm
 injection 1 µL
 sample as indicated in mobile phase
 Application No. G003723



HPLC Applications

Biomolecules: *DNA/RNA*

HPLC Analysis of tRNA Hydrolysate on SUPELCOSIL™ LC-18-S

► application for HPLC

column SUPELCOSIL LC-18-S, 15 cm x 4.6 mm I.D., 5 µm particles (58931)
 mobile phase .. A: 0.1M KH₂PO₄ (pH 5.3):methanol, 97.5:2.5; B: 0.01M KH₂PO₄ (pH 5.1):methanol,
 80:20; C: 0.01M KH₂PO₄ (pH 4.9):acetonitrile, 65:35
 flow rate 1 mL/min
 column temp. 26 °C
 detector UV, 210 nm, 254 nm, 280 nm
 injection 50 µL hydrolysate buffer (pH 7.8) containing 5 µg bovine tRNA^{L^{eu}} hydrolysate
 Application No. 713-0501

Gradient Program			
Time (min)	%A	%B	%C
0	100	—	—
7.2	100	—	—
12	90	10	—
15	75	25	—
19.2	40	60	—
21.6	38	62	—
27	—	100	—
48	—	—	100
55	—	—	100

Selective,
Quantitative Analysis

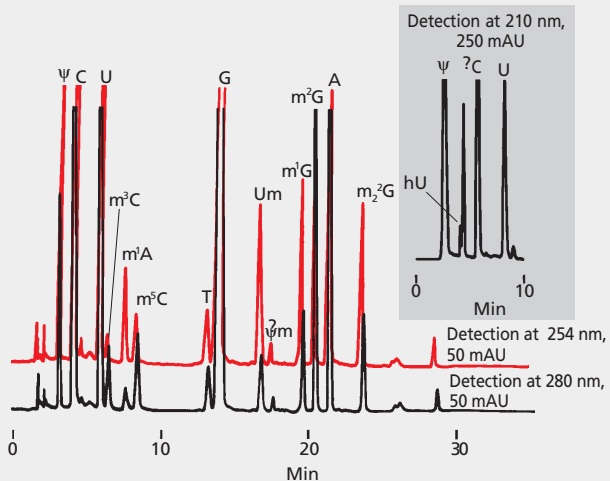
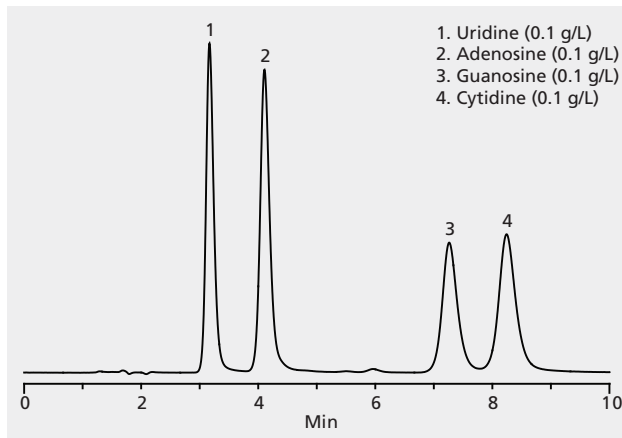


Figure provided by Dr. C.W. Gehrke and Mr. K.C. Kuo of the Interdisciplinary Chromatography-Mass Spectrometry Laboratories, University of Missouri (Columbia, MO, USA).

HPLC Analysis of Ribonucleosides on Ascentis® Si

► application for HPLC

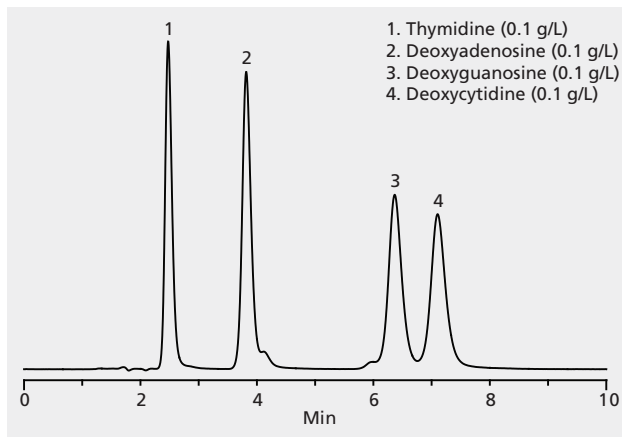
column Ascentis Si, 10 cm x 2.1 mm I.D., 5 µm particles (581508-U) (581508-U)
 mobile phase 10:90, 150 mM ammonium formate (pH 3.0, with formic acid):acetonitrile
 flow rate 0.2 mL/min.
 column temp. 35 °C
 detector UV at 270 nm
 injection 1 µL
 sample as indicated in mobile phase
 Application No. G003725



HPLC Analysis of Deoxyribonucleosides on Ascentis® Si

► application for HPLC

column Ascentis Si, 10 cm x 2.1 mm I.D., 5 µm particles (581508-U)
 mobile phase 10:90, 150 mM ammonium formate (pH 3.0, with formic acid):acetonitrile
 flow rate 0.2 mL/min.
 column temp. 35 °C
 detector UV at 270 nm
 injection 1 µL
 sample as indicated, in mobile phase
 Application No. G003719



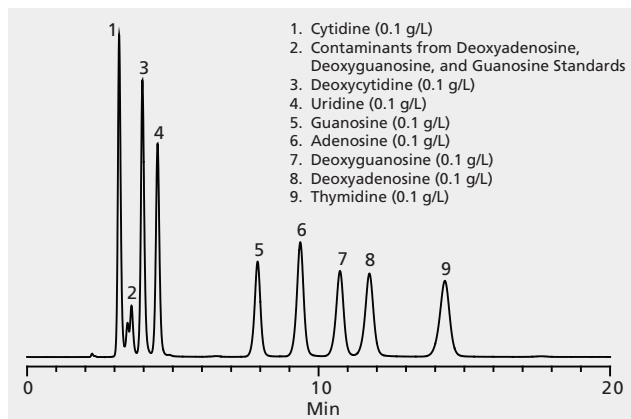
HPLC Applications

Biomolecules: DNA/RNA

HPLC Analysis of Nucleosides on Ascentis® Phenyl

▶ application for HPLC

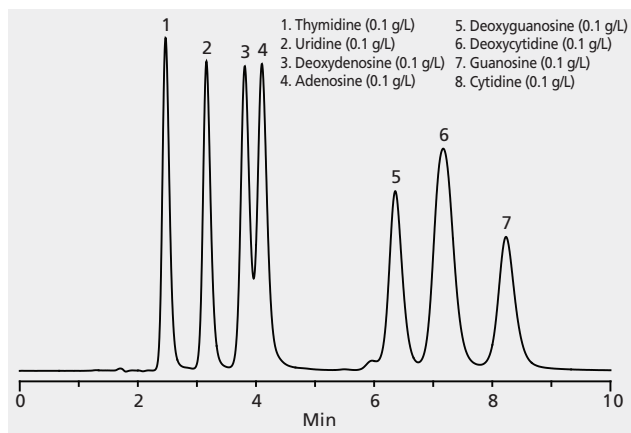
column Ascentis Phenyl, 15 cm x 2.1 mm I.D., 5 µm particles (581613-U)
 mobile phase 10 mM ammonium formate (pH 3.0 with formic acid)
 flow rate 0.2 mL/min.
 column temp. 35 °C
 detector UV at 270 nm; 750 psi back pressure regulator on outlet of flow cell
 injection 1 µL
 sample as indicated, in mobile phase
 Application No. G003710



HPLC Analysis of Nucleosides on Ascentis® Si (HILIC Mode)

▶ application for HPLC

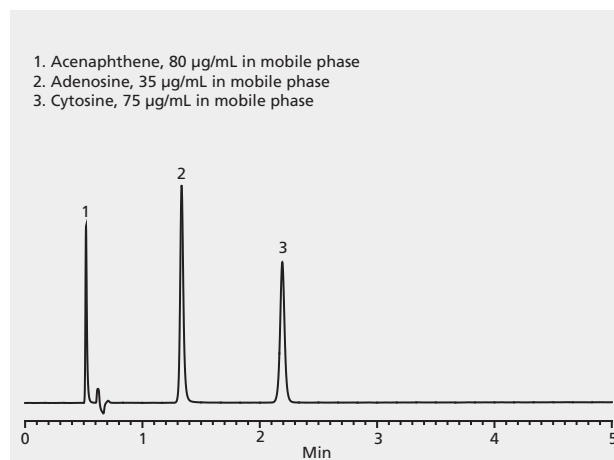
column Ascentis Si, 10 cm x 2.1 mm I.D., 5 µm particles (581508-U)
 mobile phase 10:90, 150 mM ammonium formate (pH 3.0, with formic acid):acetonitrile
 flow rate 0.2 mL/min.
 column temp. 35 °C
 detector UV at 270 nm
 injection 1 µL
 sample as indicated in mobile phase
 Application No. G003721



HPLC Analysis of Nucleosides (HILIC mode)

▶ application for HPLC

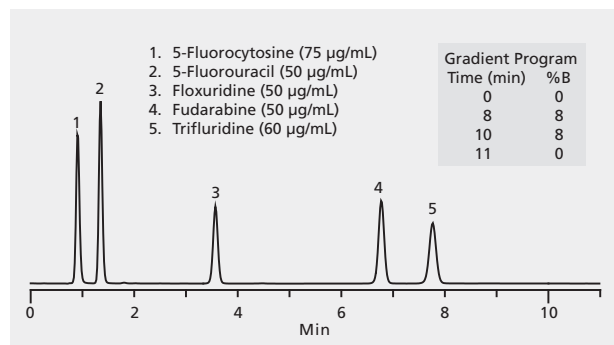
column .. Ascentis Express HILIC, 10 cm x 2.1 mm ID, 2.7 µm particles (53939-U)
 mobile phase 10:90; 100 mM ammonium formate, pH 3.0 with concentrated formic acid:
 acetonitrile
 flow rate 0.4 mL/min
 column temp. 35 °C
 detector UV at 254 nm
 injection 1 µL
 Application No. G004183



HPLC Analysis of Fluorinated Pyrimidine Nucleosides on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis RP-Amide, 5 cm x 4.6 mm I.D., 5 µm particles (565323-U)
 mobile phase .. A: water with 0.1% ammonium formate (pH 3.04 with formic acid), B: acetonitrile
 flow rate 1.0 mL/min
 column temp. 30 °C
 detector UV at 260 nm
 injection 5 µL
 sample as indicated in mobile phase A
 Application No. G003940



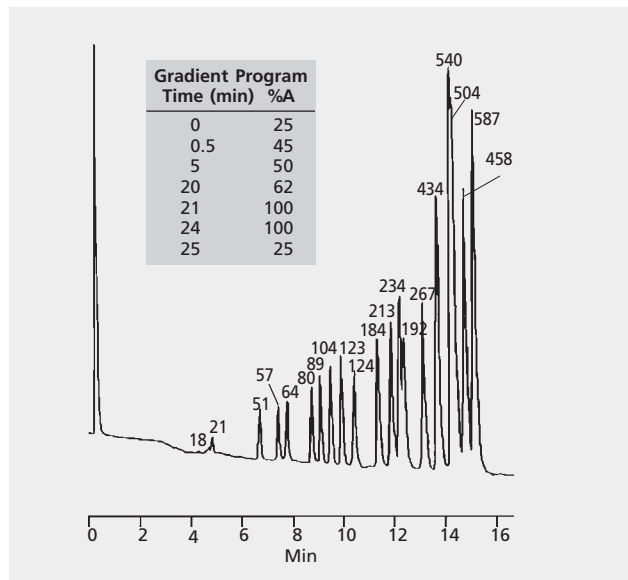
HPLC Applications

Biomolecules: *DNA/RNA*

HPLC Analysis of pBr322 DNA-*Hae* III digest on TSKgel® DEAE-NPR

► application for HPLC

column TSKgel DEAE-NPR, 3.5 cm x 4.6 mm I.D., 2.5 µm particles (with 5 mm DEAE-NPR guard column) (813075)
 mobile phase A: 1 M NaCl/25 mM Tris-HCl, pH 9.0; B: 25 mM Tris-HCl, pH 9.0
 flow rate 1 mL/min
 column temp. ambient
 detector UV, 260 nm
 injection 20 µL of 50 µg/mL *Hae* III digest of pBR322 DNA
 Application No. 794-0036



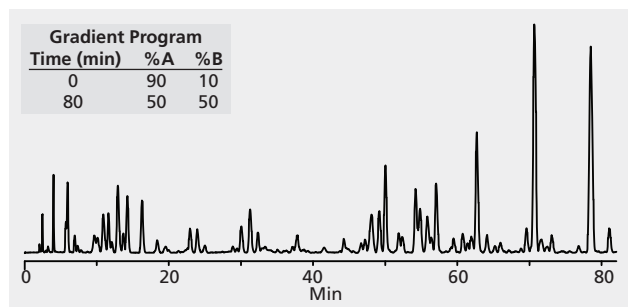
Ref: 1. Elena D. Katz, Lawrence A. Haff, Roy Eksteen, Rapid separation, quantitation, and purification of products of polymerase chain reaction by liquid chromatography *J. Chromatogr. A*. 512, 433-444 (1990)

Tryptic Digests

HPLC Analysis of Protein Tryptic Digest on Ascentis® RP-Amide

► application for HPLC

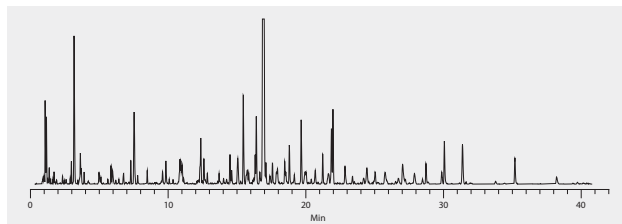
column Ascentis RP-Amide, 25 cm x 2.1 mm I.D., 5 µm particles (565306-U)
 mobile phase .. A: 50:50, 50 mM formic acid titrated with acetate (pH 3.0);water; B: 50:50, 50 mM formic acid titrated with acetate (pH 3.0): acetonitrile
 flow rate 0.2 mL/min.
 column temp. ambient
 detector ESI (+)
 injection 4 µL
 sample tryptic digest of carboxymethylated protein mixture 1.5 g/L in 50 mM formic acid
 Application No. G002670



HPLC Analysis of Tryptic Digests on Ascentis® Express Peptide ES-C18

► application for HPLC

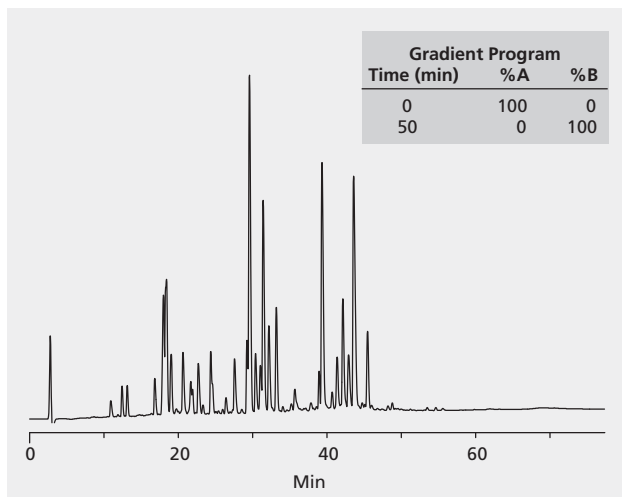
..... compound class: peptides
 column Ascentis Express Peptide ES-C18, 15 cm x 2.1 mm I.D., 2.7 µm (53307-U)
 mobile phase A: 0.1% formic acid in water
 B: 25:75, (0.4% formic acid in water):acetonitrile
 Gradient: 0 to 70% B in 40 min.
 gradient 0 to 70% B in 40 min.
 flow rate 0.3 mL/min
 column temp. 35 °C
 detector ESI(+), TOF
 injection 2 µL
 sample 10 pg/L in 0.1% formic acid
 Application No. G005381



HPLC Analysis of β-Lactoglobulin, Carboxymethylated, Tryptic Digest on Discovery® BIO Wide Pore C18

► application for HPLC

column Discovery BIO Wide Pore C18, 15 cm x 2.1 mm I.D., 3 µm particles (567202-U)
 mobile phase A: water/0.1% TFA; B: 50:50, (water/0.1% TFA):(MeCN/0.1% TFA)
 flow rate 0.20 mL/min
 column temp. 35 °C
 detector 215 nm
 injection 5 µL
 Application No. G001720

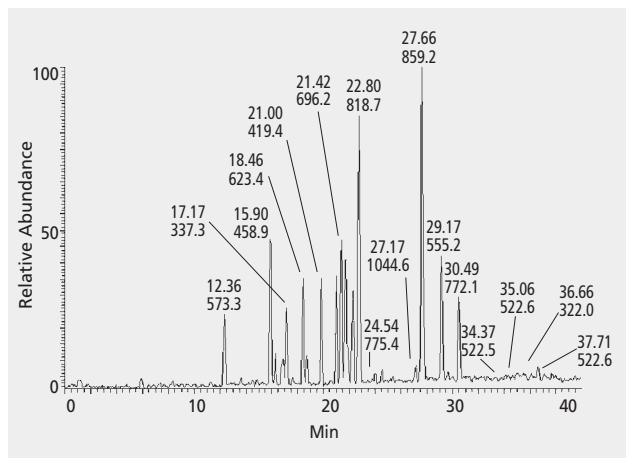


HPLC Applications

Biomolecules: *Tryptic Digests*HPLC Analysis of β -Lactoglobulin Tryptic Digest on a Discovery® BIO Wide Pore C18 Capillary Column

► application for HPLC

column Discovery BIO Wide Pore C18, 15 cm x 0.5 mm I.D., 5 μ m particles (65519-U)
 mobile phase A: 0.1% TFA in water; B: 0.1% TFA in CH₃CN
 gradient 5-40% B in 70 min
 flow rate 14 μ L/min
 column temp. 30 °C
 detector +ESI mode
 injection 500pmol (5 μ L) β -Lactoglobulin tryptic digest in 50 mM NH₄HCO₃
 Application No. G001591



Peptides

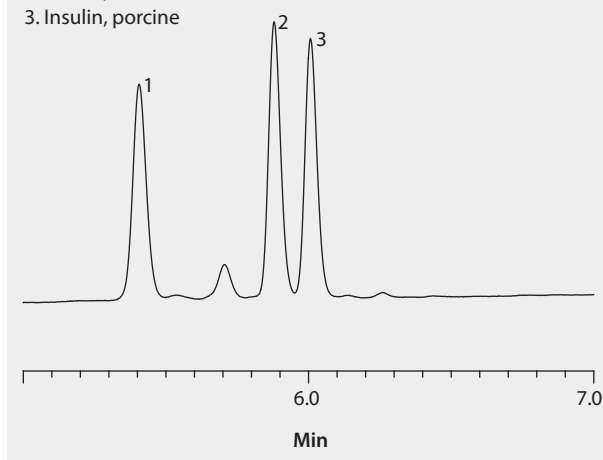
HPLC Analysis of Insulin Variants Using Ascentis® Express Peptide ES C18

► application for HPLC

These three insulins have more than 76% identical positions in a primary structure alignment. The human and porcine proteins are most similar with 85% identity. Baseline resolution of these insulins is achieved on Ascentis Express Peptide ES-C18, with relative band spacing of these three peaks approximating their relative sequence similarities. Ascentis Express Peptide ES-C18 is ideally suited for RP chromatography of small proteins or large peptides.

..... compound class: proteins, hormones
 column Ascentis Express Peptide ES C18, 15 cm x 2.1 mm, 2.7 μ m (53307-U)
 mobile phase .. (A) 70:30, water with 0.1% TFA:acetonitrile with 0.09% TFA; (B) 55:45, water with 0.1% TFA:acetonitrile with 0.09% TFA
 gradient 0 to 100% B in 7.5 min
 flow rate 0.3 mL/min
 pressure 4040 psi
 column temp. 30 °C
 detector UV, 215 nm
 injection 0.5 μ L
 sample 200 μ g/mL insulin (bovine, human, porcine) in 0.1% formic acid
 Application No. G005794

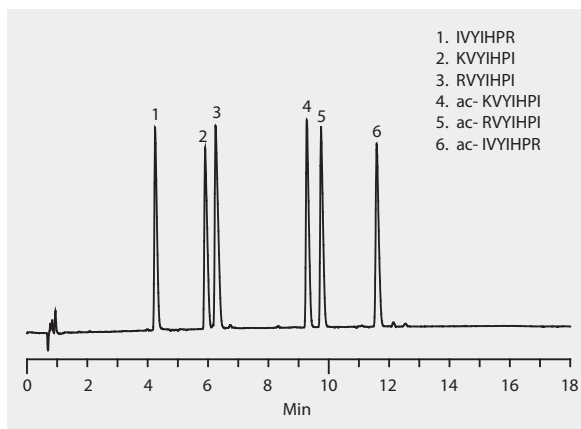
1. Insulin, bovine
2. Insulin, human
3. Insulin, porcine



HPLC Analysis of Basic Peptides (Angiotensin Analogs) on Ascentis® Express Peptide ES-C18

► application for HPLC

column Ascentis Express Peptide ES-C18, 10 cm x 3 mm I.D., 2.7 μ m (53313-U)
 mobile phase A: 0.1% (v/v) formic acid, pH 4.0 (titrated with ammonium hydroxide)
 B: 50:50, (0.175% formic acid in water, pH 4.0) : acetonitrile
 Gradient: 20 to 50% B in 15 min
 gradient 20 to 50% B in 15 min
 flow rate 0.6 mL/min
 pressure 207 bar
 column temp. 35 °C
 detector UV at 215 nm
 injection 2.0 μ L
 sample 0.5 g/L ea. peptide
 Application No. G005379



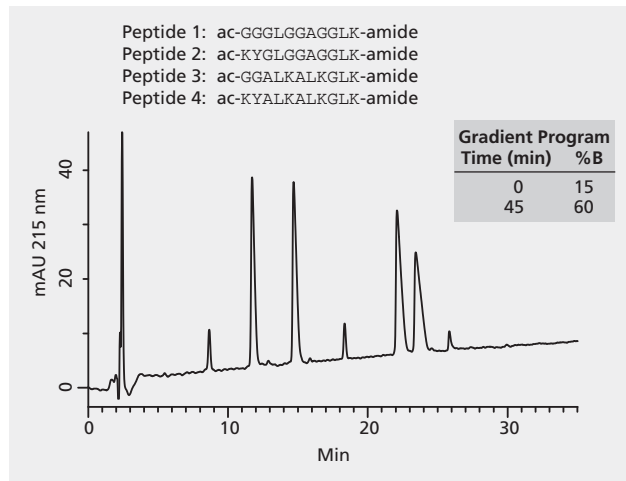
HPLC Applications

Biomolecules: *Peptides*

HPLC Analysis of Basic Peptides on Discovery® BIO Wide Pore C18, No TFA

► application for HPLC

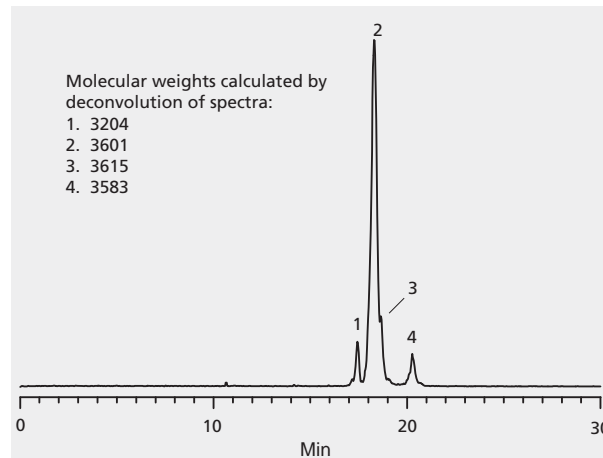
column Discovery BIO Wide Pore C18, 15 cm × 2.1 mm I.D., 5 µm particles (568202-U)
 mobile phase .. A: 25 mM HCOOH in water; B: 50:50 (25 mM HCOOH in water):(20mM HCOOH in CH₃CN)
 flow rate 0.20 mL/min
 column temp. 35 °C
 detector UV, 215 nm
 injection 0.5 µL (~0.25 µg each peptide)
 Application No. **G001642A**



HPLC Analysis of Inhibin α-Subunit Fragment 1-32 on Discovery® HS F5

► application for HPLC

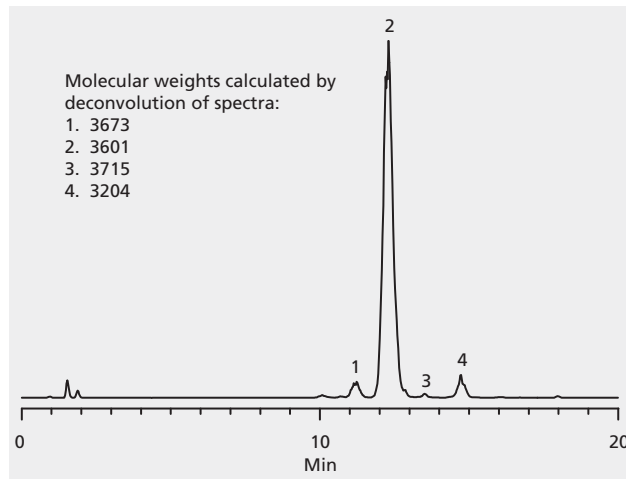
column Discovery HS F5, 10 cm × 2.1 mm ID, 5 µm particles (567510-U)
 mobile phase .. A: 80 mM HCO₂H, 40 mM NH₄OH (pH ~3.5) in water; B: 80 mM HCO₂H, 40 mM NH₄OH in 80% CH₃CN
 flow rate 0.2 mL/min
 column temp. 22 °C
 detector ESI (+), full scan
 injection 2 µL
 sample 50 mg/L in 0.1 % HCO₂H
 Application No. **G002580**



HPLC Analysis of Inhibin α-Subunit Fragment 1-32 on Discovery® HS C18

► application for HPLC

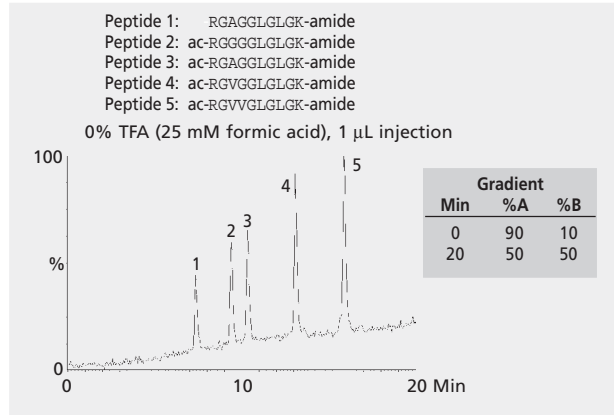
column Discovery HS C18, 10 cm × 2.1 mm ID, 5 µm particles (568501-U)
 mobile phase .. A: 20 mM HCO₂H in water; B: 50:50, (20 mM HCO₂H in water):(20mM HCO₂H in CH₃CN)
 flow rate 0.2 mL/min
 injection 2 µL
 column temp. 22 °C
 detector ESI (+), full scan
 sample 20 mg/L in 0.1 % HCO₂H
 Application No. **G002581**



HPLC Analysis of RP Peptide Performance Standard on Discovery® BIO Wide Pore C18, No TFA

► application for HPLC

column Discovery BIO Wide Pore C18, 15 cm × 2.1 mm I.D., 3 µm particles (567202-U)
 mobile phase .. A: 25 mM formic acid in H₂O; B: 50:50, (25 mM formic acid in H₂O):(20mM formic acid in CH₃CN)
 flow rate 0.20 mL/min
 column temp. ambient
 detector +ESI
 injection 1 µL
 sample RP Peptide Performance Standard, p/n RPS-P0010 (Alberta Peptide Institute)
 Application No. **G001638A**



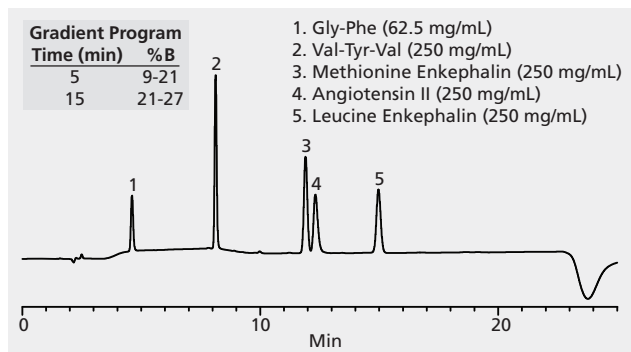
HPLC Applications

Biomolecules: Peptides

HPLC Analysis of Peptides on Ascentis® RP-Amide

▶ application for HPLC

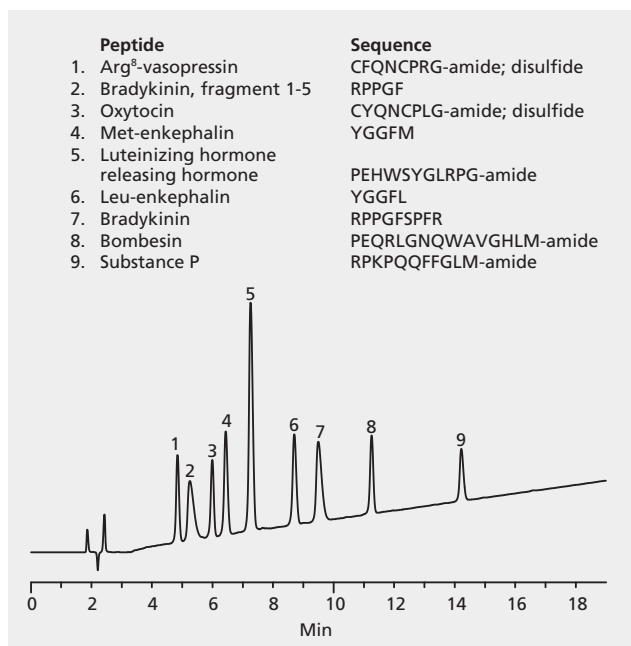
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase A: 0.1% TFA in water; B: 0.1% TFA in acetonitrile
 flow rate 1.0 mL/min.
 column temp. 30 °C
 detector UV, 220 nm
 injection 5 µL
 sample as indicated in mobile phase A
 Application No. G002613



HPLC Analysis of Peptides on Discovery® BIO Wide Pore C5

▶ application for HPLC

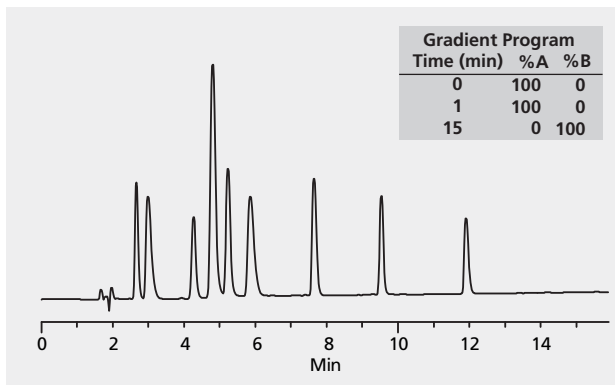
column Discovery BIO Wide Pore C5, 15 cm x 4.6 mm I.D., 5 µm particles (568422-U)
 mobile phase .. A: 0.1% PFPA (pentafluoropropionic acid) in water; CH₃CN (81:19); B: 0.1% PFPA in water; CH₃CN (62:38)
 gradient 0-100% B in 19 min
 flow rate 1 mL/min
 column temp. 30 °C
 detector UV, 215 nm
 injection 10 µL ~0.25 µg each peptide
 sample Cat. No. P2693
 Application No. G001492



HPLC Analysis of Peptides on Discovery® BIO Wide Pore C18

▶ application for HPLC

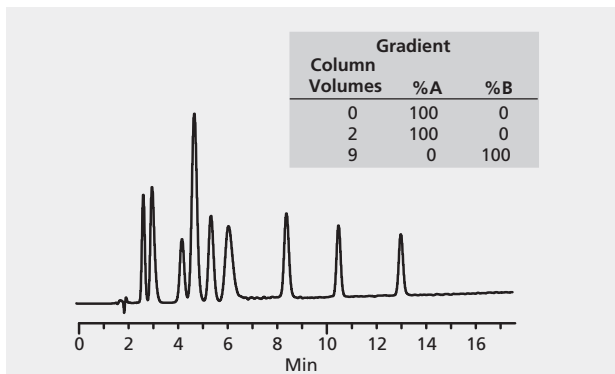
column Discovery BIO Wide Pore C18, 15 cm x 4.6 mm, 5 µm particles (568222-U)
 mobile phase .. A: 80:20, (0.1% TFA in water):(0.1% TFA in CH₃CN); B: 66:34, (0.1% TFA in water):(0.1% TFA in CH₃CN)
 gradient 0-100% B in 14 min after 1 minute delay
 flow rate 1 mL/min
 column temp. 30 °C
 detector UV, 220 nm
 injection 10 µL
 sample Cat. No. P2693
 Application No. G001512



HPLC Analysis of Peptides on Discovery® BIO Wide Pore C18, Preparative Scale

▶ application for HPLC

column Discovery BIO Wide Pore C18, 15 cm x 10 mm I.D., 10 µm (567208-U)
 mobile phase ... A: 80:20, (0.1%TFA in water):(0.1% TFA in CH₃CN); B: 66:34, (0.1% TFA in water):(0.1% TFA in CH₃CN)
 flow rate 4.7 mL/min
 column temp. 30 °C
 detector UV, 215 nm
 injection 24.5 µL
 sample Cat. No. P2693
 Application No. G001511



HPLC Applications

Biomolecules: *Peptides*

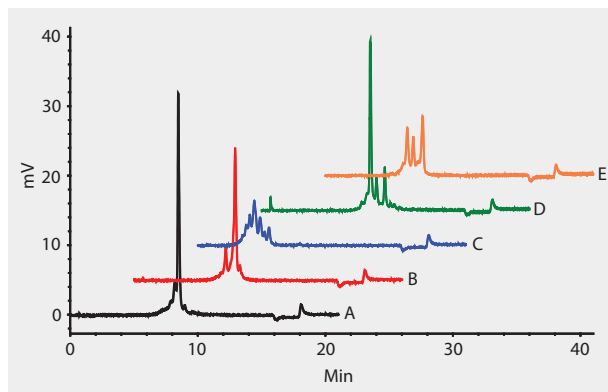
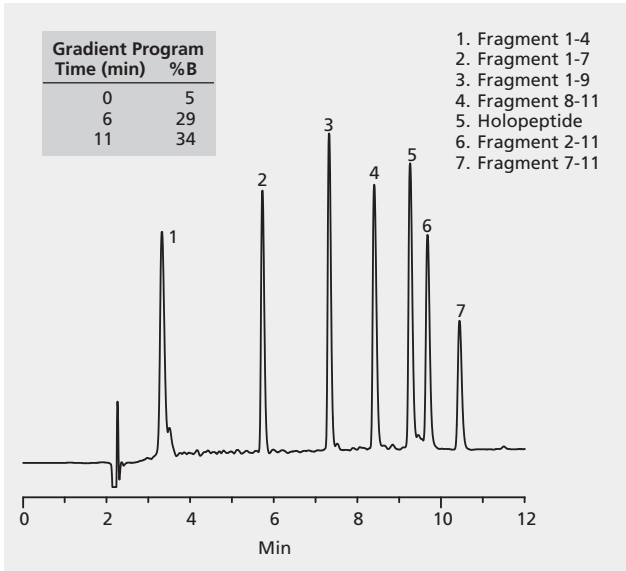
HPLC Analysis of Substance P and Its Fragments on Discovery® C18

► application for HPLC

column Discovery C18, 15 cm × 4.6 mm I.D., 5 µm particles (504955)
 mobile phase A: water + 0.1% TFA; B: acetonitrile + 0.1% TFA
 gradient linear; 5-29%B (6 min); 29-34B (5 min)
 flow rate 1 mL/min
 column temp. 35 °C
 detector UV, 220 nm
 sample Substance P in initial mobile phase
 Application No. G000322

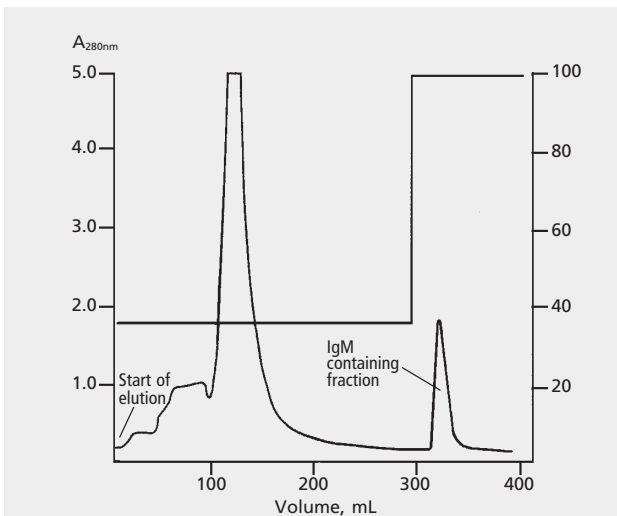
Gradient Program Time (min)	%B
0	5
6	29
11	34

1. Fragment 1-4
2. Fragment 1-7
3. Fragment 1-9
4. Fragment 8-11
5. Holopeptide
6. Fragment 2-11
7. Fragment 7-11



LC Separation of Immunoglobulins (IgM) using Q Sepharose® Fast Flow

media Q Sepharose Fast Flow
 column 30 cm × 50 mm I.D.
 Cat. No. Q1126-100ML
 mobile phase A: 0.02 M NaH₂PO₄, pH 6.5; B: A + 0.5 M NaCl, pH 6.5
 flow rate 25 cm/hr
 detector UV, 280 nm
 injection cell culture supernatant
 Application No. 794-0370



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Immunoglobulins

HPLC Analysis of mAb Charge Variants on TSKgel® CM-STAT

► application for HPLC

A TSKgel CM-STAT weak cation exchange (WCX) column was applied to separate charge variants of several monoclonal antibodies. The typical analysis time on conventional 25 cm long WCX columns of about eighty minutes could be significantly reduced when separation was performed on a 10 cm TSKgel CM-STAT column, filled with 7 µm particles. The analysis profiles for five antibodies show that high resolution analysis can be obtained in about 20 minutes analysis time.

From "Ion Exchange Chromatography for the Characterization of Biotherapeutics" in The Supelco Reporter, Vol. 29.3, page 20.

..... compound class: peptides
 column TSKgel CM-STAT, 10 cm × 4.6 mm I.D., 7 µm particles (821966)
 mobile phase A: 20 mM MES buffer, pH 6.0
 B: 0.5 M NaCl in buffer A, pH 6.0
 gradient: 10% B (0 min.), 30% B (15 min.), 100% B (15 min.),
 0% B (17 min.), 10% B (17 min.), 10% B (21 min.)
 flow rate 1 mL/min
 column temp. ambient
 detector UV at 280 nm
 injection 20 µL
 sample monoclonal antibodies (mAb A through E)
 Application No. G005458

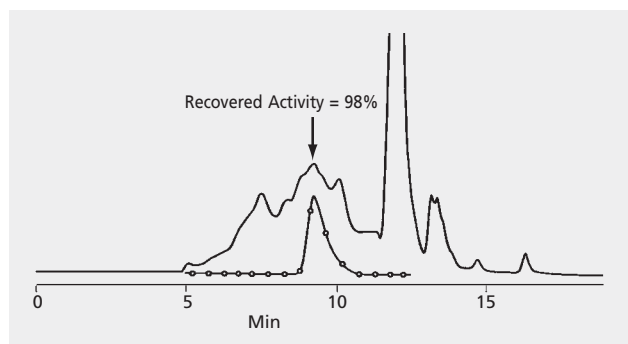
HPLC Applications

Biomolecules: *Enzymes*

HPLC Analysis of Peroxidase on TSKgel® G3000SWXL

► application for HPLC

column TSKgel G3000SW_{XL}, 30 cm × 7.8 mm I.D., 5 µm particles (808541)
 mobile phase 0.3M NaCl/0.05M phosphate buffer, pH 7.0
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV, 220 nm
 injection 100 µL crude peroxidase preparation from Japanese horseradish (0.15mg)
 Application No. 713-0940

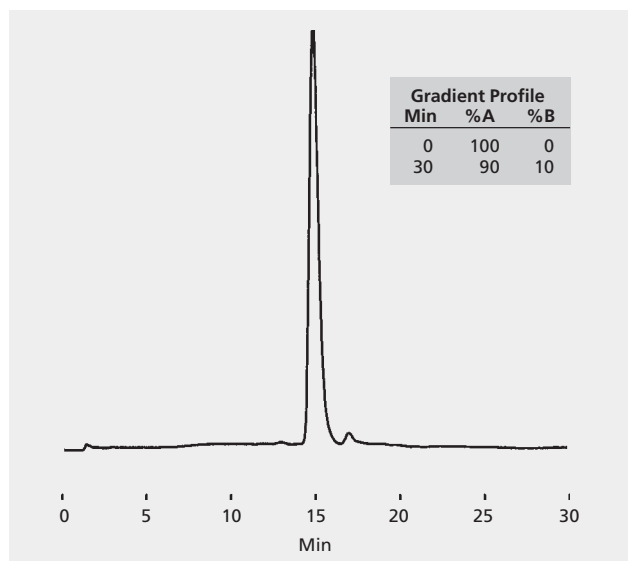


HPLC Analysis of Superoxide Dismutase on Discovery® BIO PolyMA-WAX

► application for HPLC

Discovery BIO PolyMA-SCX and PolyMA-WAX columns give sharp, efficient peaks for a wide variety of proteins.

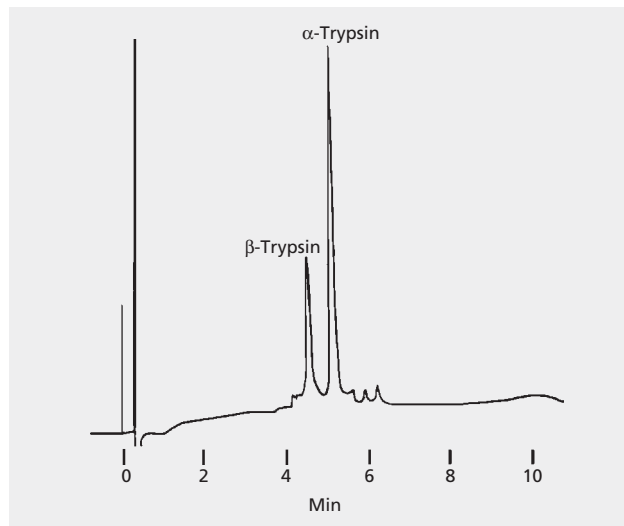
column Discovery BIO PolyMA-WAX, 5 cm × 4.6 mm, 5 µm (59602-U)
 mobile phase (A: 20 mM Tris, pH 8.0 with HCl
 B: 20 mM Tris, 0.5 M NaCl, pH 8.0 with HCl
 0 to 10% B in 30 min. (linear))
 flow rate 0.5 mL/min
 column temp. 25 °C
 detector UV, 280 nm
 injection 10 µL
 Application No. G001835



HPLC Analysis of Trypsin on TSKgel® Butyl-NPR

► application for HPLC

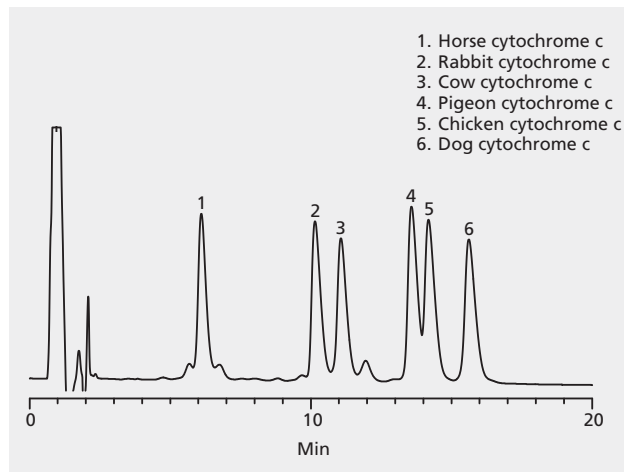
column TSKgel Butyl-NPR, 3.5 cm × 4.6 mm I.D., 2.5 µm particles (814947)
 mobile phase 2 M to 0 M ammonium sulfate in 20 mM Tris-HCl buffer, pH 7.5 in 10 min
 flow rate 1 mL/min
 detector UV, 280 nm
 injection commercial trypsin sample
 Application No. 713-1204



Other Proteins

HPLC Analysis of Cytochrome c Species Variants on Discovery® BIO Wide Pore C18

column Discovery BIO Wide Pore C18, 15 cm × 4.6 mm I.D., 5 µm particles (568222-U)
 mobile phase .. A: 70:30, (0.1% TFA in water):(0.1% TFA in CH₃CN); B: 64:36, (0.1% TFA in water):
 (0.1% TFA in CH₃CN)
 gradient 0-100% B in 30 min
 flow rate 1 mL/min
 column temp. ambient
 detector UV, 220 nm
 injection 12 µL each at 0.8 mg/mL in 0.1%TFA
 Application No. G001581

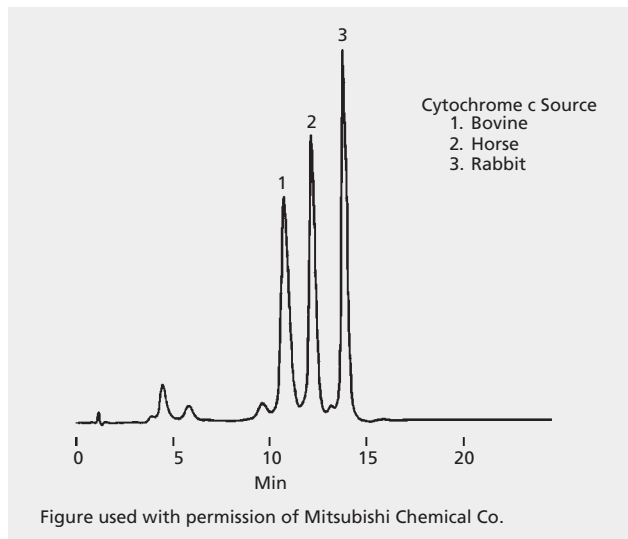


HPLC Applications

Biomolecules: Other Proteins

HPLC Analysis of Cytochrome c Species Variants on Discovery® BIO PolyMA-SCX

column Discovery BIO PolyMA-SCX, 5 cm x 4.6 mm I.D., 5 µm particles (56901-U)
 mobile phase A: 20 mM Bis-Tris HCl, pH 7.0; B: A + 0.5 M NaCl 24-69% B over 20 min
 flow rate 0.5 mL/min
 detector UV, 280 nm
 injection 10 µg each variant
 Application No. 796-0477B

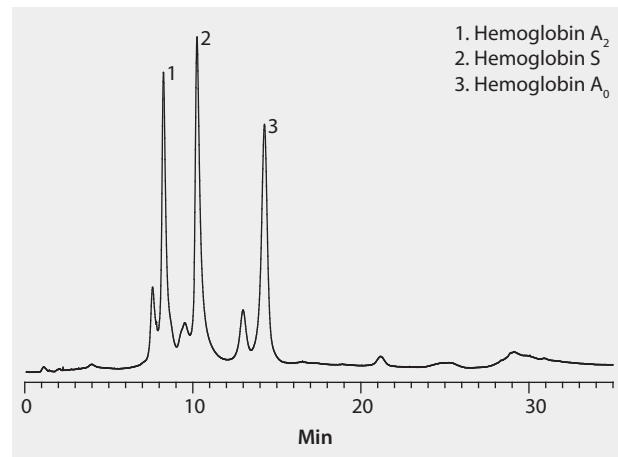


HPLC Analysis of Hemoglobin Variants on Discovery® BIO PolyMA-WAX

▶ application for HPLC

Discovery BIO PolyMA-WAX is shown to give better resolution and band spacing of hemoglobin variants than competitive columns.

..... compound class: proteins
 column Discovery BIO PolyMA-WAX, 5 cm x 4.6 mm, 5 µm particles (59602-U)
 mobile phase A: 10 mM Tris, pH 8.0 with acetic acid
 B: 10 mM Tris, 0.25 M KCl, pH 8.0 with acetic acid
 0 to 32% B in 20 min. (linear)
 flow rate 0.5 mL/min
 column temp. 35 °C
 detector UV, 280 nm
 injection 50 µg each Hb variants (A₂, S and A₀)
 Application No. G001830

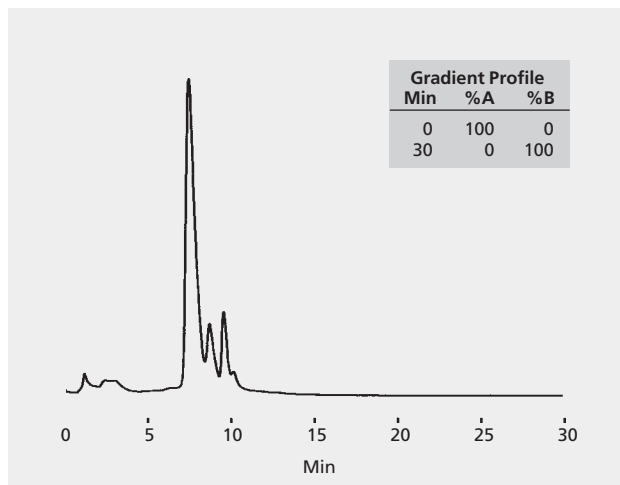


HPLC Analysis of Hemoglobin S on Discovery® BIO PolyMA-SCX, Ion Exchange

▶ application for HPLC

Discovery BIO PolyMA-SCX and PolyMA-WAX columns give sharp, efficient peaks for a wide variety of proteins.

column Discovery BIO PolyMA-SCX, 5 cm x 4.6 mm, 5 µm (59601-U)
 mobile phase A: 20 mM sodium phosphate, pH 7.0
 B: 20 mM sodium phosphate, 0.5 M NaCl, pH 7.0
 0 to 100% B in 30 min. (linear)
 flow rate 0.5 mL/min
 column temp. 25 °C
 detector UV, 280 nm
 injection 10 µL
 Application No. G001834



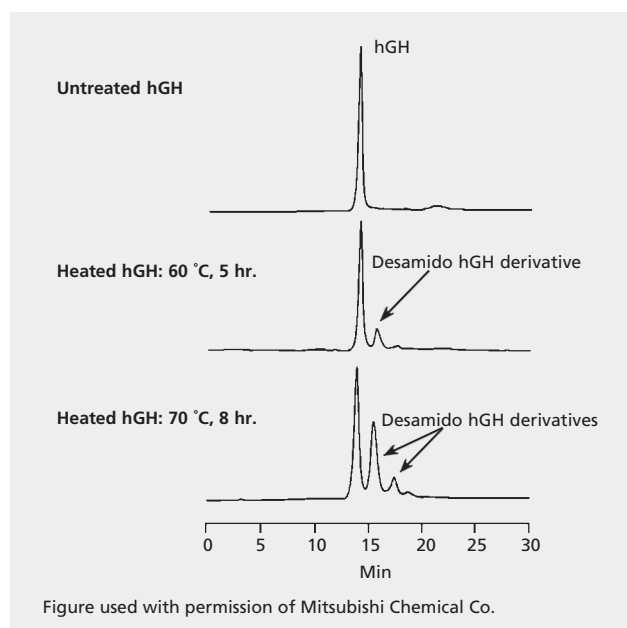
HPLC Applications

Biomolecules: Other Proteins

HPLC Analysis of Human Growth Hormone (hGH) on Discovery[®] BIO PolyMA-WAX

This Figure shows the degradation products of human growth hormone (hGH) well-separated on a Discovery BIO PolyMA-WAX anion-exchange column. The difference between the resolved compounds is the conversion of protein amide(s) to carboxylate(s), demonstrating both the power of the ion-exchange technique, and the efficiency of the Discovery BIO PolyMA-WAX column.

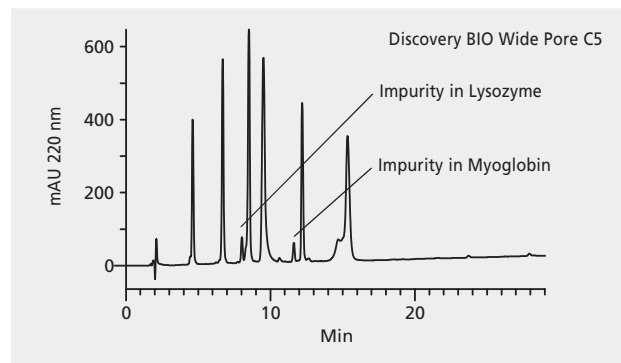
column Discovery BIO PolyMA-WAX, 5 cm x 4.6 mm I.D., 5 µm particles (59602-U)
 mobile phase A: 20 mM Tris-HCl, pH 8.0
 B: 20 mM Tris-HCl, 0.5 M NaCl, pH 8.0
 5 to 70% B in 30 min. (linear)
 flow rate 0.5 mL/min
 column temp. 25 °C
 injection 10 mg hGH
 Application No. 796-0659



HPLC Analysis of Protein Impurities on Discovery[®] BIO Wide Pore C5

► application for HPLC

column Discovery BIO Wide Pore C5, 15 cm x 4.6 mm I.D., 5 µm (568422-U)
 gradient 0-100% B in 25 min
 mobile phase .. A: 75:25, (0.1% TFA in water):(0.1% TFA in CH₃CN); B: 25:75, (0.1% TFA in water):
 (0.1% TFA in CH₃CN)
 flow rate 1.0 mL/min
 column temp. ambient
 detector UV, 220 nm
 injection (12µL in 0.1% TFA)
 Application No. G001488A

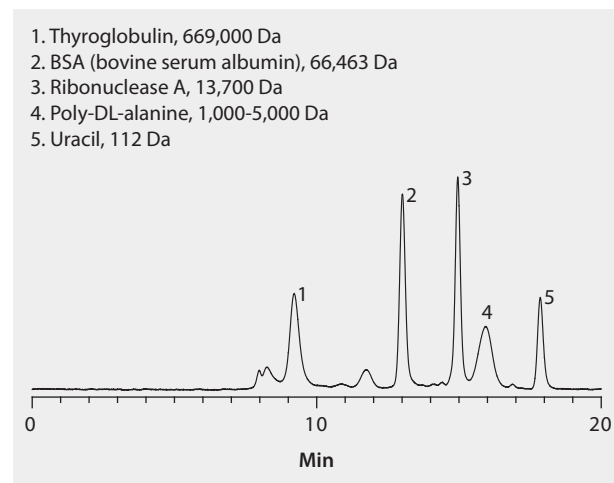


HPLC Analysis of Proteins on Discovery[®] BIO GFC 300 (30 cm, 7.8 mm, 3 µm)

► application for HPLC

This application demonstrates the suitability of Discovery BIO GFC300 for the separation of proteins. Separation is by inclusion into the pore volume with larger molecules being excluded and therefore eluting earlier.

..... compound class: proteins
 column Discovery BIO GFC 300, 30 cm x 7.8 mm I.D., 3 µm (567337-U)
 mobile phase 150 mM potassium phosphate monobasic, pH 7.0 (adjusted with potassium hydroxide)
 flow rate 0.7 mL/min
 pressure 56 bar
 column temp. 25 °C
 detector UV, 214 nm
 injection 1 µL
 sample 1 g/L each (except uracil, 0.1 g/L) in mobile phase
 Application No. G005731



HPLC Applications

Biomolecules: Other Proteins

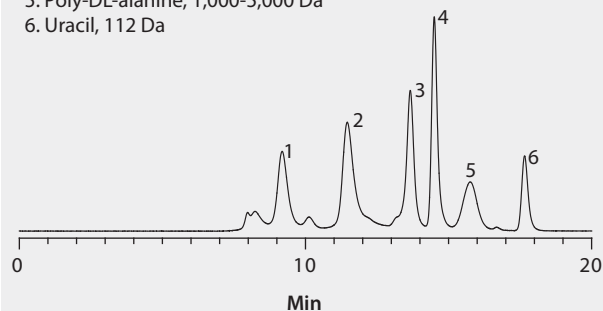
HPLC Analysis of Proteins on Discovery® BIO GFC 300 (30 cm, 4.6 mm, 3 µm)

▶ application for HPLC

This application demonstrates the suitability of Discovery BIO GFC300 for the separation of proteins. Separation is by inclusion into the pore volume with larger molecules being excluded and therefore eluting earlier.

..... compound class: proteins
 column Discovery BIO GFC 300, 30 cm x 4.6 mm I.D., 3 µm (567335-U)
 mobile phase 150 mM potassium phosphate monobasic, pH 7.0 (adjusted with potassium hydroxide)
 flow rate 0.25 mL/min
 pressure 45 bar
 column temp. 25 °C
 detector UV, 214 nm
 injection 1 µL
 sample 1 g/L each (except uracil, 0.1 g/L) in mobile phase
 Application No. G005732

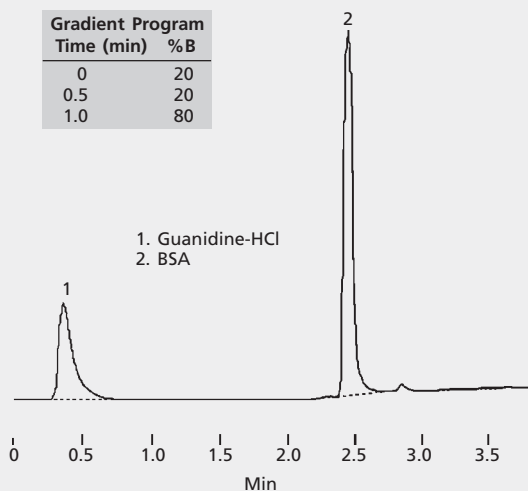
1. Thyroglobulin, 669,000 Da
2. gamma-Globulins, ~300,000 Da
3. Ovalbumin, 44,281 Da
4. Myoglobin, 17,699 Da
5. Poly-DL-alanine, 1,000-5,000 Da
6. Uracil, 112 Da



Desalting of Proteins using Supelguard™ LC-308

column Supelguard LC-308, 2 cm x 4.6 mm I.D., 5 µm particles (59511-U)
 mobile phase A: 0.1% TFA in water; B: 0.09% TFA in acetonitrile
 flow rate 2 mL/min
 detector UV, 220 nm
 injection 40 µL of 200 µg BSA in 3 M guanidine-HCl
 Application No. 796-0616

Gradient Program	
Time (min)	%B
0	20
0.5	20
1.0	80

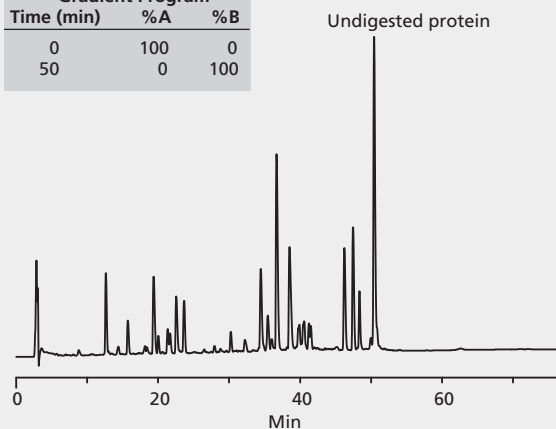


HPLC Analysis of Carboxymethylated Cytochrome c (Chicken) Tryptic Digest on Discovery® BIO Wide Pore C18

▶ application for HPLC

..... compound class: peptides
 column Discovery BIO Wide Pore C18, 15 cm x 2.1 mm I.D., 3 µm particles (567202-U)
 mobile phase A: water/0.1% TFA; B: 50:50, (water/0.1%TFA):(MeCN/0.1% TFA)
 flow rate 0.20 mL/min
 column temp. 35 °C
 detector UV, 215 nm
 injection 5 µL
 Application No. G001721

Gradient Program		
Time (min)	%A	%B
0	100	0
50	0	100

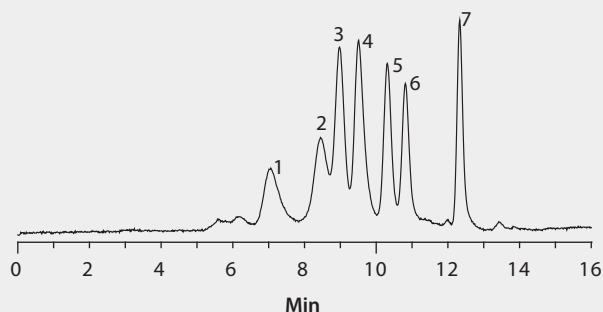


HPLC Analysis of Proteins on Discovery® BIO GFC 300 (30 cm, 7.8 mm, 5 µm)

▶ application for HPLC

..... compound class: proteins
 column Discovery BIO GFC 300, 30 cm x 7.8 mm I.D., 5 µm (567304-U)
 mobile phase 150 mM potassium phosphate monobasic, pH 7.0
 flow rate 1.0 mL/min
 column temp. 25 °C
 detector UV, 280 nm
 injection 10 µL
 sample 1-10 g/L in buffer
 Application No. G005730

1. Thyroglobulin, 669,000 Da
2. Ferritin, 440,000 Da
3. Alcohol dehydrogenase, 150,000 Da
4. Albumin, 66,000 Da
5. Carbonic anhydrase, 29,000 Da
6. Aprotinin, 6,500 Da
7. p-Aminobenzoic acid, 137 Da

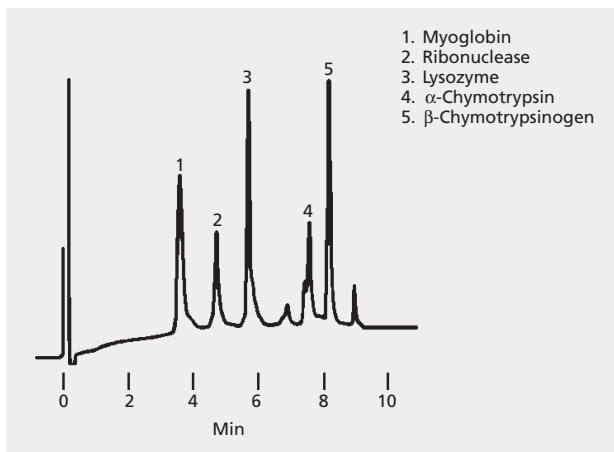


HPLC Applications

Biomolecules: *Other Proteins*

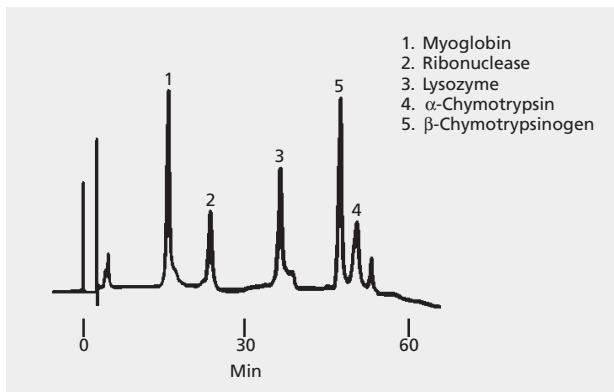
HPLC Analysis of Proteins on TSKgel® Butyl-NPR

Proteins, mixture
 column TSKgel Butyl-NPR, 3.5 cm × 4.6 mm I.D., 2.5 μm particles (814947)
 mobile phase A: 0.1 M phosphate buffer, pH 7.0 plus (NH₄)₂SO₄, 2.3 M to 0 M in 12 min
 B & C = 0.1 M phosphate buffer, pH 7.0 plus (NH₄)₂SO₄, 1.8 M to 0 M in 60 min
 flow rate 1 mL/min
 detector UV, 280 nm
 Application No. 713-1025



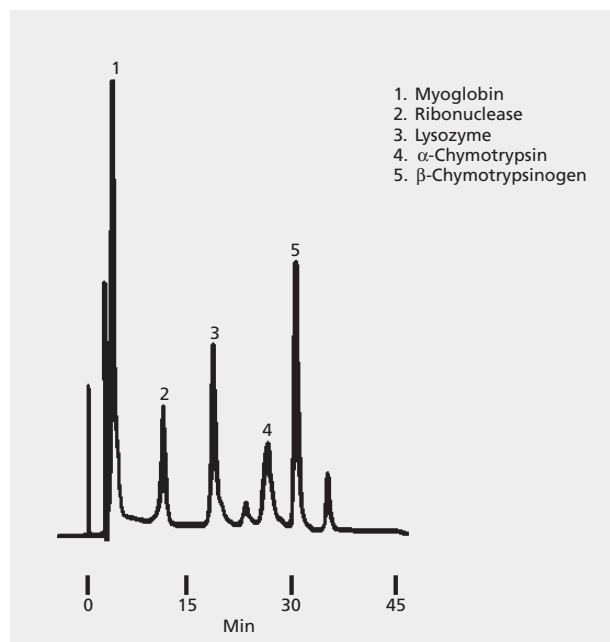
HPLC Analysis of Proteins on TSKgel® Phenyl-5PW

Proteins, mixture
 column TSKgel Phenyl-5PW, 7.5 cm × 7.5 mm I.D., 10 μm particles (807573)
 mobile phase 0.1 M phosphate buffer, pH 7.0 plus (NH₄)₂SO₄, 1.8 M to 0 M in 60 min
 flow rate 1 mL/min
 detector UV, 280 nm
 Application No. 713-1026



HPLC Analysis of Proteins on TSKgel® Ether-5PW

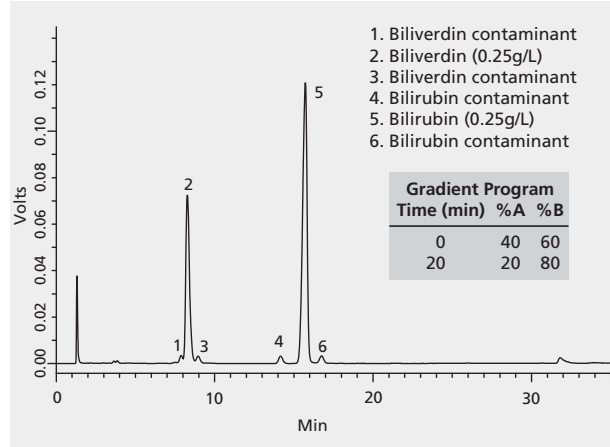
Proteins, mixture
 ▶ application for HPLC
 column TSKgel Ether-5PW, 7.5 cm × 7.5 mm I.D., 10 μm particles (808641)
 mobile phase 0.1 M phosphate buffer, pH 7.0 plus (NH₄)₂SO₄, 1.8 M to 0 M in 60 min
 flow rate 1 mL/min
 detector UV, 280 nm
 Application No. 713-1027



Other Biomolecules

HPLC Analysis of Bilirubin and Biliverdin on Discovery® C18

▶ application for HPLC
 column Discovery C18, 10 cm × 2.1 mm I.D., 5 μm particles (569220-U)
 mobile phase (A) 10 mM NH₄OAc (pH unadjusted)
 (B) 90:10, MeOH:(100 mM NH₄OAc)
 flow rate 0.2 mL/min
 column temp. ambient
 detector UV, 405 nm
 injection 1 μL
 sample as indicated (in 50% MeOH, 1% NH₄OH)
 Application No. G002490



HPLC Applications

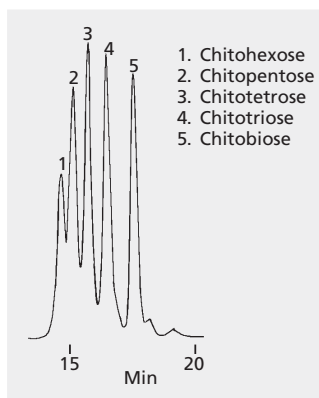
Carbohydrates

Carbohydrates

HPLC Analysis of Chito-oligosaccharides on TSKgel® G-Oligo-PW

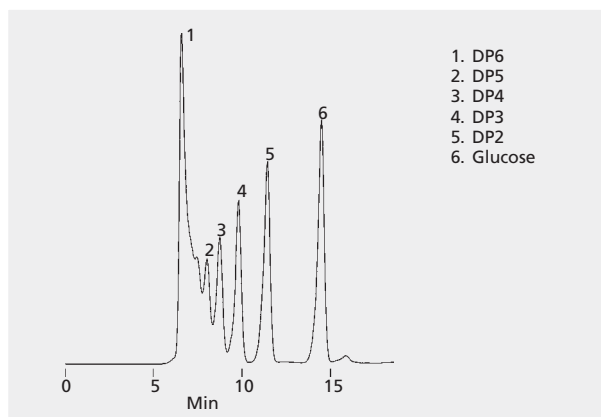
▶ application for HPLC

column TSKgel G-Oligo-PW, 30 cm × 7.8 mm I.D., 6 μm particles (808031)
 flow rate 1 mL/min
 column temp. 60 °C
 detector RI
 sample preparation distilled water
 Application No. 794-0325



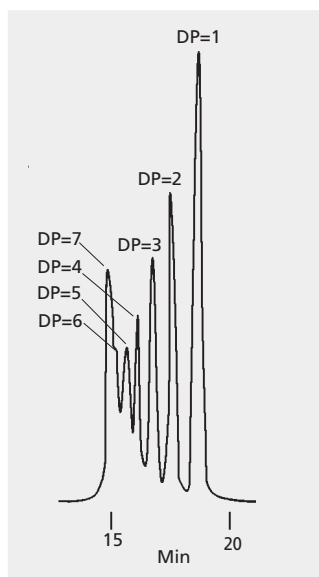
HPLC Analysis of Oligosaccharides from Dark Corn Syrup on SUPELCOGEL™ Ag

column SUPELCOGEL Ag, 30 cm × 7.8 mm I.D. (59315)
 mobile phase water
 flow rate 0.5 mL/min
 column temp. 85 °C
 detector RI
 injection 10 μL of 1g syrup/10 mL DI water, filtered (0.20 μm filter)
 Application No. 794-0029



HPLC Analysis of Hydrolyzed β-Cyclodextrin on TSKgel® G-Oligo-PW

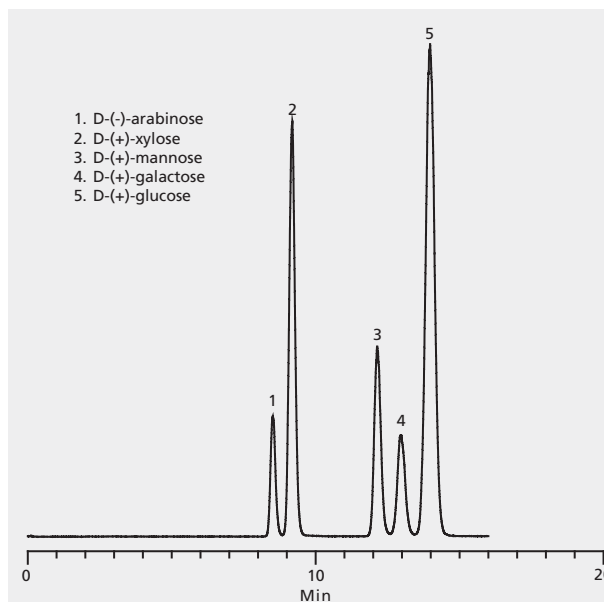
column TSKgel G-Oligo-PW, 30 cm × 7.8 mm I.D., 6 μm particles (808031)
 mobile phase distilled water
 flow rate 1 mL/min
 column temp. 60 °C
 detector RI
 Application No. 713-0917



HPLC Analysis of Simple Underivatized Sugars on apHera™ NH2

▶ application for HPLC

column an aminopropyl silica column, 15 cm × 4.6 mm I.D., 5 μm particles
 column apHera NH2, 15 cm × 4.6 mm I.D., 5 μm particles (56401AST)
 mobile phase 20:80, water:acetonitrile
 flow rate 1.0 mL/min
 column temp. 25 °C
 detector ELSD, 45 °C, 3.5 psi nitrogen
 injection 10 μL
 sample 500 μg/mL in 30:70, water: acetonitrile
 Application No. G003996



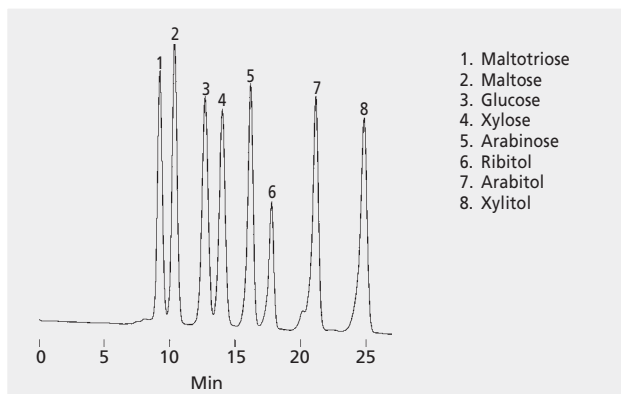
HPLC Applications

Carbohydrates

HPLC Analysis of Sugars on SUPELCOGEL™ Ca

► application for HPLC

column SUPELCOGEL Ca, 30 cm x 7.8 mm I.D. (59305-U)
 mobile phase water
 flow rate 1.5 mL/min
 column temp. 80 °C
 detector RI
 injection 10 µL, 2.5 mg/mL each analyte in water
 Application No. 795-0016

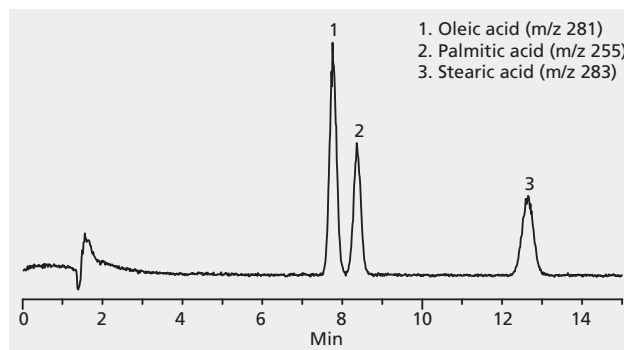


Fatty Acids

HPLC Analysis of Fatty Acids on Ascentis® RP-Amide

► application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 5:95, 0.1% formic acid in water:acetonitrile
 flow rate 1.0 mL/min, split to detector
 column temp. 35 °C
 detector ESI(-)
 injection 5 µL
 sample 10 µg/mL in acetonitrile
 Application No. G002905

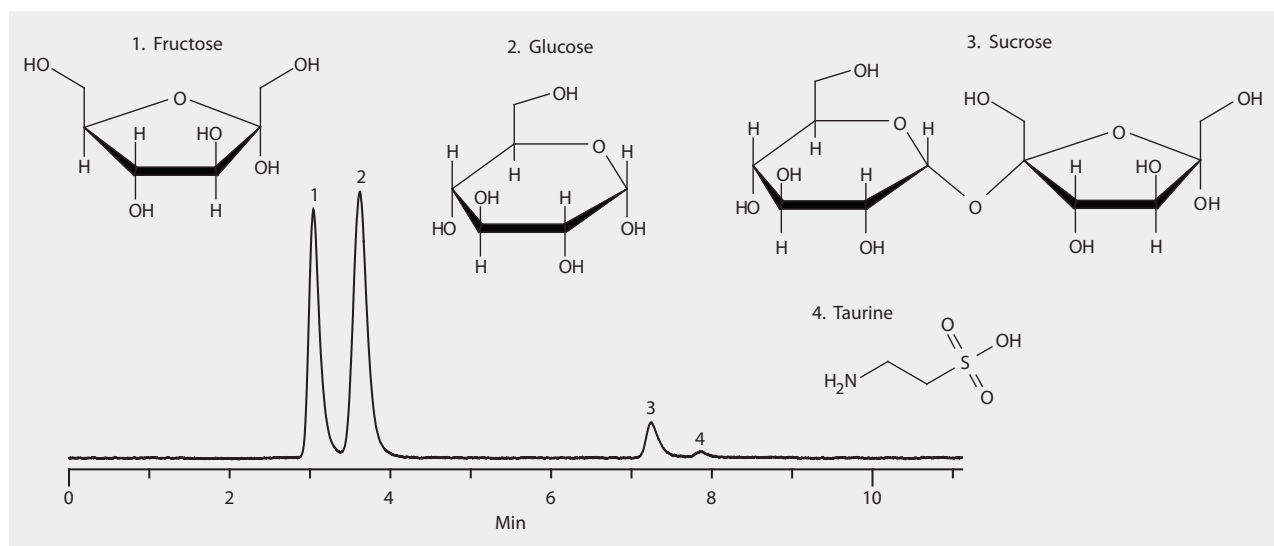


Flavonoids

HPLC Analysis of an Energy Drink Using Ascentis® Express HILIC and ELSD

► application for HPLC

column Ascentis Express HILIC, 5 cm x 3 mm I.D., 2.7 µm (53967-U)
 mobile phase A: 100 mM ammonium acetate, pH 5 (titrated with acetic acid) B: water C: acetonitrile Ratio: 9:1:90 (A:B:C)
 flow rate 0.6 mL/min
 column temp. 35 °C
 detector ELSD, 55° C, 3.5 bar nitrogen
 injection 2 µL
 sample Energy Drink Diluted 1:9 in acetonitrile
 Application No. G005388



HPLC Applications

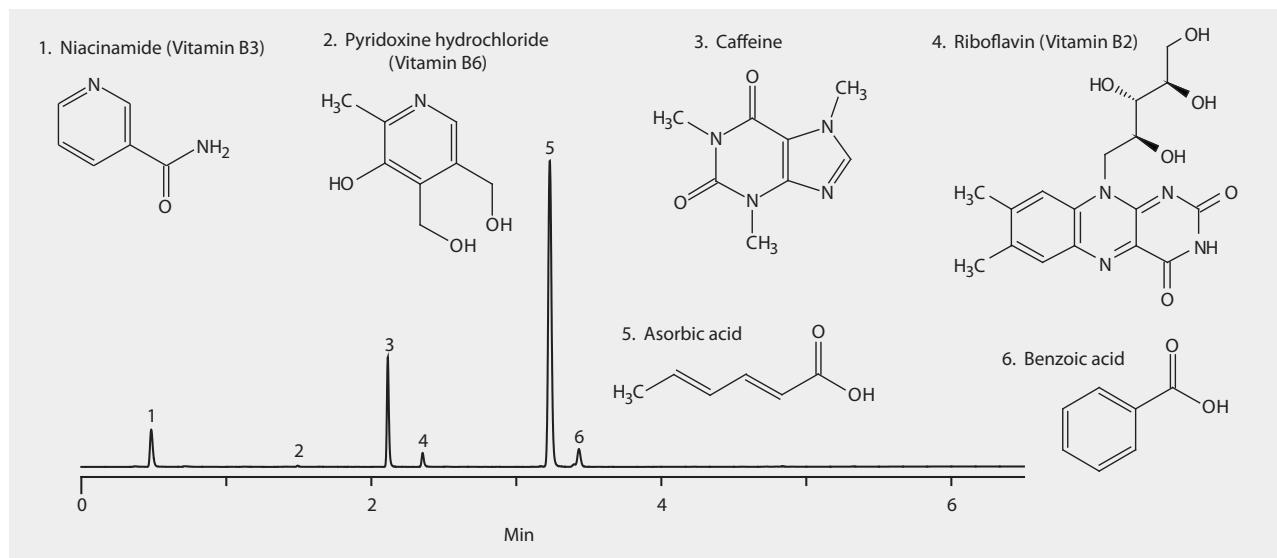
Flavonoids

HPLC Analysis of an Energy Drink Using Ascentis® Express RP-Amide and UV detection

► application for HPLC

This application demonstrates the suitability of Ascentis Express RP-Amide for the efficient separation of common drink additives used in caffeinated energy drinks.

column Ascentis Express RP-Amide, 5 cm x 3 mm I.D., 2.7 µm (53916-U)
 mobile phase (A) water with 0.1% TFA; (B) acetonitrile with 0.1% TFA
 flow rate 0.6 mL/min
 pressure 79 bar
 column temp. 35 °C
 detector UV, 254 nm
 injection 2 µL
 sample Energy Drink Diluted 1:9 in acetonitrile
 Application No. G005389



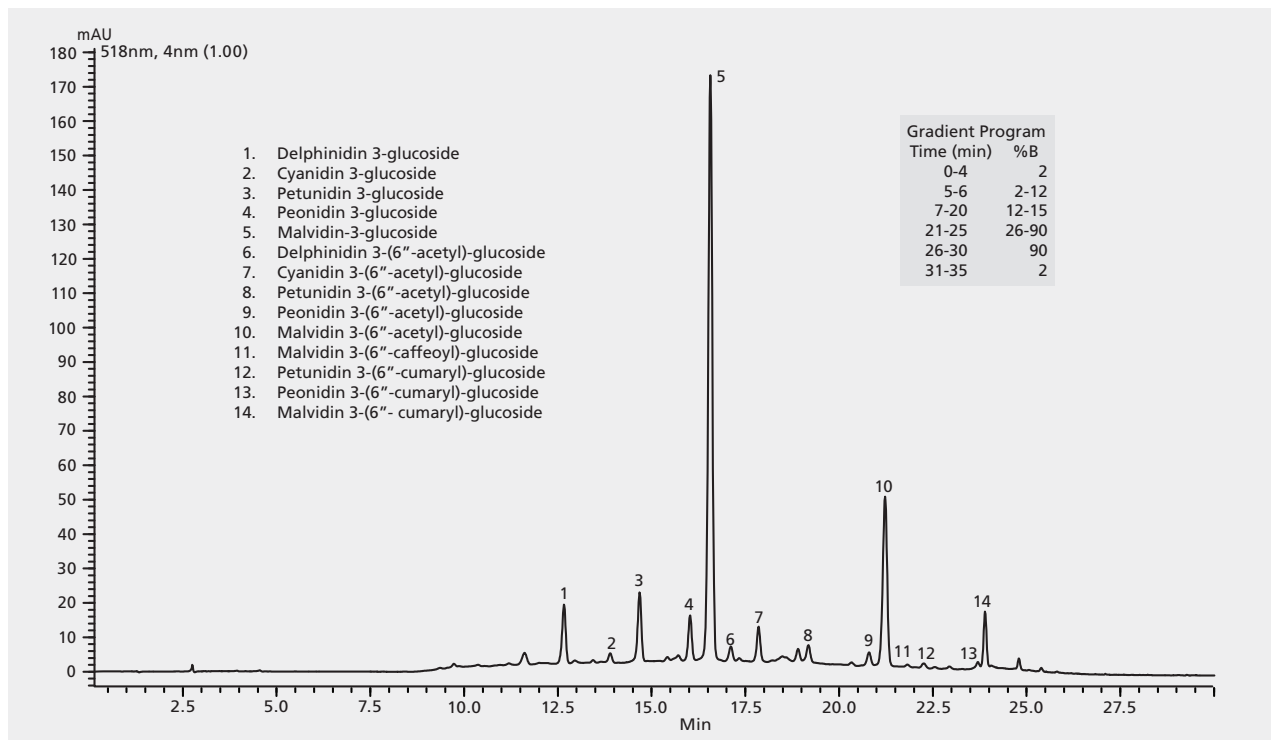
HPLC Applications

Flavonoids

HPLC Analysis of Anthocyanins in Red Wine on Ascentis® C18

▶ application for HPLC

column Ascentis C18, 25 cm × 4.6 mm I.D., 5 µm particles (581325-U)
 mobile phase A: waterformic acid (9:1), B: acetonitrile:waterformic acid (5:4:1)
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV, 518 nm
 injection 10 µL
 sample red wine diluted with water, centrifuged and passed through a 0.45 µm filter
 Application No. G003922



HPLC Applications

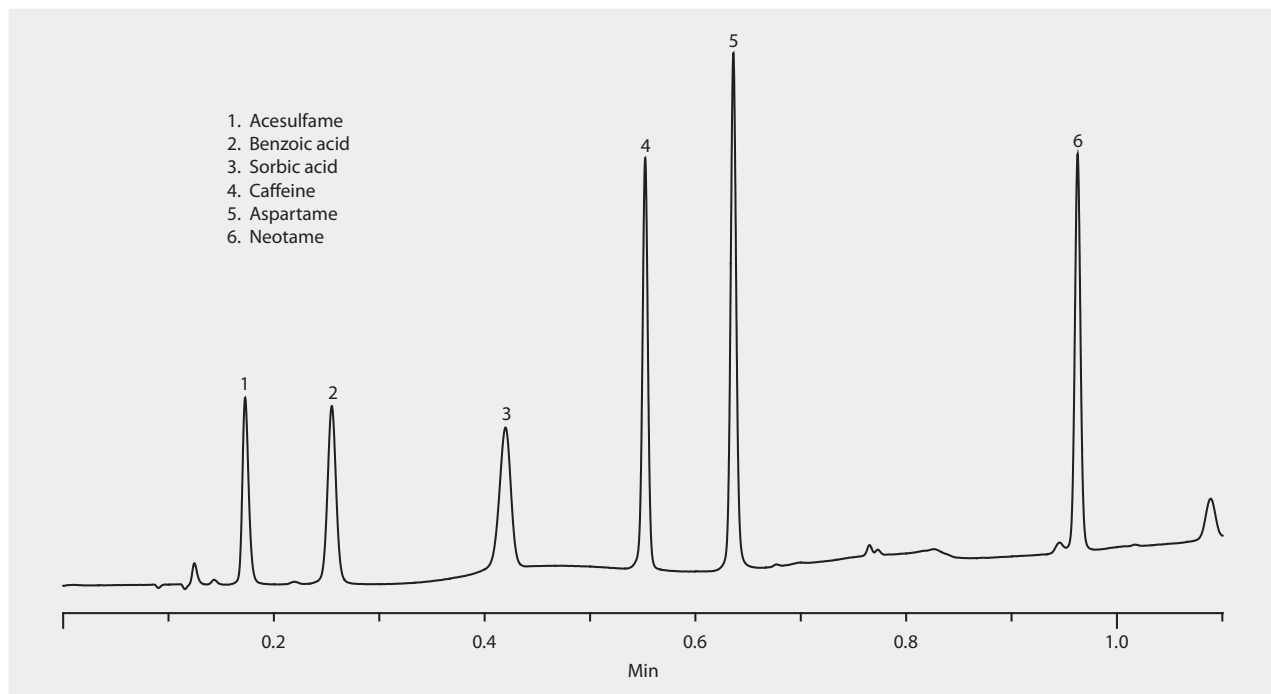
Flavonoids

HPLC Analysis of Diet soda additives on Ascentis® Express C18

▶ application for HPLC

This application demonstrates the suitability of Ascentis Express C18 for the efficient separation of common drink additives used in diet cola.

column Ascentis Express C18, 3 cm x 4.6 mm I.D., 2.7 µm (53818-U)
mobile phase 20% A constant; 75 to 20% B, 5 to 60% C in 1 min; held at 20% B, 60% C for 0.1 min
pressure 220 bar
flow rate 3 mL/min
column temp. 40 °C
detector UV, 214 nm
injection 1 µL
sample (Diet Soda 100 - 500 µg/mL in buffer)
Application No. G005392



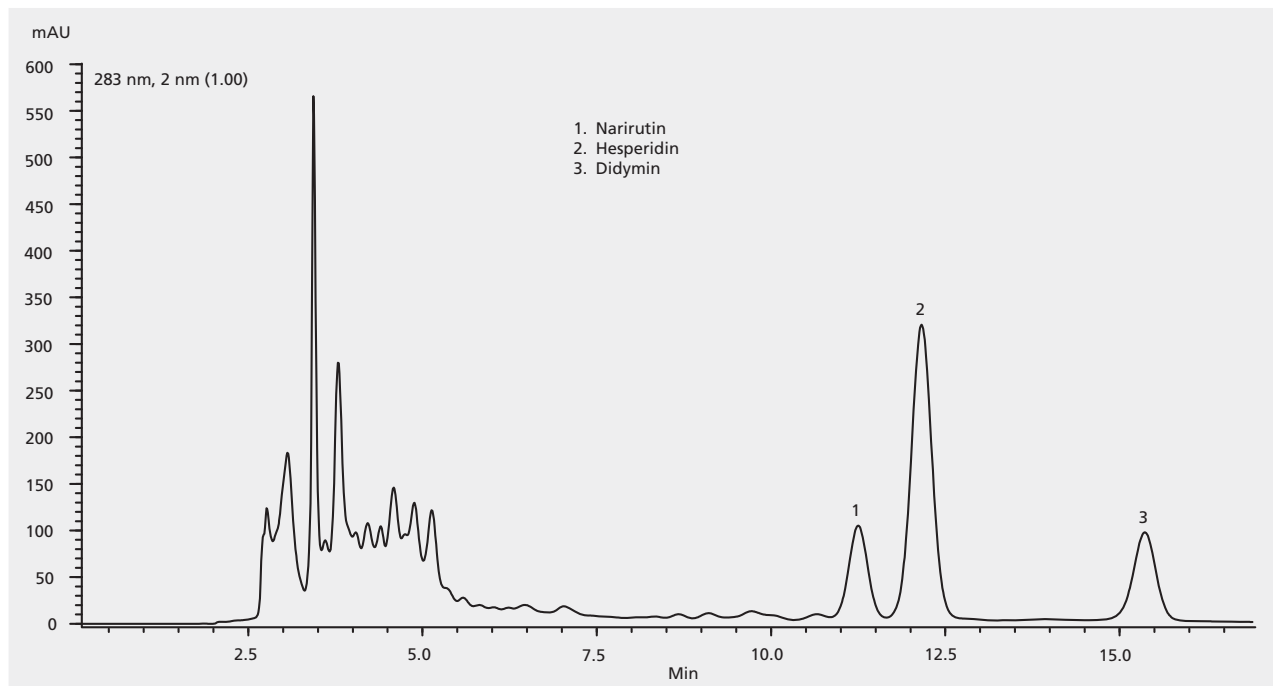
HPLC Applications

Flavonoids

HPLC Analysis of Flavonoids in Orange Juice on Ascentis® C18

▶ application for HPLC

column Ascentis C18, 25 cm x 4.6 mm I.D., 5 µm particles (581325-U)
mobile phase 0.1:10:12:78, formic acid:2-propanol:acetonitrile:water
flow rate 0.8 mL/min
column temp. 25 °C
detector PDA, 283 nm
injection 10 µL
sample orange juice, passed through a 0.45 µm filter
Application No. G003936



HPLC Applications

Flavonoids

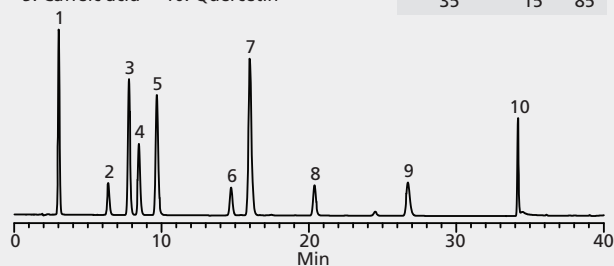
HPLC Analysis of Flavonoids on Ascentis® RP-Amide

► application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5µm particles (565324-U)
 mobile phase A: 0.085% orthophosphoric acid; B: acetonitrile
 flow rate 1.0 mL/min.
 column temp. 30 °C
 detector UV at 280 nm
 injection 10 µL
 sample as indicated in mobile phase A
 Application No. G003025

- | | |
|------------------|--------------------|
| 1. Gallic acid | 6. Rutin |
| 2. (+) catechin | 7. p-coumaric acid |
| 3. Syringic acid | 8. Quercitrin |
| 4. Vanillic acid | 9. Myricetin |
| 5. Caffeic acid | 10. Quercetin |

Gradient Program		
Time (min)	%A	%B
0	85	15
30	65	35
35	15	85



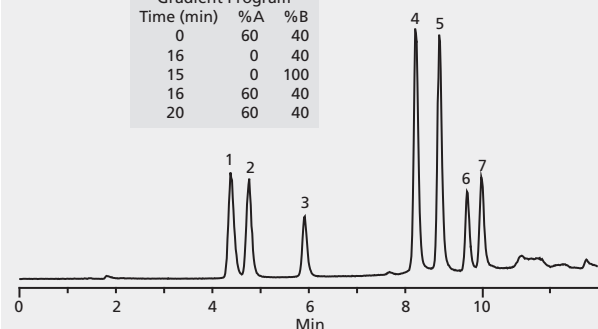
HPLC Analysis of Isoflavones on Ascentis® Phenyl

► application for HPLC

column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase A: 10 mM ammonium formate (pH 3.0 with concentrated formic acid), B: methanol
 flow rate 1 mL/min split to the MS
 column temp. 35 °C
 detector MS, ESI(+) in selected ion recording (SIR) mode
 injection 10 µL
 sample .. glycitein, genistein at 1 µg/mL, equol at 50 µg/mL and daidzin, glycitin, genistin at 10 µg/mL in 60:40 10 mM ammonium formate (pH 3.0 with concentrated formic acid);methanol
 Application No. G003868

- | | |
|-----------------------------|------------------------------|
| 1. Daidzin (M+H)+ = 417.11 | 5. Glycitein (M+H)+ = 285.06 |
| 2. Glycitin (M+H)+ = 447.12 | 6. Equol (M+H)+ = 243.09 |
| 3. Genistin (M+H)+ = 433.10 | 7. Genistein (M+H)+ = 271.05 |
| 4. Daidzein (M+H)+ = 255.05 | |

Gradient Program		
Time (min)	%A	%B
0	60	40
16	0	40
15	0	100
16	60	40
20	60	40



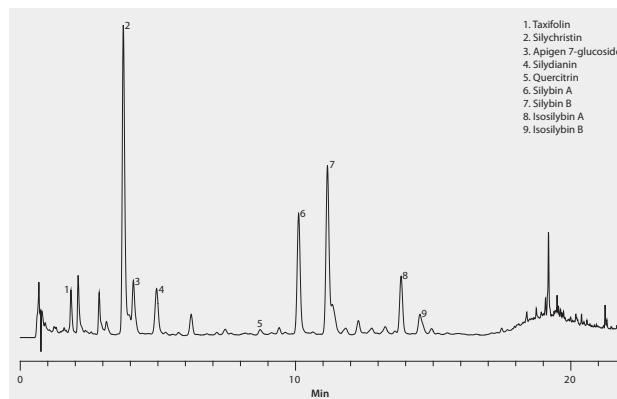
Natural Products

Analysis of Herbal Supplement Containing Milk Thistle on Ascentis® Express C18

► application for HPLC

This application demonstrates the suitability of Ascentis Express C18 for the efficient separation of milk thistle containing herbal supplement.

column Ascentis Express C18, 10 cm x 3.0 mm I.D., 2.7 µm (53814-U)
 mobile phase (A) water with 0.1% formic acid; (B) methanol
 gradient .. held at 35% B for 3 min; 35 to 45% B in 10 min; held at 45% B for 2 min; 45 to 100% B in 5 min
 flow rate 0.6 mL/min
 pressure 283 bar (4105 psi)
 column temp. 35 °C
 detector UV, 254 nm
 injection 20 µL
 sample .. 20 mg/mL in water:ethanol (5:95); sonicate 15 minutes; filter 0.45 µm; dilute to water:ethanol (80:20)
 Application No. G005604



1. Taxifolin
2. Silychristin
3. Apigenin 7-glucoside
4. Silydianin
5. Quercitrin
6. Silybin A
7. Silybin B
8. Isosilybin A
9. Isosilybin B

HPLC Applications

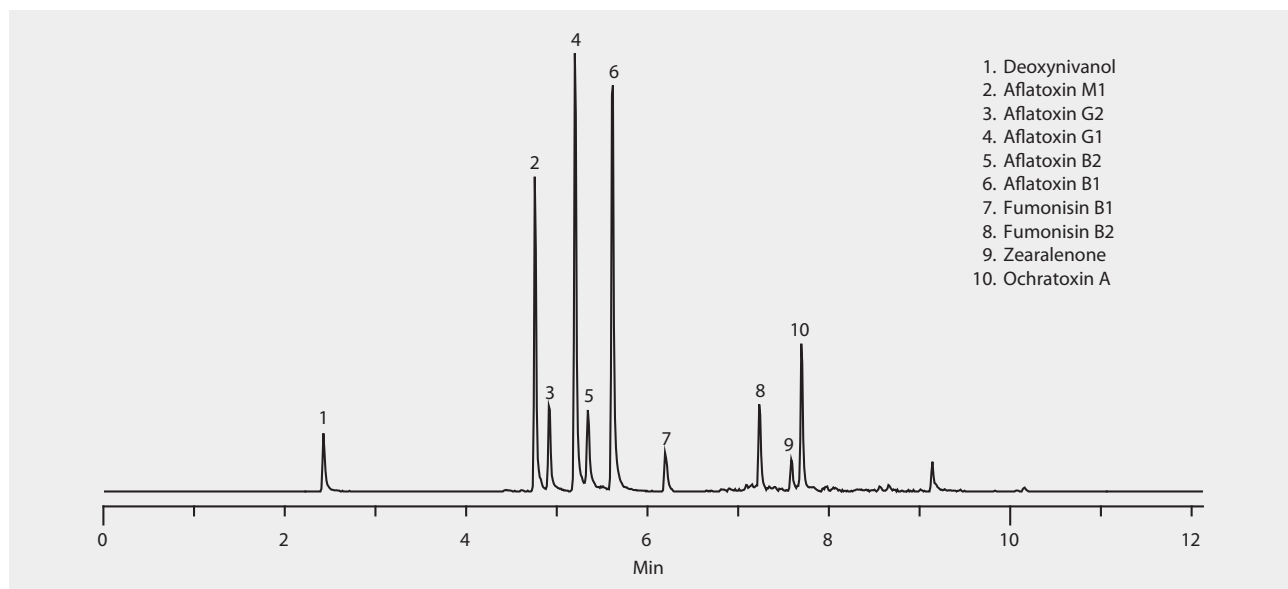
Natural Products

HPLC Analysis of Aflatoxins on Ascentis® Express C18

► application for HPLC

This application demonstrates the suitability of Ascentis Express C18 for the efficient separation of various toxins.

column Ascentis Express C18, 10 cm x 2.1 mm I.D., 2.7 µm (53823-U)
mobile phase A: 5 mM ammonium formate, pH 2.5 (titrated with formic acid) B: methanol
gradient 5 to 100% B in 10 min
flow rate 0.4 mL/min
pressure 325 bar
column temp. 35 °C
detector APCI (+)
injection 5 µL
sample 0.15 - 30 mg/L in 90:10, water:acetonitrile
Application No. G005441



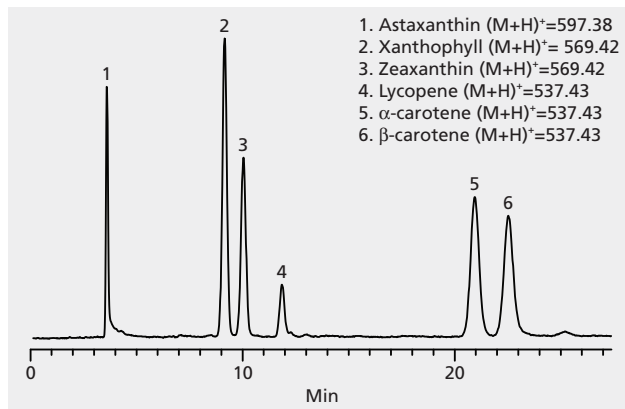
HPLC Applications

Natural Products

HPLC Analysis of Carotene Compounds on Ascentis® RP-Amide

▶ application for HPLC

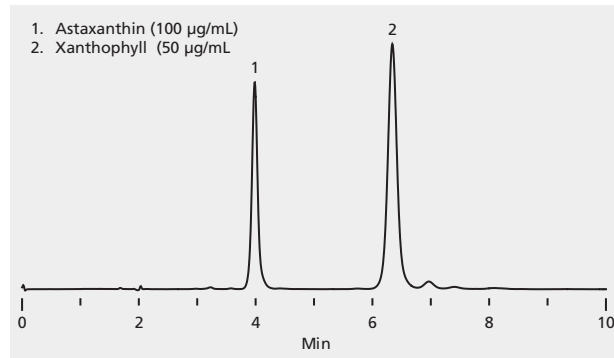
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 100% acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector MS, ESI(+) in selective ion monitoring (SIR) mode
 injection 5 µL
 sample 10 µg/mL each in 100% acetonitrile
 Application No. G003138



HPLC Analysis of Carotenoids, Using Normal Phase Chromatography on Ascentis® Silica

▶ application for HPLC

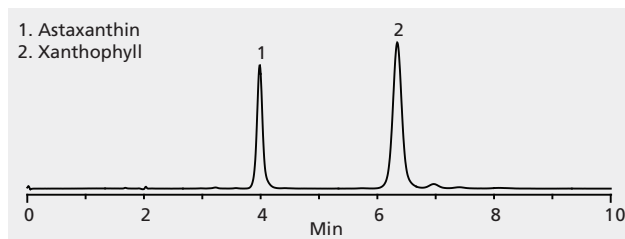
column Ascentis Si, 15 cm x 4.6 mm I.D., 5 µm particles (581512-U)
 mobile phase 85:10:5, hexane:ethyl acetate:isopropanol
 flow rate 1.0 mL/min
 column temp. 30 °C
 detector UV at 450 nm
 injection 10 µL
 sample as indicated in hexane
 Application No. G003813



HPLC Analysis of Carotenoids on Ascentis® Si

▶ application for HPLC

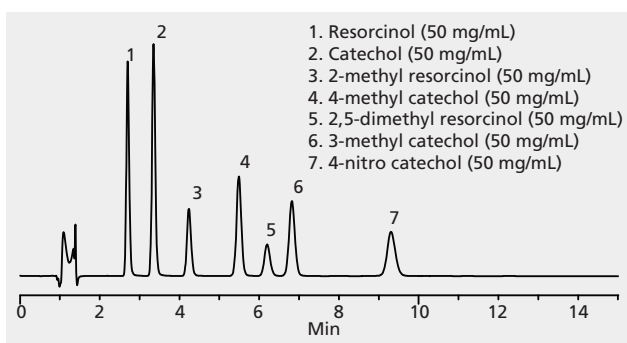
column Ascentis Si, 15 cm x 4.6 mm I.D., 5 µm particles (581512-U)
 mobile phase 85:10:5, hexane:ethylacetate:isopropanol
 flow rate 1.0 mL/min.
 column temp. 30 °C
 detector UV at 450 nm
 injection 10 µL
 sample as indicated in hexane
 Application No. G003726



HPLC Analysis of Catechols and Resorcinols on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 75:25, 20 mM phosphoric acid (pH 2.0 unadjusted):acetonitrile
 flow rate 1.5 mL/min.
 column temp. 30 °C
 detector UV, 270 nm
 injection 25 µL
 sample as indicated in 20 mM phosphoric acid (pH 2.0)
 Application No. G002597



HPLC Applications

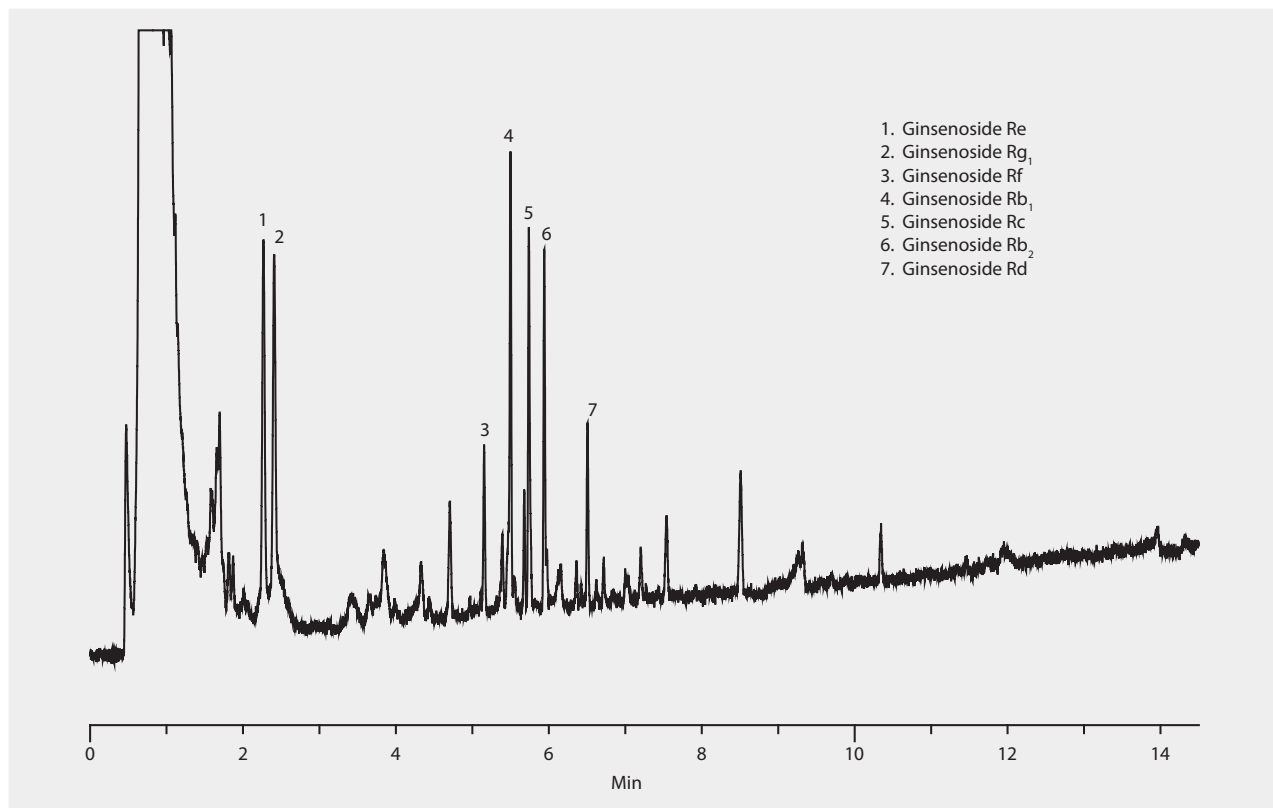
Natural Products

HPLC Analysis of Chinese Ginseng Extract on Ascentis® Express C18

► application for HPLC

This application demonstrates the suitability of Ascentis Express C18 for the efficient separation of Chinese ginseng root extract.

column Ascentis Express C18, 15 cm x 4.6 mm I.D., 2.7 µm (53829-U)
 mobile phase A: water B: acetonitrile
 gradient held at 25% B for 1.5 min; 25 to 85% B in 12 min; held at 85% for 1 min
 flow rate 1 mL/min
 pressure 240 bar
 column temp. 60 °C
 detector UV at 205 nm
 injection 25 µL
 sample Extracted from dried, ground plant material; 10 mg/mL in water:acetonitrile (85:15); sorbate 10 min at ambient
 Application No. G005396



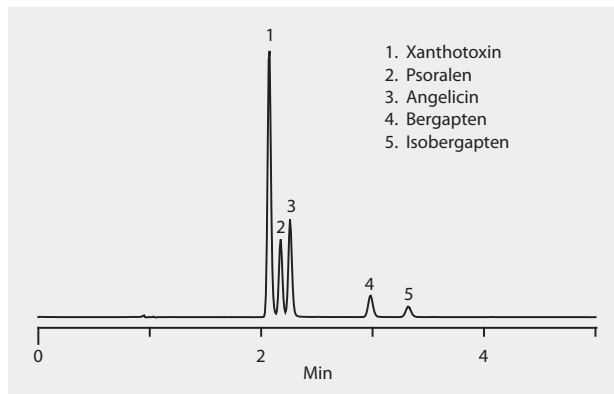
HPLC Applications

Natural Products

HPLC Analysis of Furocoumarins on Ascentis® Express RP-Amide

▶ application for HPLC

column Ascentis Express RP-Amide, 10 cm x 4.6 mm I.D., 2.7 µm (53929-U)
 mobile phase (A) water; (B) methanol; (40:60, A:B)
 flow rate 1.0 mL/min
 pressure 196 bar
 column temp. 35 °C
 detector UV at 254 nm
 injection 5 µL
 sample 25 µg/mL in water:methanol (90:10)
 Application No. G005394

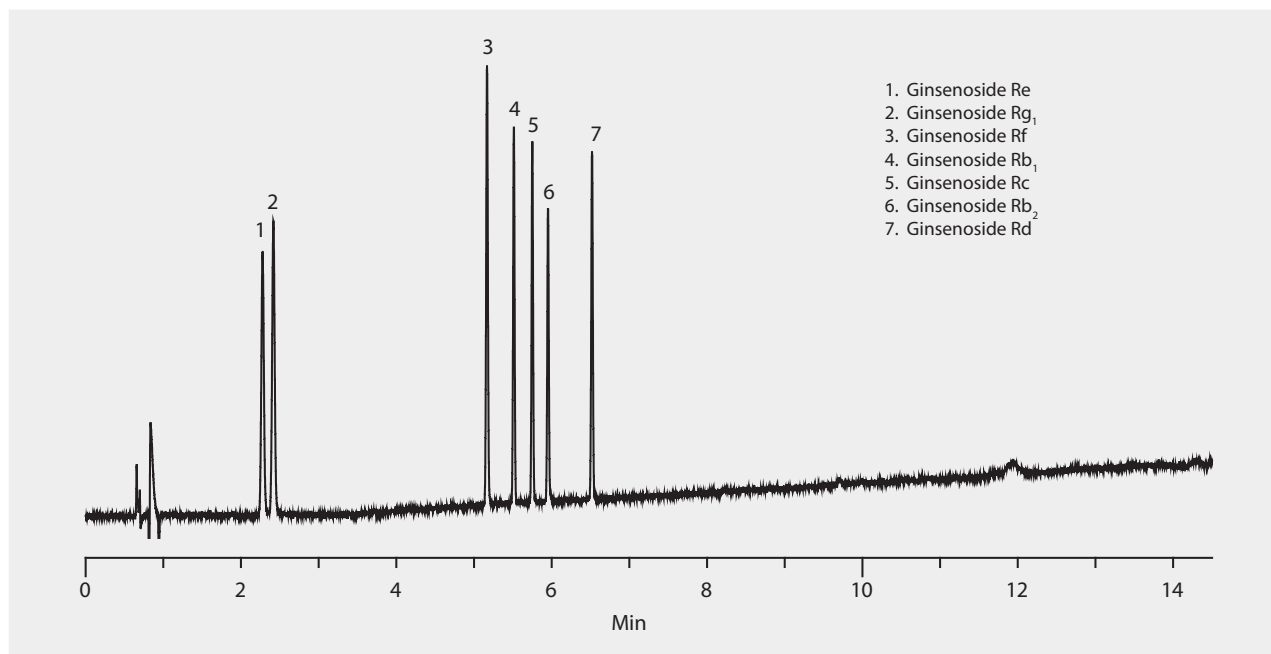


HPLC Analysis of Ginsenoside Standards on Ascentis® Express C18

▶ application for HPLC

This application demonstrates the suitability of Ascentis Express C18 for the efficient separation of ginseng.

column Ascentis Express C18, 15 cm x 4.6 mm I.D., 2.7 µm (53829-U)
 mobile phase A: water B: acetonitrile
 gradient held at 25% for 1.5 min; 25 to 85% B in 12 min; held at 85% B for 1 min
 flow rate 1.0 mL/min
 pressure 240 bar
 column temp. 60 °C
 detector UV, 205 nm
 injection 25 µL
 sample 50 µg/mL in water:methanol (82:18)
 Application No. G005397



HPLC Applications

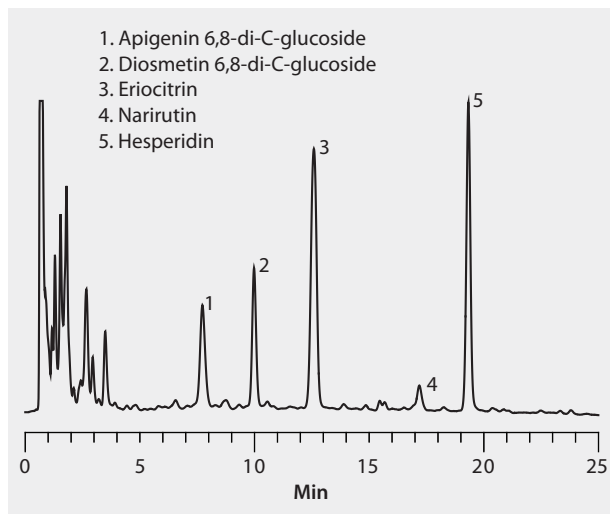
Natural Products

HPLC Analysis of Lime Juice on Ascentis® Express C18

► application for HPLC

Flavonoids are polyphenolic compounds ubiquitous in nature and classified, according to their chemical structure, into flavanols, flavones, flavanones, isoflavones, catechins, anthocyanidins and chalcones. They are widely present in fruits, vegetables, leaves, nuts, seeds, bark and beverages (tea, coffee, beer, wine and fruit drinks).

sample/matrix lime juice hand-squeezed in laboratory, centrifuged and filtered through a 0.45 µm nylon filter disc (Acrodisc)
 compound class: flavors/fragrances
 column Ascentis Express C18, 5 cm x 4.6 mm I.D., 2.7 µm (53826-U)
 mobile phase (A) water/formic acid (99:90:1);
 (B) water/acetonitrile/isopropanol/formic acid (39:9:20:40:1)
 gradient 10% B for 3 min; 10 to 34% B in 30 min; 34 to 100% B in 1 min;
 held at 100% B for 6 min; 100 to 10% B in 1 min
 flow rate 0.8 mL/min
 column temp. ambient
 detector PDA: 190–370 nm; chromatogram extracted at 283 nm
 detector ESI-MS: mass spectral range, 250–700 m/z; interval, 0.5 s; scan speed, 938 amu/s;
 nebulizing gas (N₂) flow, 1.5 L/min; (interface temperature, 350 °C; heat block, 300 °C;
 desolvation line (DL) temperature, 300 °C; DL voltage, 34 V; probe voltage, +4.5 kV; Qarray
 voltage, 1.0 V; RF voltage, 90 V; detection gain, 1.05 kV)
 injection 2 µL
 Application No. G005593

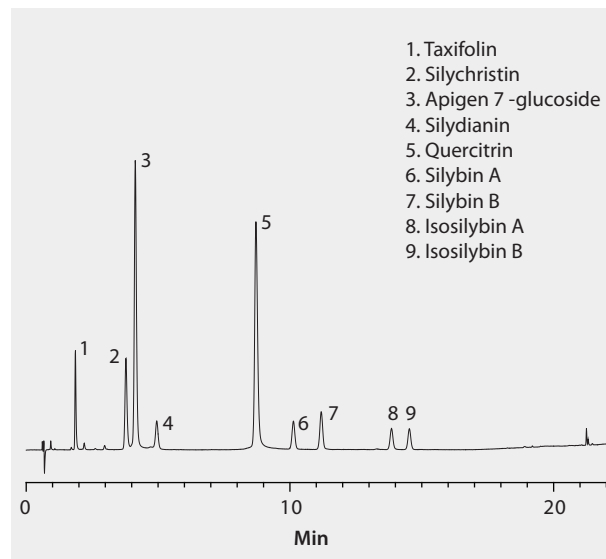


HPLC Analysis of Milk Thistle Standards on Ascentis® Express C18

► application for HPLC

This application demonstrates the suitability of Ascentis Express C18 for the efficient separation of milk thistle related compounds.

column Ascentis Express C18, 10 cm x 3 mm I.D., 2.7 µm (53814-U)
 mobile phase A: water with 0.1% formic acid B: methanol
 gradient held at 35% B for 3 min; 35 to 45% B in 10 min;
 held at 45% B for 2 min; 45 to 100% B in 5 min
 flow rate 0.6 mL/min
 pressure 283 bar
 column temp. 35 °C
 detector UV at 254 nm
 injection 20 µL
 sample 20 µg/mL in 80:20, water:methanol
 Application No. G005445

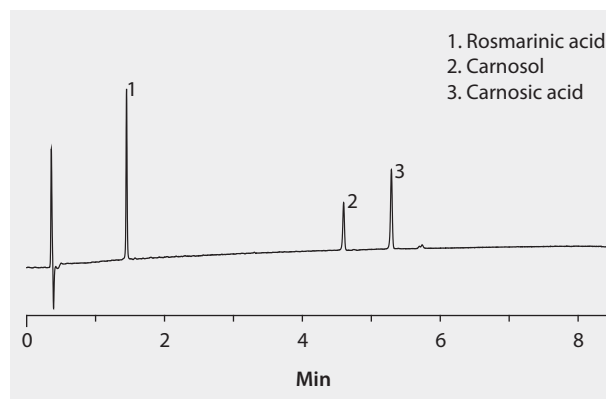


HPLC Analysis of Phenolics from Rosemary on Ascentis® Express C8

► application for HPLC

This application demonstrates the suitability of Ascentis Express C8 for the efficient separation of phenolics from rosemary.

column Ascentis Express C8, 5 cm x 3 mm I.D., 2.7 µm (53848-U)
 compound class: phenols
 mobile phase (A) 0.1% formic acid in water; (B) 0.1% formic acid in acetonitrile
 gradient 15 to 100% B in 8.5 min
 flow rate 0.6 mL/min
 column temp. 35 °C
 detector UV, 214 nm
 injection 2 µL
 sample 100 mg/L in 75 µM EDTA, 1.5 mM ascorbate, 15% acetonitrile
 Application No. G005717



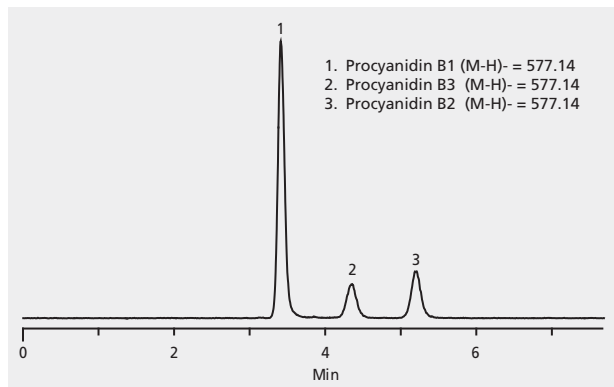
HPLC Applications

Natural Products

HPLC Analysis of Procyanidins on Ascentis® Phenyl

▶ application for HPLC

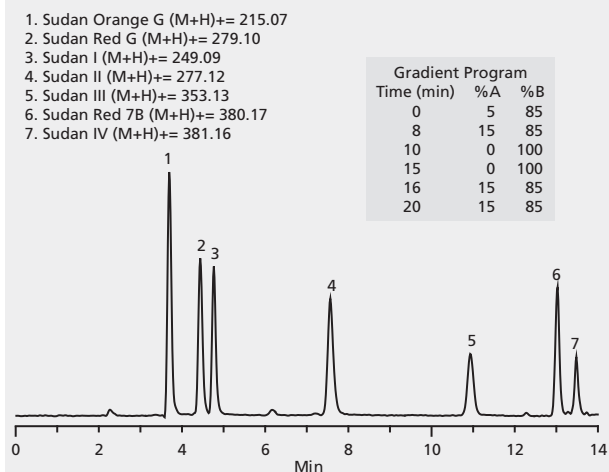
column Ascentis Phenyl, 15 cm × 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 85:15, 10 mM ammonium formate, (pH 3.0 with concentrated formic acid):
 acetonitrile
 flow rate 1.0 mL/min split to the MS
 column temp. 35 °C
 detector MS, ESI (-) in Single Ion Recording (SIR) Mode
 injection 10 µL
 sample .. 10 mg/mL in 85:15, 10 mM ammonium formate, (pH 3.0 with concentrated formic acid):
 acetonitrile
 Application No. G003879



HPLC Analysis of Sudan Red Dyes Ascentis® RP-Amide

▶ application for HPLC

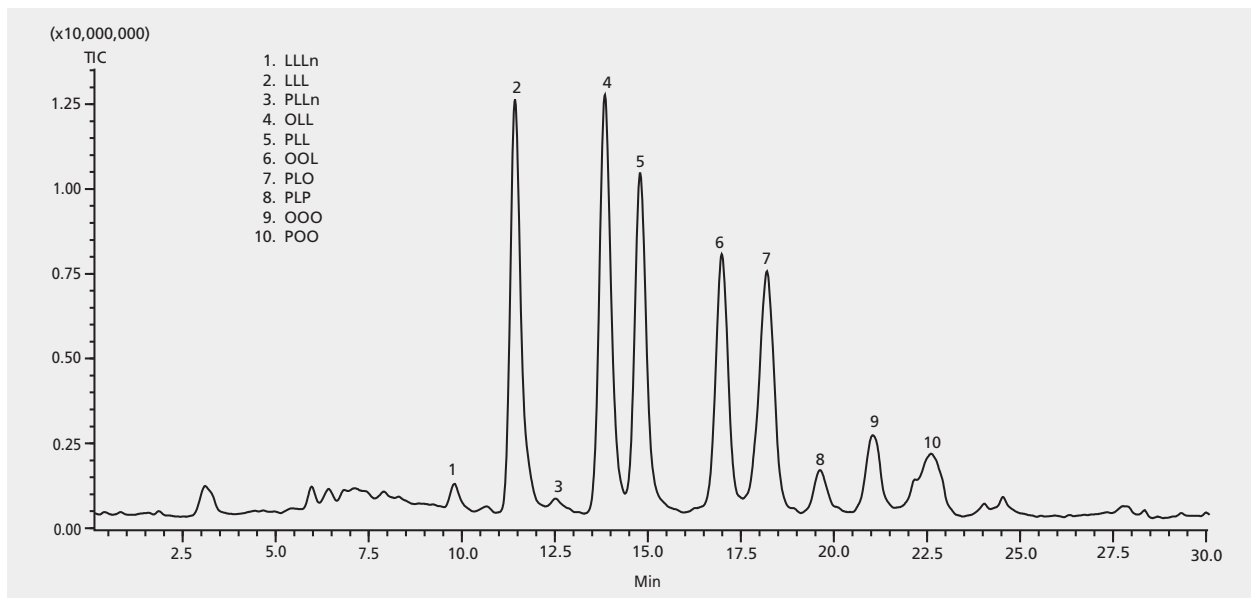
column Ascentis RP-Amide, 15 cm × 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 15:85, 0.1% formic acid in water (pH unadjusted):acetonitrile
 flow rate 1 mL/min, split to the MS
 column temp. 35 °C
 detector MS, APCI (+) in selected ion recording (SIR) mode
 injection 15 µL
 sample 1 µg/mL in 30:70, 0.1% formic acid in water (pH unadjusted):acetonitrile
 Application No. G003860



HPLC Analysis of Triglycerides in Corn Oil on Ascentis® C18

▶ application for HPLC

column two Ascentis C18, 15 cm × 2.1 mm I.D., 3 µm particles size connected in series (581302-U)
 mobile phase 60:40, 2-propanol:acetonitrile
 flow rate 0.2 mL/min
 column temp. 25 °C
 detector APCI/MS positive ion mode
 injection 2 µL
 sample corn oil weighed and diluted in acetone (10 mg in 1 mL w/v)
 Application No. G003921



HPLC Applications

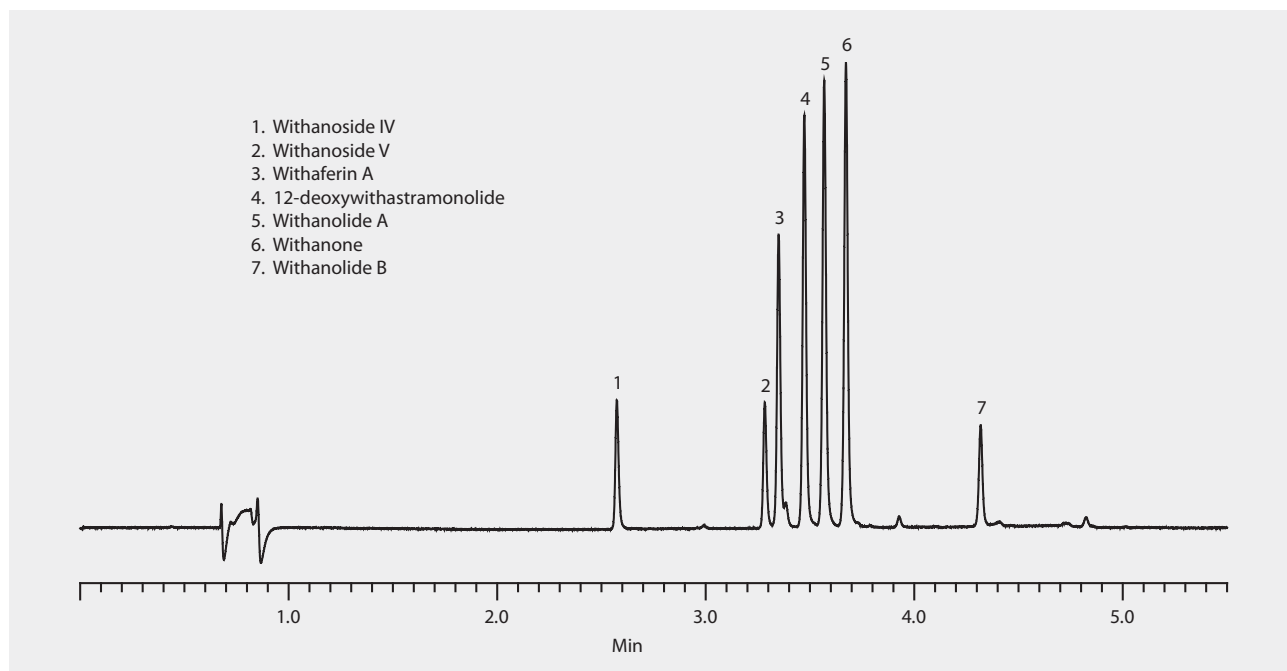
Natural Products

HPLC Analysis of Withania (Aswagandha) Standard on Ascentis® Express F5

► application for HPLC

This application demonstrates the suitability of Ascentis Express F5 for the efficient separation of withania standards.

column Ascentis Express F5, 10 cm x 2.1 mm I.D., 2.7 µm (53569-U)
 mobile phase A: water B: acetonitrile
 gradient 20 to 100% B in 10 min; held at 100% B for 0.5 min
 flow rate 0.3 mL/min
 pressure 190 bar
 column temp. 35 °C
 detector UV at 227 nm
 injection 5 µL
 sample 20 µg/mL in 80:20, water:methanol
 Application No. G005447

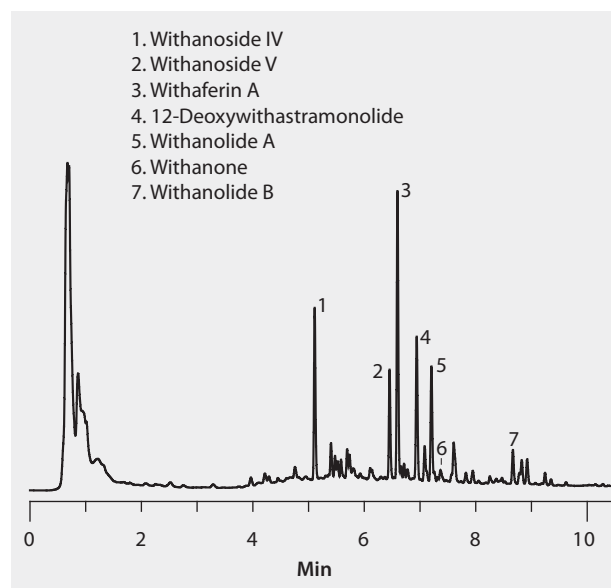


HPLC Analysis of Withania Extract on Ascentis® Express Phenyl-Hexyl

► application for HPLC

This application demonstrates the suitability of Ascentis Express Phenyl-Hexyl for the efficient separation of withania extract.

column Ascentis Express Phenyl-Hexyl, 10 cm x 2.1 mm I.D., 2.7 µm (53336-U)
 mobile phase (A) water; (B) acetonitrile
 gradient 20 to 100% B in 10 min; held at 100% B for 0.5 min
 flow rate 0.3 mL/min
 pressure 160 bar (2320 psi)
 column temp. 35 °C
 detector UV, 227 nm
 injection 5 µL
 sample 20 mg/mL in water:acetonitrile (50:50); sonicate 15 minutes; filter 0.45 µm;
 dilute to water:acetonitrile (80:20)
 Application No. G005610



HPLC Applications

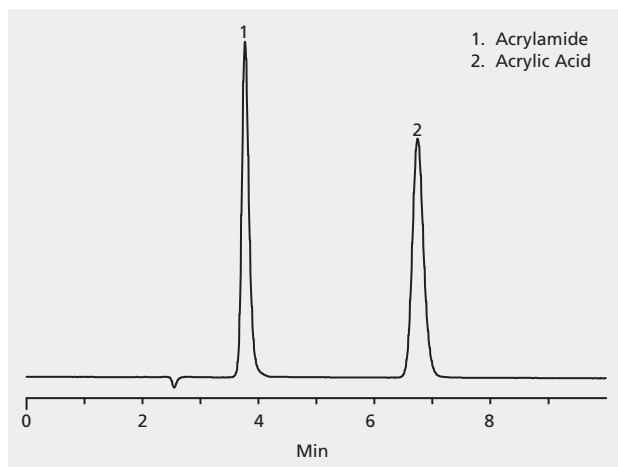
Organic Acids

Organic Acids

HPLC Analysis of Acrylamide and Acrylic Acid on Discovery® HS F5

▶ application for HPLC

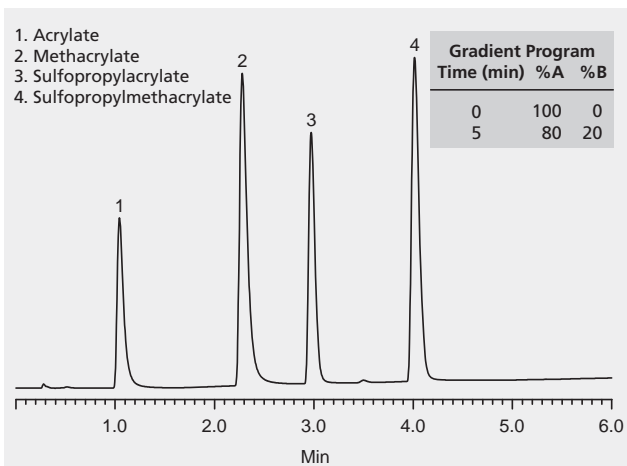
column Discovery HS F5, 15 cm x 4.6 mm ID, 5 µm particles (567516-U)
 mobile phase 0.05% formic acid
 flow rate 1.0 mL/min
 column temp. ambient
 detector UV, 206 nm
 injection 1 µL
 sample 1.0 mg/mL each in mobile phase
 Application No. G002569



HPLC Analysis of Acrylic Acid Derivatives on Discovery® Zr-Carbon

▶ application for HPLC

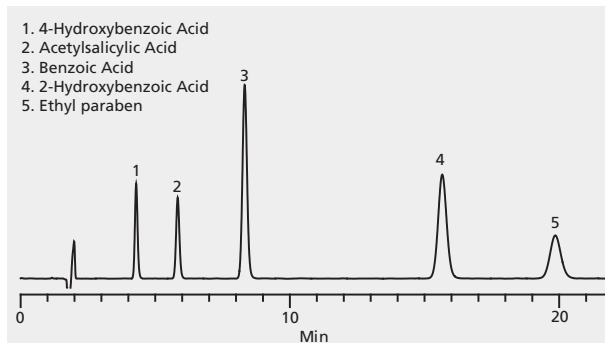
column Discovery Zr-Carbon, 7.5 cm x 2.1 mm ID, 3 µm particles (65726-U)
 mobile phase A: 30 mM H₃PO₄, pH 1.9; B: CH₃CN
 flow rate 0.42 mL/min
 column temp. 50 °C
 detector UV at 210 nm (200 nm will enhance sensitivity ~2x)
 injection 1 µL
 sample acrylate @ 0.05 g/L, methacrylate @ 0.05 g/L, sulfopropylacrylate @ 0.02 g/L,
 sulfopropylmethacrylate @ 0.02 g/L in 30 mM H₃PO₄, pH 1.9
 Application No. G002143



HPLC Analysis of Benzoic Acid and Related Compounds on Ascentis® RP-Amide

▶ application for HPLC

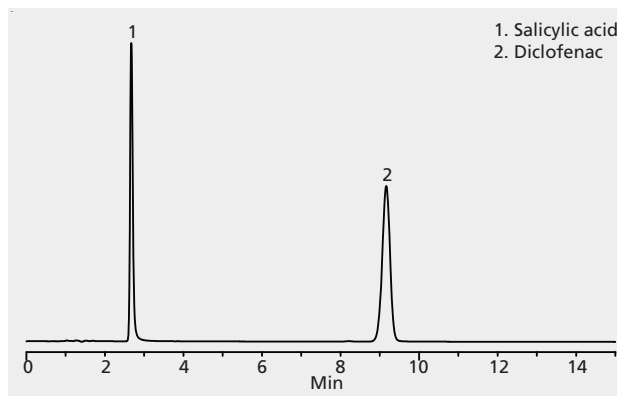
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 70:30, water with 0.1% TFA:acetonitrile
 flow rate 1 mL/min
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 Application No. G004094



HPLC Analysis of Diclofenac and Salicylic Acid on Ascentis® C18

▶ application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 50:50, 20 mM phosphoric acid (pH 2.0 unadjusted):acetonitrile
 flow rate 1 mL/min
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002424



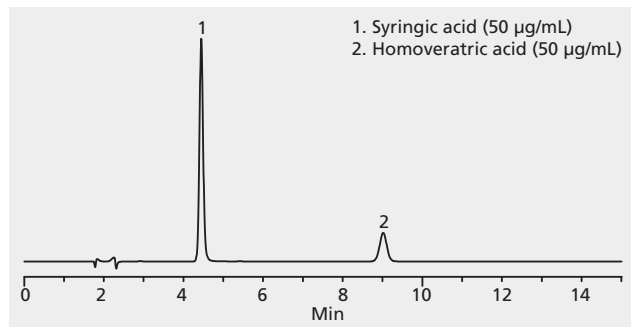
HPLC Applications

Organic Acids

HPLC Analysis of Organic Acids on Ascentis® C8

► application for HPLC

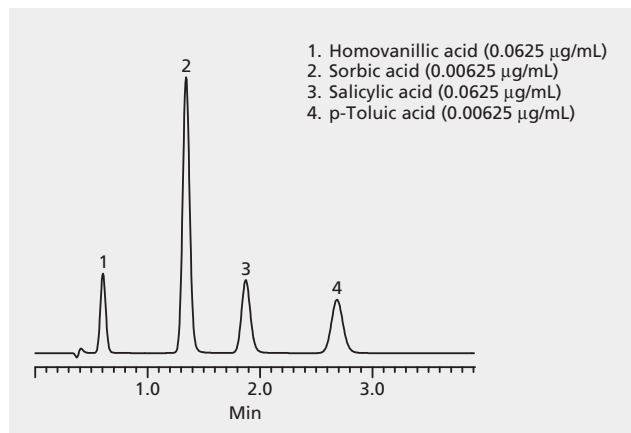
column Ascentis C8, 15 cm x 4.6 mm I.D., 5 µm particles (581424-U)
 mobile phase .. 80:20, 10 mM ammonium phosphate monobasic (pH 2.50 with phosphoric acid); acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample as indicated in mobile phase
 Application No. G003160



HPLC Analysis of Organic Acids on Discovery® C18

► application for HPLC

column Discovery C18, 5 cm x 4.6 mm I.D., 5 µm particles (504947)
 mobile phase 60:40, 0.1% TFA in Water:MeOH
 flow rate 2.0 mL/min
 column temp. 20 °C
 detector UV, 254 nm
 injection 10 µL
 Application No. G001431

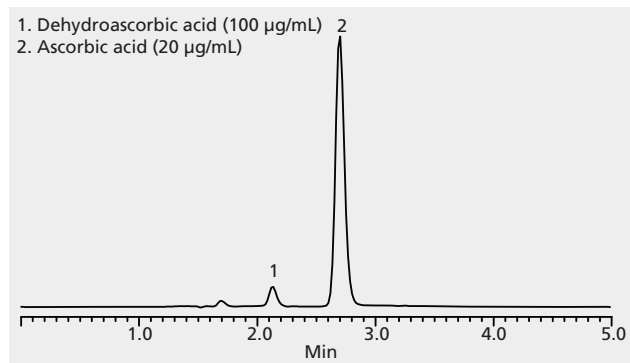


Organics

HPLC Analysis of Ascorbic Acid on Ascentis® RP-Amide

► application for HPLC

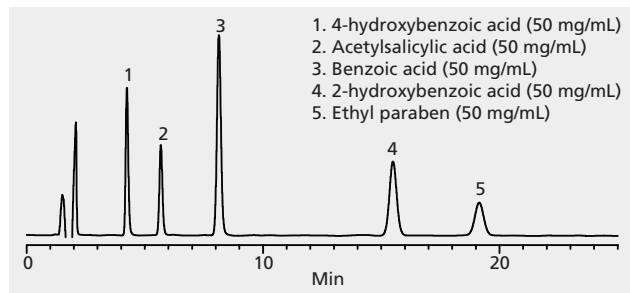
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 25 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid)
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 230 nm
 injection 10 µL
 sample as indicated each in mobile phase
 Application No. G002722



HPLC Analysis of Benzoic Acid Derivatives on Ascentis® RP-Amide

► application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 70:30, 0.1% TFA in water:0.1% TFA in acetonitrile
 flow rate 1.0 mL/min.
 column temp. 30 °C
 detector UV, 220 nm
 injection 10 µL
 sample as indicated in 0.1% TFA in water
 Application No. G002627



HPLC Applications

Organics

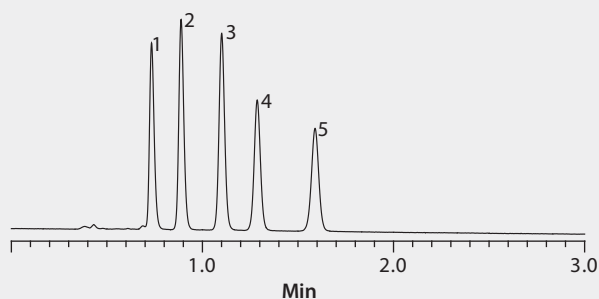
HPLC Analysis of Furans on Ascentis® Express Phenyl-Hexyl

▶ application for HPLC

This application demonstrates the suitability of Ascentis Express Hexyl-Phenyl for the efficient separation of furans as listed in ASTM method D5837-99.

column Ascentis Express Phenyl-Hexyl, 5 cm x 3.0 mm I.D., 2.7 µm (53342-U)
 mobile phase (A) water; (B) acetonitrile; (80:20, A:B)
 flow rate 0.4 mL/min
 column temp. 35 °C
 detector UV, 230 nm
 injection 1 µL
 sample 20 µg/mL in 80:20, water: acetonitrile
 Application No. G005704

1. 5-Hydroxymethyl-2-furaldehyde
2. Furfuryl alcohol
3. 2-Furaldehyde
4. 2-Acetylfuran
5. 5-Methyl-2-furaldehyde

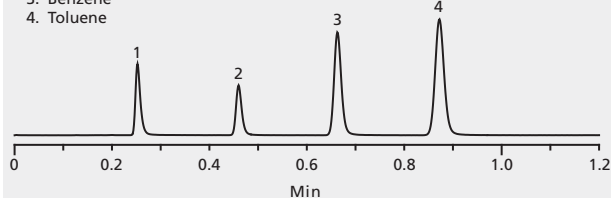


HPLC Analysis of Polar and Non-Polar Analytes on Ascentis® Express C8, Column Test Mixture

▶ application for HPLC

column Ascentis Express C8, 5 cm x 4.6 mm I.D., 2.7 µm particles (58336-U)
 mobile phase 45:55, water:acetonitrile
 flow rate 1.76 mL/min
 column temp. 30 °C
 detector UV, 254 nm
 injection 5 µL
 Application No. G003954

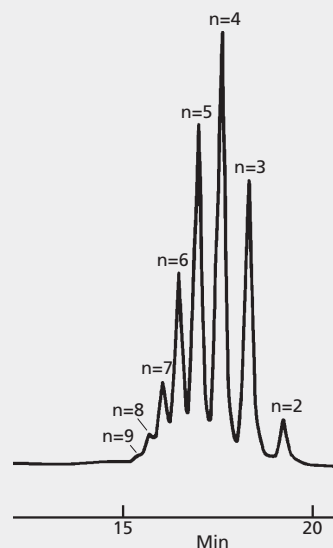
1. Uracil
2. Acetophenone
3. Benzene
4. Toluene



HPLC Analysis of Polyethylene Glycol 200 on TSKgel® G-OLIGO-PW

▶ application for HPLC

column TSKgel G-OLIGO-PW, 30 cm x 7.8 mm I.D., 6 µm particles (808031)
 mobile phase distilled water
 flow rate 1 mL/min
 detector RI
 Application No. 713-0778

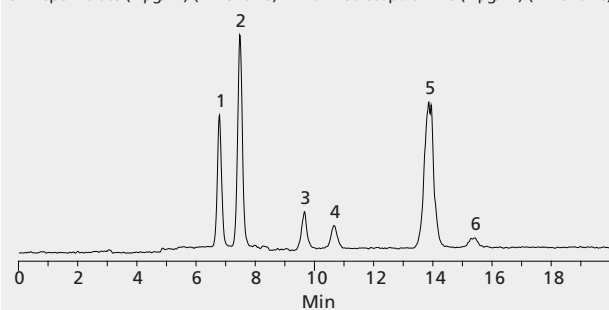


HPLC Analysis of Quarternary Ammonium Compounds on Ascentis® Si

▶ application for HPLC

column Ascentis Si, 15 cm x 4.6 mm I.D., 5 µm particles (581512-U)
 mobile phase 10:90, 0.1% ammonium acetate in water (pH unadjusted):0.1% ammonium acetate in acetonitrile
 flow rate 1 mL/min. split to the MS
 column temp. 35 °C
 detector MS, ESI (+) in selected ion recording (SIR) mode
 injection 5 µL
 sample as indicated in 0.1% ammonium acetate in 10:90:water:acetonitrile
 Application No. G003724

1. Propratheline (1 µg/ml) (M = 368.22)
2. Oxyphenonium (1 µg/ml) (M = 348.25)
3. Mepenzolate (1 µg/ml) (M = 340.19)
4. Scopolamine (10 µg/ml) (M+H)+ = 304.14
5. Ipratropium (1 µg/ml) (M = 332.22)
6. Methscopolamine (1 µg/ml) (M = 318.16)



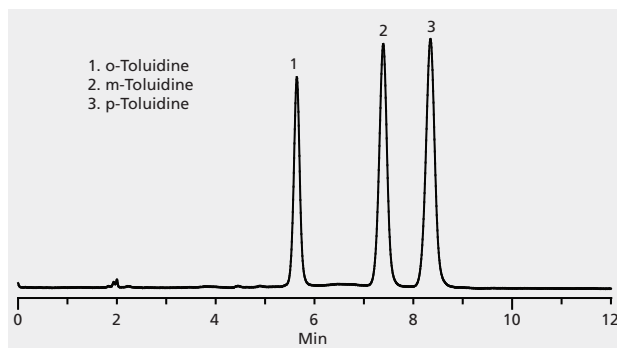
HPLC Applications

Organics

HPLC Analysis of Toluidine Isomers on Ascentis® Si

▶ application for HPLC

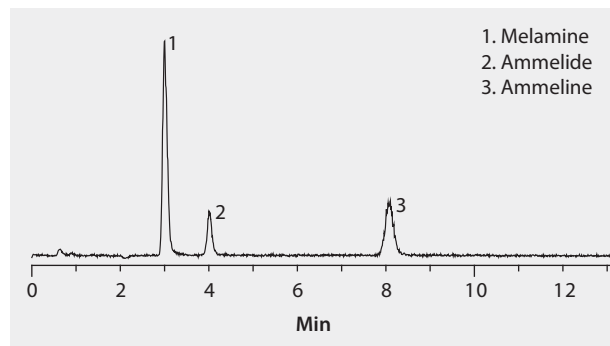
column Ascentis Si, 15 cm x 4.6 mm I.D., 5 µm particles (581512-U)
 mobile phase 96:4, hexane:2-propanol
 flow rate 1.0 mL/min
 column temp. 35 °C
 detector UV at 245 nm
 injection 10 µL
 sample 50 µg/mL in mobile phase
 Application No. G003799



LC-MS Analysis of Melamine and Hydrolysis Products on Ascentis® Express HILIC

▶ application for HPLC

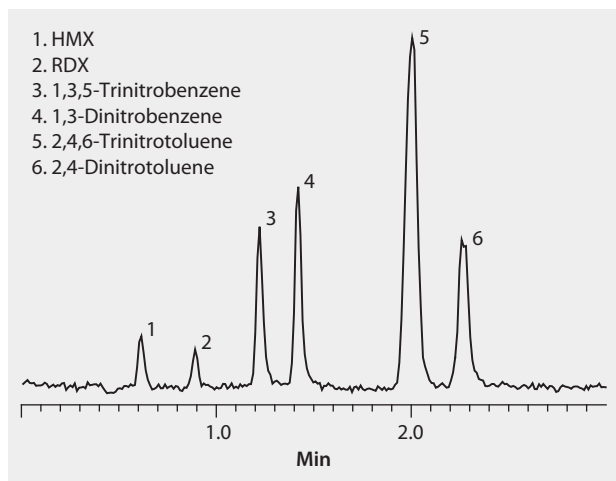
column Ascentis Express HILIC, 5 cm x 2.1 mm I.D., 2.7 µm (53934-U)
 mobile phase 5 mM ammonium formate in 95:5 (v/v) acetonitrile:water
 flow rate 0.2 mL/min
 column temp. 35 °C
 detector MS, ESI(+), full scan
 injection 2 µL
 sample 1 mg/L in mobile phase
 Application No. G005708



LC-MS Analysis of Explosives on Ascentis® Express C18

▶ application for HPLC

column Ascentis Express C18, 10 cm x 3.0 mm I.D., 2.7 µm (53814-U)
 mobile phase (A) methanol; (B) water; (50:50, A:B)
 flow rate 0.9 mL/min
 column temp. 50 °C
 detector MS: APCI(-)
 injection 5 µL
 sample 100 ng/mL in 50:50, methanol:water
 Application No. G005608



HPLC Applications

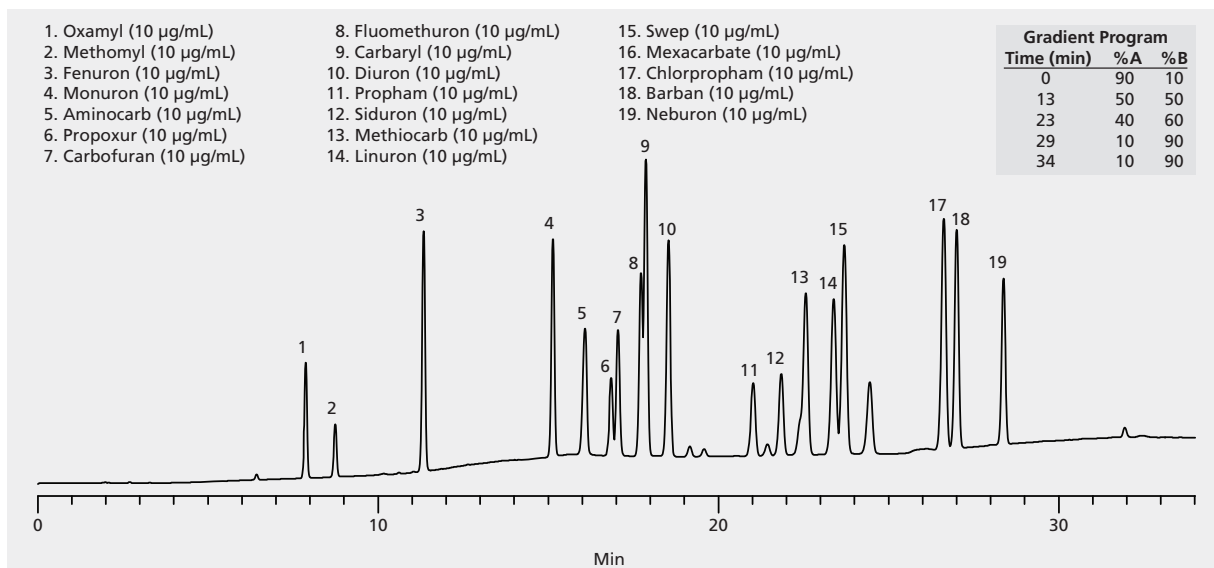
Pesticides and Herbicides

Pesticides and Herbicides

EPA Method 632: HPLC Analysis of Pesticides on Ascentis® C18

▶ application for HPLC

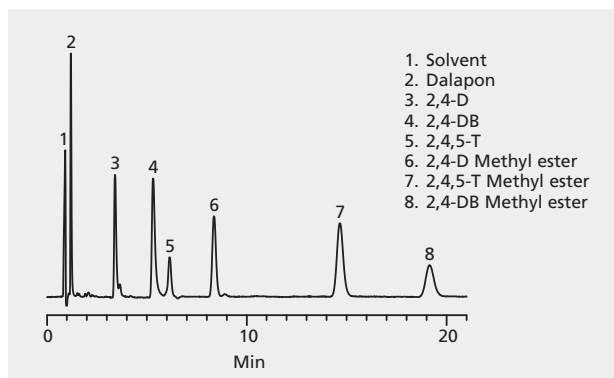
column Ascentis C18, 25 cm x 4.6 mm I.D., 5 µm particles (581325-U)
 mobile phase A: water; B: acetonitrile
 flow rate 1.0 mL/min.
 column temp. 30 °C
 detector UV at 210 nm
 injection 10 µL
 sample as indicated in 16% acetonitrile in water
 Application No. G003194



HPLC Analysis of Organo-acid Pesticides on Discovery® C18

▶ application for HPLC

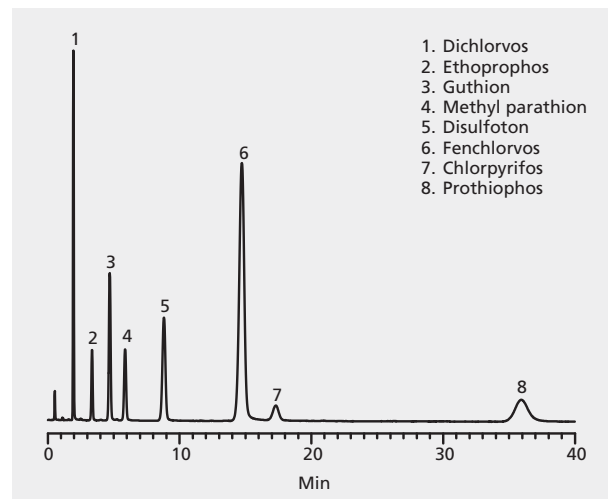
column Discovery C18, 15 cm x 4.6 mm I.D., 5 µm particles (504955)
 mobile phase 60:40, 25 mM potassium phosphate, (pH 2.3):CH₃CN
 flow rate 2 mL/min
 column temp. 20 °C
 detector UV, 214 nm
 injection 1 µL
 Application No. G001042



HPLC Analysis of Organophosphorus Pesticides on Discovery® Cyano

▶ application for HPLC

column Discovery Cyano, 15 cm x 4.6 mm I.D., 5 µm particles (59356-U)
 mobile phase 75:25 water:CH₃CN
 flow rate 2 mL/min
 column temp. 20 °C
 detector UV, 214 nm
 injection 1 µL
 Application No. G001030



HPLC Applications

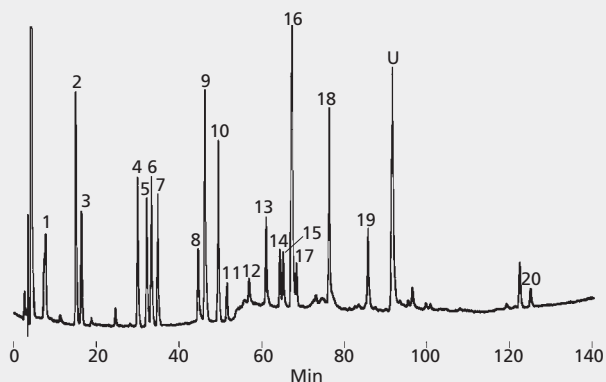
Pesticides and Herbicides

HPLC Analysis of Pesticide and Herbicide Mixture on SUPEL-COSIL™ LC-ABZ

► application for HPLC

column SUPEL COSIL LC-ABZ, 25 cm x 4.6 mm I.D., 5 µm particles (59142)
 mobile phase 10% to 90% acetonitrile in water at 0.5%/min
 flow rate 1 mL/min
 column temp. 40 °C
 detector UV, 225 nm
 injection 50 µL water, spiked with analytes
 Application No. 794-0033

- | | |
|-------------------------|--------------------------|
| 1. Caffeine (100 ng) | 12. Propazine (50 ng) |
| 2. Metamitron (50 ng) | 13. Terbutylazine (5 ng) |
| 3. Fenuron (50 ng) | 14. Linuron (50 ng) |
| 4. Metoxuron (50 ng) | 15. Propanil (50 ng) |
| 5. Simazine (5 ng) | 16. Prometryn (50 ng) |
| 6. Bromacil (50 ng) | 17. Fenamiphos (50 ng) |
| 7. Cyanazine (50 ng) | 18. Fenitrothion (50 ng) |
| 8. Atrazine (5 ng) | 19. Parathion (50 ng) |
| 9. Carbaryl (5 ng) | 20. Permethrin (50 ng) |
| 10. Isoproturon (50 ng) | U Unknown |
| 11. Propham (50 ng) | |

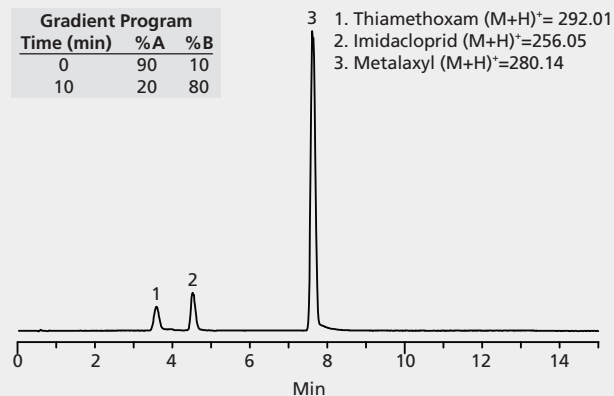


Figures reproduced courtesy of Dr. Claude Corvi, Laboratoires Cantonal de Chimie, Geneva, Switzerland.

HPLC Analysis of Pesticides on Ascentis® C18 (5 cm x 2.1 mm x 3 µm)

► application for HPLC

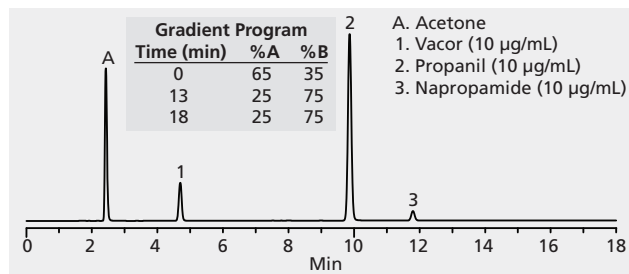
column Ascentis C18, 5 cm x 2.1 mm I.D., 3 µm particles (581300-U)
 mobile phase A: 0.1% ammonium acetate, pH unadjusted; B: acetonitrile
 flow rate 0.2 mL/min.
 column temp. 35 °C
 detector MS, (+) ESI, Selected Ion Recording Mode
 injection 5 µL
 sample 1 µg/mL each in 90:10 water:acetonitrile
 Application No. G003130



HPLC Analysis of Pesticides on Ascentis® C18 (15 cm x 4.6 mm x 5 µm)

► application for HPLC

column Ascentis C8, 15 cm x 4.6 mm I.D., 5 µm particles (581424-U)
 mobile phase A: DI water; B: acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 100 µL
 sample as indicated in 2.2% 90:10 acetonitrile:acetone in DI water
 Application No. G003121



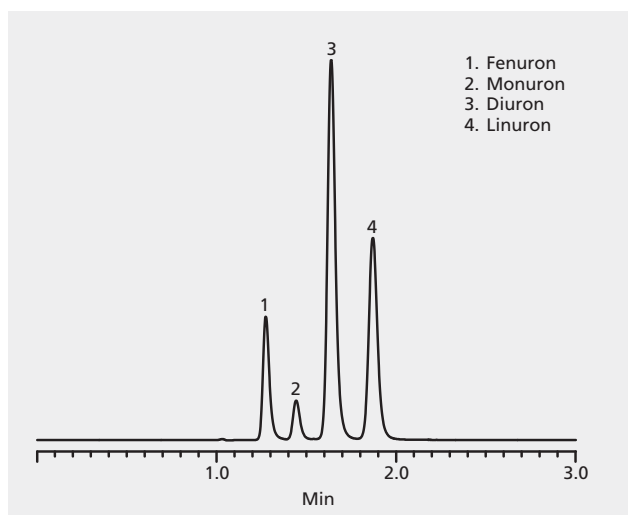
HPLC Applications

Pesticides and Herbicides

HPLC Analysis of Urea pesticides on Discovery® Cyano

▶ application for HPLC

column Discovery Cyano, 15 cm × 4.6 mm I.D., 5 µm particles (59356-U)
 mobile phase 60:40 water:CH₃CN
 flow rate 2 mL/min
 column temp. 20 °C
 detector UV, 214 nm
 injection 1 µL
 Application No. G001067



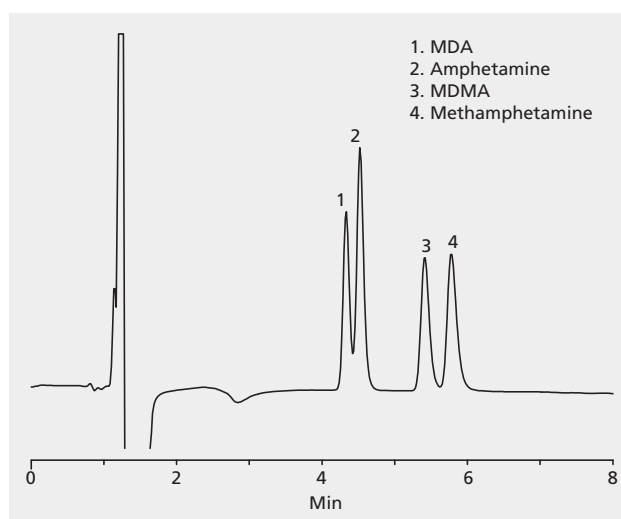
Pharmaceuticals

Amines

HPLC Analysis of Amphetamine, Methamphetamine, MDA, and MDMA on Discovery® HS F5

▶ application for HPLC

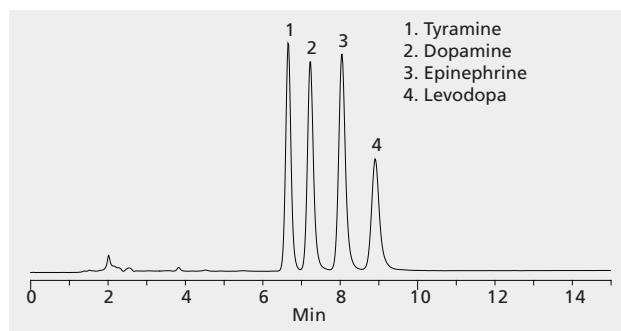
column Discovery HS F5, 15 cm × 4.6 mm I.D., 5µm particles (567516-U)
 mobile phase 10 mM ammonium acetate in 10:90 water: CH₃CN
 flow rate 1.5 mL/min
 column temp. 35 °C
 detector UV at 210 nm
 injection 5 µL
 sample 50 µg/mL each (amphetamine, methamphetamine, MDA and MDMA) in methanol
 Application No. G002081



HPLC Analysis of Biogenic Amines on Ascentis® Si (Mobile Phase, 15:85)

▶ application for HPLC

concentration 50 µg/mL
 column Ascentis Si, 15 cm × 4.6 mm I.D., 5 µm particles (581512-U)
 mobile phase . 15:85, 0.1% ammonium acetate in water (pH unadjusted):0.1% ammonium acetate in acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 280 nm
 injection 10 µL
 sample as indicated in 0.1% ammonium acetate in 10:90:water:acetonitrile
 Application No. G003716



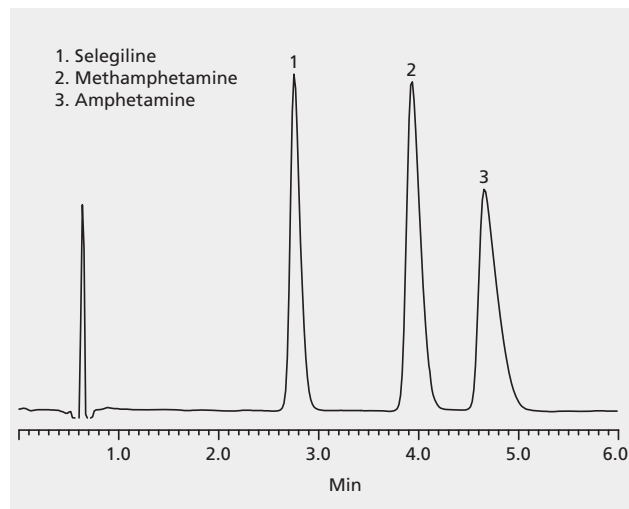
HPLC Applications

Pharmaceuticals: *Amines*

HPLC Analysis of Selegiline and Amphetamine Metabolites on Discovery® HS F5

► application for HPLC

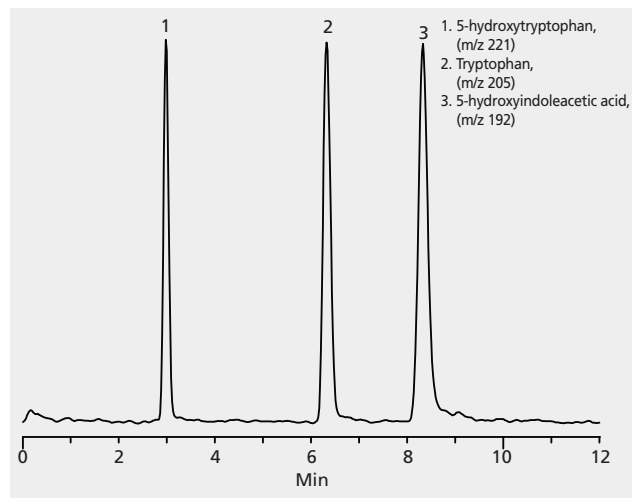
column Discovery HS F5, 5 cm x 4.6 mm I.D., 5 µm particles (567513-U)
 mobile phase 25:75 water (10 mM ammonium acetate, pH 4.0 with acetic acid):CH₃CN (v/v)
 flow rate 1.0 mL/min
 column temp. 40 °C
 detector UV, 210 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002136



HPLC Analysis of Serotonin Metabolites on Ascentis® C18

► application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 80:20, 10 mM formic acid/acetate (pH 3.0):methanol
 flow rate 0.7 mL/min.
 column temp. 35 °C
 detector ESI (+); overlay of extracted ion chromatograms of individual (M+H)⁺ species
 injection 10 µL
 sample 25 mg/L in 90:10, 10 mM formic acid/acetate (pH 3.0):methanol
 Application No. G002449

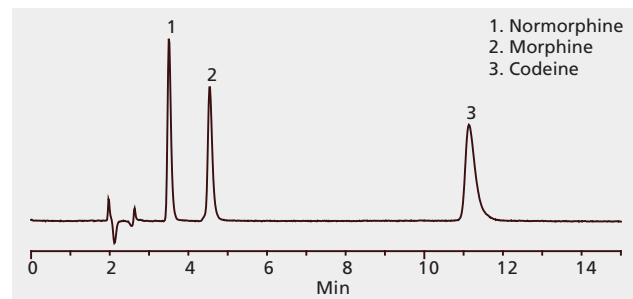


Analgesics

HPLC Analysis of Analgesics, Narcotics on Ascentis® Phenyl

► application for HPLC

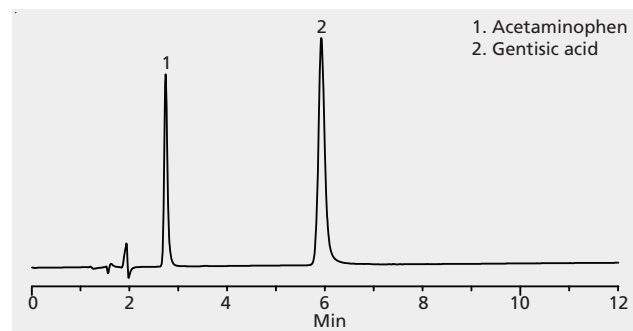
column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 90:10, 10 mM ammonium formate (pH 3.0 with formic acid):acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample 50 µg/mL in 90:10, water:methanol
 Application No. G003709



HPLC Analysis of Analgesics on Ascentis® C18

► application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 85:15, 20 mM phosphoric acid (pH 2.0, unadjusted):acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 220 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002354



HPLC Applications

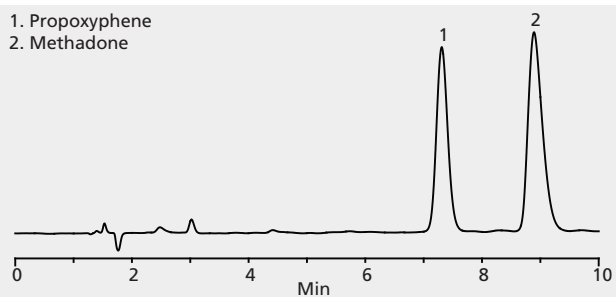
Pharmaceuticals: *Analgesics*

HPLC Analysis of Propoxyphene and Methadone on Ascentis® Phenyl

▶ application for HPLC

column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 20:80, water with 0.1% ammonium acetate:methanol
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 50 µg/mL in 20:80, water:methanol
 Application No. G003699

1. Propoxyphene
2. Methadone

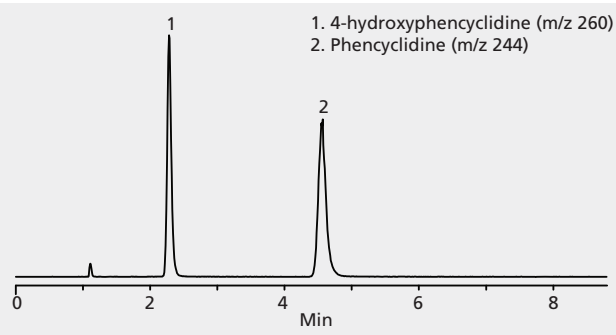


Anesthetic

HPLC Analysis of Anaesthetic Drugs on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 70:30, 10 mM ammonium acetate (pH 4.5 with acetic acid):acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector ESI (+)
 injection 10 µL
 sample 1 µg/mL each in mobile phase
 Application No. G002659

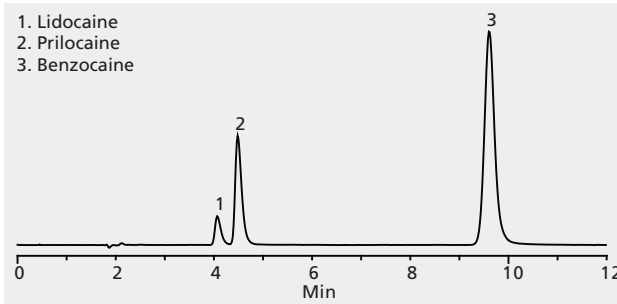


HPLC Analysis of Anesthetics, Local on Ascentis® Phenyl

▶ application for HPLC

column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 55:45, 10 mM ammonium formate (pH 3.0 with formic acid):methanol
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample 50 µg/mL in 85:15, water:methanol
 Application No. G003708

1. Lidocaine
2. Prilocaine
3. Benzocaine

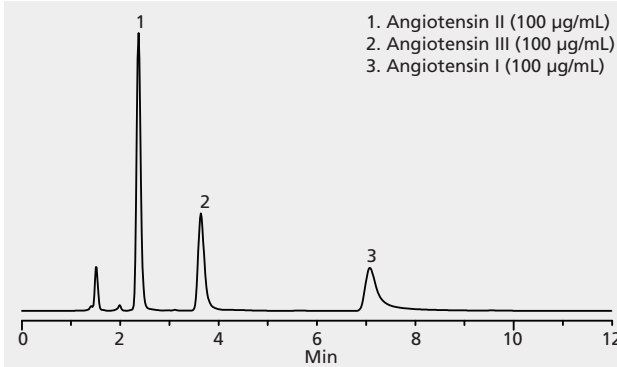


Angiotensins

HPLC Analysis of Angiotensins on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 77.5:22.5, 5 mM ammonium phosphate (pH 7.0 with ammonium hydroxide):acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 215 nm
 injection 10 µL
 sample as indicated in mobile phase
 Application No. G002914

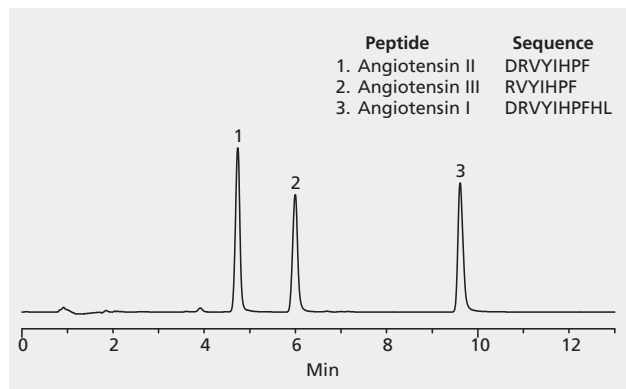


HPLC Applications

Pharmaceuticals: *Angiotensins*

HPLC Analysis of Angiotensins on Discovery® BIO Wide Pore C18

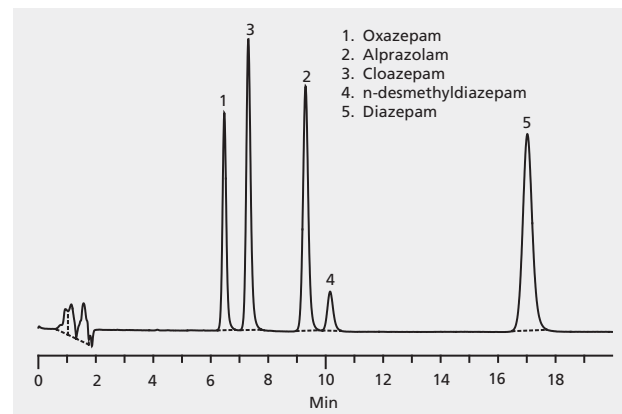
column Discovery BIO Wide Pore C18, 15 cm x 4.6 mm I.D., 5 µm particles (568222-U)
 mobile phase A: 65:35, (10 mM NH₄OAc, pH 7);(50% CH₃CN in 20 mM NH₄OAc, pH 7);
 B: 25:75, (10 mM NH₄OAc, pH 7);(50% CH₃CN in 20 mM NH₄OAc, pH 7)
 gradient 0-100% B in 12.5 min
 flow rate 1 mL/min
 column temp. ambient
 injection 6 µL (10 µg each) in water
 Application No. G001585



HPLC Analysis of Antianxiety Drugs on Ascentis® Phenyl

► application for HPLC

column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 40:60, acetonitrile:water
 flow rate 1.0 mL/min
 column temp. 25 °C
 detector UV at 254 nm
 injection 10 µL
 Application No. G003664

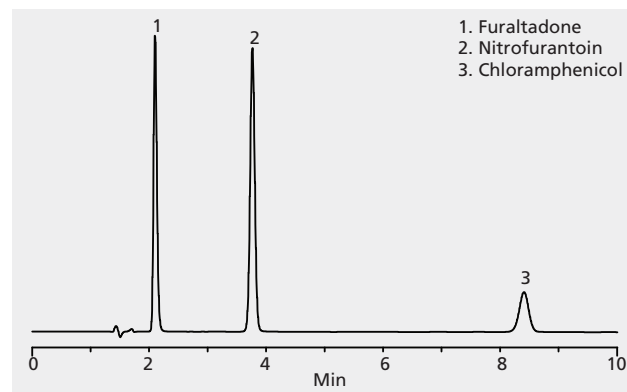


Antibacterials/Antifungals

HPLC Analysis of Antibacterials/Antifungals on Ascentis® C18

► application for HPLC

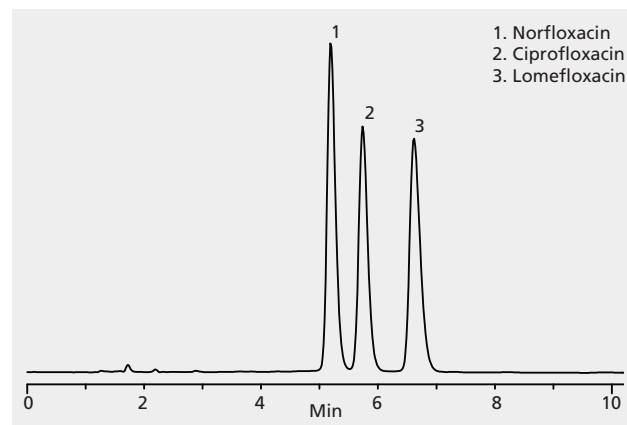
column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 75:25 10 mM ammonium formate (pH 3.0 with formic acid):acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV, 254 nm
 injection 5 µL
 sample 50 µg/mL each in acetonitrile
 Application No. G002325



HPLC Analysis of Antibacterials/Antifungals on Ascentis® RP-Amide

► application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase ... 85:15, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 254 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002589



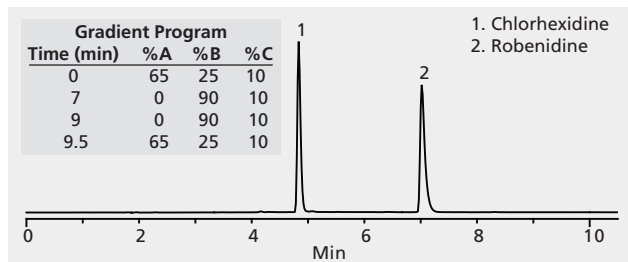
HPLC Applications

Pharmaceuticals: Antibacterials/Antifungals

HPLC Analysis of Chlorhexidine and Robenidine on Ascentis® Phenyl

▶ application for HPLC

mobile phase Ascentis Phenyl 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 column Ascentis Phenyl 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 gradient .. A = water, B = acetonitrile, C = 500 mM ammonium formate (pH 3.0 with formic acid)
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 273 nm
 injection 10 µL
 sample 100 µg/mL each in 70:30, 25 mM ammonium formate pH 3.0:acetonitrile
 Application No. G003711

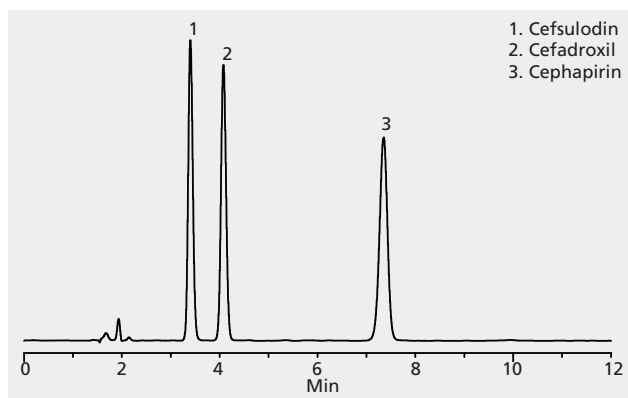


Antibiotics

HPLC Analysis of Antibiotics on Ascentis® C18

▶ application for HPLC

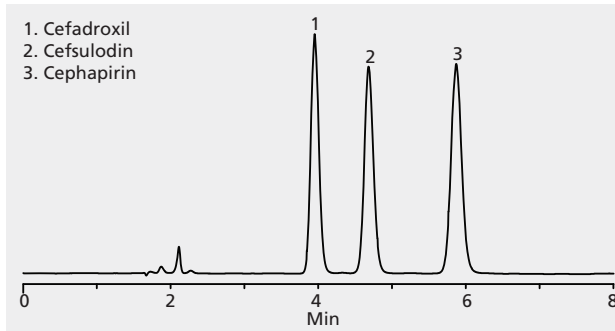
column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 93:7, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002407



HPLC Analysis of Cephalosporin Antibiotics on Ascentis® RP-Amide

▶ application for HPLC

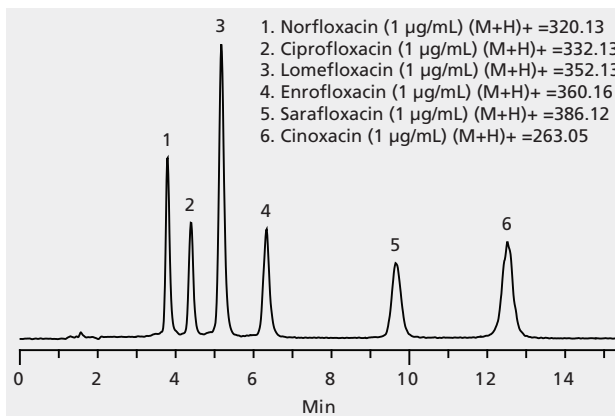
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 93:7, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 254 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002642



HPLC Analysis of Fluoroquinolone Antibiotics on Ascentis® Phenyl

▶ application for HPLC

column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 80:20, 13 mM ammonium formate (pH 3.0 with concentrated formic acid):
 acetonitrile
 flow rate 1 mL/min, split to the MS
 column temp. 35 °C
 detector MS, ESI (+) in selected ion recording (SIR) mode
 injection 5 µL
 sample as indicated in 80:20, 13 mM ammonium formate (pH 3.0 with concentrated formic
 acid):acetonitrile
 Application No. G003713



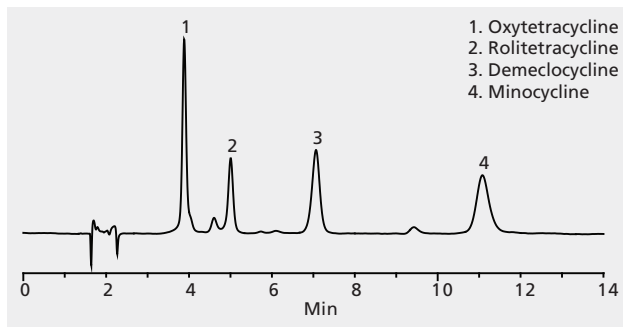
HPLC Applications

Pharmaceuticals: *Antibiotics*

HPLC Analysis of Tetracycline Antibiotics on Ascentis® Phenyl

► application for HPLC

column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 80:20, 0.1% ammonium acetate:acetonitrile with 0.1% ammonium acetate
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 353 nm
 injection 10 µL
 sample 50 µg/mL each in 80:20, water:methanol
 Application No. G003715

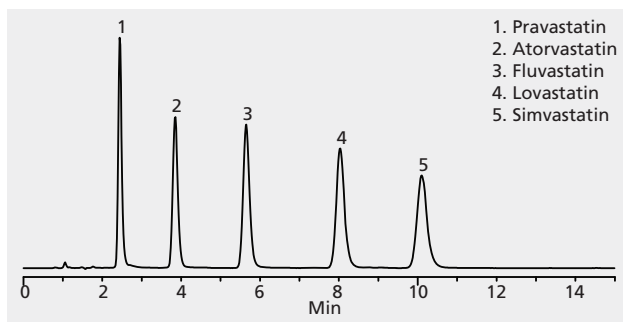


Anticholesterol

HPLC Analysis of Statins on Ascentis® RP-Amide

► application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 25:75, water with 0.1% formic acid (34673):methanol
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 240 nm
 injection 10 µL
 sample 50 µg/mL in mobile phase
 Application No. G003270

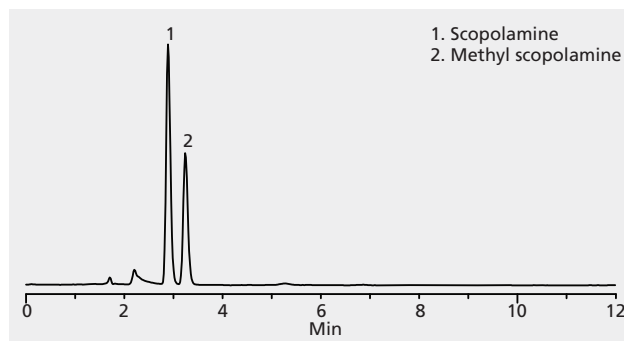


Anticholinergics

HPLC Analysis of Anticholinergic Drgs on Ascentis® RP-Amide

► application for HPLC

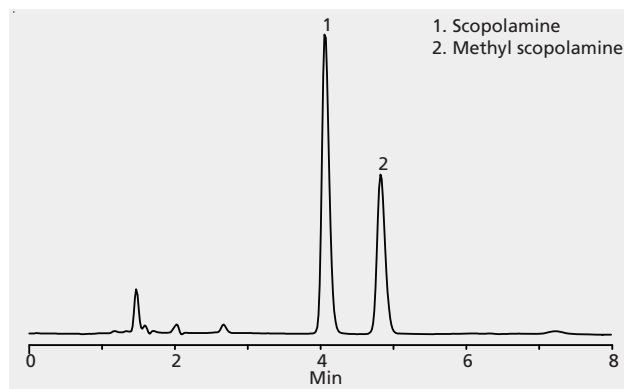
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase ... 85:15, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 220 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002663



HPLC Analysis of Anticholinergics on Ascentis® C18

► application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase ... 85:15, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002351



HPLC Applications

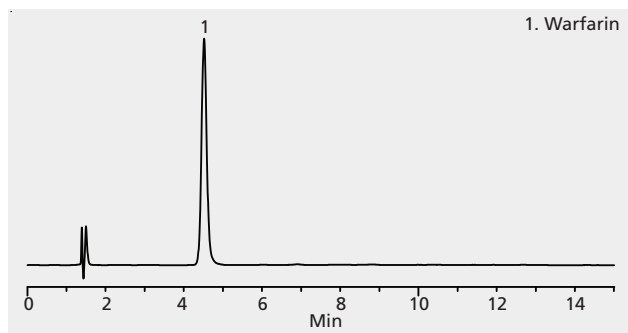
Pharmaceuticals: Anticoagulants

Anticoagulants

HPLC Analysis of Warfarin™ Anticoagulant on Ascentis® C18

▶ application for HPLC

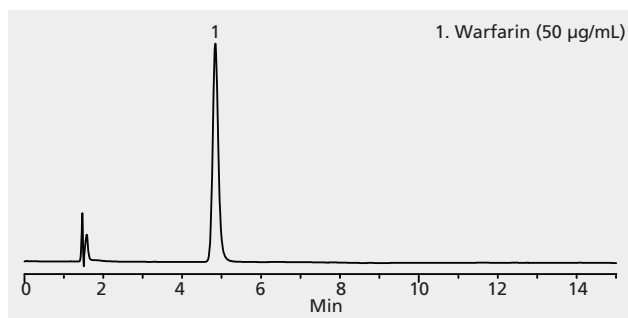
column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 30:70, 20 mM phosphoric acid (pH 2.0, unadjusted);methanol
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 280 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002340



HPLC Analysis of Warfarin™ Anticoagulant on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 30:70, 20 mM phosphoric acid (pH 2.0 unadjusted);methanol
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV, 280 nm
 injection 10 µL
 sample as indicated in 20 mM phosphoric acid (pH 2.0)
 Application No. G002638

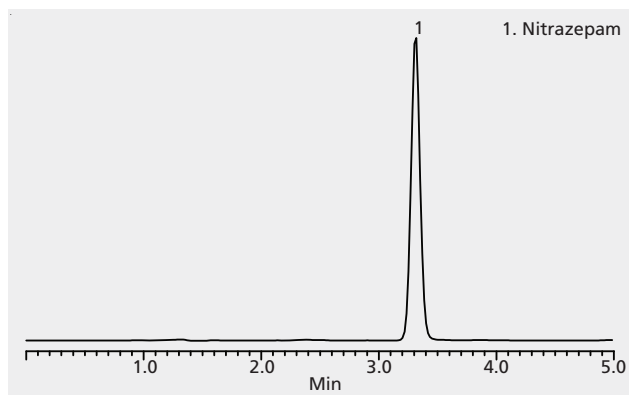


Anticonvulsants

HPLC Analysis of Nitrazepam Anticonvulsant on Ascentis® C18

▶ application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 50:50, 10 mM monobasic potassium phosphate (pH 7.0 with potassium hydroxide);acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 50 µg/mL in mobile phase
 Application No. G002356



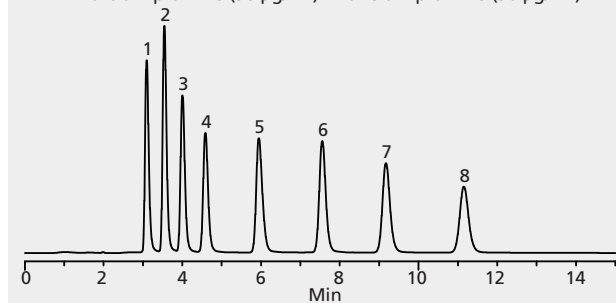
Antidepressants

HPLC Analysis of Tricyclic Antidepressants On Ascentis® C8 on Ascentis® C18

▶ application for HPLC

column Ascentis C8, 15 cm x 2.1 mm I.D., 3 µm particles (581402-U)
 mobile phase 25:75, 25 mM ammonium phosphate dibasic (pH 7.0 with phosphoric acid); methanol
 flow rate 0.2 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample as indicated in 60:40 water:methanol
 Application No. G003156

- | | |
|-------------------------------|-----------------------------|
| 1. Nordoxepin (50 µg/mL) | 5. Doxepin (50 µg/mL) |
| 2. Desipramine (50 µg/mL) | 6. Imipramine (50 µg/mL) |
| 3. Nortriptyline (50 µg/mL) | 7. Amitriptyline (50 µg/mL) |
| 4. Norclomipramine (50 µg/mL) | 8. Clomipramine (50 µg/mL) |



HPLC Applications

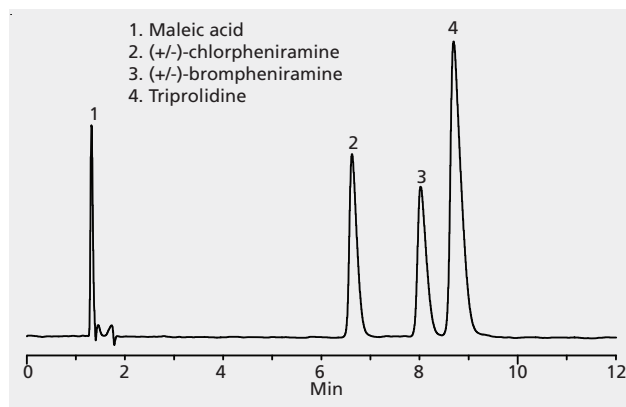
Pharmaceuticals: *Antihistamines*

Antihistamines

HPLC Analysis of Antihistamines on Ascentis® C18

► application for HPLC

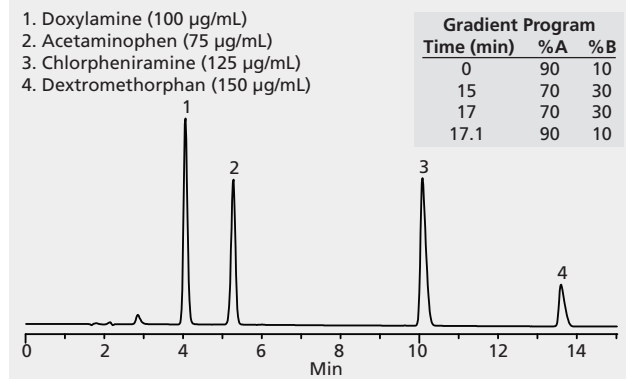
column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 75:25, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid): acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample 10 µg/mL each in mobile phase
 Application No. G002365



HPLC Analysis of Cold Remedy Ingredients on Ascentis® RP-Amide

► application for HPLC

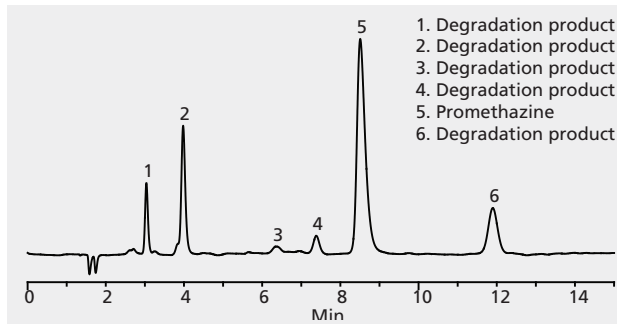
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase A: 5 mM ammonium formate (pH 2.75 with formic acid); B: acetonitrile
 flow rate 1.0 mL/min.
 column temp. 30 °C
 detector UV at 270 nm
 injection 10 µL
 sample as indicated in 5 mM ammonium formate (pH 2.75 with formic acid)
 Application No. G003006



HPLC Analysis of Promethazine and Degradants on Ascentis® Phenyl

► application for HPLC

column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 25:75 0.1% ammonium acetate:methanol
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 50 µg/mL in 20:80, water:methanol
 Application No. G003700

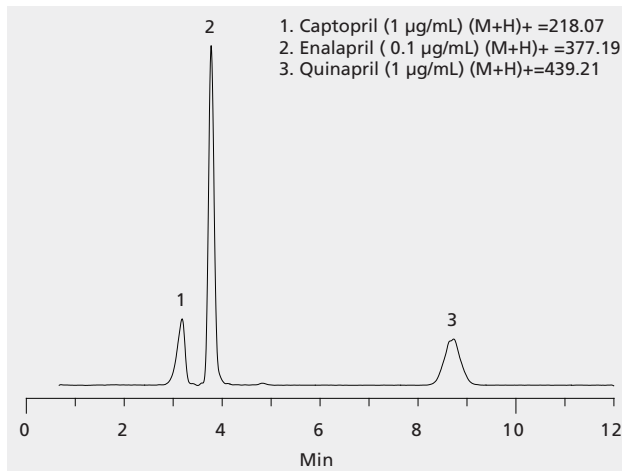


Antihypertensives

HPLC Analysis of ACE Inhibitors on Ascentis® Phenyl

► application for HPLC

column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 40:60, 13 mM ammonium formate (pH 2.0 with concentrated formic acid): methanol
 flow rate 1 mL/min, split to the MS
 column temp. 35 °C
 detector MS, ESI (+) in selected ion recording (SIR) mode
 injection 5 µL
 sample as indicated in 40:60, 13 mM ammonium formate (pH 2.0 with concentrated formic acid):methanol
 Application No. G003702



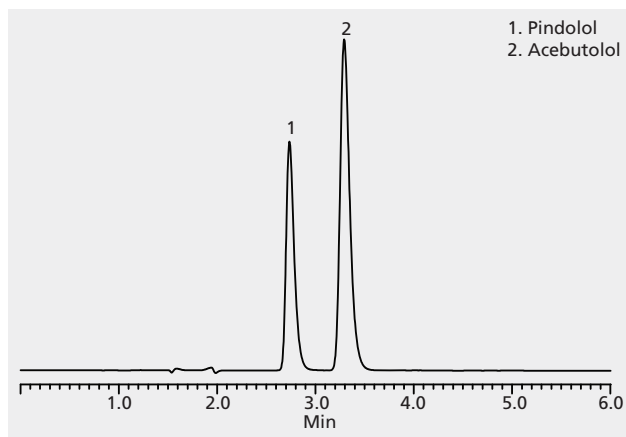
HPLC Applications

Pharmaceuticals: Antihypertensives

HPLC Analysis of Antihypertensive Drugs on Ascentis® RP-Amide

▶ application for HPLC

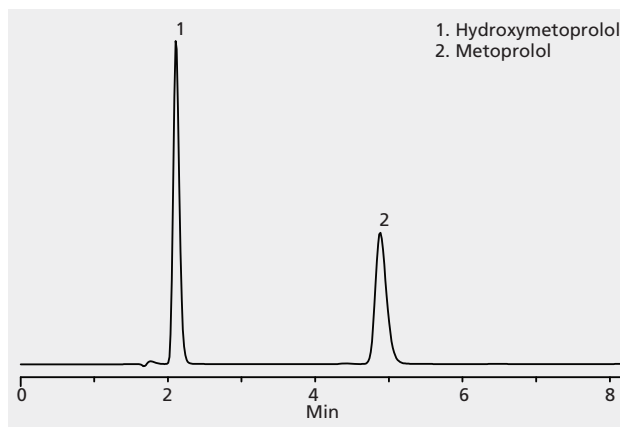
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase ... 80:20, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 254 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002600



HPLC Analysis of Antihypertensives on Ascentis® RP-Amide

▶ application for HPLC

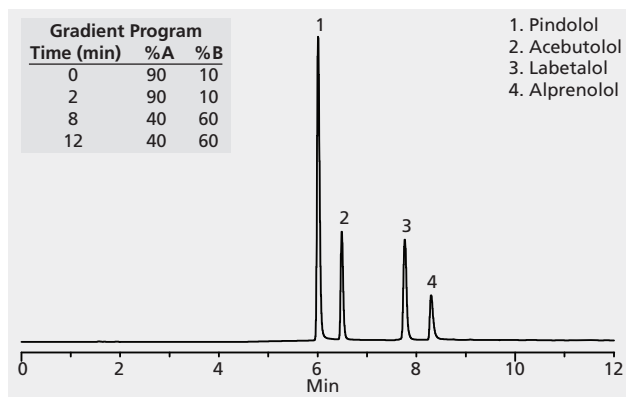
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase ... 70:30, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 methanol
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 220 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002598



HPLC Analysis of Antihypertensives on Ascentis® C18

▶ application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase .. A: 10 mM monobasic potassium phosphate (pH 7.0 with potassium hydroxide); B:
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002383

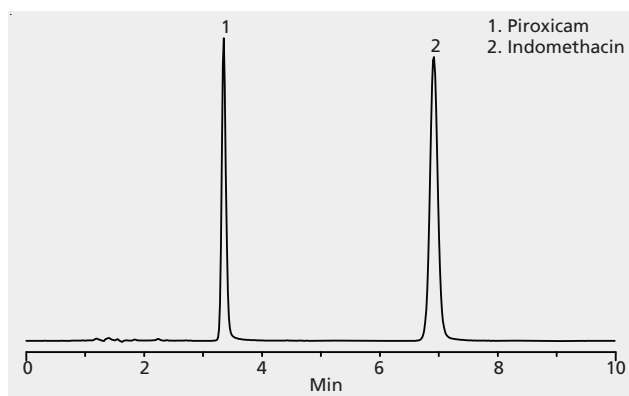


Anti-inflammatories

HPLC Analysis of Anti-Inflammatory Drugs on Ascentis® C8

▶ application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase ... 45:55, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 25 µg/mL each in mobile phase
 Application No. G002391



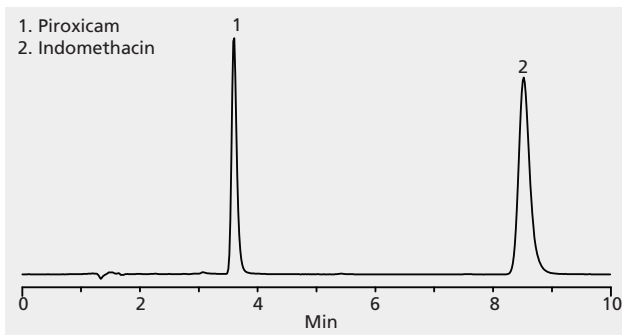
HPLC Applications

Pharmaceuticals: *Anti-inflammatories*

HPLC Analysis of Anti-Inflammatory Drugs on Ascentis® RP-Amide

▶ application for HPLC

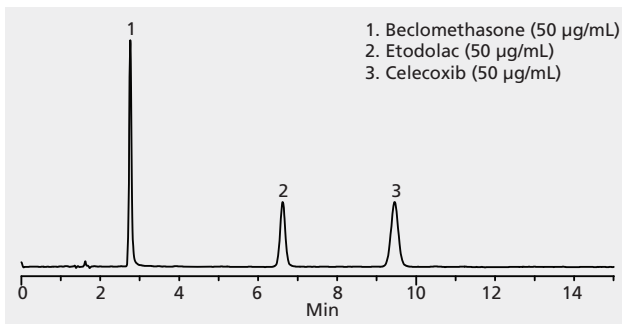
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase ... 45:55, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 220 nm
 injection 10 µL
 sample 25 µg/mL each in mobile phase
 Application No. G002660



HPLC Analysis of Anti-Inflammatory On Ascentis® C18 on Ascentis® C18

▶ application for HPLC

column Ascentis C8, 15 cm x 4.6 mm I.D., 5 µm particles (581424-U)
 mobile phase 45:55, 10 mM ammonium formate (pH 3.0 with formic acid):acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample as indicated in mobile phase
 Application No. G003155

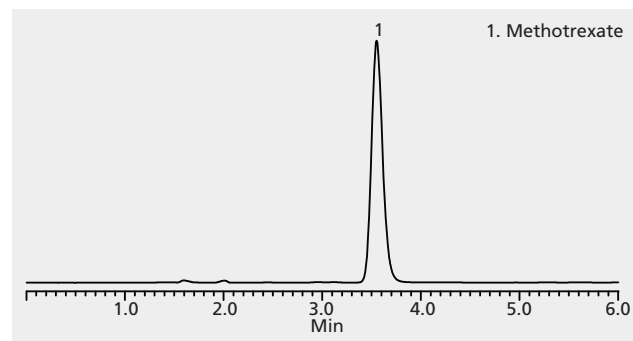


Antineoplastics

HPLC Analysis of Antineoplastic Drugs on Ascentis® C18

▶ application for HPLC

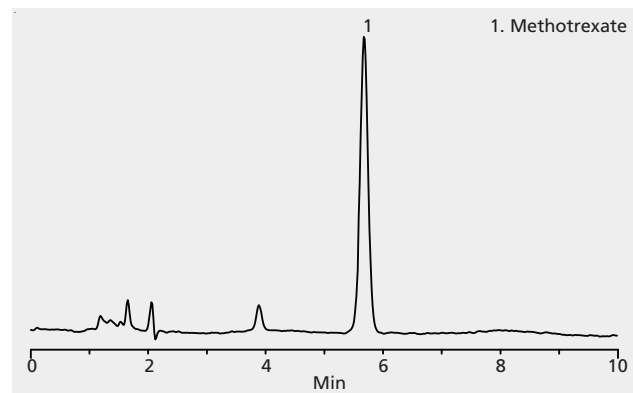
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase ... 85:15, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 220 nm
 injection 10 µL
 sample 50 µg/mL in mobile phase
 Application No. G002655



HPLC Analysis of Antineoplastic Drugs on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase ... 88:12, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 10 µg/mL in mobile phase
 Application No. G002396



HPLC Applications

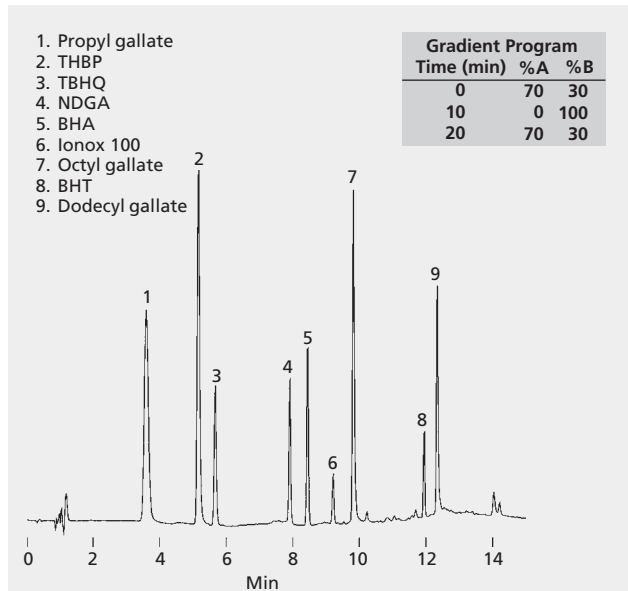
Pharmaceuticals: Antioxidants

Antioxidants

HPLC Analysis of Antioxidants on SUPELCO[™] LC-18

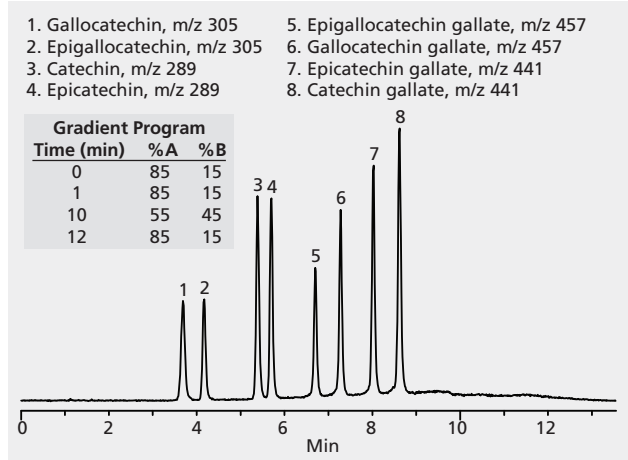
▶ application for HPLC

column SUPELCO[™] LC-18, 15 cm x 4.6 mm I.D., 5 µm particles (58230-U)
 mobile phase .. A: 5% acetic acid in deionized water; B: acetonitrile:methanol (1:1)70% A/30% B to 100% B, linear gradient over 10 min, hold 10 min
 flow rate 2 mL/min
 detector UV, 280 nm
 injection 10 µL, 20 µg/mL each antioxidant
 Application No. 795-0438

HPLC Analysis of Catechins on Ascentis[®] RP-Amide

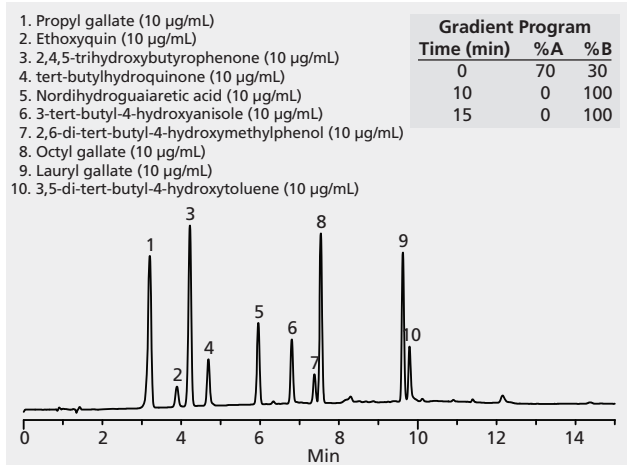
▶ application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase A: 10 mM ammonium formate (pH 3.0 with concentrated formic acid); B: acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector MS, ESI (-) in selected ion recording (SIR) mode
 injection 5 µL
 sample 10 µg/mL each in water:acetonitrile 1:1
 Application No. G002723

HPLC Analysis of Phenolic Antioxidants on Ascentis[®] C18

▶ application for HPLC

column Ascentis C8, 15 cm x 4.6 mm I.D., 5 µm particles (581424-U)
 mobile phase A: 5% acetic acid; B: 50:50 methanol:acetonitrile
 flow rate 2.0 mL/min.
 column temp. 30 °C
 detector UV at 280 nm
 injection 10 µL
 sample as indicated in 50:50 acetonitrile:2-propanol
 Application No. G003054

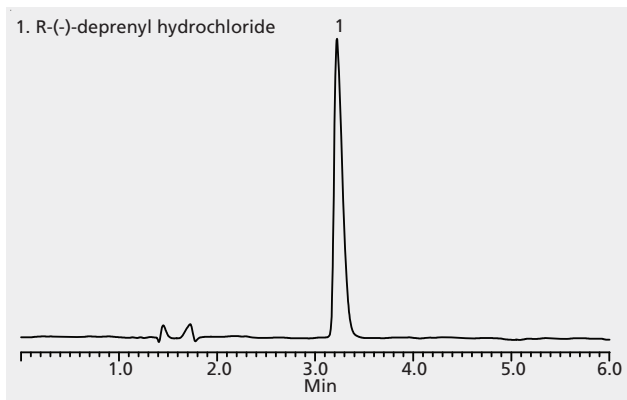


Antiparkinsonian

HPLC Analysis of Antiparkinsonian Drugs on Ascentis[®] C18

▶ application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase ... 75:25, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid); acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 50 µg/mL in mobile phase
 Application No. G002398



HPLC Applications

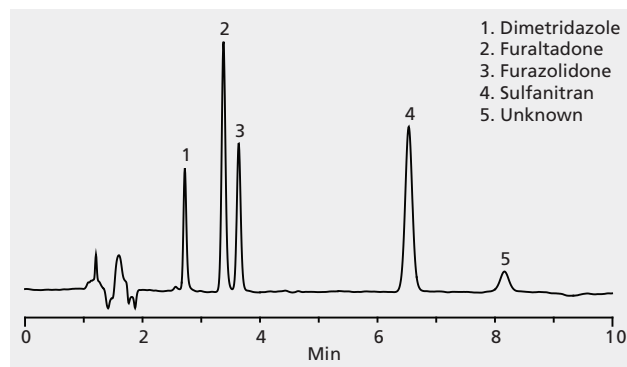
Pharmaceuticals: *Antiprotozoals*

Antiprotozoals

HPLC Analysis of Antiprotozoal Drugs on Ascentis® Phenyl

► application for HPLC

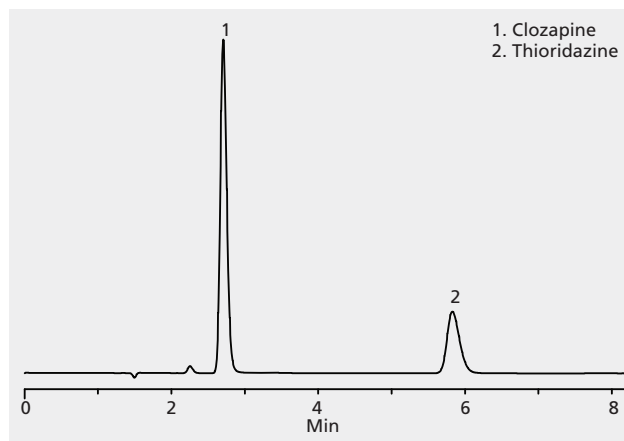
column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 60:40, 10 mM ammonium acetate (pH 5.0 with acetic acid):acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample 50 µg/mL each in 85:15, water:methanol
 Application No. G003703



HPLC Analysis of Antipsychotic Drugs on Ascentis® RP-Amide

► application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 40:60, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 methanol
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 220 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002603

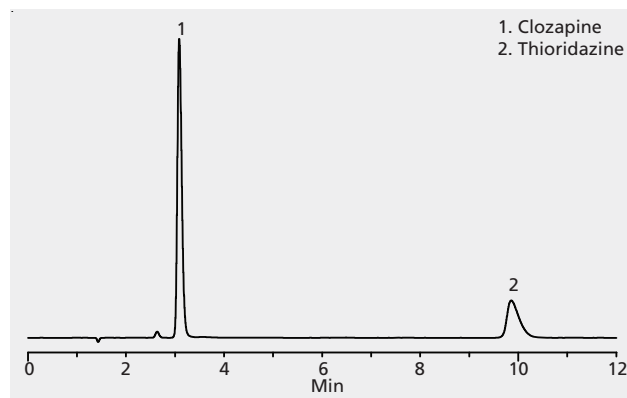


Antipsychotics

HPLC Analysis of Antipsychotic Drugs on Ascentis® C18

► application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 40:60, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 methanol
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002400

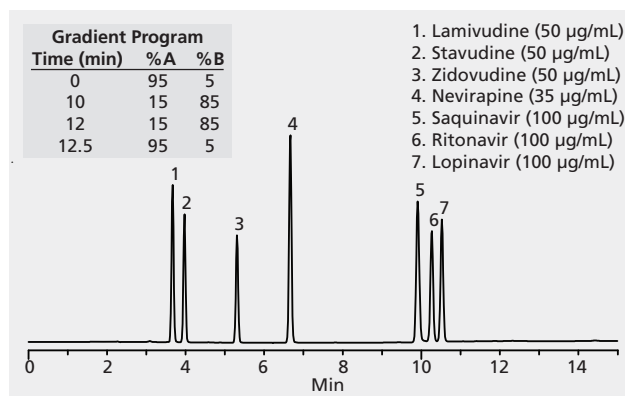


Antiretrovirals

HPLC Analysis of Antiretroviral Drugs on Ascentis® RP-Amide

► application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase A: 25 mM ammonium phosphate (pH 5.5); B: acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample as indicated in 25 mM ammonium phosphate (pH 5.5)
 Application No. G002988



HPLC Applications

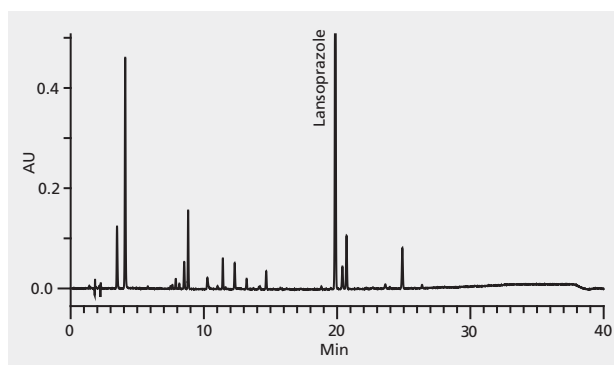
Pharmaceuticals: *Antiulcer Compounds*

Antiulcer Compounds

HPLC Analysis of Lansoprazole (degradation profile) on Ascentis® Express C18

▶ application for HPLC

column Ascentis Express C18, 15 cm x 4.6mm, 2.7 µm particles (53829-U)
 mobile phase A: water, B: acetonitrile:0.5% triethylamine in water, pH=7.0 (80:20)
 flow rate 0.8 mL/minute
 column temp. ambient
 detector 285 nm
 injection 15 µL
 Application No. G004160



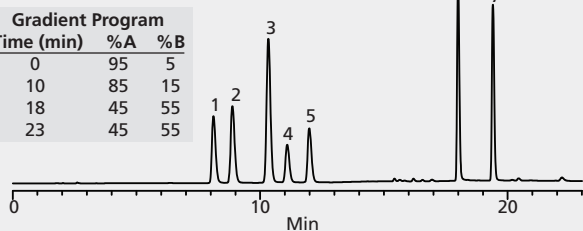
HPLC Analysis of Ulcer Treatment Drugs on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis RP-Amide, 15 cm x 2.1 mm I.D., 5 µm particles (565305-U)
 mobile phase ... A: 10 mM ammonium phosphate (pH 6.2 with phosphoric acid); B: acetonitrile
 flow rate 0.2 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 5 µL
 sample as indicated in 95:5 water:methanol
 Application No. G002992

1. Ranitidine (40 µg/mL)
2. Famotidine (40 µg/mL)
3. Cimetidine (40 µg/mL)
4. Nizatidine (40 µg/mL)
5. Pirenzepine (40 µg/mL)
6. Omeprazole (40 µg/mL)
7. Lansoprazole (40 µg/mL)

Gradient Program		
Time (min)	%A	%B
0	95	5
10	85	15
18	45	55
23	45	55

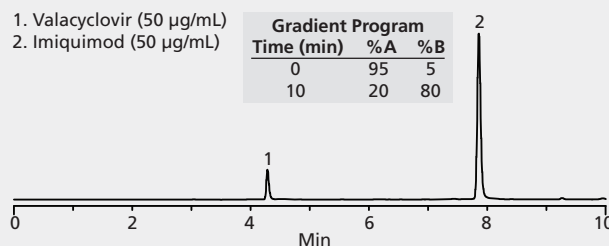


Antivirals

HPLC Analysis of Antiviral Drugs on Ascentis® C8

▶ application for HPLC

column Ascentis C8, 15 cm x 2.1 mm I.D., 3 µm particles (581402-U)
 mobile phase A: 10 mM ammonium phosphate (pH 2.5 with phosphoric acid); B: acetonitrile
 flow rate 0.2 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 2 µL
 sample as indicated in mobile phase
 Application No. G003201

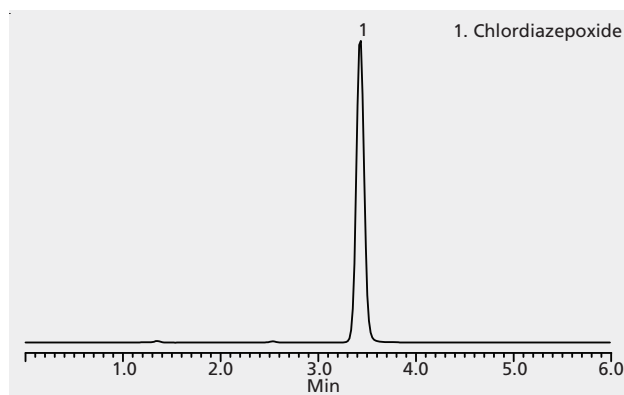


Anxiolytics

HPLC Analysis of Anxiolytic Drugs on Ascentis® C18

▶ application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 50:50, 10 mM monobasic potassium phosphate (pH 7.0 with potassium hydroxide):acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002403



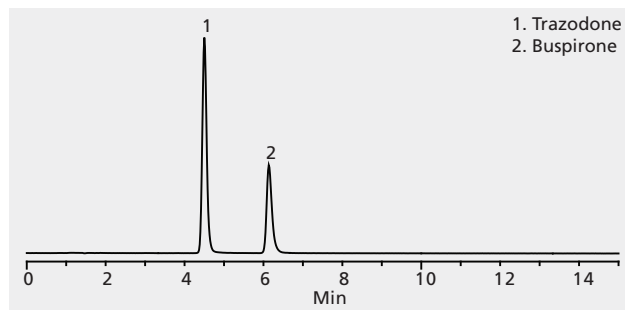
HPLC Applications

Pharmaceuticals: *Anxiolytics*

HPLC Analysis of Anxiolytic Drugs on Ascentis® Phenyl

▶ application for HPLC

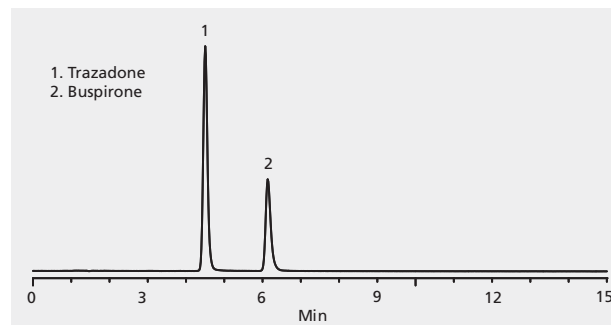
column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 40:60, 10 mM ammonium acetate (pH 5.5 with acetic acid):acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample 50 µg/mL in 90:10, water:methanol
 Application No. **G003704**



HPLC Analysis of Anxiolytics on Ascentis® Phenyl

▶ application for HPLC

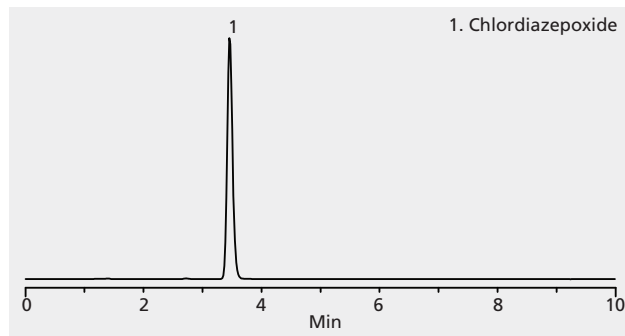
column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 40:60, 10 mM ammonium acetate (pH 5.5 with acetic acid):acetonitrile
 flow rate 1 mL/min
 column temp. 35 °C
 detector UV at 254 nm
 injection 1 µL
 Application No. **G004104**



HPLC Analysis of Anxiolytic Drugs on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 50:50, 10 mM monobasic potassium phosphate (pH 7.0 with potassium hydroxide):acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 254 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. **G002645**

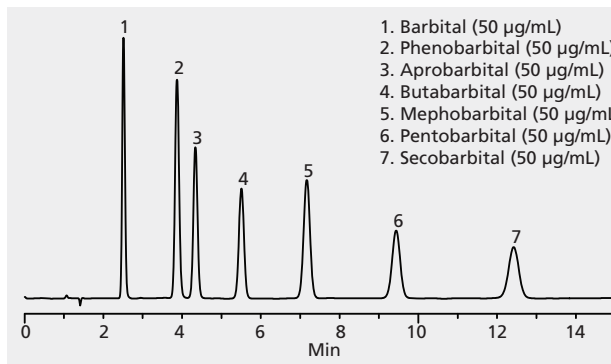


Barbiturates

HPLC Analysis of Barbiturates on Ascentis® C18

▶ application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 50:50, water: methanol
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 214 nm
 injection 10 µL
 sample as indicated in 65:35 water:methanol
 Application No. **G002877**



HPLC Applications

Pharmaceuticals: *Benzodiazepines*

Benzodiazepines

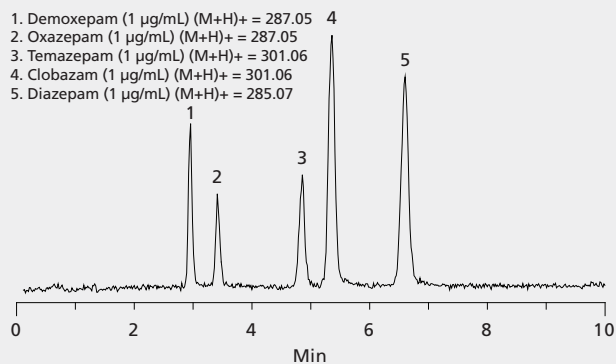
HPLC Analysis of Benzodiazepines on Ascentis® Phenyl

column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 flow rate 1 mL/min, split to the MS
 column temp. 35 °C
 detector MS, ESI (+) in selected ion recording (SIR) mode
 injection 5 µL
 sample as indicated in 0.1% ammonium acetate in 90:10:water:acetonitrile

▶ application for HPLC

mobile phase A: 50:50, 0.1% ammonium acetate in water (pH unadjusted);
 B: 0.1% ammonium acetate in acetonitrile

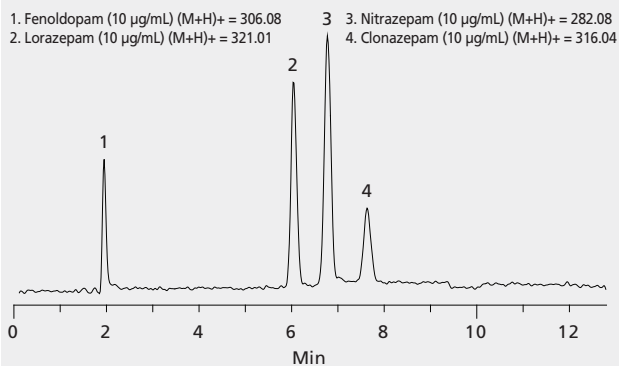
Application No. G003705



▶ application for HPLC

mobile phase A: 60:40, 0.1% ammonium acetate in water (pH unadjusted);
 B: 0.1% ammonium acetate in acetonitrile

Application No. G003706

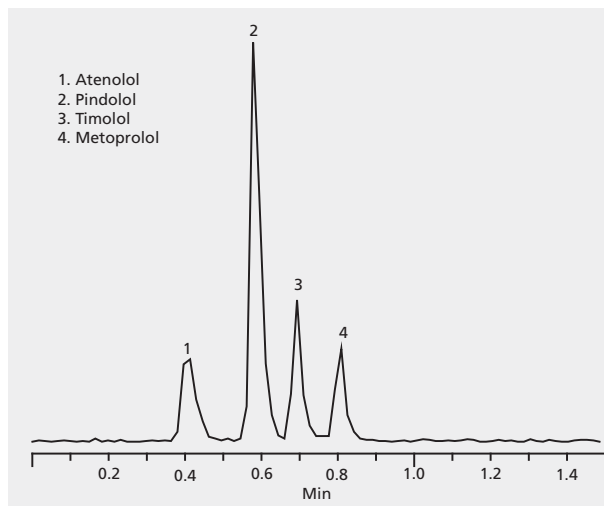


Beta Blockers

HPLC Analysis of Beta Blockers on Ascentis® Express C18

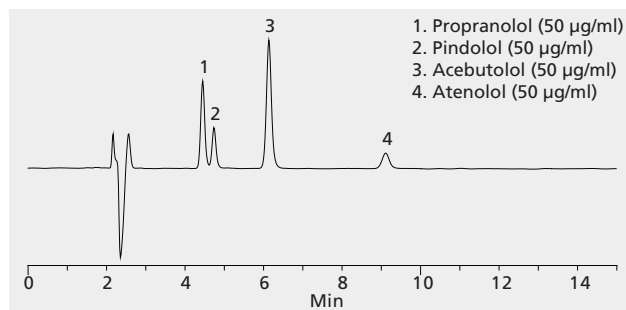
▶ application for HPLC

column Ascentis Express C18, 5 cm x 2.1 mm ID (53822-U)
 mobile phase A: 0.1% acetic acid in water, B: 0.1% acetic acid in acetonitrile
 flow rate 0.2 mL/min
 column temp. 35 °C
 detector ABI 3200 QT; ESI(+), MS/MS
 injection 1 µL
 instrument Agilent 1100
 Application No. G004063

HPLC Analysis of Beta Blockers On
Ascentis® Silica on Ascentis® Si

▶ application for HPLC

column Ascentis Si, 15 cm x 4.6 mm I.D., 5 µm particles (581512-U)
 mobile phase 15:85, 0.1% ammonium acetate in water (pH unadjusted);
 0.1% ammonium acetate in acetonitrile
 flow rate 1 mL/min
 column temp. 35 °C
 detector UV at 225 nm
 injection 10 µL
 sample as indicated in 0.1% ammonium acetate in 10:90:water:acetonitrile
 Application No. G003735



HPLC Applications

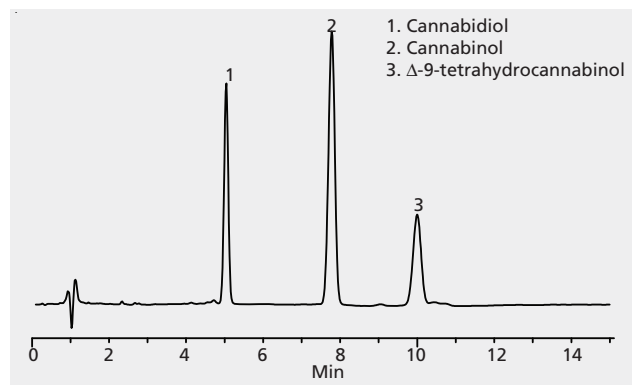
Pharmaceuticals: *Cannabinoids*

Cannabinoids

HPLC Analysis of Cannabinoids on Ascentis® C18

► application for HPLC

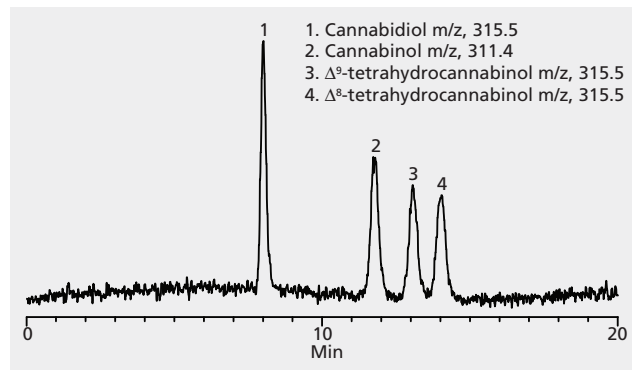
column Ascentis C18, 10 cm x 4.6 mm I.D., 3 µm particles (581321-U)
 mobile phase 25:75, 10 mM ammonium acetate (pH 4.5 with acetic acid):acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 30 µg/mL each in mobile phase
 Application No. G002326



HPLC Analysis of Ketoprofen on Ascentis® RP-Amide

► application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 20:80, 10 mM ammonium acetate (pH 5.0 with acetic acid):acetonitrile
 flow rate 1 mL/min, split to the MS
 column temp. 35 °C
 detector MS ESI (+), SIR Mode
 injection 5 µL
 sample 1 µg/mL in water:acetonitrile (1:1)
 Application No. G002681

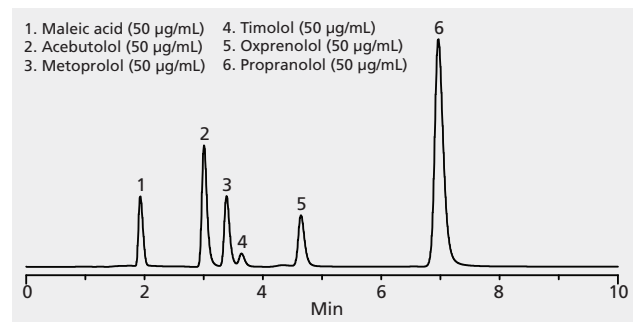


Cardiac Drugs

HPLC Analysis of Cardiac Drugs on Ascentis® C8

► application for HPLC

column Ascentis C8, 15 cm x 2.1 mm I.D., 3 µm particles (581402-U)
 mobile phase 47:53, 0.1% ammonium acetate:acetonitrile with 0.1% ammonium acetate
 flow rate 0.2 mL/min.
 column temp. 30 °C
 detector UV at 220 nm
 injection 2 µL
 sample as indicated in mobile phase
 Application No. G003172

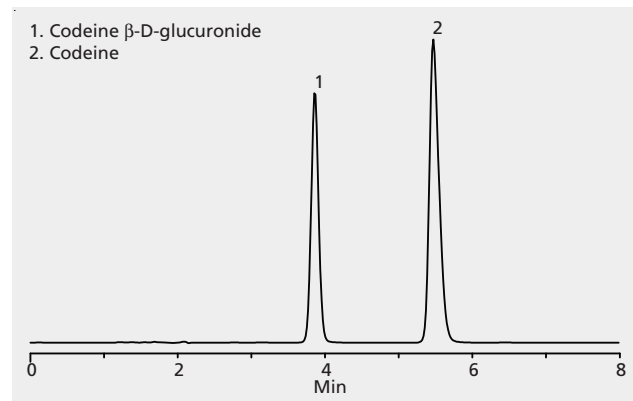


Codeines

HPLC Analysis of Codeine and Metabolite on Ascentis® C18

► application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 90:10, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002417



HPLC Applications

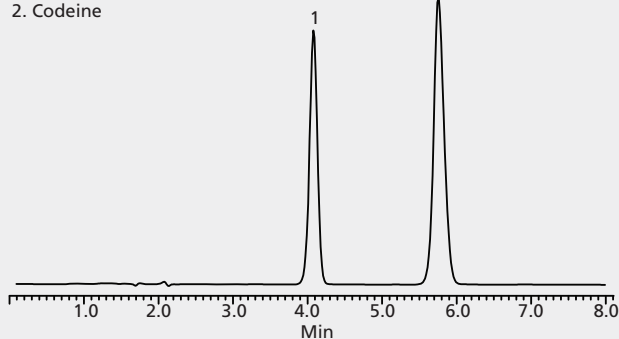
Pharmaceuticals: *Codeines*

HPLC Analysis of Codeine and Metabolite on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis RP-Amide 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 90:10, 10 mM monobasic potassium phosphate
 (pH 3.0 with phosphoric acid):acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 220 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002599

1. Codeine β-D-glucuronide
2. Codeine



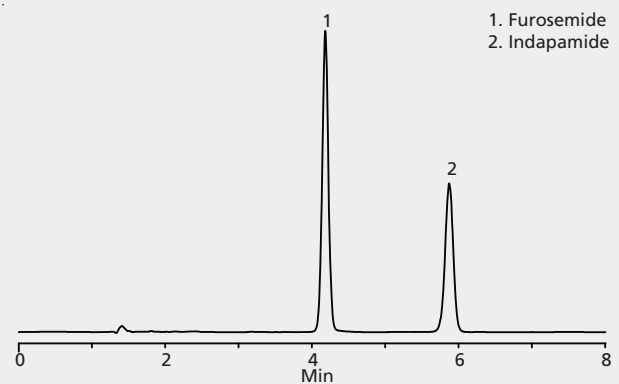
Diuretics

HPLC Analysis of Diuretics on Ascentis® C18

▶ application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 40:60, 10 mM monobasic potassium phosphate
 (pH 3.0 with phosphoric acid):acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 234 nm
 injection 10 µL
 sample 10 µg/mL each in mobile phase
 Application No. G002423

1. Furosemide
2. Indapamide

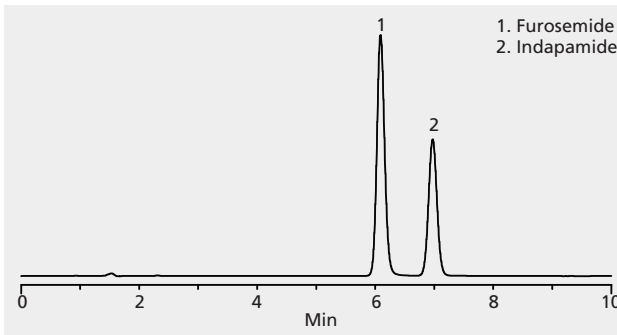


HPLC Analysis of Diuretics on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 60:40, 10 mM monobasic potassium phosphate
 (pH 3.0 with phosphoric acid):acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV, 234 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002650

1. Furosemide
2. Indapamide



Drug Screen

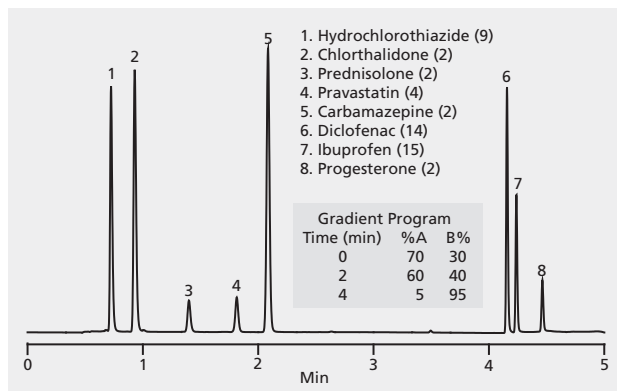
HPLC Analysis of Acidic and Neutral Drug Panel on Ascentis® Express C18

▶ application for HPLC

column Ascentis Express C18, 10 cm x 4.6 mm I.D., 2.7 µm particles (53827-U)
 mobile phase A: water with 0.1% phosphoric acid,
 B: acetonitrile with 0.1% phosphoric acid
 flow rate 1.76 mL/min
 column temp. ambient
 detector UV at 215 nm
 injection 100 µL
 Application No. G004212

1. Hydrochlorothiazide (9)
2. Chlorthalidone (2)
3. Prednisolone (2)
4. Pravastatin (4)
5. Carbamazepine (2)
6. Diclofenac (14)
7. Ibuprofen (15)
8. Progesterone (2)

Gradient Program		
Time (min)	%A	B%
0	70	30
2	60	40
4	5	95



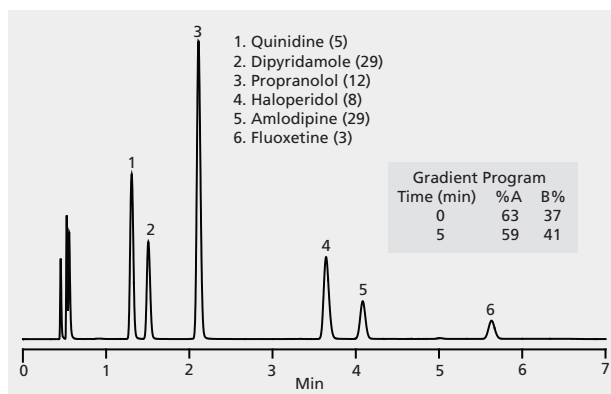
HPLC Applications

Pharmaceuticals: *Drug Screen*

HPLC Analysis of Basic Drug Panel on Ascentis® Express C18

► application for HPLC

column Ascentis Express C18, 10 cm x 4.6 mm I.D., 2.7 µm particles (53827-U)
 mobile phase A: water with 0.05M potassium phosphate and 0.1% TEA and 0.6% OSA-Na at pH = 2.9, B: acetonitrile
 flow rate 1.76 mL/min
 column temp. ambient
 detector UV at 215 nm
 injection 100 µL
 Application No. G004213

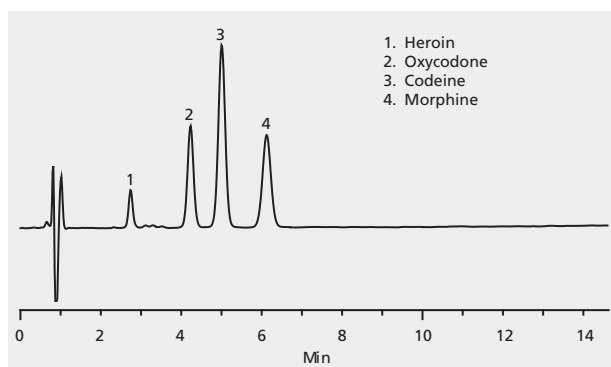


Drugs of Abuse

HPLC Analysis of Drugs of Abuse (separation in HILIC mode) on Ascentis® Silica

► application for HPLC

column Ascentis Si, 5 cm x 4.6 mm I.D., 5 µm particles (581511-U)
 mobile phase 10:90, 0.1% ammonium acetate in water (pH unadjusted); 0.1% ammonium acetate in acetonitrile
 flow rate 1 mL/min
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample 50 µg/mL in 0.1% ammonium acetate in 10:90, water:acetonitrile
 Application No. G003814

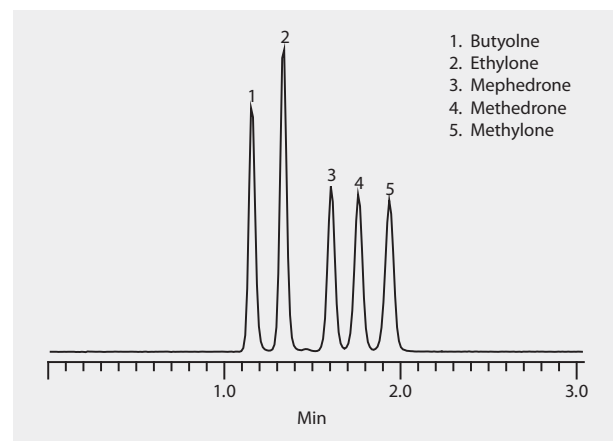


HPLC Analysis of Illicit Bath Salts on Ascentis® Express HILIC

► application for HPLC

With the rapid development of unregulated designer and synthetic compounds, the field of illicit drug testing has recently been met with a changing environment. Of most concern has been the development of a class of phenethylamine and cathinone compounds being marketed as “bath salts,” “jewelry cleaner,” or “plant food.” Though sold as “not for human consumption,” these compounds are reported to generate stimulating affects similar to that of methamphetamine, heroin, and 3,4- methylendioxypropylvalerone (MDMA). For a period of time, these compounds could be acquired legally through the internet and head shops due to no direct legal control. In the US, both state and local governments have instituted bans on the sale of these bath salt compounds. Forensic testing facilities often experience difficulty in testing these compounds due to the fact that they are not detected under normal ELISA testing methods; additional more specific LC-MS methods are necessary. The challenge for LC-MS detection of these particular bath salts resides in three sets of isobaric compounds that require chromatographic resolution for positive confirmation. For example, both butylone and ethylone have the same mono isotopic mass, making these compounds indistinguishable, even when using accurate mass time of flight TOF-MS. Efficient chromatographic separation is necessary for accurate quantitation of these compounds. The polar basic nature of the bath salts makes these compounds difficult to retain on traditional reversed-phase C18 and even polar embedded stationary phases, making them prime subjects for HILIC chromatographic separation. Shown here is the fast, high-resolution separation of nine synthetic bath salts on Ascentis Express HILIC.

mobile phase A: 5 mM ammonium formate (95:5 acetonitrile:water) (A025)
 column Ascentis Express HILIC, 5 cm x 2.1 mm I.D., 2.7 µm (53934IU)
 flow rate 0.6 mL/min
 column temp. 35 °C
 detector ESI(+), TIC 100 - 1000 m/z
 sample 1 µL
 Application No. G005444



HPLC Applications

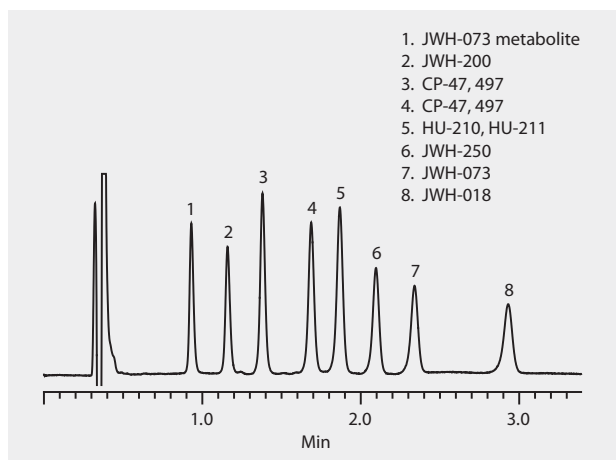
Pharmaceuticals: *Drugs of Abuse*

HPLC Analysis of Spice Cannabinoids on Ascentis® Express F5

► application for HPLC

Synthetic cannabinoids (Spice) are a relatively new type of designer drug used as a pseudo-legal means to get a cannabis-type high. New synthetic cannabinoids are continually being introduced as suppliers tweak the molecular structures. The ability to rapidly and reliably identify the continually changing population of these compounds is a significant analytical challenge facing forensic chemists. A rapid separation of nine of these compounds on Ascentis Express F5 column is shown here.

detector UV at 200 nm
 compound class: drugs of abuse
 column Ascentis Express F5, 10 cm x 2.1 mm I.D., 2.7 µm (53569-U)
 mobile phase (A) 50 mM ammonium formate; (B) water; (C) acetonitrile; (10:35:55, A:B:C)
 flow rate 0.6 mL/min
 pressure 281 bar
 column temp. 30 °C
 injection 3 µL
 sample 100 µg/mL in 45:55 water:acetonitrile
 Application No. G005446

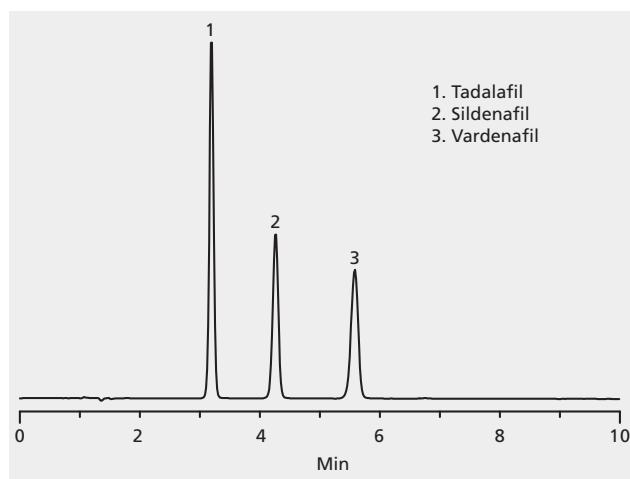


ED Drugs

HPLC Analysis of Erectile Dysfunction Drugs on Discovery® HS F5

► application for HPLC

column Discovery HS F5, 15 cm x 4.6 mm I.D., 5 µm particles (567516-U)
 mobile phase 50:50 water (10 mM NH₄COOH):CH₃CN
 flow rate 1.0 mL/min
 column temp. 35 °C
 detector UV, 230 nm
 injection 5 µL
 sample 50 µg/mL each in 50:50 water:CH₃CN
 Application No. G002542

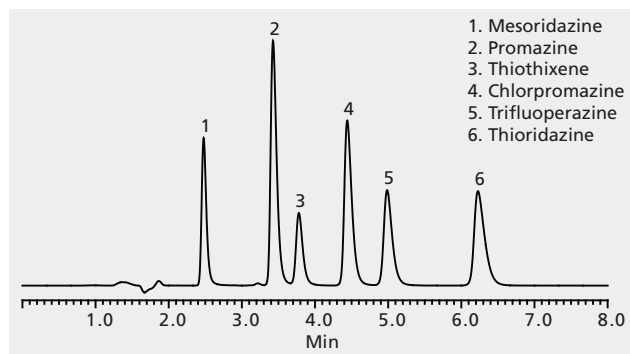


Hormones

HPLC Analysis of Dopamine Receptor Antagonists on Ascentis® Phenyl

► application for HPLC

column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 45:55, 50 mM ammonium formate (pH 3.0 with formic acid):acetonitrile
 flow rate 1.0 mL/min
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample 50 µg/mL in 50:50, water:methanol
 Application No. G003707



HPLC Applications

Pharmaceuticals: *Hormones*

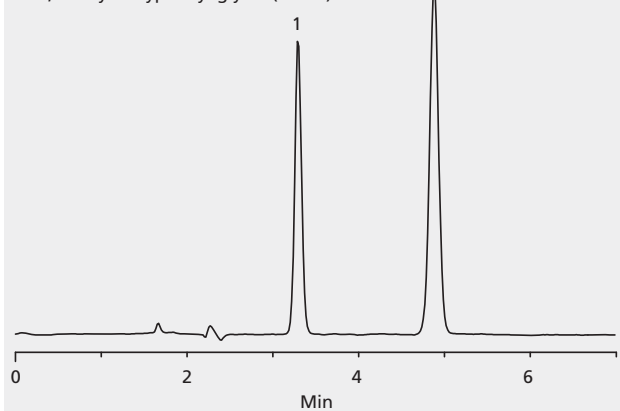
HPLC Analysis of Norepinephrine and 3,4-Dihydroxyphenylglycol on Discovery® HS F5

► application for HPLC

column Discovery HS F5, 15 cm x 4.6 mm I.D., 5 µm particles (567561-U)
 mobile phase 50 mM ammonium formate, pH to 3.0 with formic acid
 flow rate 1.0 mL/min
 column temp. 35 °C
 detector UV, 266 nm
 injection 10 µL
 sample 50 µg/mL each (NE and DHPG) in 5% methanol in mobile phase
 Application No. G002096

1. Norepinephrine (NE)

2. 3,4-Dihydroxyphenyl glycol (DHPG)

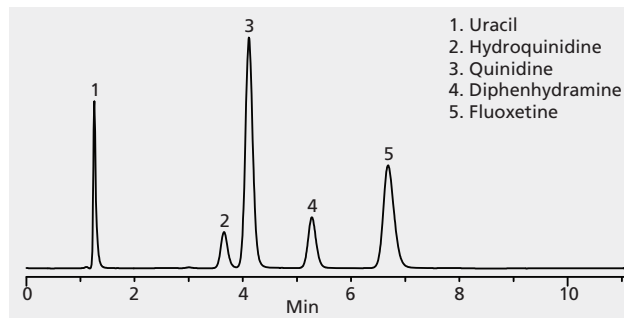


Hydrophobic Bases

HPLC Analysis of Hydrophobic Bases on Ascentis® RP-Amide

► application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 35:65, 25 mM ammonium phosphate (pH 7):methanol
 flow rate 1.2 mL/min.
 column temp. 35 °C
 detector UV, 230 nm
 injection 10 µL
 sample N05158
 Application No. G002612

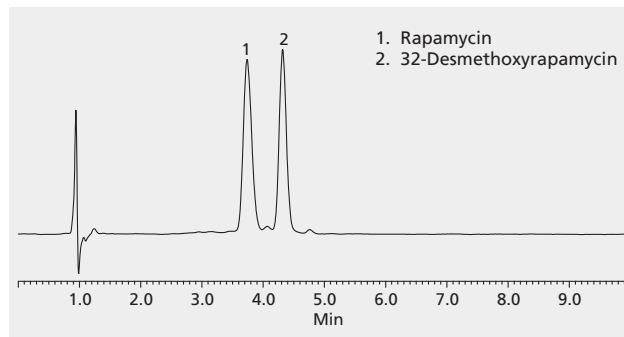


Immunosuppressants

HPLC Analysis of Rapamycin and 32-Desmethoxyrapamycin on Discovery® HS C18

► application for HPLC

column Discovery HS C18, 15 cm x 4.6 mm ID, 3µm particles (568522-U)
 mobile phase 10mM Ammonium Acetate, pH unadjusted:Acetonitrile (25:75, v/v)
 flow rate 1.5 mL/min
 column temp. 60 °C
 detector UV at 268 nm
 injection 10 µg/mL
 Application No. G002015

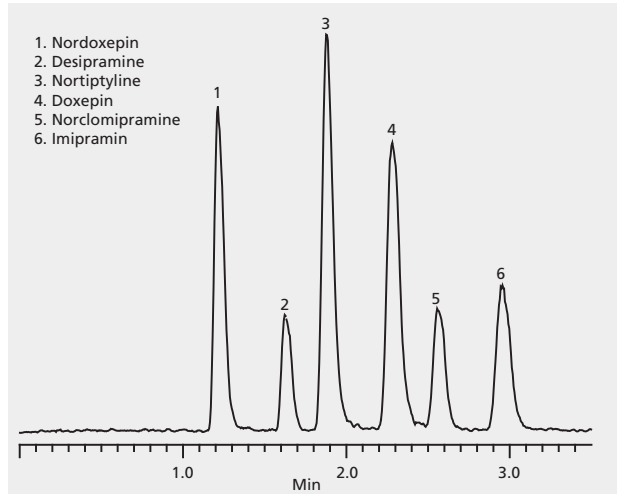


HPLC Analysis of Tricyclic Antidepressants on Ascentis® Express C18

► application for HPLC

column Ascentis Express C18, 10 cm x 2.1 mm ID (53823-U)
 mobile phase .. A: 100 mM ammonium acetate (pH 7.0; titrated with ammonium hydroxide), B: water, C: methanol
 flow rate 0.3 mL/min
 column temp. 55 °C
 detector Thermo LCQ Advantage; ESI(+), m/z 250-320
 injection 1 µL
 instrument Jasco X-LC
 Application No. G004062

1. Nordoxepin
 2. Desipramine
 3. Nortriptyline
 4. Doxepin
 5. Norclomipramine
 6. Imipramin



HPLC Applications

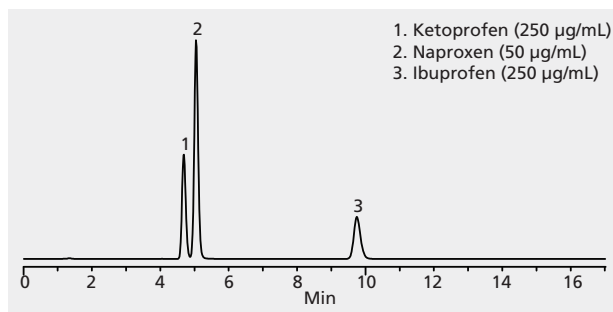
Pharmaceuticals: NSAIDs

NSAIDs

HPLC Analysis of NSAIDs on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 45:55, 10 mM dibasic potassium phosphate (pH 3.0):acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV, 230 nm
 injection 5 µL
 sample as indicated in 10 mM dibasic potassium phosphate (pH 3.0)
 Application No. G002621

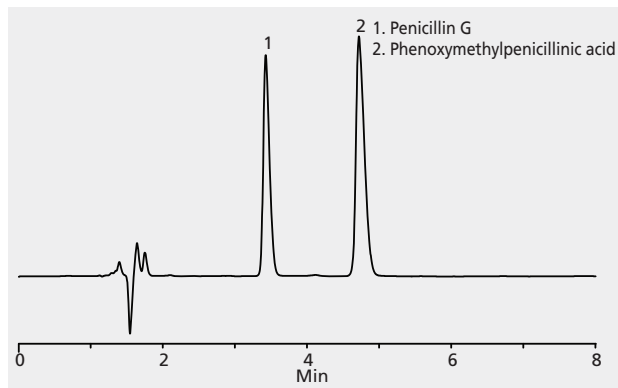


Penicillins

HPLC Analysis of Penicillin G and Phenoxyethylpenicillinic Acid on Ascentis® C18

▶ application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 75:25, 10 mM ammonium acetate (pH 4.5 acetic acid):acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 100 µg/mL each in mobile phase
 Application No. G002427

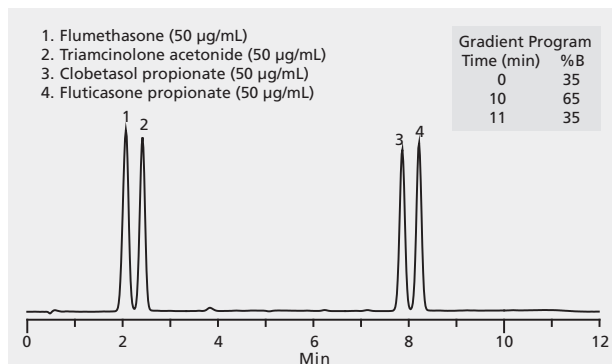


Steroids

HPLC Analysis of Fluorinated Corticosteroids on Ascentis® C18

▶ application for HPLC

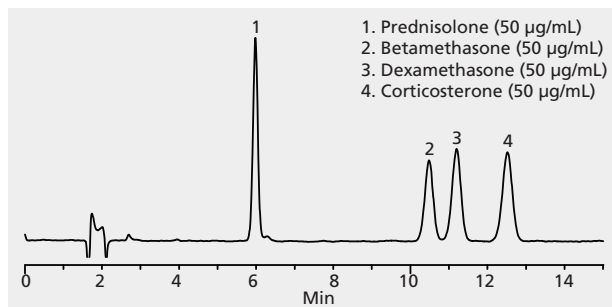
column Ascentis C18, 5 cm x 4.6 mm I.D., 5 µm particles (581323-U)
 mobile phase A: water, B: acetonitrile
 flow rate 1.0 mL/min
 column temp. 30 °C
 detector UV at 240 nm
 injection 5 µL
 sample as indicated in acetonitrile
 Application No. G003939



HPLC Analysis of Glucocorticoids on Ascentis® C8

▶ application for HPLC

column Ascentis C8, 15 cm x 4.6 mm I.D., 5 µm particles (581424-U)
 mobile phase 68:32, water:acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample as indicated in mobile phase
 Application No. G003148



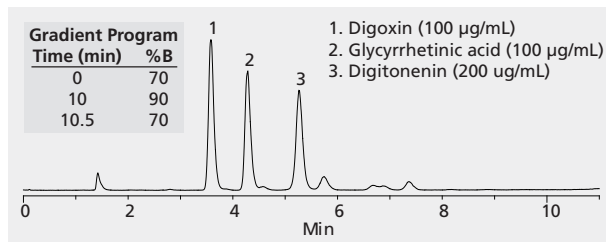
HPLC Applications

Pharmaceuticals: *Steroids*

HPLC Analysis of Steroidal Glycosides on Ascentis® Phenyl

▶ application for HPLC

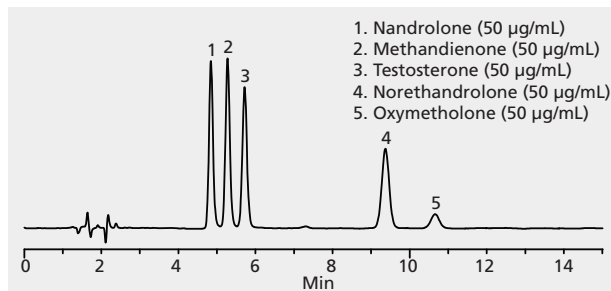
column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase A: 10 mM ammonium formate (pH 3 with formic acid); B: methanol
 flow rate 1.25 mL/min.
 column temp. 35 °C
 detector ELSD at 45 °C, gain 6, 3.5 bar N2
 injection 20 µL
 sample as indicated in mobile phase A
 Application No. G003714



HPLC Analysis of Steroids, Anabolic on Ascentis® C8

▶ application for HPLC

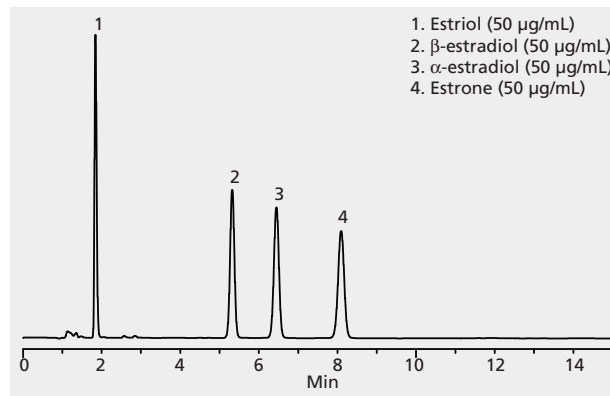
column Ascentis C8, 15 cm x 4.6 mm I.D., 5 µm particles (581424-U)
 mobile phase 50:50, water:acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample as indicated in mobile phase
 Application No. G003238



HPLC Analysis of Steroids on Ascentis® C18 (Mobile phase: 55:45)

▶ application for HPLC

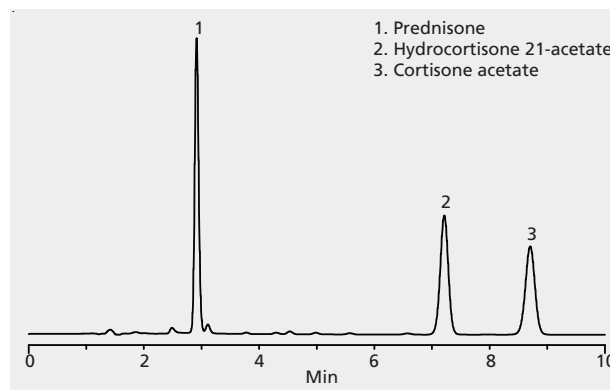
column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U) (581324-U)
 mobile phase 55:45, water:acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample as indicated in 55:45, water:acetonitrile
 Application No. G002330



HPLC Analysis of Steroids on Ascentis® C18 (Mobile phase: 60:40)

▶ application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 60:40, water:acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002432



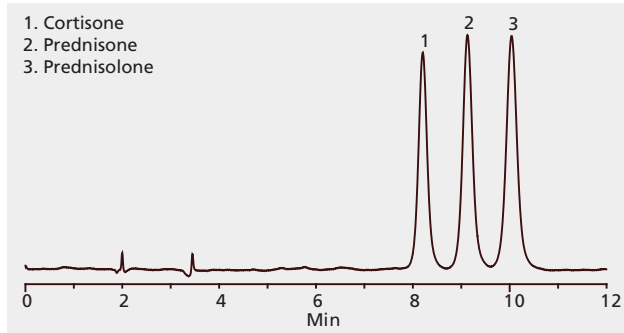
HPLC Applications

Pharmaceuticals: *Steroids*

HPLC Analysis of Steroids On Ascentis® Si

► application for HPLC

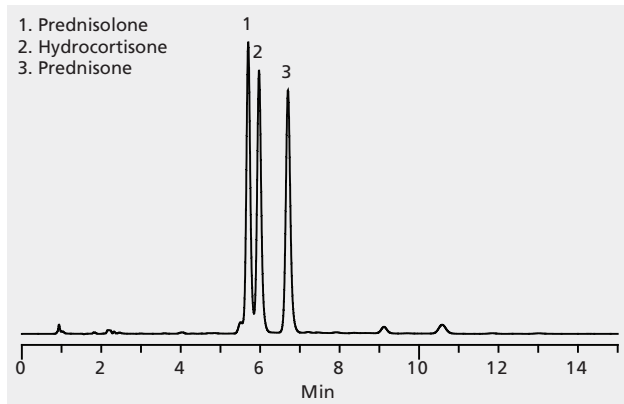
column Ascentis Si, 15 cm x 4.6 mm I.D., 5 µm particles (581512-U)
 mobile phase 88:12, hexane:ethanol
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 245 nm
 injection 10 µL
 sample 50 µg/mL in 85:15, hexane:2-propanol
 Application No. G003728



HPLC Analysis of Steroids on Ascentis® Phenyl

► application for HPLC

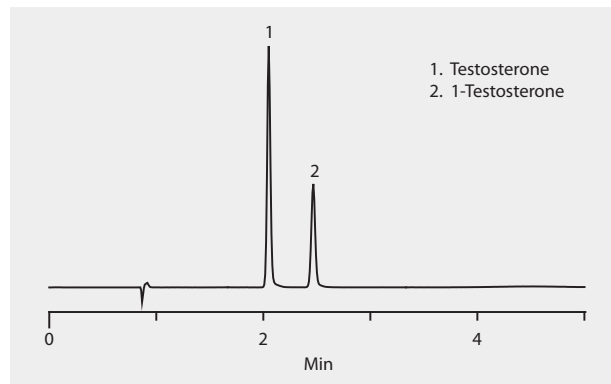
column Ascentis Phenyl, 15 cm x 4.6 mm I.D., 3 µm particles (581610-U)
 mobile phase 75:25, water:acetonitrile
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV at 240 nm
 injection 10 µL
 sample 50 µg/mL in 85:15, water:methanol
 Application No. G003698



HPLC Analysis of Testosterone and 1-Testosterone on Ascentis® Express C18

► application for HPLC

..... compound class: steroids
 column Ascentis Express C18, 10 cm x 4.6 mm I.D., 2.7 µm (53827-U)
 mobile phase A: water B: methanol Ratio: 20:80 (A:B)
 flow rate 1 mL/min
 column temp. 35 °C
 detector UV at 240 nm
 injection 5 µL
 sample 50 ug/mL in 10:90 water:methanol
 Application No. G005413

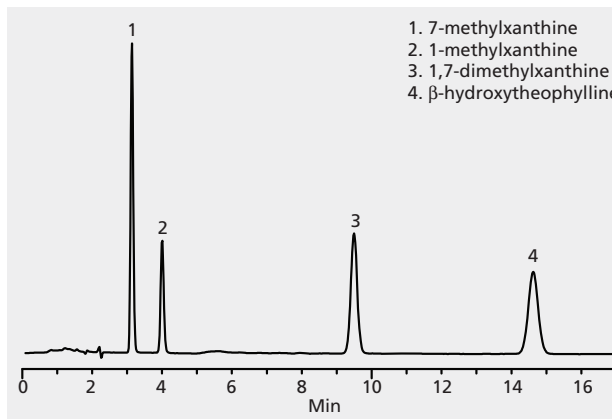


Stimulants

HPLC Analysis of Xanthines on Ascentis® C18

► application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 94:6, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid):
 methanol
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 220 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002465



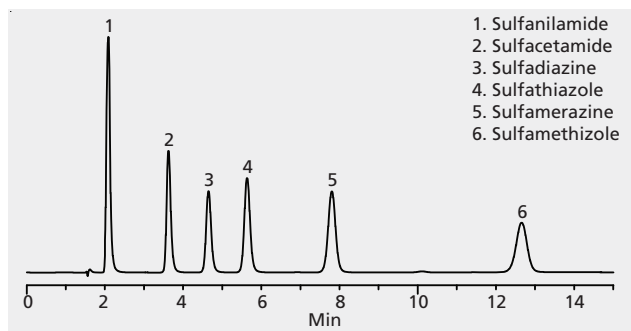
HPLC Applications

Pharmaceuticals: *Sulfa Drugs**Sulfa Drugs*

HPLC Analysis of Antibiotic Sulfa Drugs on Ascentis® C18

▶ application for HPLC

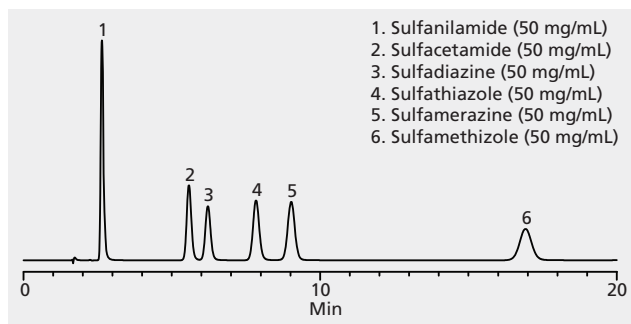
column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 85:15, water with 1% acetic acid:methanol
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 254 nm
 injection 10 µL
 sample 50 µg/mL each in mobile phase
 Application No. G002345



HPLC Analysis of Antibiotic Sulfa Drugs on Ascentis® RP-Amide

▶ application for HPLC

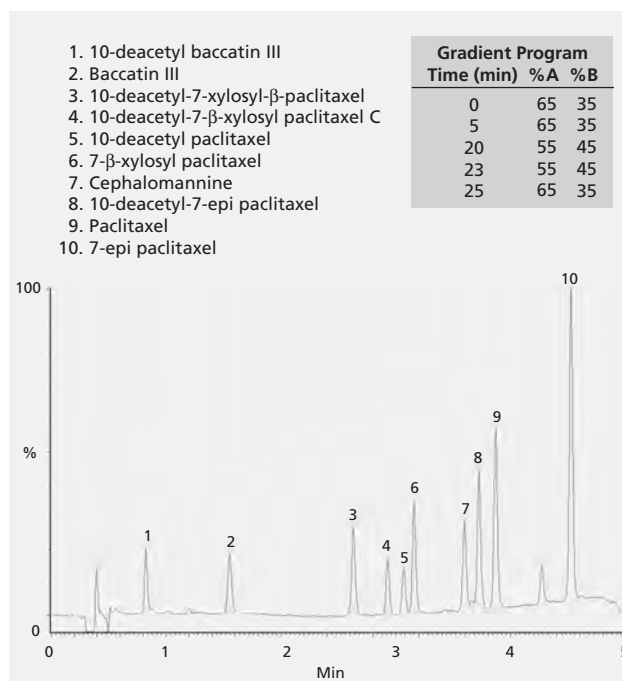
column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 85:15, 1% acetic acid in water:methanol
 flow rate 1.0 mL/min.
 column temp. 35 °C
 detector UV, 254 nm
 injection 10 µL
 sample as indicated in 1% acetic acid in water
 Application No. G002637

*Taxols*

HPLC Analysis of Taxols on Discovery® HS F5

▶ application for HPLC

column Discovery HS F5, 15 cm x 2.1 mm I.D., 3 µm particles (567503-U)
 mobile phase (A) 10 mM ammonium acetate (pH 6.8 unadjusted) (B) CH₃CN
 flow rate 0.2 mL/min
 column temp. ambient
 detector UV, 227 nm
 injection 10 µL
 sample 10 µg/mL (in 50:50, water:CH₃CN)
 Application No. G002150



HPLC Applications

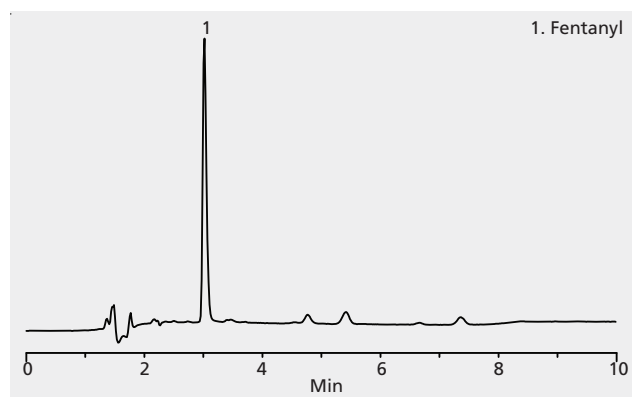
Pharmaceuticals: *Tranquilizers*

Tranquilizers

HPLC Analysis of Fentanyl Tranquilizer on Ascentis® C18

► application for HPLC

column Ascentis C18, 15 cm x 4.6 mm I.D., 5 µm particles (581324-U)
 mobile phase 67:33, 10 mM monobasic potassium phosphate (pH 3.0 with phosphoric acid): acetonitrile
 flow rate 1 mL/min.
 column temp. 35 °C
 detector UV at 215 nm
 injection 10 µL
 sample 20 µg/mL in mobile phase
 Application No. G002435

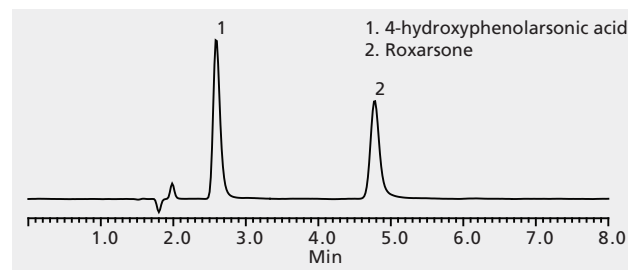


Preservatives

HPLC Analysis of Animal Feed Additives on Ascentis® Phenyl

► application for HPLC

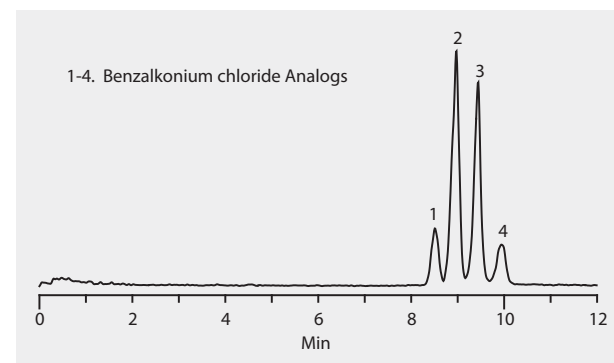
column Ascentis Phenyl 15 cm x 4.6 mm I.D., 5 µm particles (581616-U)
 mobile phase 78:22, 10 mM ammonium formate (pH 3.0 with formic acid):methanol
 flow rate 1.0 mL/min.45/
 column temp. 35 °C
 detector UV at 225 nm
 injection 5 µL
 sample as indicated in mobile phase A
 Application No. G003712



HPLC Analysis of Benzalkonium Chloride in Commercial Disinfecting Wipes on Ascentis® Express HILIC

► application for HPLC

column Ascentis Express HILIC, 15 cm x 4.6 mm I.D., 2.7 µm (53981-U)
 mobile phase A: 20 mM ammonium acetate B: acetonitrile Ratio: 10:90 (A:B)
 flow rate 1 mL/min
 column temp. 35 °C
 detector ESI(+), TIC 150 - 500 m/z
 injection 2 µL
 sample Single wipe sheet, extracted with 10 mL methanol
 Application No. G005414



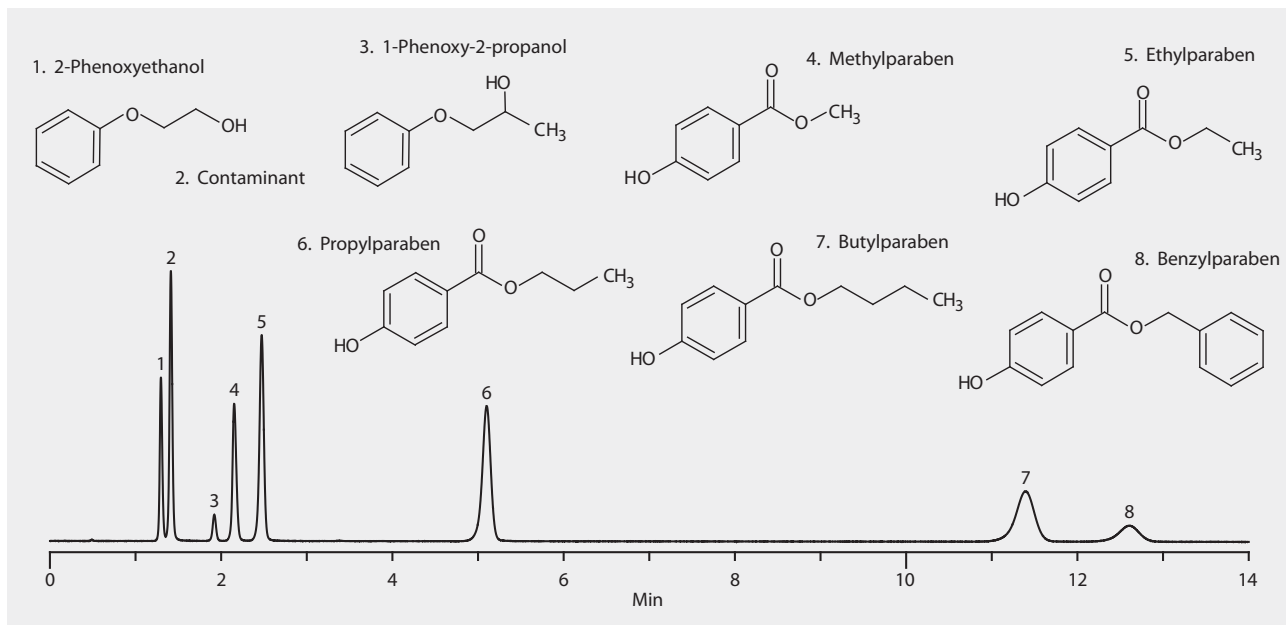
HPLC Applications

Preservatives

HPLC Analysis of Cosmetic Preservatives on Ascentis® Express C18 (Flow rate: 0.6 mL/min)

► application for HPLC

column Ascentis Express C18, 7.5 cm x 3 mm I.D., 2.7 µm (53812-U)
 mobile phase A: water B: methanol Ratio: 55:45 (A:B)
 flow rate 0.6 mL/min
 column temp. 35 °C
 detector UV at 250 nm
 injection 1 µL
 sample methyl-, benzylparaben, 50 mg/L; ethylparaben, 30 mg/L; propyl-, butylparaben, 100 mg/L; 2-phenoxyethanol, 1.5 g/L; 1-phenoxy-2-propanol, 3 g/L; all in 40% methanol
 Application No. G005386



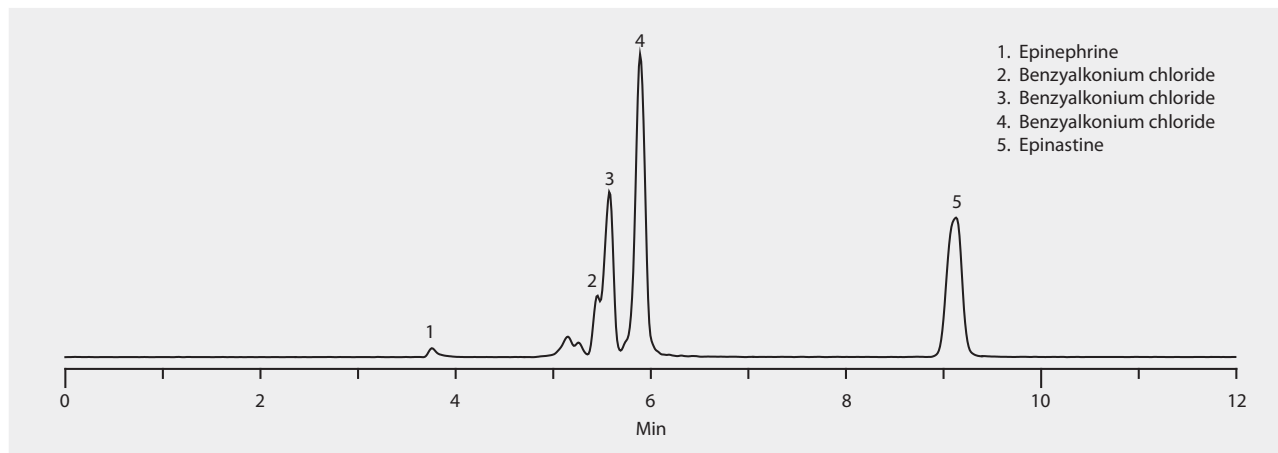
HPLC Applications

Preservatives

HPLC Analysis of Epinephrine, Epinastine, and Benzalkonium Chlorides on Ascentis® Express HILIC

▶ application for HPLC

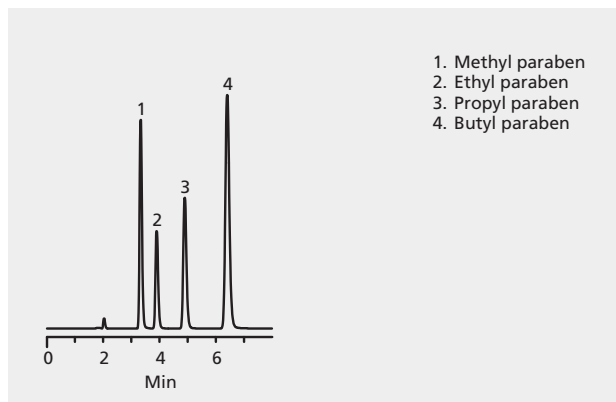
column Ascentis Express HILIC, 15 cm x 4.6 mm I.D., 2.7 µm (53981-U)
 mobile phase A: 50 mM ammonium acetate B: acetonitrile Ratio: 10:90 (A:B)
 flow rate 1 mL/min
 column temp. 35 °C
 detector ESI(+), XIC m/z 304 & 332 (BAC), 250 (epinastine), 180 (epinephrine)
 injection 10 µL
 sample 10 mg/L ea. in acetonitrile
 Application No. G005411



HPLC Analysis of Paraben Preservatives on Discovery® Cyano

▶ application for HPLC

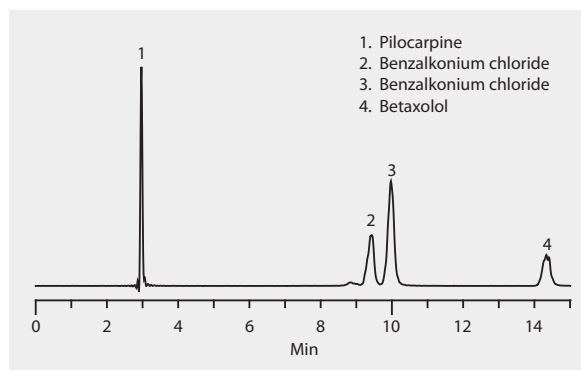
column Discovery Cyano, 15 cm x 4.6 mm I.D., 5 µm particles (59356-U)
 mobile phase CH₃CN:H₂O, (40:60)
 flow rate 1 mL/min
 column temp. 20 °C
 detector UV, 254 nm
 injection 10 µL
 Application No. G001237



HPLC Analysis of Pilocarpine, Betaxolol, and Benzalkonium Chloride on Ascentis® Express HILIC

▶ application for HPLC

column Ascentis Express HILIC, 15 cm x 4.6 mm I.D., 2.7 µm (53981-U)
 mobile phase A: 20 mM ammonium acetate B: acetonitrile Ratio: 10:90 (A:B)
 flow rate 1 mL/min
 column temp. 35 °C
 detector ESI (+), XIC m/z 304, 332 (BAC), 209 (pilocarpine), 308 (betaxolol)
 injection 2 µL
 sample 10 mg/L in acetonitrile
 Application No. G005412

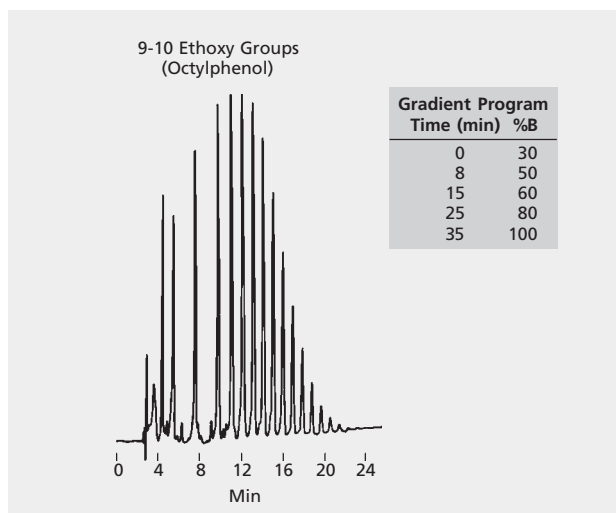


Surfactants

HPLC Analysis of Nonionic Surfactants, 9-10 Ethoxy Groups (Octylphenol) on SUPELCOSIL™ LC-Diol

▶ application for HPLC

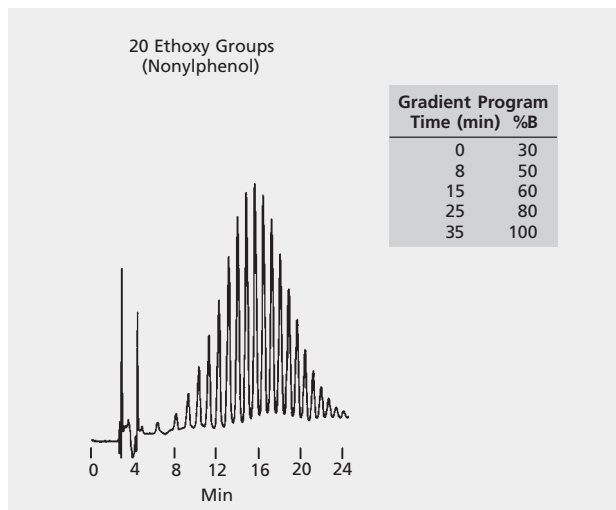
column SUPELCOSIL LC-Diol, 25 cm x 4.6 mm I.D., 5 µm particles (58201)
 mobile phase A: hexane:methylene chloride (95:5); B: hexane:methylene chloride:methanol (50:40:10)
 flow rate 1 mL/min
 column temp. 35 °C
 detector UV, 280 nm
 injection 10 µL methylene chloride containing 20 µg surfactant
 Application No. 713-0782



HPLC Analysis of Nonionic Surfactants, 20 Ethoxy Groups (Nonylphenol) on SUPELCOSIL™ LC-Diol

▶ application for HPLC

column SUPELCOSIL LC-Diol, 25 cm x 4.6 mm I.D., 5 µm particles (58201)
 mobile phase A: hexane:methylene chloride (95:5); B: hexane:methylene chloride:methanol (50:40:10)
 flow rate 1 mL/min
 column temp. 35 °C
 detector UV, 280 nm
 injection 10 µL methylene chloride containing 20 µg surfactant
 Application No. 713-1068

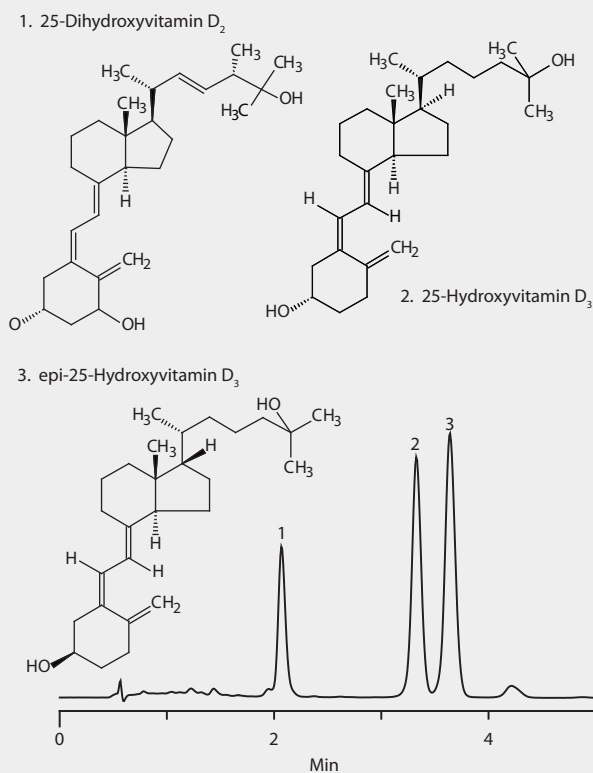


Vitamins

HPLC Analysis of 25-Dihydroxyvitamin D₂, 25-Hydroxyvitamin D₃ and 3-epi-25-Hydroxyvitamin D₃ on Ascentis® Express F5 (30 °C)

▶ application for HPLC

column Ascentis Express F5, 10 cm x 2.1 mm I.D., 2.7 µm (53569-U)
 compound class: vitamins
 mobile phase A: 5 mM ammonium formate B: methanol Ratio: 25:75 (A:B)
 flow rate 0.4 mL/min
 pressure 296 bar
 column temp. 30 °C
 detector UV at 265 nm
 ESI(+), m/z 100 - 1000
 injection 1 µL
 sample 500 µg/mL in methanol
 Application No. G005376



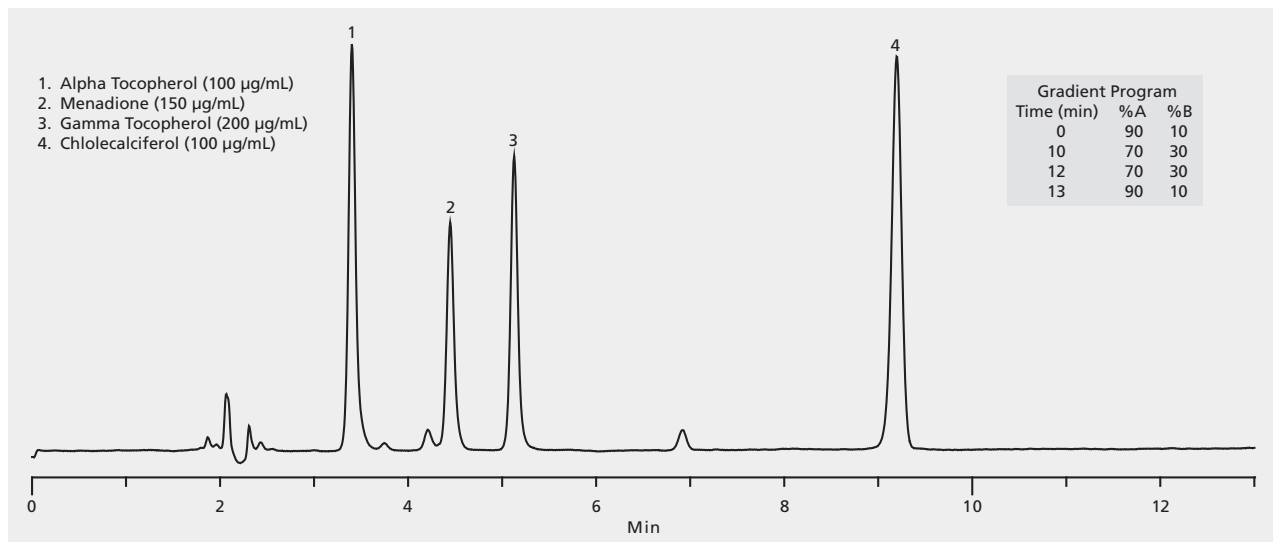
HPLC Applications

Vitamins

HPLC Analysis of Fat Soluble Vitamins by Normal Phase Chromatography on Ascentis® Si (15 cm x 4.6 mm x 5 µm)

▶ application for HPLC

column Ascentis Si, 15 cm x 4.6 mm I.D., 5 µm particles (581512-U)
 mobile phase A: hexane, B: ethyl acetate
 flow rate 1.0 mL/min
 column temp. 30 °C
 detector UV at 290 nm
 injection 10 µL
 sample as indicated in 96:4 (hexane:isopropanol)
 Application No. G003693



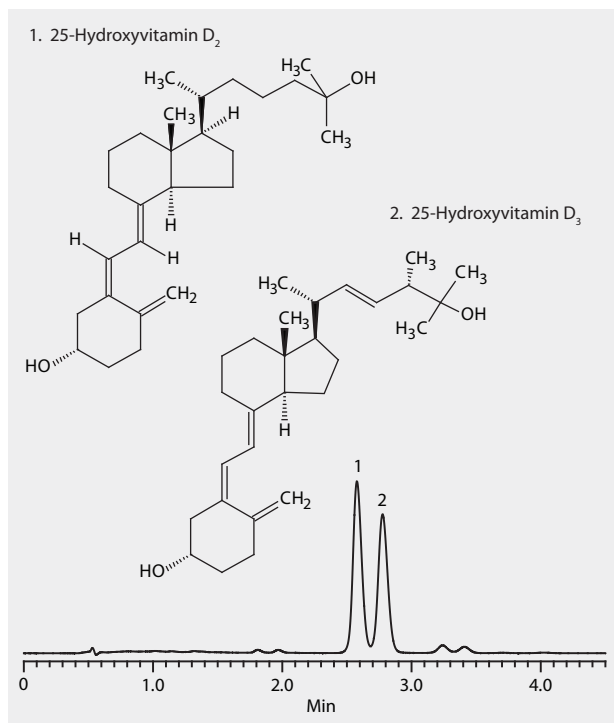
HPLC Applications

Vitamins

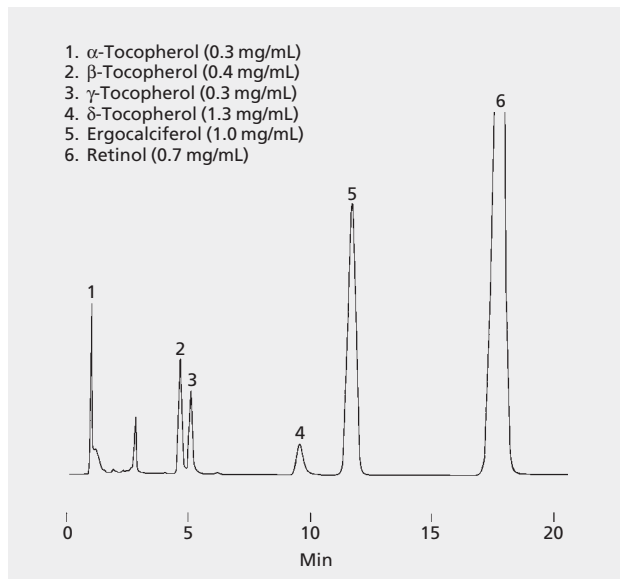
HPLC Analysis of 25-Hydroxyvitamin D₃ and 25-Hydroxyvitamin D₂ on Ascentis® Express F5

▶ application for HPLC

compound class: vitamins
 mobile phase: A: 7 mM ammonium formate B: methanol Ratio: 25:75 (A:B)
 flow rate: 0.4 mL/min
 column temp.: 40 °C
 injection: 1 µL
 sample: 300 mg/L in 25:75, water:methanol
 column: Ascentis Express F5, 10 cm x 2.1 mm I.D., 2.7 µm (53569-U)
 detector: UV at 250 nm
 ESI(+), TIC m/z 100 - 1000
 Application No.: G005374

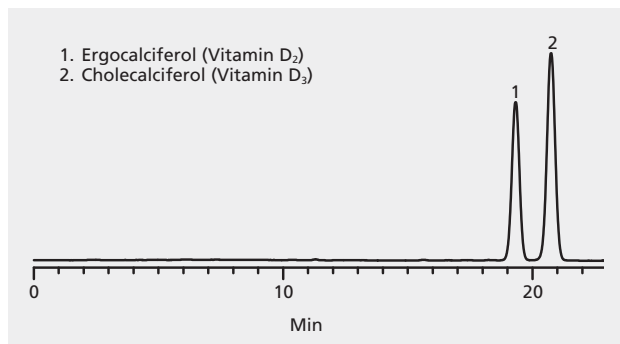
HPLC Analysis of Vitamins, Fat Soluble (A and E) on SUPELCO[™] LC-Si

column: SUPELCO[™] LC-Si, 15 cm x 4.6 mm I.D., 5 µm particles (58200-U)
 mobile phase: hexane:amyl alcohol (99.65:0.35)
 flow rate: 2 mL/min
 detector: UV, 280 nm
 injection: 20 µL
 Application No.: 713-0881

HPLC Analysis of Vitamins, Fat Soluble (D₂ and D₃) on Discovery® HS C18

▶ application for HPLC

column: Discovery HS C18, 15 cm x 4.6 mm I.D., 3 µm particles (569252-U)
 mobile phase: 100% CH₃CN
 flow rate: 0.8 mL/min
 column temp.: 30 °C
 detector: UV, 290 nm
 injection: 10 µL 50 µg/mL of each analyte
 Application No.: G001419



HPLC Applications

Vitamins

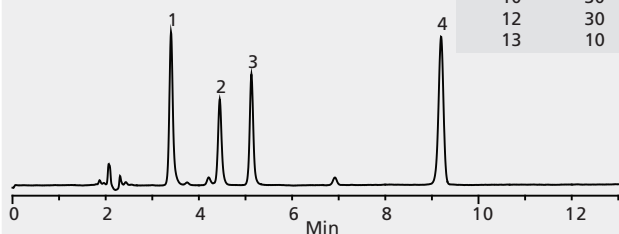
HPLC Analysis of Vitamins, Fat Soluble on Ascentis® Si

▶ application for HPLC

column Ascentis Si, 15 cm x 4.6 mm I.D., 5 µm particles (581512-U)
 mobile phase A: hexane; B: ethylacetate
 flow rate 1.0 mL/min.
 column temp. 30 °C
 detector UV at 290 nm
 injection 10 µL
 sample as indicated in 96:4 (hexane:isopropanol)
 Application No. G003727

1. alpha Tocopherol
2. Menadione
3. gamma Tocopherol
4. Cholecalciferol

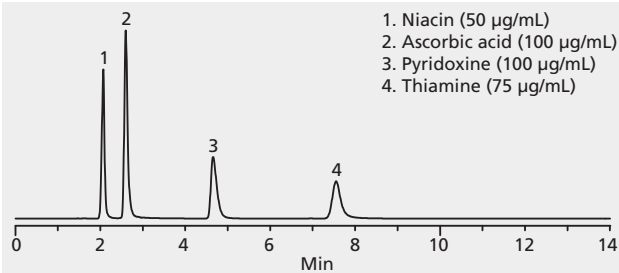
Gradient Program	
Time (min)	%B
0	10
10	30
12	30
13	10



HPLC Analysis of Vitamins, Water Soluble on Ascentis® RP-Amide

▶ application for HPLC

column Ascentis RP-Amide, 15 cm x 4.6 mm I.D., 5 µm particles (565324-U)
 mobile phase 25 mM potassium phosphate, dibasic (pH 3.5 with phosphoric acid)
 flow rate 1.0 mL/min.
 column temp. 30 °C
 detector UV at 230 nm
 injection 10 µL
 sample as indicated in 25 mM potassium phosphate, dibasic (pH 3.5 with phosphoric acid)
 Application No. G003035



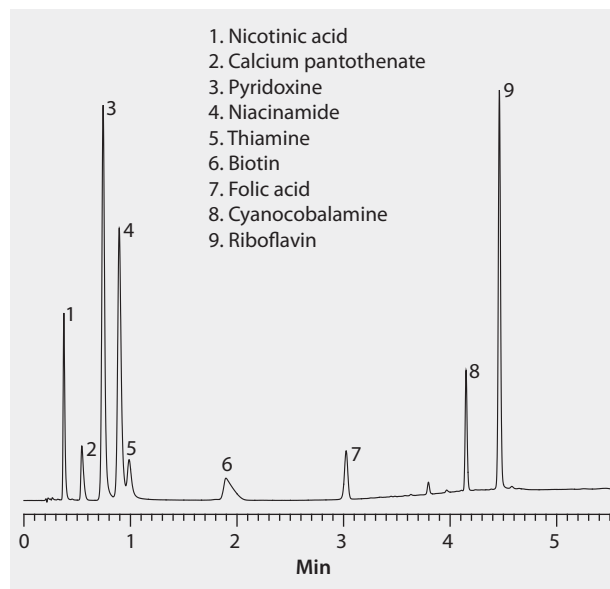
1. Niacin (50 µg/mL)
2. Ascorbic acid (100 µg/mL)
3. Pyridoxine (100 µg/mL)
4. Thiamine (75 µg/mL)

HPLC Analysis of Water-Soluble B-Vitamins on Ascentis® Express C18

▶ application for HPLC

A mix of 9 water-soluble B-vitamins was separated on Ascentis Express C18 column

..... compound class: vitamins
 column Ascentis Express C18, 5 cm x 3.0 mm I.D., 2.7 µm particles (53811-U)
 mobile phase A; 20 mM K₂HPO₄, pH 7; B; methanol
 gradient 0.5% B for 1.3 min, 0.5-30%B over 1.7 min;
 to 30% B in 1.4 min, 2 min equilibration at 0.5% B
 flow rate 1.0 mL/min
 pressure 4130 psi
 column temp. 35 °C
 detector UV, 210 nm
 sample 9 vitamins in water, 10 µg/mL for nicotinic acid and folic acid,
 12 µg/mL for thiamine hydrochloride and cyanocobalamin,
 (20 µg/mL for pyridoxine, 30 µg/mL for riboflavin, 40 µg/mL for niacinamide,
 100 µg/mL for calcium pantothenate, 120 µg/mL for biotin)
 Application No. G005625



1. Nicotinic acid
2. Calcium pantothenate
3. Pyridoxine
4. Niacinamide
5. Thiamine
6. Biotin
7. Folic acid
8. Cyanocobalamin
9. Riboflavin



CHIRAL CHROMATOGRAPHY

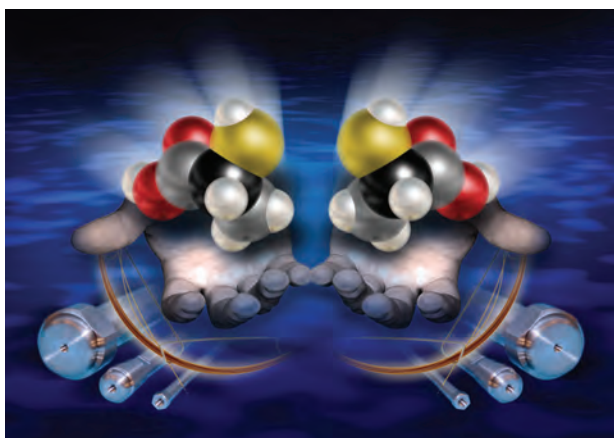
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Think Chiral...Think Supelco

NEW PRODUCTS

Think Chiral...Think Supelco

From a separation perspective, few types of compounds can match the challenges posed by chiral compounds. Chirality is important primarily because biological systems recognize stereochemistry. The enantiomers of chiral drug substances usually have different therapeutic efficacies, and it is not uncommon for one enantiomer to have unwanted and even toxic qualities. Eliminating the inactive enantiomer in chiral agrochemicals can reduce by half or more the amount of chemical that needs to be applied to the crop, with less waste and less environmental impact. However, chiral compounds pose a particular analytical challenge: Enantiomers have identical physical and chemical properties and differ only in their optical rotation and interactions with other chiral molecules.



sigma-aldrich.com/chiral

Corporate web portal devoted to all things chiral

Sigma-Aldrich is a leader in chiral products and services for chemical synthesis, drug discovery, and analytical assessment. Our regularly-updated chiral web portal presents all of our products, services, seminars and technical literature for chirality in one convenient location. The site can be used to access Supelco's chiral HPLC and GC columns, our Chiral Services Laboratory, as well as Aldrich® chiral chemistry products, like privileged ligands and complexes, chiral catalysts, ligands and reagents, chiral auxiliaries and chiral building blocks.

Your resource for technical literature, bibliography, and applications for chiral chromatography

Developing a new chiral method typically involves perusing application databases, consulting the literature, screening columns, or contracting with a chiral service lab. Supelco can help with all of these approaches. We have created a centralized location of chiral resources and facile navigation. Visit and bookmark our chiral web portal to gain access to the valuable chiral resources:

- Applications: A growing list of thousands of applications on Astec and Supelco columns
- Bibliography: Up-to-date compilation of citations using our chiral columns
- Technical literature, handbooks and presentations

Astec: Part of the Sigma-Aldrich Analytical Family



A pre-eminent innovator in chiral chromatography, Astec, its products and the expertise and dedication of its people became part of Sigma-Aldrich in 2006. Many Astec products were conceived through collaboration with Prof. Daniel Armstrong under a spirit of innovation that continues to thrive in our R&D group today.

Chiral Columns + Chiral Reagents + Chiral Services + Expert Customer Support = Successful Enantiomer Separations

Astec columns are backed by our world-class customer and technical support. They have become an integral part of our chiral offering, which includes:

- **HPLC & SFC columns** - Choices in stationary phase chemistry allow versatile mobile phase selection, suitable for a wide variety of analytes
- **Capillary GC columns** - Wide choice in inert, low-bleed, coated and chemically-bonded highly-enantioselective cyclodextrin derivatives
- **Reagents** - Selective chiral derivatization reagents and high-purity chiral mobile phase additives
- **Chiral Services** - Chiral column screening (HPLC and GC), method development and optimization and small-scale purification

Chiral Services

Developing chiral methods and isolating pure enantiomers for further testing can be time consuming. To help our customers, we offer chiral column screening, method optimization and isolation of mg to gram quantities of purified enantiomer. Process-scale amounts can be purified by our SAFC facilities around the world. All work done by the expert staff of our state-of-the-art Chiral Services Laboratory is performed according to your specifications and is fully confidential. Our laboratory personnel also perform achiral separations and purifications.

Chiral Services

HPLC Chiral Column Screening	HPLC chiral column screening protocol includes multiple mobile phase conditions run on multiple chiral stationary phases representing four separation modes (NP, RP, PIM and POM). Positive separation is verified on a separate system. Enantiomers are identified as (+) and (-)
GC Chiral Column Screening	GC column screening involves exploration of 4 GC chiral phases. Samples that require derivatization are verified by GC-MS.
HPLC and GC Chiral Method Optimization and Development Services	Method optimization may vary, depending on the intended use of the method, which may include isolation/purification of enantiomers, resolution of metabolites, establishment of minimum detection limits, LC-MS compatible methods for clinical, stability or dissolution studies. Typical experiments in the optimization study include modifying buffer and pH, organic modifier type and strength, and column temperature.
Small-Scale Enantiomeric Purification	Milligram to gram quantities. Typical enantiomeric purity is 98% and verification is determined by analytical methods established in the screening study. Larger scale purifications are available through our SAFC offices worldwide.

Chiral Services



Supelco Chiral Services Laboratory

Chiral HPLC & SFC Columns

Supelco's HPLC chiral stationary phases (CSPs) cover a broad range of chemistries, enantioselectivity, and application focus. The unique, proprietary Astec CHIROBIOTIC® and Astec CYCLOBOND® are particularly interesting from a chiral method development standpoint. Currently, the chiral HPLC and SFC columns we carry include:

- Astec CHIROBIOTIC® macrocyclic glycopeptide-based CSPs
- Astec CYCLOBOND® bonded cyclodextrin-based CSPs
- Astec Cellulose DMP polysaccharide-based CSPs
- Astec P-CAP™ and P-CAP™-DP chiral polymer-based CSPs
- Astec CLC copper ligand exchange CSPs
- CHIRALPAK® AGP, CBH, and HSA protein-based CSPs from DAICEL Corp.
- LARIHC™ and FRULIC™ cyclofructan-based CSPs from AZYP, LLC
- Kromasil® AmyCoat®, CelluCoat®, Chiral DMB, and Chiral TBB from Eka Chemicals AB (available from Sigma-Aldrich in USA, Canada, and Puerto Rico)

The development of innovative, new CSPs is an important R&D activity for us. Please call our Technical Services or visit our web site, www.sigma-aldrich.com/chiral, for information on our most current offering.

Rapid, Efficient and Effective Chiral Method Development

Successful separations are more likely when you include Astec CHIROBIOTIC® and Astec CYCLOBOND columns in your chiral column screening protocol along with conventional cellulosic/amylosic CSPs. These two types of CSPs are highly complementary. For developing a new chiral HPLC method, we have created and use routinely in our laboratories a simple and rapid chiral column screening protocol shown below. Method development follows a simple strategy that tests polar ionic, polar organic, reversed-phase and normal phase modes.

Method Development and Column Screening Protocol on CHIROBIOTIC® and CYCLOBOND HPLC Columns

	CHIROBIOTIC® V2, T, R, TAG	CYCLOBOND I 2000, HP-RSP, DMP, DNP	
Mobile Phase System	Screening Mobile Phase	Screening Mobile Phase	Parameters to Optimize
Polar Ionic	(100:0.1:0.1, v/v/v) CH ₃ OH/acetic acid/ triethylamine		Change acid-base ratio, change the type of acid or base, add a volatile salt (test different ammonium salts)
Reversed-Phase	(30:70) CH ₃ CN/20 mM ammonium acetate, pH 5	(1) (30:70) CH ₃ CN/20 mM ammonium acetate, pH 5 (2) (20:80) CH ₃ OH/20 mM ammonium acetate, pH 5	Change the % and type of organic modifier, adjust pH, buffer type and ionic strength
Polar Organic	Methanol	95:5:0.1:0.1; CH ₃ CN/ CH ₃ OH/acetic acid/ triethylamine	Use other polar organic solvents or blends
Normal Phase	(30:70) Ethanol/ heptane	(30:70) Ethanol/heptane (DMP, DNP only)	Increase % of polar modifier, change both solvents

The Astec CHIROBIOTIC® and CYCLOBOND CSPs we recommend in the screening protocol are available in convenient kits. Also, you can increase the probability of success by incorporating the Astec Cellulose, Astec P-CAP, Astec CLC, LARIHC, and protein-based CSPs into your screening protocol. We would be happy to help you select the best line-up of columns for your types of analytes, detectors, and preferred mobile phase systems.



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T409107	Chiral Method Development Wallchart

Preparative Chiral Separations

It is often the case that mg to gram quantities of purified enantiomer are required for safety and efficacy testing, or for further modification. Chiral HPLC is commonly used for this application. Once an enantiomer is shown to have desirable characteristics, then an asymmetrical synthesis may be developed to avoid a racemate. However, if a cost-effective synthetic approach is not readily available, then chromatography may indeed provide the best means to obtain purified enantiomer. Supelco's HPLC CSPs are amenable to preparative separations, whether in classic LC mode, SFC or in continuous preparative techniques such as SMB and multi-column processes. Supelco chiral HPLC phases offer benefits in:

- **Sample Solubility** - Choose mobile phases that maximize sample solubility, including aqueous and polar systems
- **Throughput** - Shorter retention times give higher throughput

Supercritical Fluid Chromatography (SFC)

SFC is gaining in popularity primarily because of its speed and "green" advantages over normal phase HPLC. The CO₂ is readily removed from the eluate, which makes it ideal for prep. We offer several types of Astec chiral HPLC columns that are suitable for SFC separations.

- **Astec Cellulose DMP** columns are the most ideally suited for chiral SFC. They provide rapid separations with excellent enantioselectivity, long column lifetime, and low backpressure without significant column bleed.
- **Astec P-CAP** columns have recently been found to be beneficial in the separation of a complex mixture of enantiomers and achiral impurities. They provided resolution in instances where conventional polysaccharide-based CSPs failed (1).

Chiral HPLC & SFC Columns

Supercritical Fluid Chromatography (SFC)

- A number of the Astec CYCLOBOND derivatives offer good opportunities for SFC, including CYCLOBOND I 2000 DNP, a pi acid, and the CYCLOBOND I 2000 DMP, a pi base. Astec CYCLOBOND I 2000, RSP and DM are also useful for SFC, the DM especially for fused polycyclic compounds. Since these latter CSPs have as their primary mechanism steric repulsion and hydrogen bonding, SFC's benefits of speed and efficiency are realized.
- Astec CHIROBIOTIC® CSPs are suitable for polar and non-polar neutral analytes. However, because of their ionic character, additives are required for ionized analytes to avoid lengthy analysis times. A good summary appears in Liu, et al (2).

(1) Barnhart, W. W.; Gahm, K. H.; Hua Z.; Goetzinger, W. Supercritical Fluid Chromatography Comparison of the Poly(trans-1,2-Cyclohexanediyl-bis Acrylamide) (P-CAP) Column with Several Derivatized Polysaccharide-based Stationary Phases. *J. Chromatogr. B*, **2008**, *875*, 217-229.

(2) Liu, Y.; Berthod, A.; Mitchell, C. R.; Xiao, T. L.; Zhang, B.; Armstrong, D. W. Super/Subcritical Fluid Chromatography Chiral Separations with Macroyclic Glycopeptide Stationary Phases. *J. Chrom. A*, **2002**, *978*, 185-204.

Simulated Moving Bed Chromatography (SMB)

A continuous preparative HPLC technique, SMB or counter-current chromatography can be conceptualized as multiple columns used in series to make a single column of effectively infinite length. Supelco chiral HPLC columns and packings permit robust SMB operation. The polar organic and polar ionic (methanol or acetonitrile containing soluble ionic additives) mobile phases and larger particle sizes of Astec CHIROBIOTIC®; and Astec CYCLOBOND CSPs provide minimal back pressure, which is important in SMB to maximize through-put by allowing high flow rates. Additionally, mobile phases can be chosen to maximize sample solubility to prevent precipitation and increase the sample load. Note the special section on SMB sets in the Astec CHIROBIOTIC®; products.



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No. Title
T409105 Astec CHIROBIOTIC® Columns Sets for SMB

Choosing a Chiral HPLC Column

When performing a chiral separation, it is usually very difficult to predict which CSP will provide adequate enantioselectivity, especially when working with new chemical entities. Even the experts use a column screening protocol. To make this process easier for you, we offer three economical and time-saving options:

- Access our extensive applications and bibliographical database by calling our Technical Services or viewing the growing applications library on our web site.
- Purchase an Astec CHIROBIOTIC® and/or Astec CYCLOBOND column screening kit. The kits contain CSPs in column geometries that have the highest success rate. They are priced below what the columns would cost if purchased separately.
- Rely on the expertise and professionalism of our Chiral Services laboratory for column screening, method optimization, and small-scale purification.

Astec CHIROBIOTIC® Chiral HPLC Columns



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No. Title
T408131 CHIROBIOTIC® Brochure

CHIROBIOTIC®: "Chiral by Nature"

The Astec CHIROBIOTIC® family comprises highly enantioselective chiral HPLC stationary phases based on naturally-occurring macrocyclic glycopeptides that have been bonded through multiple covalent linkages to high purity silica particles. Developed by Prof. Daniel Armstrong (1), CHIROBIOTIC® CSPs are unique in possessing ionic functional groups, which means they can be used for reversed-phase and LC-MS separation of ionizable enantiomers, as well as neutral molecules. The members of the CHIROBIOTIC® family have complementary stereoselectivity. If one CHIROBIOTIC® CSP does not give baseline resolution, testing the other CHIROBIOTIC® CSPs in the same mobile phase often results in complete resolution.

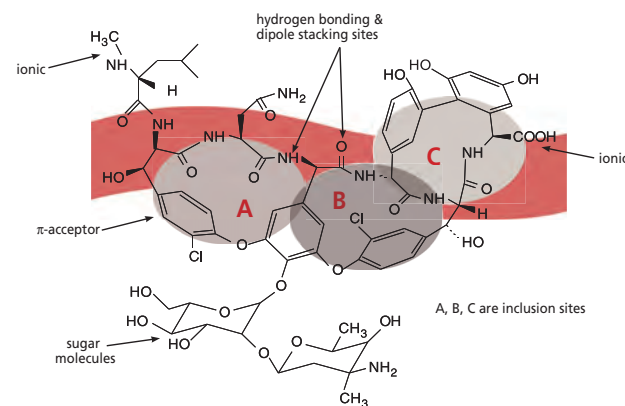
Astec CHIROBIOTIC®; features and application areas:

- Aqueous and non-aqueous separations on the same column
- Ideal for reversed-phase and polar mobile phases for LC-MS
- No solvent or additive memory effects
- Robust columns with long lifetimes, important in bioanalysis
- Solvent choices maximize sample solubility
- Excellent preparative scalability and capacity
- Fast kinetics for speed and efficiency

(1) Armstrong, D. W.; Tang, Y.; Chen, S.; Zhou, Y.; Bagwill, C.; Chen, J. Macroyclic Antibiotics as a New Class of Chiral Selectors for Liquid Chromatography. *Anal. Chem.* **1994**, *66*, 1473-1484.

CHIROBIOTIC® CSPs—Physical Properties

CHIROBIOTIC® CSP	Chiral Selector	Chiral Centers	Sugar Groups	Inclusion Cavities	pH Range
CHIROBIOTIC® V and V2	Vancomycin	18	2	3	3.5–7.0
CHIROBIOTIC® T and T2	Teicoplanin	23	3	4	3.8–6.8
CHIROBIOTIC® TAG	Teicoplanin aglycone	8	0	4	3.0–6.8
CHIROBIOTIC® R	Ristocetin A	38	6	4	3.5–6.8



Proposed structure of vancomycin (the chiral selector in CHIROBIOTIC® V and V2) showing different types of molecular interactions. The presence of ionic interactions is what differentiates CHIROBIOTIC® CSPs from other CSPs, and makes them valuable for polar and ionic compounds and MS detection.

Chiral HPLC & SFC Columns

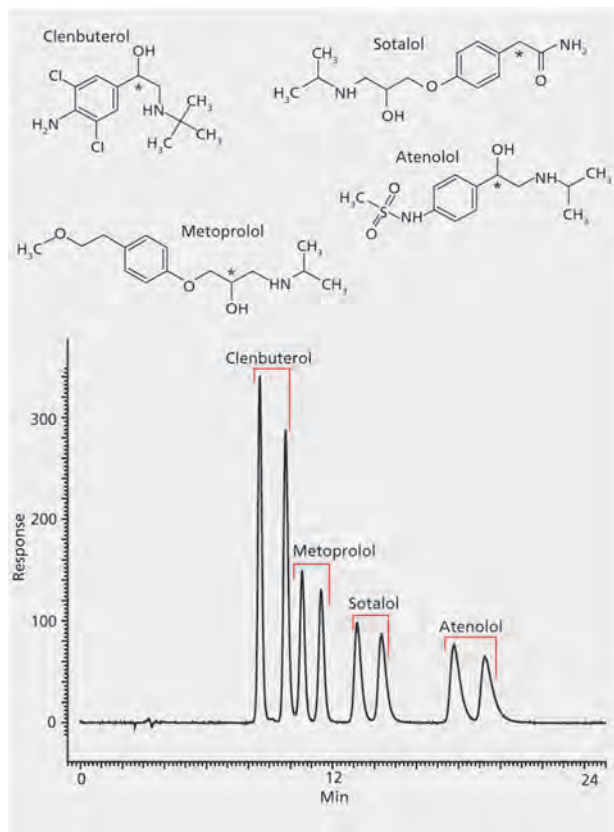
Astec CHIROBIOTIC® Chiral HPLC Columns: *Unique Multi-Modal Operation Includes Ionic Interactions***Unique Multi-Modal Operation Includes Ionic Interactions**

Astec CHIROBIOTIC® CSPs offer six different types of molecular interactions on **one** column: ionic, H-bond, pi-pi, dipole, hydrophobic and steric. They also possess multiple inclusion cavities that influence selectivity based on the molecular shape of the analyte. The optimization of enantiomer resolution is achieved by changing the mobile phase to leverage the types and relative strengths of the various interactions.

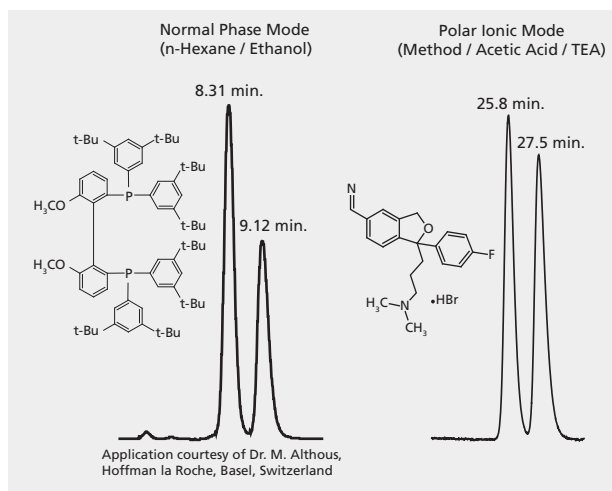
HPLC Analysis of Beta-Receptor Agonist Enantiomers on Astec® CHIROBIOTIC® T

► application for HPLC

column Astec CHIROBIOTIC® T, 25 cm x 4.6 mm, 5 µm particles (12024AST)
 mobile phase 15 mM ammonium formate in methanol
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV at 220 nm
 Application No. G004337

**The Most Versatile HPLC CSP**

Astec CHIROBIOTIC® CSPs offer the flexibility in choice of mobile phase conditions, both aqueous and non-aqueous, and are ideal for analytical and preparative separations of neutral, polar and ionic compounds. Their multiple interactions and absence of memory effects means the same CHIROBIOTIC® column can be successfully used in a variety of mobile phases, a significant benefit over CSPs that operate only in a single mode, normal or reversed-phase, for example, and must be dedicated to those mobile phase systems.



Demonstration of CHIROBIOTIC® column utility in both normal phase and polar ionic modes. The same CHIROBIOTIC® column can be used in all four modes, from aqueous to organic, without memory effects or loss of performance.
 Column: CHIROBIOTIC® V, 25 cm x 4.6 mm, 5 µm particles (11024AST).

Left: **Normal phase mode.** 3,5-tBu-MeOBIPHEP enantiomers.
 n-Hexane:10% ethanol in n-hexane (75:25), 1.5 mL/min.

Right: **Polar ionic mode.** Citalopram enantiomers.
 Methanol:acetic acid:TEA (99:8.0:1.0:1), 0.5 mL/min.

Astec CHIROBIOTIC® Application Areas

Astec CHIROBIOTIC® CSPs have found utility in many areas of analytical chemistry, including:

- **Drug Discovery** - High enantioselectivity, fast screening protocols, scalability to prep, reproducibility for reliable methods, polar and non-polar analytes
- **Bioanalytical, Drug Metabolism** - High throughput, MS-compatibility, aqueous samples, short run times, rugged columns
- **Amino Acid and Peptide Analysis** - Resolves underivatized natural and synthetic chiral amino acids and peptides; different selectivity and higher preparative capacity for achiral amino acids than C18
- **Organic Synthesis** - Compatible with all HPLC solvents, including chlorinated solvents, to optimize sample solubility, fully scalable to prep

Simplified Chiral Method Development

Astec CHIROBIOTIC® HPLC columns enable simple method development, and are particularly useful for polar compounds due to the unique polar ionic mode. A single CHIROBIOTIC® column possesses multiple types of molecular interactions and can be run in four distinct modes. The same column can be exposed to all of the conditions outlined in the screening protocol without any change or loss of performance. This versatility is just one advantage that CHIROBIOTIC® CSPs have over other CSPs.

Chiral HPLC & SFC Columns

Astec CHIROBIOTIC® Chiral HPLC Columns: *Complementary Selectivity to Cellulosic/Amylosic CSPs, but with Benefits*

Complementary Selectivity to Cellulosic/Amylosic CSPs, but with Benefits

Astec CHIROBIOTIC® CSPs will perform the desired separation in nearly 75% of the cases, with a 50% overlap of the cellulosic/amylosic phases. However, the CHIROBIOTIC® CSPs often provide significant advantages, like allowing mobile phases that are better suited to the sample and detection method, or the CHIROBIOTIC® method may be faster, more efficient or more robust. A CHIROBIOTIC® method may also have advantages from a preparative standpoint in terms of solvent selection and capacity.



When performing chiral HPLC column screening, most enantiomers can be resolved on both CHIROBIOTIC® and cellulosic/amylosic CSPs. However, CHIROBIOTIC® CSPs often work better with ionic and highly polar compounds. Even in the areas of overlap, CHIROBIOTIC® CSPs often have advantages in solubility, LC/MS-compatibility and throughput.

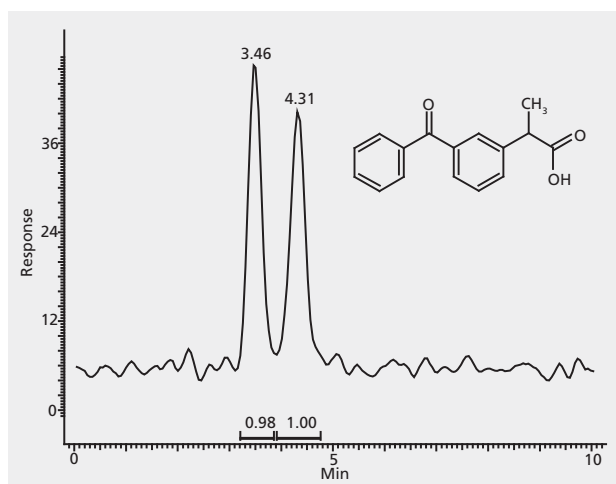
LC-MS-friendly Chiral Separations

Each MS ionization source has an optimal set of mobile phase conditions. Outside this set, ionization may be suppressed with resulting loss in sensitivity. Astec CHIROBIOTIC® phases are uniquely able to operate across all mobile phase systems. CSPs that are limited to normal phase operation, like the majority of cellulose-based CSPs, reduce the analyst's options in detection methods. Astec CHIROBIOTIC® columns can be used in conjunction with HybridSPE-Phospholipid plates to enhance sensitivity by completely removing endogenous proteins and phospholipids, as shown in the clenbuterol from rat plasma application that follows.

HPLC Analysis of Ketoprofen Enantiomers on Astec® CHIROBIOTIC® R (MS Detection)

► application for HPLC

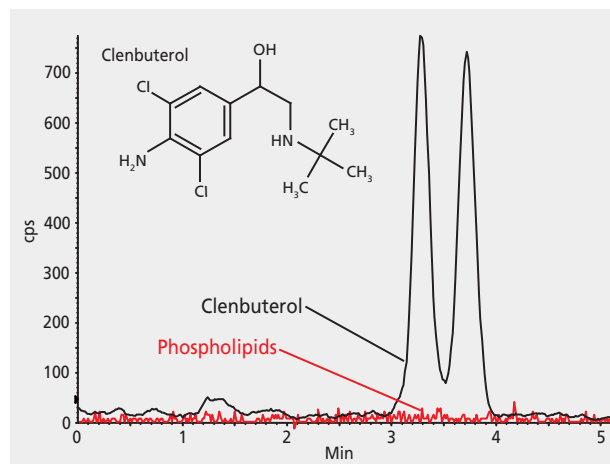
column Astec CHIROBIOTIC® R, 15 cm x 2.1 mm, 5 µm particles (13019AST)
 mobile phase A: 20 mM ammonium acetate, pH 5.6 B: methanol Ratio: 70:30 (A:B)
 flow rate 0.2 mL/min
 column temp. 35 °C
 detector ESI(-)
 sample ketoprofen
 Application No. G004331



HPLC Analysis of Clenbuterol Enantiomers on Astec® CHIROBIOTIC® T (ESI-MS of Plasma Extract)

► application for HPLC

column Astec CHIROBIOTIC® T, 10 cm x 2.1 mm I.D., 5 µm particles (12018AST)
 mobile phase 10 mM ammonium formate in methanol
 flow rate 0.3 mL/min
 column temp. 30 °C
 detector ESI(+)
 sample clenbuterol, 10 ng/mL in rat plasma (phospholipids removed by extraction with HybridSPE-Phospholipid)
 Application No. G004245



Ideally Suited for Preparative Applications

Astec CHIROBIOTIC® phases offer unique opportunities for preparative purifications.

- **Excellent economics** - Especially with the polar organic and polar ionic modes. Ionic interactions play a significant role in the chiral recognition mechanism on Astec CHIROBIOTIC® CSPs. Solvents here are anhydrous and more volatile and less toxic than the typical normal phase mode.
- **No solvent limitations** - Halogenated solvents and very polar solvents are well tolerated on Astec CHIROBIOTIC® CSPs. This solvent tolerance is especially useful when optimizing for sample solubility.
- **Versatility** - The same Astec CHIROBIOTIC® column can be run in four distinctly different mobile phase types. Use of acid/base does not preclude their use in other mobile phases.
- **Stability** - Exceptional long-term stability of Astec CHIROBIOTIC® CSPs is derived from the multiple linkages used in anchoring the CSP and to the mild run conditions that are typically required.
- **Capacity** - The range of capacities is compound dependent. Significantly overlaps cellulose and amylose phases based on throughput, primarily because separations on Astec CHIROBIOTIC® CSPs are usually very fast. Capacities on Astec CHIROBIOTIC® V2/T2 phases are ~2.5 mg/gm ($\alpha = 1.5$). Maximum capacity achieved was ~300 mg on column using a 250 x 21.2 mm column with $\alpha = 2.0$.

Chiral HPLC & SFC Columns

Astec CHIROBIOTIC® Chiral HPLC Columns: Astec CHIROBIOTIC® Column Screening Kits

Astec CHIROBIOTIC® Column Screening Kits

The four Astec CHIROBIOTIC® CSPs we recommend in the screening protocol are available in 25 cm or 10 cm column kits. A full description of the screening procedure and instructions on how to optimize the separation are included with each kit.

Kit components:

- Astec CHIROBIOTIC®; T2
- Astec CHIROBIOTIC®; V
- Astec CHIROBIOTIC®; R
- Astec CHIROBIOTIC®; TAG
- Astec CHIROBIOTIC®; Handbook

You can further expand the screening field by incorporating Astec Cellulose DMP, Astec CYCLOBOND, Astec P-CAP, Astec CLC, LARIHC, and protein-based CSPs (sold separately) into your screening protocol.

Astec CHIROBIOTIC® HPLC Column Screening Kit

Description	Cat. No.	Qty
Astec CHIROBIOTIC® HPLC Column Screening Kit, particle size 5 µm, L 10 cm x I.D. 4.6 mm	10300AST	1 kit
Astec CHIROBIOTIC® HPLC Column Screening Kit, particle size 5 µm, L 25 cm x I.D. 4.6 mm	10305AST	1 kit

Astec CHIROBIOTIC® V and V2 (Vancomycin)

Neutral molecules, amides, acids, esters and amines show considerable enantioselectivity on these vancomycin-based CSPs. A wide variety of secondary and tertiary amines have been separated on the Astec CHIROBIOTIC® V in the polar ionic mode. Astec CHIROBIOTIC® V has demonstrated many of the separation characteristics of protein-based stationary phases, but with exceptional stability and much higher sample capacity. Some chiral analytes have been resolved that have not been reported separated on any other chiral stationary phase. Astec CHIROBIOTIC® V and V2 differ in their bonding chemistry the pore size of the support particle, giving them different selectivity and preparative capacity.

- Bonded phase: Vancomycin
- Operating pH range: 3.5 - 7.0
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 µm (other particles sizes, please inquire)
- Pore size: 100 Å (CHIROBIOTIC® V) or 200 Å (CHIROBIOTIC® V2)

For other column dimensions, particle sizes and bulk material, please inquire.

Astec CHIROBIOTIC® V Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	10	11018AST	1 ea
2.1	15	11019AST	1 ea
2.1	25	11020AST	1 ea
3.0	10	11010AST	1 ea
4.6	5	11021AST	1 ea
4.6	10	11022AST	1 ea
4.6	15	11023AST	1 ea
4.6	25	11024AST	1 ea
10.0	25	11034AST	1 ea
21.2	25	11044AST	1 ea
30.0	25	11054AST	

Astec CHIROBIOTIC® V Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
1.0	2	11101AST	1 ea
4.0	2	11100AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CHIROBIOTIC® V2 Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	10	15018AST	1 ea
2.1	15	15019AST	1 ea
2.1	25	15020AST	1 ea
4.6	5	15021AST	1 ea
4.6	10	15022AST	1 ea
4.6	15	15023AST	1 ea
4.6	25	15024AST	1 ea
10.0	25	15034AST	1 ea
21.2	25	15044AST	1 ea
30.0	25	15054AST	
particle size 10 µm			
4.6	25	15124AST	1 ea
particle size 15 µm			
4.6	25	51041AST	1 ea

Astec CHIROBIOTIC® V2 Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
1.0	2	15101AST	1 ea
4.0	2	15100AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CHIROBIOTIC® T and T2 (Teicoplanin)

Astec CHIROBIOTIC® T and T2 have teicoplanin as the chiral selector. They offer unique selectivity for a number of classes of molecules, specifically underivatized α , β , γ and cyclic amino acids, N-derivatized amino acids, hydroxy-carboxylic acids, acidic compounds including carboxylic acids and phenols, small peptides, neutral aromatic analytes and cyclic aromatic and aliphatic amines. Separations normally obtained on a chiral crown ether or ligand exchange-type CSPs are also possible on Astec CHIROBIOTIC® T and T2, but with much simpler mobile phases, such as alcohol-water. In addition, all of the known beta-blockers (amino alcohols), and dihydrocoumarins have been resolved. Astec CHIROBIOTIC® T and T2 differ in their bonding chemistry and the pore size of the support particle, giving them different selectivity and preparative capacity.

- Bonded phase: Teicoplanin
- Operating pH range: 3.8 - 6.8
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 µm (other particles sizes, please inquire)
- Pore size: 100 Å (CHIROBIOTIC® T) or 200 Å (CHIROBIOTIC® T2)
- USP Code L63

For other column dimensions, particle sizes and bulk material, please inquire.

Chiral HPLC & SFC Columns

Astec CHIROBIOTIC® Chiral HPLC Columns: Astec CHIROBIOTIC® T and T2 (Teicoplanin)

Astec CHIROBIOTIC® T Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	10	12018AST	1 ea
2.1	15	12019AST	1 ea
2.1	25	12020AST	1 ea
3.0	10	12010AST	1 ea
4.6	5	12021AST	1 ea
4.6	10	12022AST	1 ea
4.6	15	12023AST	1 ea
4.6	25	12024AST	1 ea
10.0	25	12034AST	1 ea
21.2	25	12044AST	1 ea
30.0	25	12054AST	
particle size 10 µm			
4.6	25	12124AST	1 ea
particle size 15 µm			
10	5	51046AST	1 ea
4.6	25	51047AST	1 ea

Astec CHIROBIOTIC® T Chiral HPLC Guard

suitable for L63 per USP

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
1.0	2	12101AST	1 ea
4.0	2	12100AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CHIROBIOTIC® T2 Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	10	16018AST	1 ea
2.1	15	16019AST	1 ea
2.1	25	16020AST	1 ea
4.6	5	16021AST	1 ea
4.6	10	16022AST	1 ea
4.6	15	16023AST	1 ea
4.6	25	16024AST	1 ea
21.2	25	16044AST	1 ea
30.0	25	16054AST	
particle size 10 µm			
4.6	25	16124AST	1 ea

Astec CHIROBIOTIC® T2 Chiral HPLC Guard

suitable for L63 per USP

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
1.0	2	16101AST	1 ea
4.0	2	16100AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CHIROBIOTIC® R (Ristocetin A)

CHIROBIOTIC®; R, based on the ristocetin A glycopeptide covalently bonded to high purity silica particles, has shown particular applicability to enantiomers of acidic compounds. Selectivity on CHIROBIOTIC®; R strongly correlates to the organic modifier, favoring the alcohol-type mobile phases by a large margin.

- Bonded phase: Ristocetin A
- Operating pH range: 3.5 - 6.8
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 µm (other particles sizes, please inquire)
- Pore size: 100 Å

For other column dimensions, particle sizes and bulk material, please inquire.

Astec CHIROBIOTIC® R Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	10	13018AST	1 ea
2.1	15	13019AST	1 ea
2.1	25	13020AST	1 ea
3.0	10	13010AST	1 ea
4.6	5	13021AST	1 ea
4.6	10	13022AST	1 ea
4.6	15	13023AST	1 ea
4.6	25	13024AST	1 ea
10.0	25	13034AST	1 ea
21.2	25	13044AST	1 ea
30.0	25	13054AST	
particle size 10 µm			
4.6	25	13124AST	1 ea

Astec CHIROBIOTIC® R Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
1.0	2	13101AST	1 ea
4.0	2	13100AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CHIROBIOTIC® TAG (Teicoplanin Aglycone)

The removal of three carbohydrate moieties gives CHIROBIOTIC®; TAG complementary selectivity to CHIROBIOTIC®; T. Resolution is enhanced toward many of the amino acids, α, β, γ and cyclic, and especially sulfur-containing methionine, histidine and cysteine. A number of neutral molecules like the oxazolidinones, hydantoin and diazepam, have shown enhanced resolution and, more remarkably, in single-solvent mobile phases, like methanol, ethanol or acetonitrile. Some acidic molecules have also shown increased selectivity.

- Bonded phase: Teicoplanin aglycone
- Operating pH range: 3.0 - 6.8
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 µm (other particles sizes, please inquire)
- Pore size: 100 Å

For other column dimensions, particle sizes and bulk material, please inquire.

Chiral HPLC & SFC Columns

Astec CHIROBIOTIC® Chiral HPLC Columns: Astec CHIROBIOTIC® TAG (Teicoplanin Aglycone)

Astec CHIROBIOTIC® TAG Chiral HPLC Column

suitable for L63 per USP

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.1	10	14018AST	1 ea
2.1	15	14019AST	1 ea
2.1	25	14020AST	1 ea
4.6	5	14021AST	1 ea
4.6	10	14022AST	1 ea
4.6	15	14023AST	1 ea
4.6	25	14024AST	1 ea
10.0	15	14232AST	1 ea
10.0	25	14034AST	1 ea
21.2	25	14044AST	1 ea
30.0	25	14054AST	1 ea
particle size 10 µm			
4.6	25	14124AST	1 ea

Astec CHIROBIOTIC® TAG Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
1.0	2	14101AST	1 ea
4.0	2	14100AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CHIROBIOTIC® 8-Column Sets for SMB

NEW PRODUCTS

SMB (simulated moving bed) is a form of preparative chromatography that utilizes multiple columns that act in concert as a single column. Throughput using SMB can be significantly higher than batch or column format. The qualities of Astec CHIROBIOTIC® CSPs that make them ideal for prep, including SMB, are excellent enantioselectivity, especially for polar and ionic compounds, mobile phase flexibility to maximize sample solubility, versatility for operation in all mobile phases without memory effects and high column efficiency for high throughput and minimal downstream processing. Especially relevant for prep by SMB, the ruggedness of Astec CHIROBIOTIC® CSPs enables long-term and reliable operation. The new Astec CHIROBIOTIC® columns for SMB feature particle size and column dimensions chosen for high flow rate and high efficiency. The 8 columns in the set have efficiencies that are matched to within 6% rsd. Single columns in 25 cm x 4.6 mm I.D. and 5 cm x 10 mm I.D. dimensions are available for method development and scale-up experiments. These sets are ideal for the Octave Chromatography System manufactured by Semba Biosciences.



Photograph of the 8-column SMB set. Each perfectly-matched column is 5 cm x 10 mm I.D.



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T409105	Astec CHIROBIOTIC® Columns Sets for SMB

Particle Size (µm)	L x I.D.	Cat. No.	Qty
phase Astec CHIROBIOTIC® V2			
15	5 cm x 10 mm	51039AST	1 set
phase Astec CHIROBIOTIC® V			
15	5 cm x 10 mm	51045AST	1 set

Astec CYCLOBOND® Chiral HPLC Columns



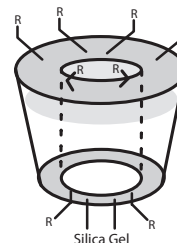
Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T410091	Astec CYCLOBOND® Brochure

Bonded Cyclodextrin Stationary Phases for Chiral HPLC Separations

Cyclodextrins are produced by the partial degradation of starch and enzymatic coupling of cleaved glucose units into crystalline, homogeneous toroidal structures of different molecular size. Three of the most widely characterized are α (alpha), β (beta) and γ (gamma) cyclodextrin. They contain 6, 7 and 8 glucose units, respectively. Since glucose is chiral, cyclodextrins are chiral. For example, β-cyclodextrin has 35 stereogenic centers. The toroidal structure has a hydrophilic surface resulting from the 2, 3 and 6 position hydroxyl groups, which makes them water soluble. The cavity is composed of the glucoside oxygens and methylene hydrogens giving it an apolar character. As a consequence, cyclodextrins can include the apolar portion of molecules of appropriate dimensions and bind them through dipole-dipole interactions, hydrogen bonding, or London dispersion forces. Therefore, the cyclodextrin structure offers unique opportunities to separate a wide variety of isomers that have the same chemical formula but differ in the spatial arrangement of their substituents.



Representation of a cyclodextrin toroid molecule attached to a silica surface. The functionalized glucose hydroxyl groups (shown as R groups in the figure) provide different enantioselectivity.

Cyclodextrins—Physical Properties

Cyclodextrin	Glucose Units	Stereogenic Centers	MW	Cavity (nm)
Alpha	6	30	972	0.57
Beta	7	35	1135	0.78
Gamma	8	40	1297	0.95

Chiral HPLC & SFC Columns

Astec CYCLOBOND® Chiral HPLC Columns: *Bonded Cyclodextrin Stationary Phases for Chiral HPLC Separations*

CYCLOBOND is the name given to the Astec technology for bonding cyclodextrins to high purity silica gel through a stable ether linkage. Developed in conjunction with Prof. Daniel Armstrong (1) and introduced in 1983, this patented line of chiral stationary phases retains its ability to form inclusion complexes, and allows for numerous chemical separations by selectively including into the cyclodextrin cavity a wide variety of organic molecules.

Astec CYCLOBOND features and application areas:

- Native and derivatized β - and γ -cyclodextrins
- Covalent bonding for greater phase stability, especially in aqueous systems
- High degree of selectivity from inclusion mechanism and the unusual hydrogen bonding effects of the hydrophilic surface
- Additional interactions introduced by replacing some of the secondary hydroxyl groups with different selectors

Astec CYCLOBOND I 2000 Series:

Based on the original CYCLOBOND I (β -cyclodextrin) technology, CYCLOBOND I 2000 columns are second-generation products. The CYCLOBOND I 2000 line includes native β -cyclodextrin and eight β -cyclodextrin derivatives.

Astec CYCLOBOND II Series:

CYCLOBOND II columns are excellent chiral selectors for multi-ring structures such as those based on anthracene, chrysene or pyrene. These are γ -cyclodextrin bonded phases, and consist of eight glucopyranose units arranged in the same truncated cone shape.

Astec CYCLOBOND Derivatives:

- Underivatized: CYCLOBOND I 2000, CYCLOBOND II
- Acetylated: CYCLOBOND I 2000 AC, CYCLOBOND II AC
- 2,3-di-O-Methyl: CYCLOBOND I 2000 DM
- 3,5-Dimethylphenyl carbamate: CYCLOBOND I 2000 DMP
- 2,6-Dinitro-4-trifluoromethyl phenyl ether: CYCLOBOND I 2000 DNP
- Hydroxypropyl ether (high performance): CYCLOBOND I 2000 HP-RSP
- Hydroxypropyl ether: CYCLOBOND I 2000 RSP, CYCLOBOND I 2000 SP

(1) Armstrong, D. W.; DeMond, W. Cyclodextrin bonded phases for the liquid chromatographic separation of optical, geometrical, and structural isomers. *J. Chrom. Sci.* **1984**, 22 (9), 411-415.

Astec CYCLOBOND® Column Screening Kit

For convenience, the four Astec CYCLOBOND CSPs we recommend in the screening protocol described earlier in this section are available in a kit. A full description of the screening procedure and techniques to optimize the separation are included with each kit.

Kit components:

- Astec CYCLOBOND I 2000
- Astec CYCLOBOND I 2000 DMP
- Astec CYCLOBOND I 2000 HP-RSP
- Astec CYCLOBOND I 2000 DNP
- Astec CYCLOBOND Handbook

Also, you can further expand the screening field by incorporating the Astec CHIROBIOTIC®, Astec Cellulose DMP, Astec P-CAP, Astec CLC, and protein-based CSPs (all sold separately) into your screening protocol.

Astec CYCLOBOND® HPLC Column Screening Kit

Ref: 1. Armstrong, D.W., DeMond, W. Cyclodextrin Bonded Phases for the Liquid Chromatographic Separation of Optical, Geometrical, and Structural Isomers *J. Chromatogr. Sci.* **22**, 411 (1984)

Description	Cat. No.	Qty
Astec CYCLOBOND® HPLC Column Screening Kit, particle size 5 μ m, L 25 cm x I.D. 4.6 mm	2005AST	1 kit



Related Information

Need help choosing the right chiral HPLC or GC column? Let our Chiral Services group do the work for you.

Astec CYCLOBOND® I 2000 (β -Cyclodextrin)

Astec CYCLOBOND I 2000 is β -cyclodextrin bonded to high purity silica by a patented process to produce a stable matrix with the cyclodextrin arranged in such a way as to retain its most valuable property of forming inclusion complexes. This allows the cyclodextrin toroids to effect numerous chemical separations by selectively including into their cavities a wide variety of organic molecules. Non-inclusion type separations are also possible with the polar organic mode for a wide variety of molecule types.

- Bonded phase: Underivatized, native β -cyclodextrin
- Operating pH range: 3 - 7
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 μ m
- Pore size: 100 Å
- USP Code L45

For other column dimensions not listed, please inquire.

Astec CYCLOBOND® I 2000 Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
2.1	10	20018AST	1 ea
2.1	15	20019AST	1 ea
2.1	25	20020AST	1 ea
4.6	5	20021AST	1 ea
4.6	10	20022AST	1 ea
4.6	15	20023AST	1 ea
4.6	25	20024AST	1 ea
10.0	25	20034AST	1 ea
particle size 10 μ m			
4.6	25	22024AST	1 ea

Astec CYCLOBOND® I 2000 Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
1.0	2	21010AST	1 ea
4.0	2	21100AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CYCLOBOND® I 2000 AC (Acetyl β -Cyclodextrin)

Astec CYCLOBOND I 2000 AC is used primarily for aromatic alcohols or amines that are chiral on the α or β carbon.

- Bonded phase: Acetylated β -cyclodextrin
- Operating pH range: 3 - 7
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 μ m
- Pore size: 100 Å
- USP Code L45

For other column dimensions not listed, please inquire.

Chiral HPLC & SFC Columns

Astec CYCLOBOND® Chiral HPLC Columns: *Astec CYCLOBOND® I 2000 AC (Acetyl β-Cyclodextrin)***Astec CYCLOBOND® I 2000 AC Chiral HPLC Column**

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
2.1	15	20119AST	1 ea
4.6	5	20121AST	1 ea
4.6	10	20122AST	1 ea
4.6	15	20123AST	1 ea
4.6	25	20124AST	1 ea
10.0	25	20134AST	1 ea
30.0	25	20154AST	
particle size 10 μm			
4.6	25	22124AST	1 ea

Astec CYCLOBOND® I 2000 AC Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
1.0	2	21011AST	1 ea
4.0	2	21101AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CYCLOBOND® I 2000 DM (Dimethyl β-Cyclodextrin)

Astec CYCLOBOND I 2000 DM separates a wide variety of structural and geometric isomers and is complementary to Astec CYCLOBOND I 2000. This phase operates only in the reversed-phase mode with steric bulk as the main mechanism.

- Bonded phase: Dimethylated β-cyclodextrin
- Operating pH range: 3 - 7
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 μm
- Pore size: 100 Å
- USP Code L45

For other column dimensions not listed, please inquire.

Astec CYCLOBOND® I 2000 DM Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
2.1	15	20919AST	1 ea
4.6	5	20921AST	1 ea
4.6	10	20922AST	1 ea
4.6	15	20923AST	1 ea
4.6	25	20924AST	1 ea
30.0	25	20954AST	

Astec CYCLOBOND® I 2000 DM Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
1.0	2	21019AST	1 ea
4.0	2	21109AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CYCLOBOND® I 2000 DMP (Dimethylphenyl β-Cyclodextrin)

The reaction of the 3,5-dimethylphenyl isocyanate with the hydroxyl groups of β-cyclodextrin results in a pi-basic phase similar in character to the naphthylethyl carbamate phases. The selectivity is greater for the Astec CYCLOBOND I 2000 DMP when the chiral center of the analyte is part of a ring structure or is on the α carbon. This phase has been very useful for derivatized amines, like amphetamine ACQ.

- Bonded phase: 3,5-Dimethylphenyl carbamate modified β-cyclodextrin
- Operating pH range: 3 - 7
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 μm
- Pore size: 100 Å
- USP Code L45

For other column dimensions not listed, please inquire.

Astec CYCLOBOND® I 2000 DMP Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
2.1	15	20719AST	1 ea
2.1	25	20720AST	1 ea
4.6	5	20721AST	1 ea
4.6	10	20722AST	1 ea
4.6	15	20723AST	1 ea
4.6	25	20724AST	1 ea
10.0	25	20734AST	1 ea
21.2	25	20744AST	1 ea
30.0	25	20754AST	
particle size 10 μm			
4.6	25	22724AST	1 ea

Astec CYCLOBOND® I 2000 DMP Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
1.0	2	21017AST	1 ea
4.0	2	21107AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CYCLOBOND® I 2000 DNP (Dinitrophenyl β-Cyclodextrin)

This Astec CYCLOBOND derivative has dinitrophenyl functionality bonded through an ether linkage to the hydroxyl positions of the β-cyclodextrin. In this arrangement, a pi-electron sharing system is established with analytes having pi-electron systems (e.g. aromatic rings, carbonyl) in the stereogenic environment. Use of the ether linkage to anchor this pi-acidic dinitrophenyl ring results in a very stable system even under strong reversed-phase conditions. The pi-acidity of this group is further enhanced with the introduction of the trifluoromethyl group into the aromatic ring.

- Bonded phase: Dinitrophenyl modified β-cyclodextrin
- Operating pH range: 3 - 7
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 μm
- Pore size: 100 Å
- USP Code L45

For other column dimensions not listed, please inquire.

Chiral HPLC & SFC Columns

Astec CYCLOBOND® Chiral HPLC Columns: *Astec CYCLOBOND® I 2000 DNP (Dinitrophenyl β-Cyclodextrin)*

Astec CYCLOBOND® I 2000 DNP Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
2.1	10	25018AST	1 ea
2.1	15	25019AST	1 ea
4.6	5	25021AST	1 ea
4.6	15	25023AST	1 ea
4.6	25	25024AST	1 ea

Astec CYCLOBOND® I 2000 DNP Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
1.0	2	25101AST	1 ea
4.0	2	25100AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CYCLOBOND® I 2000 HP-RSP (R,S-Hydroxypropyl β-Cyclodextrin)

In the design of this phase chemistry, it was an objective to create a very stable and reproducible phase with shorter retention times, while maintaining or improving selectivity over Astec CYCLOBOND I 2000 RSP. With that goal and more achieved, Astec CYCLOBOND I 2000 HP-RSP separates by extended H-bonding capability, and offers broad chiral selectivity for chiral screening. It is most beneficial for basic and neutral compounds.

- Bonded phase: (R,S)-Hydroxypropyl modified β-cyclodextrin (high performance)
- Operating pH range: 3 - 7
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 μm
- Pore size: 100 Å
- USP Code L45

For other column dimensions not listed, please inquire.

Astec CYCLOBOND® I 2000 HP-RSP Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
2.1	10	24018AST	1 ea
2.1	25	24020AST	1 ea
4.6	5	24021AST	1 ea
4.6	10	24022AST	1 ea
4.6	15	24023AST	1 ea
4.6	25	24024AST	1 ea
30.0	25	24054AST	
particle size 10 μm			
4.6	25	24124AST	1 ea

Astec CYCLOBOND® I 2000 HP-RSP Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
1.0	2	24101AST	1 ea
4.0	2	24100AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CYCLOBOND® I 2000 RSP (R,S-Hydroxypropyl β-Cyclodextrin)

The hydroxyl groups on the surface of the β-cyclodextrin are reacted with (R,S)-propylene oxide to yield a general purpose chiral stationary phase. It has the added property of separating non-aromatic structures such as t-boc amino acids, for which it is a standard methodology.

- Bonded phase: (R,S)-Hydroxypropyl modified β-cyclodextrin
- Operating pH range: 3 - 7
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 μm
- Pore size: 100 Å
- USP Code L45

For other column dimensions not listed, please inquire.

Astec CYCLOBOND® I 2000 RSP Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
2.1	10	20318AST	1 ea
2.1	15	20319AST	1 ea
2.1	25	20320AST	1 ea
4.6	5	20321AST	1 ea
4.6	10	20322AST	1 ea
4.6	15	20323AST	1 ea
4.6	25	20324AST	1 ea
10.0	25	20334AST	1 ea
21.2	25	20344AST	1 ea
30.0	25	20354AST	
particle size 10 μm			
4.6	25	22324AST	1 ea

Astec CYCLOBOND® I 2000 RSP Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
1.0	2	21013AST	1 ea
4.0	2	21103AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CYCLOBOND® I 2000 SP (S-Hydroxypropyl β-Cyclodextrin)

On Astec CYCLOBOND I 2000 SP, the hydroxyl groups on the surface of the β-cyclodextrin have been reacted with (S)-propylene oxide. This has the effect of extending hydrogen-bonding capabilities to accommodate analytes with chiral centers that are relatively distant from an aromatic ring structure. The (S)- form shows enhanced selectivity and efficiency for some separations.

- Bonded phase: (S)-Hydroxypropyl modified β-cyclodextrin
- Operating pH range: 3 - 7
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 μm
- Pore size: 100 Å
- USP Code L45

For other column dimensions not listed, please inquire.

Chiral HPLC & SFC Columns

Astec CYCLOBOND® Chiral HPLC Columns: Astec CYCLOBOND® I 2000 SP (*S*-Hydroxypropyl β -Cyclodextrin)

Astec CYCLOBOND® I 2000 SP Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
2.1	15	20219AST	1 ea
4.6	5	20221AST	1 ea
4.6	25	20224AST	1 ea
30.0	25	20254AST	
particle size 10 μ m			
4.6	25	22224AST	1 ea

Astec CYCLOBOND® I 2000 SP Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
4.0	2	21102AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CYCLOBOND® II (γ -Cyclodextrin)

Consisting of eight glucopyranose units arranged in a truncated cone shape, Astec CYCLOBOND II is an excellent chiral selector for multi-ring structures. It is useful for isomeric compounds based on anthracene, chrysene and pyrene type ring structures. Astec CYCLOBOND II offers good selectivity and stability and is applicable to the polar organic mode of separation. Applications include steroids, porphyrins, Fmoc amino acids.

- Bonded phase: Underivatized, native γ -cyclodextrin
- Operating pH range: 3 - 7
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 μ m
- Pore size: 100 Å

For other column dimensions not listed, please inquire.

Astec CYCLOBOND® II Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
2.1	15	46019AST	1 ea
4.6	5	46021AST	1 ea
4.6	10	40020AST	1 ea
4.6	15	46023AST	1 ea
4.6	25	41020AST	1 ea
particle size 10 μ m			
4.6	25	44024AST	1 ea

Astec CYCLOBOND® II Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
4.0	2	42120AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec CYCLOBOND® II AC (Acetyl γ -Cyclodextrin)

Astec CYCLOBOND II AC columns are bonded γ -cyclodextrin with acetylation of the 2- and 3-hydroxyl groups. As a result, the mouth of the cavity has available a hydrogen-acceptor site that can interact with a hydrogen donor, such as an amine attached to at least two or more fused rings. An example would be 1- or 2-substituted naphthylethylamine. Applications include steroids and sterols, depending on where the hydroxyl groups are positioned.

- Bonded phase: Acetylated γ -cyclodextrin
- Operating pH range: 3 - 7
- Particle type: High-purity, spherical silica
- Particle diameter: 5 or 10 μ m
- Pore size: 100 Å

For other column dimensions not listed, please inquire.

Astec CYCLOBOND® II AC Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
2.1	10	47018AST	1 ea
2.1	15	47019AST	1 ea
4.6	25	41022AST	1 ea
particle size 10 μ m			
4.6	25	44124AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec Cellulose DMP
(Dimethylphenylcarbamate)

NEW PRODUCTS

Efficient, Rugged and Economical Columns for Chiral HPLC & SFC

Astec Cellulose DMP comprises spherical, high-purity porous silica coated with DMPC (dimethylphenyl carbamate)-derivatized cellulose packed in analytical to preparative size HPLC columns. It separates a wide range of chiral compounds under normal phase, polar organic, SFC, and reversed-phase conditions, with high efficiency, high loading capacity, and excellent column lifetime. With performance comparable to other DMPC-derivatized cellulose CSPs, but at substantially lower price, Astec Cellulose DMP is a must-have for every chiral column HPLC or SFC screening protocol. Astec Cellulose DMP is complementary to the other Astec CSPs, including CHIROBIOTIC<REFERENCE ID="3826" TYPE="trademark"/>, CYCLOBOND, and the P-CAP product lines. It should be investigated as an alternative to higher priced cellulose-DMPC columns for existing methods. The cost savings are especially dramatic when comparing preparative column dimensions.

- Phase: DMPC (dimethylphenyl carbamate)-derivatized cellulose (coated)
- Particle type: High-purity, spherical silica
- Particle diameter: 5 μ m
- Normal phase, polar organic, and SFC modes
- Scalable from analytical to preparative
- Suitable for USP Code L40



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T410110	Astec Cellulose DMP Brochure

Chiral HPLC & SFC Columns

Astec Cellulose DMP (Dimethylphenylcarbamate)

Astec Cellulose DMP Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
2.1	10	51112AST	1 ea
2.1	15	51100AST	1 ea
2.1	25	51101AST	1 ea
4.6	10	51097AST	1 ea
4.6	15	51098AST	1 ea
4.6	25	51099AST	1 ea
10	25	51102AST	1 ea
21.2	25	51103AST	1 ea

Astec Cellulose DMP Chiral HPLC Guard

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μm			
2.1	2	51105AST	1 kit
2.1	2	51104AST	2 ea
4	2	51107AST	1 kit
4	2	51106AST	2 ea
10	1	51108AST	1 ea
21.2	1	51109AST	1 ea

Guard cartridges require holders that are sold separately. The 2.1 and 4 mm I.D. cartridges use 21150AST or 59660-U (both stand-alone) or 504254 or 55205 (both integral). The 10 mm I.D. cartridges use 567499-U. The 21.2 mm I.D. cartridges use 581392-U.

Astec P-CAP™ and P-CAP™-DP Chiral HPLC Columns

Useful for chiral HPLC and SFC separations, Astec P-CAP and P-CAP-DP are based on a unique polycyclic amine polymer that has been covalently bonded to high-purity silica particles. They offer high stability, extremely high sample loadability, easy scale-up and no memory effect. Conceptualized by Prof. Francesco Gasparrini (1) with further phase development by Prof. Daniel Armstrong (2), these CSPs are used primarily for normal phase, polar organic and SFC chiral separations. The bonding procedure offers maximum protection of the silica and excellent availability of the short-chain polymer ligand to ensure high capacity. The resulting thin, ordered layer of polymer does not alter the porous structure of the silica. The repeating chiral moiety offers both structural conformation and hydrogen bonding interactions as the driving mechanisms.

Preparative separations on Astec P-CAP and P-CAP-DP can be run in a variety of solvents, without any large impact on selectivity, to meet analyte solubility requirements. As a result of the juxtaposition of the binding sites, molecules with two or more functional groups demonstrate the best selectivity. Separations have been run in pure acetone, heptane/ethanol, dichloromethane/methanol and ethylacetate. Selectivity can be obtained in a variety of solvent choices with different efficiencies. Salt and/or acetic acid can be added to improve efficiency or enhance detection in mass spectrometry. Astec P-CAP and P-CAP-DP are available in two enantiomeric forms (R,R) and (S,S). This permits reversing the elution order, which can be very useful in preparative applications.

Astec P-CAP and P-CAP-DP features and application areas:

- Polymeric ligand CSP for normal phase and polar organic operation
- Ideal for SFC and Sub-SFC
- No solvent limitations
- High capacity for preparative applications
- Stable, covalent chemistry
- Reversible elution order through R,R and S,S configurations
- Available in standard (Astec P-CAP) and diphenyl (Astec P-CAP-DP) chemistries

(1) Gasparrini, F.; Misiti, D.; Rompietti, R.; Villani, C. "New hybrid polymeric liquid chromatography chiral stationary phase prepared by surface-initiated polymerization" *J. Chromatogr. A* **2005**, *1064* (1), 25-38.

(2) Zhong, Q.; Han, X.; He, L.; Beesley, T. E.; Trahanovsky, W. S.; Armstrong, D. W. "Chromatographic evaluation of poly(trans-1,2-cyclohexanediy-bisacrylamide) as a chiral stationary phase for HPLC" *J. Chromatogr. A* **2005**, *1066* (1-2), 55-70.



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T410060	Astec P-CAP™ and P-CAP™-DP Brochure

Astec (R,R) and (S,S) P-CAP™

Astec P-CAP is made from a polymerized diacryloyl-trans-1,2-diphenylethylenediamine bonded to the silica surface. It utilizes hydrogen bonding and steric effects as enantiomer separation mechanisms. Astec P-CAP can be used for SFC and normal phase separations of racemic mixtures. It has high stability, high sample loading capacity (suitable for preparative scale-up), and no memory effect. The elution order of compounds can be reversed in the (R,R) versus (S,S) configuration.

- Bonded phase: Poly(trans-1,2-cyclohexanediy-bis-acrylamide)
- Operating pH range: N/A (operated in normal phase and polar organic modes)
- Particle type: High-purity, spherical silica
- Particle diameter: 3.5, 5 or 10 μm
- Pore size: 200 Å

For other column dimensions not listed, please inquire.

Astec (R,R) P-CAP™ Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3.5 μm			
4.6	15	30023AST	1 ea
particle size 5 μm			
2.1	15	31019AST	1 ea
4.6	5	31021AST	1 ea
4.6	10	31022AST	1 ea
4.6	15	31023AST	1 ea
4.6	25	31024AST	1 ea
particle size 10 μm			
4.6	25	31124AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec (S,S) P-CAP™ Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3.5 μm			
4.6	5	32021AST	1 ea
4.6	15	32023AST	1 ea
particle size 5 μm			
2.1	10	33018AST	1 ea
2.1	15	33019AST	1 ea
4.6	5	33021AST	1 ea
4.6	10	33022AST	1 ea
4.6	15	33023AST	1 ea
4.6	25	33024AST	1 ea
particle size 10 μm			
4.6	25	33124AST	1 ea

Chiral HPLC & SFC Columns

Astec P-CAP™ and P-CAP™-DP Chiral HPLC Columns: Astec (R,R) and (S,S) P-CAP™

Astec (S,S) P-CAP™ Chiral HPLC Guard Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.0	2	33100AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately. The 1 mm I.D. guard is sold complete and does not require a separate holder.

Astec (R,R) and (S,S) P-CAP™-DP

The DP introduces phenyl rings to add pi-pi interactions, giving it one additional type of interaction compared to Astec P-CAP. Astec P-CAP-DP uses similar protocols as Astec P-CAP and can be optimized for either normal or polar organic mobile phases. It is less polar than Astec P-CAP, and ideal for sub- and supercritical fluid applications. The elution order of compounds can be reversed in the (R,R) versus (S,S) configuration.

- Bonded phase: Poly(diphenylethylenediamine-bis-acryloyl) or Poly-DPEDA
- Operating pH range: N/A (operated in normal phase and polar organic modes)
- Particle type: High-purity, spherical silica
- Particle diameter: 3.5 or 5 µm
- Pore size: 200 Å

For other column dimensions not listed, please inquire.

Astec (R,R) P-CAP™-DP Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3.5 µm			
4.6	15	34023AST	1 ea
particle size 5 µm			
4.6	15	35023AST	1 ea
4.6	25	35024AST	1 ea
21.2	25	35044AST	1 ea

Astec (R,R) P-CAP™-DP Chiral HPLC Guard Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.0	2	35100AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately.

Astec (S,S) P-CAP™-DP Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 3.5 µm			
4.6	15	36023AST	1 ea
particle size 5 µm			
4.6	15	37023AST	1 ea
4.6	25	37024AST	1 ea

The 4 mm I.D. guard cartridge requires a holder, Cat. No. 21150AST (stand-alone) or 504254 (direct-connect), sold separately.

Astec CLC-L and CLC-D (Copper Ligand Exchange)

Astec CLC columns use the copper ligand concept described by Davankov to effect enantiomer separation (1,2). The method uses a small, chiral bidentate ligand attached to the silica surface and a copper sulphate-containing mobile phase. The copper ions coordinate with the chiral selector on the stationary phase and carboxylic acid functional groups on the analytes to form transient diastereomeric complexes in solution. The technique also has the advantage of giving small acids with no UV chromophore a strong 254 nm signal.

Astec CLC columns are ideal for analysis of alpha-hydroxy acids, like lactic, malic, tartaric and mandelic acids, amino acids, other amines and bi-functional racemates, like amino alcohols. Two versions of the column provide elution order reversal. On the CLC-D column, the L enantiomer generally elutes before D, with the exception of tartaric acid. The reverse is true on the CLC-L column where D elutes before L. Proline and aspartic acid are particularly suited for low-level detection on the CLC column since the copper complex is detected at 254 nm UV. Both can be resolved on the CLC-D or CLC-L in 5 mM CuSO₄ with the usual reversal of elution order from the CLC-D to CLC-L. In theory, any analyte that can complete the coordination with the copper ion can be resolved.

Astec CLC features and application areas:

- Separates α-hydroxy carboxylic acids, amino acids and other α-bifunctional compounds
- High selectivity with simple mobile phases
- Copper complex gives strong UV 254 nm signal
- Simple reversal of elution order, AstecCLC-L vs. AstecCLC-D
- Excellent reproducibility

Properties of Astec CLC-L and Astec CLC-D:

- Bonded phase: Chiral bidentate ligand (L and D forms)
- Requires 5 mM CuSO₄ mobile phase
- Operating pH range: 3 - 6 (adjust pH of the 5 mM CuSO₄ mobile phase with acetic acid)
- Particle type: High-purity spherical silica
- Particle diameter: 5 µm
- Pore size: 100Å
- USP Code L32

- (1) Davankov, V. A.; Rogozhin, S. V. Ligand chromatography as a novel method for the investigation of mixed complexes: Stereoselective effects in α-amino acid copper(II) complexes. *J. Chrom. A.* **1971**, *60*, 280-283.
- (2) Davankov, V. A. Enantioselective ligand exchange in modern separation techniques. *J. Chrom. A.* **2003**, *1000*, 891-915.



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T410062	Astec CLC (Copper Ligand Exchange) Flyer

Astec CLC-D Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	15	53023AST	1 ea

Astec CLC-L Chiral HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
4.6	15	53123AST	1 ea

We recommend using a Supelco ColumnSaver precolumn filter (Cat. No. 55214-U or 55215-U) to protect CLC columns.

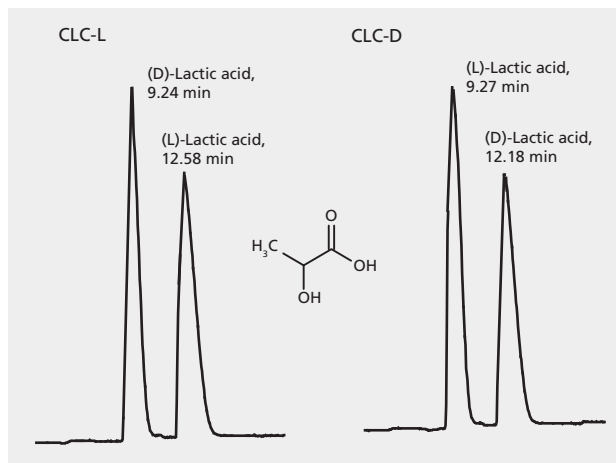
Chiral HPLC & SFC Columns

Astec CLC-L and CLC-D (Copper Ligand Exchange)

HPLC Analysis of Lactic Acid Enantiomers on Astec® CLC-L and CLC-D

▶ application for HPLC

column Astec CLC-L and CLC-D, 15 cm x 4.6 mm I.D., 5 µm particles (53023AST, 53123AST)
 mobile phase 5 mM CuSO₄
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV at 254 nm
 injection 10 µL
 sample lactic acid
 Application No. G004399



Protein-based Chiral HPLC Columns

Hermansson described the use of natural proteins immobilized onto a silica support for chiral separations in 1983 (1). Proteins contain a large number of chiral centers of one configuration, and many other sites that contribute to the general retention process. We offer three CSPs with proteins as the chiral selectors, CHIRALPAK® AGP (α_1 -acid glycoprotein), CHIRALPAK® CBH (cellobiohydrolase) and CHIRALPAK® HSA (human serum albumin). All are manufactured by DAICEL Corporation. They are typically used in reversed-phase mode, and perform a wide variety of chiral separations. CHIRALPAK® HSA is also used for drug-binding studies. Solutes are retained by three types of interactions: ionic (for charged solutes), hydrophobic, and hydrogen bonding. The relative contribution of the different forces to solute retention depends on the nature of the analyte.

CHIRALPAK® AGP: Extremely broad applicability. First choice when developing methods on protein-CSPs.

CHIRALPAK® HSA: Analytes are typically very hydrophilic acids.

CHIRALPAK® CBH: Analytes are typically very hydrophilic amines and amino alcohols.

Protein-based CSP features and application areas:

- Direct reversed-phase resolution of chiral molecules
- Stable in a variety of organic modifiers
- Available in analytical and semi-preparative sizes
- CHIRALPAK HSA is also used for drug-binding studies

(Note: These columns were previously named CHIRAL-AGP, CHIRAL-HSA, and CHIRAL-CBH prior to the acquisition of ChromTech by DAICEL Corp.)

(1) Hermansson, J. Direct liquid chromatographic resolution of racemic drugs using α_1 -acid glycoprotein as the chiral stationary phase. *J. Chromatogr. A*, **1983**, 269, 71-80.

CHIRALPAK® AGP (α_1 -Acid Glycoprotein)

CHIRALPAK® AGP has the broadest range of selectivity of all protein phases currently available. It comprises α_1 -acid glycoprotein (AGP) as the chiral selector immobilized onto spherical 5 µm silica particles. When bonded, AGP is very stable and tolerates pure organic solvents (up to 20%), elevated temperatures (up to 40 °C), and pH values from 4 to 7. Operated in reversed-phase mode, CHIRALPAK® AGP separates enantiomers of an extremely broad range of drug substances, such as acids, amines and neutral compounds. The mobile phases are mixtures of phosphate or acetate buffers and organic solvents such as 2-propanol or acetonitrile. The enantioselectivity and retention can easily be regulated by mobile phase pH and ionic strength, and the nature and concentration of the organic modifier. The most important tool in method development is the mobile phase pH, which affects the ionization of both solutes and the protein stationary phase. AGP has a low isoelectric point (pI) of 2.7. This means at pH 2.7 the column has a net zero charge. From pH 2.7 to 7, the net negative charge on the AGP molecule increases, providing increased retention of positively-charged analytes, like amines. These compounds are also retained by hydrophobic and hydrogen bonding interactions.

- Bonded phase: α_1 -Acid glycoprotein (CHIRALPAK® AGP)
- Particle type: High-purity spherical silica
- Particle diameter: 5 µm
- Operating pH range: 4 - 7
- Maximum organic percentage in mobile phase: 20%
- Maximum pressure: 2000 psi
- Maximum operating temperature: 40 °C
- Washing procedure: 10-15% isopropanol in water (do not exceed max. pressure)
- USP Code L41

CHIRALPAK® AGP HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.0	5	58129AST	1 ea
2.0	10	58130AST	1 ea
2.0	15	58131AST	1 ea
3.0	5	58169AST	1 ea
3.0	10	58170AST	1 ea
3.0	15	58171AST	1 ea
4.0	5	58149AST	1 ea
4.0	10	58150AST	1 ea
4.0	15	58151AST	1 ea
10.0	10	58155AST	1 ea
10.0	15	58157AST	1 ea

CHIRALPAK® AGP HPLC Guard Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.0	1	58178AST	2 ea
3.0	1	58158AST	2 ea
4.0	1	58188AST	2 ea

The 2, 3, and 4 mm I.D. guard cartridges require a guard column holder (Cat. No. 58159AST), sold separately.

Chiral HPLC & SFC Columns

Protein-based Chiral HPLC Columns: CHIRALPAK® AGP (α_1 -Acid Glycoprotein)

Guard Column Holder for CHIRALPAK® AGP, HSA, and CBH

► for use with CHIRALPAK AGP, CBH, and HSA 1 cm x 2.0, 3.0, and 4.0 mm guard cartridges

stainless steel



Holder for CHIRALPAK AGP, HSA, and CBH 1 cm length guard cartridges (58159AST)



Right, holder (58159AST) and left, representative CHIRALPAK® AGP, HSA, or CBH 1 cm length guard cartridges.

58159AST

1 ea

CHIRALPAK® CBH (Cellobiohydrolase)

Used primarily for the separation enantiomers of basic compounds, CHIRALPAK® CBH has cellobiohydrolase as the chiral selector immobilized on spherical 5 μ m silica particles. Used in reversed-phase mode, retention and enantioselectivity is regulated by changes of pH, buffer concentration and organic modifier. The mobile phases are mixtures of phosphate or acetate buffers and organic solvents such as 2-propanol or acetonitrile. The column is preferably used for the separation of enantiomers of basic drugs, particularly compounds containing one or more nitrogen atoms along with one or more hydrogen-bonding groups (alcohol, phenol, carbonyl, amide, ether, ester, etc.).

- Bonded phase: Cellobiohydrolase (CBH)
- Particle type: High-purity spherical silica
- Particle diameter: 5 μ m
- Operating pH range: 3 - 7
- Maximum organic percentage in mobile phase: 20%
- Maximum pressure: 2000 psi
- Maximum operating temperature: 40 °C
- Washing procedure: 10-15% isopropanol in water (do not exceed max. pressure)

CHIRALPAK® CBH HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
2.0	5	58529AST	1 ea
2.0	10	58530AST	1 ea
2.0	15	58531AST	1 ea
3.0	5	58569AST	1 ea
3.0	10	58570AST	1 ea
3.0	15	58571AST	1 ea
4.0	5	58549AST	1 ea
4.0	10	58550AST	1 ea
4.0	15	58551AST	1 ea
10.0	10	58555AST	1 ea
10.0	15	58557AST	1 ea

CHIRALPAK® CBH HPLC Guard Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
2.0	1	58578AST	2 ea
3.0	1	58558AST	2 ea
4.0	1	58588AST	2 ea

The 2, 3, and 4 mm I.D. guard cartridges require a guard column holder (Cat. No. 58159AST), sold separately.

CHIRALPAK® HSA (Human Serum Albumin)

CHIRALPAK® HSA, which uses human serum albumin as the chiral selector, is highly selective for acidic racemates, preferably weak and strong acids, zwitterionic and non-protolytic (neutral) compounds. Phosphate buffers (normally 0.01-0.1M, pH 5-7) with addition of organic modifiers are used as mobile phases. Enantioselectivity and retention can be regulated by changing the mobile phase composition. However, the primary use of CHIRALPAK® HSA is for fast drug/protein binding studies (1). To calculate the % protein binding, measure the retention time of an unretained compound (t_0) and the compound of interest (t_r) on the CHIRALPAK® HSA column. Then use the capacity factor equation:

$$k = (t_r - t_0)/t_r$$

to calculate the % protein binding (P):

$$P = 100k/(k+1)$$

Different types of mobile phases can be used. A mobile phase consisting of 6% 2-propanol in 20 mM potassium phosphate buffer, pH 7.0 gives data in good agreement with literature data. The mobile phase conditions should be chosen to suit the drugs to be tested, i.e., for high protein binding drugs a mobile phase with higher eluting strength might be needed in order to reduce retention times.

- Bonded phase: Human serum albumin (HSA)
- Particle type: High-purity spherical silica
- Particle diameter: 5 μ m
- Operating pH range: 5 - 7
- Maximum organic percentage in mobile phase: 20%
- Maximum pressure: 2000 psi
- Maximum operating temperature: 40 °C
- Washing procedure: 10-15% isopropanol in water (do not exceed max. pressure)

(1) Goodman, A.; Gilman, A.G. *The Pharmacological Basis of Therapeutics*, 9th Edition, McGraw-Hill: New York, 1996; pp 1712-1792.

CHIRALPAK® HSA HPLC Column

I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 μ m			
2.0	5	58429AST	1 ea
2.0	10	58430AST	1 ea
2.0	15	58431AST	1 ea
3.0	5	58469AST	1 ea
3.0	10	58470AST	1 ea
3.0	15	58471AST	1 ea
4.0	5	58449AST	1 ea
4.0	10	58450AST	1 ea
4.0	15	58451AST	1 ea
10.0	10	58455AST	1 ea
10.0	15	58457AST	1 ea

Chiral HPLC & SFC Columns

Protein-based Chiral HPLC Columns: *CHIRALPAK® HSA (Human Serum Albumin)*

CHIRALPAK® HSA HPLC Guard Column			
I.D. (mm)	L (cm)	Cat. No.	Qty
particle size 5 µm			
2.0	1	58478AST	2 ea
3.0	1	58458AST	2 ea
4.0	1	58488AST	2 ea

The 2, 3, and 4 mm I.D. guard cartridges require a guard column holder (Cat. No. 58159AST), sold separately.

Kromasil® Chiral HPLC Columns

NEW PRODUCTS

We are pleased to be able to offer Kromasil products, including their high-quality chiral HPLC line, to our customers in the USA (including Puerto Rico) and Canada. Kromasil chiral stationary phases have an excellent reputation in analytical to process scale HPLC and SFC.

Kromasil AmyCoat® and CelluCoat®

The functionalized amylose and cellulose coated chiral selectors are coated onto a wide pore silica (>1000 Å) matrix; this silica has a low surface area, which reduces the number of achiral interaction sites and thus increases the chiral selectivity. High resolution, excellent selectivity, high-pressure stability, and stable performance when switching between compatible mobile phases are some important benefits. AmyCoat and CelluCoat columns are also available in columns that are compatible with reversed-phase operation.

- **AmyCoat:** The chiral selector is tris-(3,5-dimethylphenyl)carbamoyl amylose (USP Code L51)
- **CelluCoat:** The chiral selector is tris-(3,5-dimethylphenyl)carbamoyl cellulose (USP Code L40)

Kromasil DMB and TBB

Kromasil DMB and TBB bonded chiral phases separate a broad range of racemates. These 2 phases have been developed to complement each other in selectivity. The chiral monomers are polymerized with a hydrosilane to yield a network polymer, which incorporates the bifunctional C2-symmetric chiral selector and is covalently bonded onto 100 Å silica.

- **Chiral DMB:** The chiral monomer is O,O'-bis (3,5-dimethylbenzoyl)-N,N'-diallyl-L-tartar diamide
- **Chiral TBB:** The chiral monomer is O,O'-bis (4-tert-butylbenzoyl)-N,N'-diallyl-L-tartar diamide

Kromasil Guard Columns

The Kromasil guards are sold in packs of 3 or 5 cartridges. They require a holder and coupler that are sold separately.

- For 2.1 to 4.6 mm I.D. cartridges: Use holder **K08970954** and coupler **K08970955**.
- For 10 to 21.2 mm I.D. cartridges: Use holder **K08970956** and coupler **K08970957**.

A convenient Guard Cartridge Starter Kit for 4.6 mm I.D. Kromasil CelluCoat columns is available. It contains 5 guard cartridges, a guard cartridge holder, and a coupler. The part number is **K08971109**.



Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T409214	Kromasil® Chiral Applications Guide

Kromasil® AmyCoat® Chiral HPLC Column			
I.D. (mm)	L (mm)	Cat. No.	Qty
particle size 3 µm			
2.1	50	K08971229	1 ea
2.1	150	K08971225	1 ea
4.6	50	K08670344	1 ea
4.6	150	K08670346	1 ea
particle size 5 µm			
2.1	50	K08971230	1 ea
2.1	150	K08971226	1 ea
4.6	50	K08670608	1 ea
4.6	150	K08670347	1 ea
4.6	250	K08670348	1 ea
10	250	K08670605	1 ea
21.2	250	K08670606	1 ea
30	250	K08670607	1 ea
particle size 10 µm			
4.6	150	K08670603	1 ea
4.6	250	K08670604	1 ea
10	250	K08670600	1 ea
21.2	250	K08670601	1 ea
30	250	K08670602	1 ea

Kromasil® AmyCoat® Chiral Reversed Phase HPLC Column			
I.D. (mm)	L (mm)	Cat. No.	Qty
particle size 3 µm			
4.6	50	K08670500	1 ea
4.6	150	K08670501	1 ea

Kromasil® AmyCoat® Chiral HPLC Guard Cartridge			
I.D. (mm)	L (mm)	Cat. No.	Qty
particle size 5 µm			
4.6	10	K08971102	1 ea
10	10	K08971103	1 ea
21.2	10	K08971104	1 ea

Kromasil guard cartridges require a holder and coupler that are sold separately. For 2.1 to 4.6 mm I.D. cartridges: Use holder **K08970954** and coupler **K08970955**. For 10 to 21.2 mm I.D. cartridges: Use holder **K08970956** and coupler **K08970957**.

Kromasil® CelluCoat® Chiral HPLC Column			
I.D. (mm)	L (mm)	Cat. No.	Qty
particle size 3 µm			
2.1	50	K08971227	1 ea
2.1	150	K08971223	1 ea
particle size 5 µm			
2.1	50	K08971228	1 ea
2.1	150	K08971224	1 ea
particle size 3 µm			
4.6	50	K08670372	1 ea
4.6	150	K08670370	1 ea

Chiral HPLC & SFC Columns

Kromasil® Chiral HPLC Columns

I.D. (mm)	L (mm)	Cat. No.	Qty
particle size 5 µm			
4.6	50	K08670617	1 ea
4.6	150	K08670373	1 ea
4.6	250	K08670374	1 ea
10	250	K08670614	1 ea
21.2	250	K08670615	1 ea
30	250	K08670616	1 ea
particle size 10 µm			
4.6	150	K08670612	1 ea
4.6	250	K08670613	1 ea
10	250	K08670609	1 ea
21.2	250	K08670610	1 ea
30	250	K08670611	1 ea

Kromasil® CelluCoat® Chiral Reversed Phase HPLC Column

I.D. (mm)	L (mm)	Cat. No.	Qty
particle size 3 µm			
4.6	50	K08670502	1 ea
4.6	150	K08670503	1 ea

Kromasil® CelluCoat® Chiral HPLC Guard Cartridge

I.D. (mm)	L (mm)	Cat. No.	Qty
particle size 5 µm			
4.6	10	K08971106	1 ea
10	10	K08971107	1 ea
21.2	10	K08971108	1 ea

Kromasil guard cartridges require a holder and coupler that are sold separately. For 2.1 to 4.6 mm I.D. cartridges: Use holder **K08970954** and coupler **K08970955**. For 10 to 21.2 mm I.D. cartridges: Use holder **K08970956** and coupler **K08970957**.

Kromasil guard cartridges require a holder and coupler that are sold separately. For 2.1 to 4.6 mm I.D. cartridges: Use holder **K08970954** and coupler **K08970955**. For 10 to 21.2 mm I.D. cartridges: Use holder **K08970956** and coupler **K08970957**.

Kromasil® TBB Chiral HPLC Column

I.D. (mm)	L (mm)	Cat. No.	Qty
particle size 5 µm			
4.6	250	K08670376	1 ea

Kromasil guard cartridges require a holder and coupler that are sold separately. For 2.1 to 4.6 mm I.D. cartridges: Use holder **K08970954** and coupler **K08970955**. For 10 to 21.2 mm I.D. cartridges: Use holder **K08970956** and coupler **K08970957**.

Cyclofructans: LARIHC™ and FRULIC™ Chiral HPLC and HILIC Columns

NEW PRODUCTS

Cyclofructans are cyclic oligosaccharides and the newest class of chiral stationary phases for HPLC, SFC, and HILIC. Invented by Prof. Daniel W. Armstrong (1,2) and introduced by AZYP, the LARIHC and FRULIC derivatized cyclofructan-based HPLC columns are now available world-wide through Supelco/Sigma-Aldrich.

CF Phase	Mode	Description
LARIHC CF6-P	Chiral HPLC	Alkyl derivatized cyclofructan 6. Particularly useful for chiral primary amines.
LARIHC CF6-M	Chiral HPLC	Methyl-functionalized cyclofructan 6. Complementary to LARIHC CF6-P for chiral primary amines.
LARIHC CF6-RN	Chiral HPLC	R-Naphthylethyl-functionalized cyclofructan 6. Suitable for enantiomers that are not primary amines.
LARIHC CF7-DMP	Chiral HPLC	3,5-Dimethylphenyl functionalized cyclofructan 7. Complementary enantioselectivity to LARIHC CF-6-RN.
FRULIC-N	HILIC	Neutral poly-hydroxy based stationary phase
FRULIC-C	HILIC	Hydrophilic charged cyclofructan 6

All phases are available in standard HPLC column dimensions. For more information on AZYP's LARIHC and FRULIC columns, please visit our website or contact your local Sigma-Aldrich office.

References:

- (1) Ping Sun, Chunlei Wang, Zachary S. Breitbach, Ying Zhang, and Daniel W. Armstrong. "Development of New HPLC Chiral Stationary Phases Based on Native and Derivatized Cyclofructans" *Anal. Chem.* **2009**, *81*, 10215-10226.
- (2) Ping Sun and Daniel W. Armstrong. "Effective enantiomeric separations of racemic primary amines by the isopropyl carbamate-cyclofructan6 chiral stationary phase" *J. Chromatogr. A*, **2010**, *1217*, 4904-4918.

Protection for Chiral HPLC Columns

Within our chiral HPLC line we offer three distinct guard column formats:

- 2 cm x 1.0 mm I.D. stand-alone guard columns for all Astec CSPs (CHIROBIOTIC®, CYCLOBOND, Cellulose, P-CAP)
- 2 cm x 4.0 mm I.D. guard cartridges for all Astec CSPs (holder required)
- 1 cm x 2, 3, and 4 mm I.D. guard cartridges for the protein-based CSPs (CHIRAL-AGP, -HSA, -CBH) (holder required)

Examples are shown below. We also offer the Supelco ColumnSaver direct-connect in-line filter (55214-U or 55215-U) to remove particulate matter. The ColumnSaver can be used to protect any of our HPLC columns. This section describes the hardware needed for the various guard designs. Packed guard cartridges and columns can be found with the respective CSP they are intended to protect.



Astec 2 cm x 1 mm I.D. HPLC guard column. Does not require a holder.



Representative 2 cm length Supelguard or Astec HPLC guard cartridge. Requires a stand-alone (21150AST) or direct-connect (504254) holder.



Representative CHIRALPAK® AGP, HSA, or CBH HPLC guard cartridge, 1 cm length by 2, 3 or 4 mm I.D. Requires holder 58159AST.

Chiral HPLC & SFC Columns

Protection for Chiral HPLC Columns: *Column Protection for Astec Chiral HPLC Columns (CHIROBIOTIC®, CYCLOBOND®, Cellulose DMP, P-CAP™, CLC)*

Column Protection for Astec Chiral HPLC Columns (CHIROBIOTIC®, CYCLOBOND®, Cellulose DMP, P-CAP™, CLC)

Guards are available for Astec CHIROBIOTIC®, CYCLOBOND, Cellulose, and P-CAP columns in the following dimensions:

- 2 cm x 4.0 mm I.D. packed guard cartridges that use both stand-alone (21150AST) or direct-connect (504254) holders. The choice depends on user preferences. These holders accommodate standard 1/16" O.D. Valco-type nuts and ferrules, and have a freely-rotating inlet/outlet port that allows for complete rotation of tubing on one side of the holder. The direct-connect style holder attaches directly to Supelco or Astec 3.0, 4.0 and 4.6 mm I.D. columns.
- 2 cm x 1.0 mm I.D. packed guard columns for protecting 2.1 mm and lesser I.D. columns. The 1.0 mm I.D. columns do not require a holder.

Both of these guard designs use 1/16" O.D. tubing, nuts and ferrules (not included). You can couple the stand-alone holders to the analytical column using a short piece of 1/16" tubing, or use the convenient column couplers. A list of suggested hardware appears in the table below. Our complete hardware offering appears in the HPLC Accessories section of this catalog. Other guard dimensions, including **preparative guards**, are available. Please inquire.



Stand-alone HPLC guard column holder (21150AST) and representative 2 cm length Supelguard or Astec guard cartridge.



Direct-connect style holder (504254) for 2 cm length Supelguard and Astec guard cartridges. Connects to 3, 4 and 4.6 mm I.D. Supelco or Astec HPLC columns.

	Cat. No.	Qty
Coupler for Legacy Guard Column Holder		
PEEK, I.D. 0.010 in. x O.D. 1/16 in. x Overall L 1 in.	54986	1 ea
Supelguard™ Guard Cartridge Holder		
Stand-Alone (Swivel-type), for use with Supelguard cartridges (2 cm L. x 2 to 4.6 mm I.D.)	21150AST	1 ea
Direct-Connect (Swivel-type), for use with Supelguard cartridges (2 cm L. x 3 to 4.6 mm I.D.)	504254	1 ea
Stand-Alone, for use with Supelguard cartridges (1 cm L. x 10.0 mm I.D.)	567499-U	1 ea
Stand-Alone, for use with Supelguard cartridges (1 cm L. x 21.2 mm I.D.)	581392-U	1 ea
Stainless Steel HPLC Fittings		
ferrule, configured for 1/16 in. tubing	22988	10 ea
nut, for for 1/16 in. tubing	22990-U	10 ea
Stainless Steel 1/16 in. Capillary Tubing		
L 5 cm x O.D. 1/16 in. x I.D. 0.007 in.	56713	1 ea
HPLC Column Coupler		
PEEK, I.D. 0.007 in. x O.D. 1/16 in. x Overall L 1 in.	58162AST	1 ea

Column Protection for Protein-based HPLC Columns

Guards for the CHIRALPAK® AGP, HSA, and CBH columns are supplied in 1 cm length by 2.0, 3.0 or 4.0 mm I.D. cartridge format in packs of 2. They require a holder (58159AST) that is sold separately. The holder accommodates standard 1/16" O.D. tubing. You can couple the holder to the analytical column using a short piece of 1/16" tubing, or use the convenient column couplers. A list of suggested hardware appears in the table below. Our complete hardware offering appears in the HPLC Accessories section of this catalog.



Right, holder (58159AST) and left, representative CHIRALPAK® AGP, HSA, or CBH 1 cm length guard cartridges.

	Cat. No.	Qty
Coupler for Legacy Guard Column Holder		
PEEK, I.D. 0.010 in. x O.D. 1/16 in. x Overall L 1 in.	54986	1 ea
Guard Column Holder for CHIRALPAK® AGP, HSA, and CBH		
for use with CHIRALPAK AGP, CBH, and HSA 1 cm x 2.0, 3.0, and 4.0 mm guard cartridges	58159AST	1 ea
HPLC Column Coupler		
PEEK, I.D. 0.007 in. x O.D. 1/16 in. x Overall L 1 in.	58162AST	1 ea
Stainless Steel 1/16 in. Capillary Tubing		
L 5 cm x O.D. 1/16 in. x I.D. 0.007 in.	56713	1 ea
Stainless Steel HPLC Fittings		
ferrule, configured for 1/16 in. tubing	22988	10 ea
nut, for for 1/16 in. tubing	22990-U	10 ea

Pre-column Filters

Our applications chemists have found the Supelco ColumnSaver pre-column filter to be very good at protecting the column from particulate matter in the sample and mobile phase. This simple in-line filter comes in two frit porosities, 0.5 and 2 micron. More information on this product can be found in the HPLC Accessories section.

Supelco® ColumnSaver Precolumn Filter



Description	Cat. No.	Qty
0.5 µm	55214-U	10 ea
2.0 µm	55215-U	10 ea

Chiral HPLC & SFC Columns

Chiral HPLC Column Test Mixes

Chiral HPLC Column Test Mixes

Use these test mixes to evaluate the performance of your chiral HPLC column and make sure it is operating effectively. Consult the QA report supplied with the column, or call or email our Technical Services for mobile phase and expected performance criteria.

- 5-Methyl-5-phenylhydantoin is used to evaluate the performance of Astec CHIROBIOTIC® columns. The mobile phase is 100% methanol and detection is by UV at 254 nm. The test mix is supplied as a racemic mixture of two enantiomers.
- Trans-stilbene oxide (TSO) is used to evaluate the performance of Astec Cellulose DMP and other polysaccharide-based chiral HPLC columns. The recommended mobile phase is 10:90 IPA:hexane and detection is by UV at 220 nm. The test mix is supplied as a racemic mixture of the two TSO enantiomers and 1,3,5-tri-tert-butylbenzene is a void volume marker.

Chiral Test Mix for Astec CHIROBIOTIC®

5-Methyl-5-phenylhydantoin
 $C_{10}H_{10}N_2O_2$ FW 190.20

▶ analytical standard

5-Methyl-5-phenylhydantoin is used to evaluate the performance of Astec CHIROBIOTIC® chiral HPLC columns. The mobile phase is 100% methanol and detection is by UV at 254 nm. The test mix is supplied as a racemic mixture of two enantiomers in methanol.

Components

5-Methyl-5-phenylhydantoin 5000 µg/mL

40095-U

1 mL

Chiral Normal Phase Test Mix

▶ 30 µg/mL each component in hexane, analytical standard

Trans-stilbene oxide (TSO) is used to evaluate the performance of Astec Cellulose DMP and other polysaccharide-based chiral HPLC columns. The recommended mobile phase is 10:90 IPA:hexane and detection is by UV at 220 nm. The test mix is supplied as a racemic mixture of the two TSO enantiomers with 1,3,5-tri-tert-butylbenzene as a void volume marker. The solvent is hexane.

Components

trans-Stilbene oxide
 1,3,5-tri-t-Butylbenzene

40119-U

1 mL

Chiral GC Columns

The acquisition of Astec by Sigma-Aldrich in 2006 merged two well-established lines of CSPs for enantiomer separations by capillary GC. Both Supelco DEX™ and Astec CHIRALDEX® are based on cyclodextrins and exhibit complementary selectivity. All columns are manufactured to deliver high resolution and analyte response, low bleed, and long column life.

Our chiral GC columns currently comprise:

- **Astec CHIRALDEX®** - Developed by Astec, the CHIRALDEX line of chiral capillary GC columns use specialized phase chemistries that include unique derivatives of cyclodextrins with a broad range of selectivities. The "TA" (trifluoroacetyl) derivatives possess the most popular and unique chemistry.
- **Supelco DEX™** - Developed by Supelco, DEX capillary GC columns comprise derivatized cyclodextrins that are able to perform many enantiomeric separations.



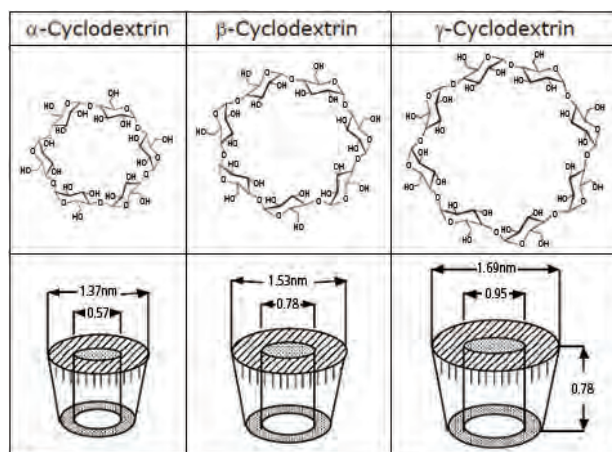
Related Information

Request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T411101	Supelco Chiral GC Columns

Cyclodextrin-based GC CSPs

Cyclodextrins (CDs) are macromolecules composed of 6 or more D (+)-glucose residues bonded through α -glycosidic linkages. They are classified according to the number of glucose residues they contain: α -cyclodextrins (six residues), β -cyclodextrins (seven residues), and γ -cyclodextrins (eight residues). The three different sizes separate analytes over a wide range of molecular size. All hydroxyl groups, whether at the 2, 3 or 6 position, can be selectively modified with a derivative to impart unique physical properties and inclusion selectivities. Unlike LC, there is no enantioselectivity in chiral GC without derivatization of the CD.



Cyclodextrin molecules showing dimensions

Chiral GC Columns

Cyclodextrin-based GC CSPs

Cyclodextrins—Physical Properties

Cyclodextrin	Glucose Units	Stereogenic Centers	MW	Cavity (nm)
Alpha	6	30	972	0.57
Beta	7	35	1135	0.78
Gamma	8	40	1297	0.95

In cyclodextrin-based capillary GC CSPs, the derivatized cyclodextrin is used neat or after being doped at controlled percentages into a polysiloxane polymer matrix. Cyclodextrin GC CSPs are grouped into three general categories:

Group 1: Surface Interactions, Complex Derivatives

Because the predominant mechanism of retention for phases in this group is based on surface interaction, γ -cyclodextrin, with eight glucose molecules, has been shown to be the most useful. Compared to α - and β -cyclodextrins, the greater number of glucose molecules in a γ -cyclodextrin results in the greater number of 2,3,6-position hydroxyl functional groups available for derivatization. High derivative concentration is beneficial for maximizing surface interactions. This group includes the highly popular **CHIRALDEX® G-TA**.

Group 2: Surface/Inclusion Interactions, Simple Derivatives

This group includes the diacetyl (**Supelco DEX 225**) and dimethyl (**Supelco DEX 325**) derivatives. The β -cyclodextrin has shown the greatest applicability for phases with these derivatives.

Group 3: Inclusion Interactions

The third group of GC CSPs relies on inclusion interactions for retention. The fact that there are three different size cyclodextrins (α , β and γ) allows for separation of a wide variety of different size analytes. This group includes **CHIRALDEX® DM** and **CHIRALDEX® DA**, and **Supelco DEX 110** and **Supelco DEX 120**.

CD Derivatives in the Supelco Chiral GC Line:

Derivative	Phase	Cyclodextrin Type		
		α (alpha)	β (beta)	γ (gamma)
Butyryl	Astec CHIRALDEX BP			✓
Diacetyl	Supelco DEX 225	✓	✓	✓
Dialkyl	Astec CHIRALDEX DA	✓	✓	✓
Dimethyl	Astec CHIRALDEX DM		✓	✓
Dimethyl	Supelco DEX 325	✓	✓	✓
Dipropionyl	Astec CHIRALDEX DP		✓	✓
S-Hydroxypropyl	Astec CHIRALDEX PH		✓	
Permethylated	Astec CHIRALDEX PM		✓	
Permethylated	Supelco DEX 110		✓	
Permethylated	Supelco DEX 120	✓	✓	✓
Propionyl	Astec CHIRALDEX PN			✓
Trifluoroacetyl	Astec CHIRALDEX TA	✓	✓	✓

Choosing a Chiral GC Column

Supelco offers the most extensive line of chiral capillary GC columns in the industry. Our two premium lines of GC CSPs, Supelco DEX and Astec CHIRALDEX®, comprise a wide range of cyclodextrin derivatives with complementary selectivity. All are stable, high boiling liquids and make effective CSPs for enantiomer separations by GC. Selectivity is a function of the derivative, the degree of derivatization, the position of the derivative on the cyclodextrin, whether the derivatized cyclodextrin is used neat or doped into a polysiloxane, and if doped, at what percentage. Certain CSPs are more selective for given molecular structures and often more than one will achieve a separation. CSPs may be chosen to optimize resolution, but also elution order or analysis time. It is conventional practice to screen multiple CSPs when developing a new method. We offer **column screening kits** at very attractive prices for this purpose.

Supelco Chiral Capillary GC Column Selection Guidelines

	CHIRALDEX TA	CHIRALDEX DP	CHIRALDEX PN	CHIRALDEX BP	CHIRALDEX DM	Supelco DEX 325	Supelco DEX 225	CHIRALDEX PM	Supelco DEX 120	Supelco DEX 110	CHIRALDEX DA	CHIRALDEX PH	α -Cyclodextrin	β -Cyclodextrin	γ -Cyclodextrin	
	By Chemistry											By Cyclodextrin				
Oxygen containing analytes in the form of alcohols, ketones, acids, aldehydes, and lactones; halogenated compounds	✓															
Aliphatic and aromatic amines; aliphatic and some aromatic esters; polar racemates		✓														
Lactones and aromatic amines; epoxides; styrene oxide			✓													
Amino acids; amines; furans				✓												
Aliphatic, olefinic, and aromatic enantiomers					✓	✓	✓					✓				
Terpenes and tertiary amines								✓	✓	✓						
Heterocyclic amines											✓					
Xylenes, menthols, cresols, substituted phenols, substituted benzenes, epoxide enantiomers													✓			
Acids, alcohols, amines, diols, esters, ethers, halohydrocarbons, hydrocarbons, ketones, positional isomers, silanes, terpenes, terpeneols														✓		
α -BHC, carvone, carboxylic acids, methamphetamine																✓

Chiral GC Columns

Chiral GC Column Screening Kits

Chiral GC Column Screening Kits

These column screening kits provide the necessary columns to perform most chiral separations and run mechanistic studies, and are offered at very attractive prices.



Related Information

Need help choosing the right chiral HPLC or GC column?
Let our Chiral Services group do the work for you.

Astec CHIRALDEX® GC Column Screening Kit

The Astec CHIRALDEX® column kit contains three GC CSPs that cover the widest possible range of enantioselectivity: CHIRALDEX® G-TA, B-DM, and B-DA, in the popular 30 m x 0.25 mm, 0.12 µm d_i dimensions. The CHIRALDEX® G-TA separates the greatest number of enantiomers, often with high enantioselectivity. The CHIRALDEX® B-DM separates the widest variety of different structural types. The CHIRALDEX® B-DA is best suited for larger multi-ring structures. Eighty-five percent of analytes that exhibit enantioselectivity on cyclodextrin based chiral stationary phases will give enantioselectivity on one of these phases. The kit provides considerable savings over the columns purchased separately.

Kit contents: One 30 m x 0.25 mm I.D., 0.12 µm column of each type: CHIRALDEX® G-TA, B-DM, and B-DA

Astec CHIRALDEX® GC Column Screening Kit

Description	Cat. No.	Qty
30 m kit	71030AST	1 kit

Supelco DEX™ GC Column Screening Kit

These Supelco DEX kits provide the tools you need to perform most chiral separations. Confirm identities of enantiomers by monitoring elution order changes (enantioreversal) from one column to another. In combination, the columns in the two kits span the full range of Supelco DEX column enantioselectivity. Compare the savings to the columns purchased separately.

Kit I: One 30 m x 0.25 mm I.D., 0.25 µm column of each type: α-DEX 120, β-DEX 120 and γ-DEX 120

Kit II: One 30 m x 0.25 mm I.D., 0.25 µm column of each type: β-DEX 120, β-DEX 225, γ-DEX 225 and β-DEX 325

Supelco DEX™ GC Column Screening Kit

Description	Cat. No.	Qty
kit I	24340	1 kit
kit II	24328-U	1 kit

Group 1: Surface Interactions, Complex Derivatives

Sigma-Aldrich is the only supplier of complex derivatives for chiral GC. There are four members in this important group:

- Astec CHIRALDEX® TA (Trifluoroacetyl derivatives)
- Astec CHIRALDEX® PN (Propionyl derivatives)
- Astec CHIRALDEX® DP (Dipropionyl derivatives)
- Astec CHIRALDEX® BP (Butyryl derivatives)

Because the predominant mechanism of retention for phases in this group is based on surface interaction, the gamma-cyclodextrin, with 8 glucose molecules, has been shown to be the most useful. Compared to alpha- and beta-cyclodextrins, the greater number of glucose molecules in a gamma-

cyclodextrin results in the greater number of 2,3,6-position hydroxyl functional groups available for derivatization. High derivative concentration is beneficial for maximizing surface interactions.

Astec CHIRALDEX® G-TA is the first choice in this group. This phase has been shown to be the most broadly selective phase for the pharmaceutical industry, especially in the analysis of chiral intermediates and drug studies in various stages of clinical trials. Separations occur without the inclusion mechanism and are typically faster and more efficient than most chiral stationary phases. This phase does not contain a polysiloxane carrier and, therefore, there are no deleterious effects at low temperatures. The ability of this phase to separate parent drug enantiomers and their metabolites has proven quite beneficial. A modified version of the G-TA is the **Astec CHIRALDEX® G-PN**. It functions like the G-TA but shows higher selectivity toward certain amines (amphetamine, methamphetamine). This phase is more stable to moisture than the G-TA.

The **Astec CHIRALDEX® G-DP** phase was introduced to enhance selectivity for both aliphatic and aromatic amines in addition to aliphatic and some aromatic esters. This phase is especially useful for polar racemates. This phase demonstrates better hydrolytic and thermal stability than the G-TA. The **Astec CHIRALDEX® G-BP** phase can be used as a general purpose column but it is especially useful for amino acids.

Note: The subtle differences in functional groups between the G-TA, G-DP, G-PN, and G-BP often allow for major enhancements in chiral and achiral selectivity when changing from one phase to another.

Trifluoroacetyl (TA) Cyclodextrin Derivatives

Astec CHIRALDEX® A-TA, B-TA, and G-TA

Trifluoroacetylation of the 3-hydroxyl group after pentylation of the 2,6-hydroxyl groups creates a phase with high selectivity for oxygen-containing analytes in the form of alcohols, ketones, acids, aldehydes, lactones. Highly selective for halogenated compounds. Astec CHIRALDEX® G-TA is the most popular phase in our chiral GC line.

Features

- Phase: 2,6-di-O-pentyl-3-trifluoroacetyl derivative of α-, β-, or γ-cyclodextrin
- Separates the widest variety and greatest number of enantiomers
- Unique retention behavior
- Extraordinary versatility and chiral selectivity
- Sensitive to moisture, but can be regenerated
- Thermal limit 180 °C (isothermal or programmed)

Analytes

- Useful for separating homologous series of amino acids (primary, secondary, aromatic and aliphatic), amines (primary, secondary, cyclic, aromatic and halogenated), amino alcohols, alkanes, hydrogenated alkanes, alcohols (aliphatic and aromatic), acids (halogenated and hydroxy), esters (aromatic, aliphatic, hydroxy, di-ester), diols, lactones, ketones, phthalides, and sulphoxides

Mechanism Observations

- Strong dipole-dipole interactions
- Longer alkyl chain; greater retention; increase in enantioselectivity up to C₄/C₅
- Halogens known to favor cavity interaction
- Dipole-dipole interactions are commonly identified in the mechanism of separation for CHIRALDEX® TA phases. In a homologous series of alkane enantiomers, identical alpha values are observed regardless of chain length or branching indicating only 1 or 2 carbons may be contributing to chiral recognition. Alpha values are greatly affected by size and polarity of the head group. Functional groups like epoxides, amino alcohols and alcohols can dictate the cyclodextrin selection. Aldehydes, carboxylic acids and epoxides separate better on the gamma while alcohols, alcohol amines and other linear molecules separate better on the beta derivative.

Chiral GC Columns

Group 1: Surface Interactions, Complex Derivatives: *Trifluoroacetyl (TA) Cyclodextrin Derivatives*

Size Selectivity

- The γ -TA (CHIRALDEX G-TA) derivative has proven to exhibit a wider chiral selectivity and usefulness than the β (CHIRALDEX® B-TA) analog. The influence of the inclusion mechanism for chiral recognition is very much reduced and capacities are generally higher indicating more surface interaction. Of all the compounds we have tested, the split between CHIRALDEX® G-TA and CHIRALDEX® B-TA is approximately 55/35 with only 10% of the separations accomplished on the α (CHIRALDEX® A-TA).

Astec CHIRALDEX® A-TA Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-trifluoroacetyl derivative of α -cyclodextrin. This phase exhibits high selectivity for oxygen-containing analytes in the form of alcohols, ketones, acids, aldehydes and lactones. It is also highly selective for halogenated compounds.

Temp. Limits:

- 10 °C to 180 °C, isothermal and programmed

phase non-bonded; 2,6-di-O-pentyl-3-trifluoroacetyl derivative of α -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	20	500	73002AST	1 ea
	0.12	30	500	73003AST	1 ea
	0.12	40	500	73004AST	1 ea
	0.12	50	500	73005AST	1 ea

Astec CHIRALDEX® B-TA Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-trifluoroacetyl derivative of β -cyclodextrin. This phase exhibits high selectivity for oxygen-containing analytes in the form of alcohols, ketones, acids, aldehydes and lactones. It is also highly selective for halogenated compounds.

Temp. Limits:

- 10 °C to 180 °C isothermal and programmed

phase non-bonded; 2,6-di-O-pentyl-3-trifluoroacetyl derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	20	500	73022AST	1 ea
	0.12	30	500	73023AST	1 ea
	0.12	40	500	73024AST	1 ea

Astec CHIRALDEX® G-TA Capillary GC Column

Astec CHIRALDEX G-TA is the first choice in the Group 1 CSPs (Surface Interactions, Complex Derivatives). This phase has been shown to be the most broadly-selective phase for the pharmaceutical industry, especially for the analysis of chiral intermediates and drug studies in various stages of clinical trials. Separations occur without the inclusion mechanism and are typically faster and more efficient than most chiral stationary phases. G-TA has also been used to separate parent drug enantiomers and their metabolites. G-TA has its highest selectivity for oxygen-containing analytes like alcohols, diols and polyols as the free alcohol and as an acyl derivative; amines as acyl derivatives; amino alcohols, halogens (Cl>Br>F), amino acids, hydroxy acids, lactones, furans and pyrans. It is also highly selective for halogenated compounds.

Temp. Limits:

- 10 °C to 180 °C isothermal and programmed

phase non-bonded; 2,6-di-O-pentyl-3-trifluoroacetyl derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	10	500	73031AST	1 ea
	0.12	20	500	73032AST	1 ea
	0.12	30	500	73033AST	1 ea
	0.12	40	500	73034AST	1 ea
	0.12	50	500	73035AST	1 ea

Astec CHIRALDEX® TA Series Column Regeneration Reagents

The trifluoroacetic anhydride (TFA) derivative of the cyclodextrins used in CHIRALDEX® TA phases can hydrolyze in the presence of moisture at and above room temperature. Sources of moisture include the sample, carrier gas, injection solvents and the atmosphere if stored unsealed. For long column life, ensure that the carrier gas line has an effective moisture trap, all sample extracts are moisture free, the injection solvent is anhydrous and the column is stored properly when not in use by flame-sealing the ends. Guard columns will also help protect the column from the damaging effects of moisture. This regeneration method does not restore retention due to loss of phase, it restores enantioselectivity lost by hydrolysis of the acetyl derivative. Instructions for regeneration of CHIRALDEX® TA columns are available by contacting techservice@sial.com.

For flame-sealing the ends of the column, we offer the Microflame Gas Torch Set (Cat. No. 22969). Details of this item can be found in the Laboratory Supplies section of this catalog.

Description	Cat. No.	Qty
Trifluoroacetic anhydride, for GC derivatization	33164	25 mL
Trifluoroacetic anhydride	33165-U	10 × 1 mL
	33164	25 mL
Methyl Red, ACS reagent, crystalline	250198-25G	25 g
	250198-100G	100 g
Sodium hydroxide, ACS reagent, ≥97.0%, pellets	221465-25G	25 g
	221465-500G	500 g
	221465-6X500G	6 × 500 g
	221465-2.5KG	2.5 kg
	221465-12KG	12 kg
	221465-50KG	50 kg

Propionyl (PN) Cyclodextrin Derivatives

Astec CHIRALDEX® G-PN

A modified version of the CHIRALDEX® G-TA, Astec CHIRALDEX® G-PN exhibits high selectivity for lactones, epoxides, and aromatic amines. Additionally, the analysis of styrene oxide can be accomplished on this phase (this analyte degrades on the TA phases). This phase is more stable to moisture than the CHIRALDEX® G-TA.

Features

- Phase: 2,6-di-O-pentyl-3-propionyl derivative of γ -cyclodextrin
- Suitable for epoxide separations
- High selectivity for lactones
- High selectivity for aromatic amines (i.e. amphetamine, methamphetamine)
- More stable to moisture than the CHIRALDEX® TA phases
- Thermal limit 200/220°C (isothermal/programmed)

Analytes

- Epoxides, aromatic amines (amphetamine/methamphetamine), >C6 alcohols and lactones

Mechanism Observations

- There is little evidence of inclusion formation. Retention increases with increased chain length of analyte. This allows for efficient separation of a series of homologs.

Size Selectivity

- The CHIRALDEX® G-PN shows very little size selectivity.

Chiral GC Columns

Group 1: Surface Interactions, Complex Derivatives: *Propionyl (PN) Cyclodextrin Derivatives*

NEW PRODUCTS

Astec CHIRALDEX® G-PN Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-propionyl derivative of γ -cyclodextrin. This phase exhibits high selectivity for lactones and aromatic amines. It is also suitable for epoxide separations. Additionally, the analysis of styrene oxide can be accomplished on this phase (this analyte degrades on the TA phases).

GC capillary column
fused silica

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,6-di-O-pentyl-3-propionyl derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	74033AST	1 ea

Dipropionyl (DP) Cyclodextrin Derivatives**Astec CHIRALDEX® B-DP and G-DP**

This derivative demonstrates good selectivity for a wide range of analytes except alcohols and epoxides where the CHIRALDEX® G-TA remains the best choice. The CHIRALDEX® G-DP has shown very high selectivity for both aromatic and aliphatic amines and for aliphatic and some aromatic esters. Both hydrolytic and temperature stability are better than CHIRALDEX® G-TA, and for bulky fused ring structures the CHIRALDEX® G-DP is better than the CHIRALDEX® B-DP.

Features

- Phase: 2,3-di-O-propionyl-6-t-butyl silyl derivative of β - or γ -cyclodextrin
- Broad chiral selectivity
- Good hydrolytic stability
- High efficiency and resolution at low retention times for polar racemates
- Thermal limit 200/220 °C (isothermal/programmed)

Mechanism Observations

- Mostly surface interactions
- Fused ring structures better selectivity on gamma
- Acids have better selectivity as methyl rather than ethyl esters

Analytes

- Excellent for aromatic and aliphatic amines
- Good for many aliphatic and some aromatic esters

Size Selectivity

- Speed and sample capacity point to a surface-type mechanism for very polar racemates. Large, bulky molecules still require a larger surface area than the beta provides, therefore, an increase in selectivity is seen on the gamma derivative for fused ring structures. The smaller alpha cavity offered no selectivity while the beta covered the largest range of molecular sizes. The choice between beta and gamma is compound dependent for this phase.

NEW PRODUCTS

Astec CHIRALDEX® B-DP Capillary GC Column

Incorporates a phase consisting of a 2,3-di-O-propionyl-6-t-butyl silyl derivative of β -cyclodextrin. This phase exhibits good hydrolytic stability, broad chiral selectivity, and is excellent for aliphatic and aromatic amines. It is also good for many aliphatic and some aromatic esters as well as exhibiting high efficiency and resolution at low retention times for polar racemates.

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,3-di-O-propionyl-6-t-butyl silyl derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	78023AST	1 ea

Astec CHIRALDEX® G-DP Capillary GC Column

Incorporates a phase consisting of a 2,3-di-O-propionyl-6-t-butyl silyl derivative of γ -cyclodextrin. The CHIRALDEX G-DP phase was designed to enhance selectivity for both aliphatic and aromatic amines, in addition to aliphatic and some aromatic esters. This phase is especially useful for polar racemates, as it exhibits high efficiency and resolution at low retention times. G-DP demonstrates better hydrolytic and thermal stability than the CHIRALDEX G-TA.

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,3-di-O-propionyl-6-t-butyl silyl derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	78033AST	1 ea

Butyryl (BP) Cyclodextrin Derivatives**Astec CHIRALDEX® G-BP**

Astec CHIRALDEX® G-BP incorporates a phase consisting of a 2,6-di-O-pentyl-3-butyryl derivative of γ -cyclodextrin. It is a good general-purpose column. It is also especially useful for amino acids and is, therefore, a good substitute for the bonded amino acid-type chiral GC phases.

Features

- Phase: 2,6-di-O-pentyl-3-butyryl derivative of γ -cyclodextrin
- High selectivity for amino acids, amines, and furans
- High sample capacity
- Thermal limit 200/220 °C (isothermal/programmed)

Mechanism Observations

- Alkyl chain on analyte contributes to chiral recognition
- High sample capacity indicates primarily surface interactions

Analytes

- Amino acids, amines and furans

Size Selectivity

- The influence of the inclusion mechanism on selectivity is much reduced and capacities are, therefore, generally higher.

Chiral GC Columns

Group 1: Surface Interactions, Complex Derivatives: *Butyryl (BP) Cyclodextrin Derivatives*

NEW PRODUCTS

Astec CHIRALDEX® G-BP Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-butyryl derivative of γ -cyclodextrin. This phase exhibits high selectivity for amino acids, amines, and furans.

GC capillary column
fused silica

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,6-di-O-pentyl-3-butyryl derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	75033AST	1 ea

Group 2: Surface/Inclusion Interactions, Simple Derivatives

There are three different derivatives in this group:

- Supelco DEX™ 225 (Diacetyl derivatives)
- Astec CHIRALDEX® DM and Supelco DEX™ 325 (Dimethyl derivatives)
- Astec CHIRALDEX® PM, Supelco DEX™ 110, and DEX™ 120 (Permethy derivatives)

The beta-cyclodextrin has shown the greatest applicability for phases with these derivatives. Astec CHIRALDEX® B-DM is the recommended column in this category. The Supelco β -DEX 325 is similar in both chemistry and use to the CHIRALDEX® B-DM phase, the main difference being the concentration of the dimethyl-derivatized cyclodextrin that is doped into the polysiloxane carrier. The Supelco β -DEX 225 is a modified form of the β -DEX 325 phase, employing acetyl derivatives at the 2,3-positions instead of more traditional methyl derivatives.

This group also includes the popular dimethyl and permethyl derivatives, and includes Astec CHIRALDEX® B-PM, Supelco β -DEX 110, and Supelco β -DEX 120 phases. They are recommended as general purpose columns for the separation of a wide variety of compounds and are especially useful for the analysis of alcohols and diols in their underivatized form and analytes with polar groups (such as tertiary amines). The main difference between these three phases is the concentration of the permethyl-derivatized cyclodextrin that is doped into the polysiloxane carrier.

Diacetyl (225) Cyclodextrin Derivatives

Supelco DEX™ 225

The Supelco DEX 225 phases are modified forms of the DEX 325 phases, employing acetyl derivatives at the 2,3-positions instead of more traditional methyl derivatives. The chiral stationary phase in DEX 225 columns contains 2,3-di-O-acetyl-6-O-TBDMS derivatized α , β , or γ cyclodextrin embedded in an intermediate polarity phase. These columns provide unique selectivity for enantiomeric separations of small molecules: alcohols, aldehydes (e.g., 2-phenylpropionaldehyde), esters (e.g., methyl malate, methyl lactate), flavor compounds and ketones.

Features

- Phase: 25% 2,3-di-O-acetyl-6-O-TBDMS- α -, β - or γ -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)
- Thermal limit 230 °C (isothermal or programmed)

Analytes

- Alcohols, aldehydes (e.g., 2-phenylpropionaldehyde), esters (e.g., methyl malate, methyl lactate), flavor compounds, ketones

 α -DEX™ 225

The chiral stationary phase in α -DEX 225 columns contains 2,3-di-O-acetyl-6-O-TBDMS- α -cyclodextrin embedded in an intermediate polarity phase.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-acetyl-6-O-TBDMS- α -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24311	1 ea

 β -DEX™ 225

The Supelco β -DEX 225 is a modified form of the β -DEX 325 phase, and employs acetyl derivatives at the 2,3-positions instead of more traditional methyl derivatives. The chiral stationary phase in β -DEX 225 columns contains 2,3-di-O-acetyl-6-O-TBDMS- β -cyclodextrin embedded in an intermediate polarity phase. These columns provide unique selectivity for enantiomeric separations of small molecules: alcohols, aldehydes (e.g., 2-phenylpropionaldehyde), esters (e.g. methyl malate, methyl lactate), flavor compounds and ketones.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-acetyl-6-O-TBDMS- β -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24348	1 ea

 γ -DEX™ 225

The chiral stationary phase in γ -DEX 225 columns contains 2,3-di-O-acetyl-6-O-TBDMS- γ -cyclodextrin embedded in an intermediate polarity phase.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-acetyl-6-O-TBDMS- γ -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24312	1 ea

Dimethyl (DM, 325) Cyclodextrin Derivatives

Astec CHIRALDEX® B-DM and G-DM

The dimethyl derivative was designed to overlap with the applications of both Astec CHIRALDEX® PM and CHIRALDEX® PH series, having similar selectivity but with shorter retention times and better resolution.

Features

- Phase: 2,3-di-O-methyl-6-t-butyl silyl derivative of β - or γ -cyclodextrin
- Broad chiral selectivity
- Combines selectivity of CHIRALDEX® PM (permethyl) and CHIRALDEX® PH (hydroxypropyl)
- Short retention, high resolution
- β derivative is broadly applicable
- Thermal limit 200/220 °C (isothermal/programmed)

Analytes

- Resolves aliphatic, olefinic and aromatic enantiomers

Mechanism Observations

- Size selectivity present but not dominant as in CHIRALDEX® DA
- Fewer structural requirements
- Characteristic temperature selectivity

Chiral GC Columns

Group 2: Surface/Inclusion Interactions, Simple Derivatives: *Dimethyl (DM, 325) Cyclodextrin Derivatives*

Size Selectivity

- Size selectivity is evident, implying that the inclusion mechanism plays a role in the separation mechanism, but does not dominate as it does in the CHIRALDEX® DA series. The β form covers a very broad range of molecular sizes and, therefore, has the widest applicability.

Supelco DEX™ 325

The chiral stationary phase in DEX 325 columns is the 2,3-di-O-methyl-6-O-TBDMS derivative of α -, β -, or γ -cyclodextrin embedded in an intermediate polarity phase. The Supelco β -DEX 325 is similar in both chemistry and use to the Astec CHIRALDEX® B-DM phase; the main difference being the concentration of the dimethyl-derivatized cyclodextrin that is doped into the polysiloxane carrier.

Features

- Phase: 25% 2,3-di-O-methyl-6-O-TBDMS- α -, β -, or γ -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)
- Thermal limit 230 °C (isothermal or programmed)

NEW PRODUCTS

Astec CHIRALDEX® B-DM Capillary GC Column

Through special derivatization techniques, the concentration of the cyclodextrin in the CHIRALDEX B-DM has been substantially increased in the polysiloxane carrier. This phase is very useful for a number of free acids and bases. The B-DM is able to perform most of the separations done on a beta-permethylated phase, but with higher resolution. The selectivity of the B-DM covers applications of both the B-PM and B-PH phases, although with superior performance.

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,3-di-O-methyl-6-t-butyl silyl derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	20	500	77022AST	1 ea
	0.12	30	500	77023AST	1 ea
	0.12	40	500	77024AST	1 ea
	0.12	50	500	77025AST	1 ea

Astec CHIRALDEX® G-DM Capillary GC Column

Incorporates a phase consisting of a 2,3-di-O-methyl-6-t-butyl silyl derivative of γ -cyclodextrin. This phase exhibits broad chiral selectivity, resolving aliphatic, olefinic, and aromatic enantiomers. It combines the selectivities of the PM and PH phases.

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,3-di-O-methyl-6-t-butyl silyl derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	77033AST	1 ea

 α -DEX™ 325

The chiral stationary phase in α -DEX 325 columns contains 2,3-di-O-methyl-6-O-TBDMS- α -cyclodextrin embedded in an intermediate polarity phase.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-methyl-6-O-TBDMS- α -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24303	1 ea

 β -DEX™ 325

The chiral stationary phase in β -DEX 325 columns contains 2,3-di-O-methyl-6-O-TBDMS- β -cyclodextrin embedded in an intermediate polarity phase. The Supelco β -DEX 325 is similar in both chemistry and use to the CHIRALDEX B-DM phase, the main difference being the concentration of the dimethyl-derivatized cyclodextrin that is doped into the polysiloxane carrier.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-methyl-6-O-TBDMS- β -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24308	1 ea

 γ -DEX™ 325

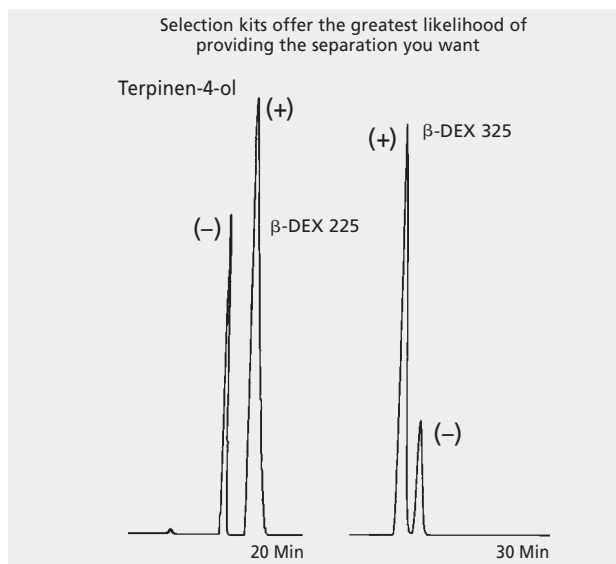
The chiral stationary phase in Supelco γ -DEX 325 columns contains 2,3-di-O-methyl-6-O-TBDMS- γ -cyclodextrin embedded in an intermediate polarity phase.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-methyl-6-O-TBDMS- γ -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24306	1 ea



Chiral GC Columns

Group 2: Surface/Inclusion Interactions, Simple Derivatives: *Permethyl (PM, 110, 120) Cyclodextrin Derivatives*

Permethyl (PM, 110, 120) Cyclodextrin Derivatives

The main difference between Astec CHIRALDEX B-PM and Supelco β -DEX 110 and Supelco β -DEX 120 is the concentration of the permethyl-derivatized cyclodextrin that is doped into the polysiloxane carrier. This confers selectivity differences between the columns.

Astec CHIRALDEX® B-PM

The permethylated β -cyclodextrin is a GC CSP with potential to separate a wide variety of racemates. The PM is especially valuable for separating certain hydrocarbons, like terpenes, some underivatized alcohols and diols, and some analytes with polar groups like tertiary amines.

Features

- Phase: 2,3,6-tri-O-methyl derivative of β -cyclodextrin
- Broad chiral selectivity
- Strong inclusion/size selectivity
- Thermal limit 200/220 °C (isothermal/programmed)

Analytes

- A general purpose column used for the separation of acids, alcohols, barbitals, diols, epoxides, esters, hydrocarbons, ketones, lactones, and terpenes.
- Some underivatized alcohols and diols as well as some analytes with polar groups, e.g. tertiary amines, show excellent separation.

Mechanism Observations

- Inclusion a dominant mechanism
- Highest temperature stability of CHIRALDEX phases along with the CHIRALDEX DM

Size Selectivity

- Some size selectivity is evident with the permethylated phase. The beta form will cover a broad range of molecule sizes.

Supelco DEX™ 110 and 120

The chiral stationary phases in DEX 110 and 120 columns contain permethylated cyclodextrins embedded in an intermediate polarity stationary phase. These columns are recommended for the enantiomeric separation of a wide range of chiral compounds (ketones, esters, alkanes, alkenes, alcohols, acids, ethers, etc.). The 10% (β -DEX 110) and 20% (β -DEX 120) β -cyclodextrin content alters the elution order while maintaining similar enantioselectivity.

Because the elution order of a pair of enantiomers frequently reverses (enantioreversal) on a γ -DEX column compared to the elution order on an α -DEX or β -DEX column, we recommend γ -DEX 120 columns as complements to α -DEX 120 and β -DEX 120 columns. The γ -DEX is useful for enantiomeric differentiation of large analytes, e.g. α -BHC, carvone, carboxylic acids, and methamphetamine.

Features

- Phase (110): 10% permethylated β -cyclodextrin in SPB-35 poly(35% diphenyl/65% dimethylsiloxane)
- Phase (120): 20% permethylated α -, β -, or γ -cyclodextrin in SPB-35 poly(35% diphenyl/65% dimethylsiloxane)
- Thermal limit 230 °C (isothermal or programmed)

NEW PRODUCTS

Astec CHIRALDEX® B-PM Capillary GC Column

The main difference between CHIRALDEX B-PM and the Supelco β -DEX 110 and Supelco β -DEX 120 phases is the concentration of the permethyl-derivatized cyclodextrin that is doped into the polysiloxane carrier. CHIRALDEX B-PM is a general-purpose column used for the separation of acids, alcohols, barbitals, diols, epoxides, esters, hydrocarbons, ketones, lactones and terpenes. Also, some underivatized alcohols and diols as well as some analytes with polar groups, i.e. tertiary amines, show excellent separation.

Temp. Limits:

- -10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,3,6-tri-O-methyl derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	76023AST	1 ea
	0.12	50	500	76025AST	1 ea

β -DEX™ 110

The chiral stationary phase in β -DEX 110 columns contains permethylated β -cyclodextrin embedded in an intermediate polarity stationary phase. They are recommended for the enantiomeric separation of a wide range of chiral compounds (ketones, esters, alkanes, alkenes, alcohols, acids, ethers, etc.). The 10% (β -DEX 110) and 20% (β -DEX 120) β -cyclodextrin content alters the elution order while maintaining similar enantioselectivity.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 10% permethylated β -cyclodextrin in SPB-35 poly(35% diphenyl/65% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24301	1 ea
	0.25	60	250	24302	1 ea

α -DEX™ 120

Containing permethylated α -cyclodextrin embedded in an intermediate polarity stationary phase, Supelco α -DEX 120 columns provide unique selectivity for enantiomeric separations of small molecules. They are also recommended for separating positional isomers (phenols, xylenes, etc.).

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 20% permethylated α -cyclodextrin in SPB-35 poly(35% diphenyl/65% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24310	1 ea

β -DEX™ 120

The chiral stationary phase in β -DEX 120 columns contains permethylated β -cyclodextrin embedded in an intermediate polarity stationary phase. They are recommended for the enantiomeric separation of a wide range of chiral compounds (ketones, esters, alkanes, alkenes, alcohols, acids, ethers, etc.). The 10% (β -DEX 110) and 20% (β -DEX 120) β -cyclodextrin content alters the elution order while maintaining similar enantioselectivity.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 20% permethylated β -cyclodextrin in SPB-35 poly(35% phenyl/65% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24304	1 ea
	0.25	60	250	24305-U	1 ea

Chiral GC Columns

Group 2: Surface/Inclusion Interactions, Simple Derivatives: *Permethyl (PM, 110, 120) Cyclodextrin Derivatives***γ-DEX™ 120**

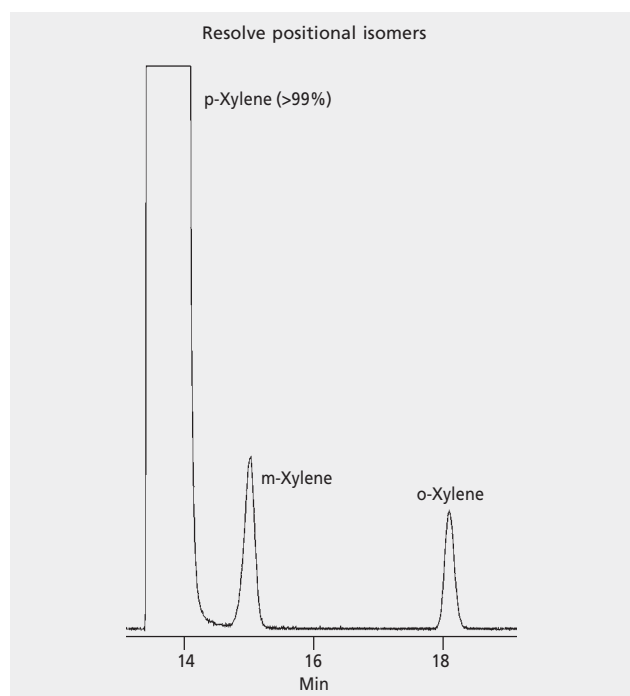
Because the elution order of the members of a chiral pair frequently reverses (enantioreversal) on a γ-DEX column compared to the elution order on an α-DEX or β-DEX column, we recommend γ-DEX 120 columns as complements to α-DEX 120 and β-DEX 120 columns. γ-DEX is useful for enantiomeric differentiation of large analytes, i.e. α-BHC, carvone, carboxylic acids and methamphetamine.

Temp. Limits:

- 30 °C to 230 °C

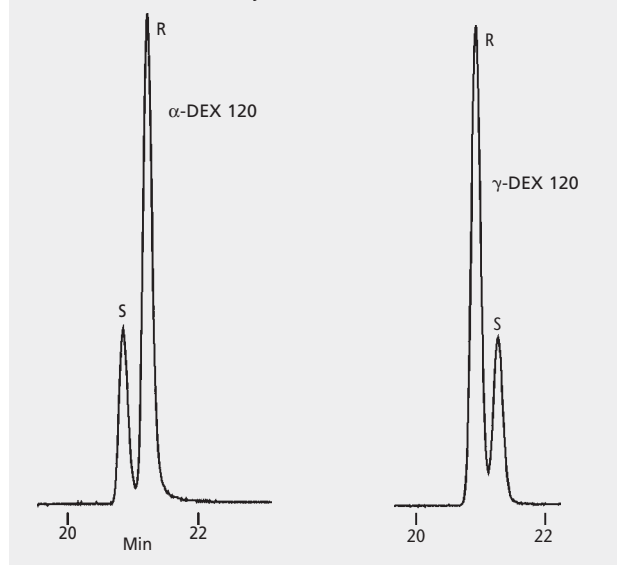
phase non-bonded; 20% permethylated γ-cyclodextrin in SPB-35 poly(35% phenyl/65% dimethylsiloxane)

I.D. (mm)	d _r (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24307	1 ea



column: α-DEX 120, 30 m × 0.25 mm I.D., 0.25 μm (24310)
 oven: 50 °C
 inj.: 80 °C
 det.: FID, 300 °C
 carrier gas: helium, 30 cm/sec
 sample: 0.6 μL each analyte (neat), split (100:1)

Use γ-DEX to reverse elution order for many compounds
 (methyl mandelate shown)



column: α-DEX 120 and γ-DEX 120, 30 m × 0.25 mm I.D., 0.25 μm
 α-DEX 120 (24310), γ-DEX 120 (24307)
 oven: 130 °C
 inj.: 250 °C
 det.: FID, 300 °C
 carrier gas: helium, 35 cm/sec
 sample: 1 μL methylene chloride (1 mg/mL each analyte), split (100:1)

Group 3: Inclusion Interactions

The third group relies on inclusion interactions for retention mechanism. There are two derivatives in this group:

- Astec CHIRALDEX® DA (Dialkyl derivatives)
- Astec CHIRALDEX® PH (S-Hydroxypropyl derivatives)

The fact that there are three different size cyclodextrins (α, β, and γ) allows for separation of a wide variety of different size analytes. Astec CHIRALDEX® B-DA demonstrates the strongest size selectivity. This phase requires analytes to minimally contain two ring structures, one of which is unsaturated (aromatic). The mechanism of this phase is strongly dependent on the inclusion mechanism and is able to differentiate changes in the base structure. Because the CHIRALDEX® DA phases most effectively separate multi-ring analytes, analysis temperatures are often higher than 150 °C. A key application area for this phase is fingerprinting raw materials and identifying structural differences.

Astec CHIRALDEX® B-PH shows at least some selectivity to a great variety of analytes, but is especially effective for saturated analytes with minimal functionality, saturated cyclics, and saturated bicyclics. This phase often shows a reversal of elution order (enantioreversal) compared to the CHIRALDEX® B-DA phase.

Chiral GC Columns

Group 3: Inclusion Interactions: *Dialkyl (DA) Cyclodextrin Derivatives*

Dialkyl (DA) Cyclodextrin Derivatives

Astec CHIRALDEX® A-DA, B-DA, and G-DA

The dipentylated cyclodextrin derivatives show pronounced selectivity differences based on the size, shape and functionality of the analyte. Strong evidence exists for inclusion complexation as the basic driving mechanism and, therefore, resolution is affected by sample load.

The most popular member of this group is Astec CHIRALDEX B-DA. It requires minimally two ring structures, one of which is unsaturated (aromatic) α , β to the stereogenic center (examples include fluoxetine, methylphenidate, chlorpheniramine). Inclusion complexation or proper fit between the analyte and cyclodextrin cavity is the dominant enantioselectivity mechanism for the CHIRALDEX DA series of columns. There must be an includable group α or β to the stereogenic center for chiral recognition. Since the Astec CHIRALDEX DA series of columns most effectively separate multi-ring analytes, analysis temperatures are often higher than 150°C. Enantioselectivity has been observed at temperatures >200°C (fluoxetine acetyl derivative).

Features

- Phase: 2,6-di-O-pentyl-3-methoxy derivative of α -, β -, or γ -cyclodextrin
- Hydrophobic surface
- Pronounced selectivity differences based on analyte size, shape and functionality
- Different selectivity from other cyclodextrin derivatives
- Thermal limit 200/220 °C (isothermal/programmed)

Analytes

- Useful for separating heterocyclic amines

Mechanism Observations

- Stronger inclusion for CHIRALDEX DA derivatives, therefore, size selectivity is important.
- Critical temperature dependence for enantioselectivity. Above this temperature no separation occurs.

Size Selectivity

- Unlike LC, the size selectivity and chiral recognition applies to both aromatic and nonaromatic enantiomers on this phase.

NEW PRODUCTS

Astec CHIRALDEX® A-DA Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-methoxy derivative of α -cyclodextrin. This phase is good for separations of heterocyclic amines. It has different selectivity from other phases and often shows reversal in elution from the PH phases. MAOT = 200 °C isothermal, 220 °C programmed. GC capillary column fused silica

Temp. Limits:

- -10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,6-di-O-pentyl-3-methoxy derivative of α -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	72003AST	1 ea

Astec CHIRALDEX® B-DA Capillary GC Column

CHIRALDEX B-DA requires that analytes possess a minimum of two ring structures, one of which is unsaturated (aromatic) α , β to the stereogenic center. Examples include fluoxetine, methylphenidate and chlorpheniramine. Inclusion complexation or proper fit between the analyte and cyclodextrin cavity is the dominant enantioselectivity mechanism for the DA series. There must be an includable group α or β to the stereogenic center for chiral recognition. Since CHIRALDEX DA columns most effectively separate multi-ring analytes, analysis temperatures are often higher than 150°C. Enantioselectivity has been observed at temperatures >200°C (fluoxetine acetyl derivative).

Temp. Limits:

- -10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,6-di-O-pentyl-3-methoxy derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	72023AST	1 ea

Astec CHIRALDEX® G-DA Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-methoxy derivative of γ -cyclodextrin. This phase is good for separations of heterocyclic amines. It has different selectivity from other phases and often shows reversal in elution from the PH phases. MAOT = 200 °C isothermal, 220 °C programmed. GC capillary column fused silica

Temp. Limits:

- -10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,6-di-O-pentyl-3-methoxy derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	72033AST	1 ea

S-Hydroxypropyl (PH) Cyclodextrin Derivatives

Astec CHIRALDEX® B-PH

The first general purpose derivative involved substitution of the cyclodextrin hydroxyl groups with pure "S" hydroxypropyl followed by permethylation. The surface is hydrophilic in character and the influence of size and shape selectivity is greatly reduced but not absent. The β -cyclodextrin form has the broadest applicability.

Features

- Phase: (S)-2-hydroxy propyl methyl ether derivative of β -cyclodextrin
- Good general purpose chiral column
- Separates a wide variety of enantiomers
- Hydrophilic surface
- Resolves aliphatic, olefinic and aromatic enantiomers
- Thermal limit 200/220 °C (isothermal/programmed)

Analytes

- Saturated compounds with minimal functionality
- Saturated cyclics and bicyclics

Mechanism Observations

- Reduced influence of inclusion complexing
- Less size selectivity compared to DA derivatives
- Strong influence of temperature on selectivity

Size Selectivity

- Minimal size selectivity

Chiral GC Columns

Group 3: Inclusion Interactions: *S*-Hydroxypropyl (PH) Cyclodextrin Derivatives

NEW PRODUCTS

Astec CHIRALDEX® B-PH Capillary GC Column

CHIRALDEX B-PH shows at least some selectivity to a great variety of analytes, but is especially effective for saturated analytes with minimal functionality, saturated cyclics and bicyclics. The CHIRALDEX PH series of columns shows less of a necessity for inclusion complexation for chiral recognition than the DA columns. This phase often shows a reversal of elution order (enantioreversal) compared to the B-DA phase.

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; (S)-2-hydroxy propyl methyl ether derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	71023AST	1 ea

Chiral GC Column Protection

Guard columns protect your capillary column investment. They remove residual moisture, protect the column from non-volatile impurities and the high temperature of the injector and/or detector, and allow for the injection of sample volumes up to 7 μL on-column. Typically a 5-10 m long guard column is used. The guard column can be connected via a press fit or other column connector. To couple to a mass spectrometer, use a 1 m length as a transfer line. We recommend using methyl- or phenyl/methyl-deactivated guard columns to protect CHIRALDEX® and Supelco DEX™ capillary GC columns.

Chiral GC Column Test Mixes

After you install a column in your system, use a test mix to make sure you haven't also installed some surprises (such as ferrule or tubing fragments in the column, or small leaks). Weekly tests thereafter will keep little problems from growing into big problems. Test mixes are an inexpensive aid to obtaining high quality chromatograms.

Description	Concentration	Application	Cat. No.	Qty
β-DEX™ 120 Column Test Mix	500 μg/mL each component in methylene chloride <i>Decane</i> <i>3,3-Dimethyl-2-butanol</i> <i>1-Hexanol</i>	For use with Supelco β-DEX 120. <i>(+)-3-Methyl-2-heptanone</i> <i>Nonane</i> <i>Undecane</i>	48028	1 mL
α-DEX™ 120 Column Test Mix	500 μg/mL each component in methylene chloride <i>Decane</i> <i>Nonane</i> <i>1,2-Propanediol</i>	For use with Supelco α-DEX 120. <i>Undecane</i> <i>m-Xylene</i> <i>p-Xylene</i>	48013	1 mL
1-(N-TFA)-2-Methylpiperidine	5000 μg/mL in ethanol: isopropanol (95:5)	For use with CHIRALDEX G-TA.	90002AST	1 mL
2-(N-TFA)aminoheptane	5000 μg/mL in ethanol: isopropanol (95:5)	For use with CHIRALDEX B-PH, A-TA, G-DM and G-DP.	90003AST	1 mL
1-(N-TFA)aminoindan	5000 μg/mL in ethanol: isopropanol (95:5)	For use with CHIRALDEX B-DA and G-DA.	90004AST	1 mL
2-(Bromomethyl)tetra-2H-pyran	5000 μg/mL in ethanol: isopropanol (95:5)	For use with CHIRALDEX B-TA and B-DP.	90005AST	1 mL
3,4-Dihydro-2-ethoxy-2H-pyran	5000 μg/mL in ethanol: isopropanol (95:5)	For use with CHIRALDEX A-PH and G-PH.	90006AST	1 mL
1-Phenyl-1-ethanol	5000 μg/mL in ethanol: isopropanol (95:5)	For use with CHIRALDEX B-PM and B-DM.	90007AST	1 mL

Guard Columns for Chiral GC Columns

Tubing Treatment	Application	Max. Temp.
Non-polar (methyl)	Low polarity solvents (e.g., alkanes, carbon disulfide, ethers)	360 °C
Intermediate polarity (phenyl/methyl)	Intermediate polarity solvents (e.g., acetone, methylene chloride, toluene)	360 °C

Non-Polar Fused Silica Tubing

max. temp. 360 °C

I.D. (mm)	L (m)	Cat. No.	Qty
0.25	1	24025	3 ea
0.25	3	25722	1 ea
0.25	5	25742	1 ea
0.25	15	25756	1 ea

Intermediate Polar Fused Silica Tubing

max. temp. 360 °C

I.D. (mm)	L (m)	Cat. No.	Qty
0.25	3	25727	1 ea
0.25	5	25747	1 ea
0.25	15	25760-U	1 ea

Chiral Derivatization Reagents

Chiral Derivatization Reagents

ChiraSelect™ is a unique, high-quality set of the most useful chiral derivatization reagents, carefully produced and rigorously analyzed in our laboratories for all your analytical applications in the chiral field. ChiraSelect reagents are specially selected to meet the requirements for derivatization reagents for enantiomeric excess determinations. To meet any analytical situation, the ChiraSelect line provides pairs of reagents with each respective enantiomer exhibiting an enantiomeric ratio of 99.5:0.5.

ChiraSelect™ HPLC Derivatization Reagents

CAS No.	Compound	Cat. No.	Qty
7322-88-5	(S)-(+)-O-Acetylmaleic acid, 99%	253022-5G	5 g
-	(S)-5-Allyl-2-oxabicyclo[3.3.0]oct-8-ene, purum p.a., chiral derivatization reagent for HPLC, ≥97.0% (GC)	53835-1G 53835-5G	1 g 5 g
20887-95-0	Boc-Cys-OH, for chiral derivatization, ≥98.5%	15411-250MG 15411-1G	250 mg 1 g
19132-06-0	L-(+)-2,3-Butanediol, for chiral derivatization, ≥97.0%	18967-1ML 18967-5ML	1 mL 5 mL
89104-48-3	(4 <i>R</i> ,5 <i>R</i>)-2-Chloro-4,5-dimethyl-1,3,2-dioxaphospholane 2-oxide, for chiral derivatization, ≥95.0%	24370-500MG-F 24370-5G-F	500 mg 5 g
28166-41-8	α-Cyano-4-hydroxycinnamic acid, 99%	476870-2G 476870-10G	2 g 10 g
130678-42-1	(+)-Diisopropyl- <i>O,O'</i> -bis(trimethylsilyl)- <i>L</i> -tartrate, 99%, Flukabrand™ ChiraSelect reagent	420131-1G	1 g
95713-52-3	N _α -(2,4-Dinitro-5-fluorophenyl)- <i>L</i> -alaninamide, for chiral derivatization, ≥99.0%	71478-50MG	50 mg
210529-62-7	N _α -(2,4-Dinitro-5-fluorophenyl)- <i>D</i> -valinamide, for chiral derivatization, ≥98.0%	42100-500MG	500 mg
132679-61-9	N _α -(2,4-Dinitro-5-fluorophenyl)- <i>L</i> -valinamide, for chiral derivatization, ≥98.0%	42102-100MG	100 mg
69632-32-2	(<i>R</i>)-(-)-3,5-Dinitro- <i>N</i> -(1-phenylethyl)benzamide, 98%	296902-1G	1 g
69632-31-1	(<i>S</i>)-(+)-3,5-Dinitro- <i>N</i> -(1-phenylethyl)benzamide, 98%	296910-1G	1 g
154479-90-0	(-)-1-(9-Fluorenyl)ethyl chloroformate solution, 18 mM in acetone, for chiral derivatization	338710-1ML	1 mL
107474-79-3	(+)-1-(9-Fluorenyl)ethyl chloroformate solution, ≥18 mM in acetone, for chiral derivatization	23182-10X1ML-F 23182-10ML-F	10 × 1 mL 10 mL
124529-07-3	<i>N</i> -Isobutyl- <i>D</i> -cysteine, for chiral derivatization, ≥97.0%	58689-250MG	250 mg
124529-02-8	<i>N</i> -Isobutyl- <i>L</i> -cysteine, for chiral derivatization, ≥97.0%	58698-250MG-F 58698-1G-F	250 mg 1 g
784213-51-0	(1 <i>R</i> ,4 <i>a</i> 5,10 <i>a</i>)-7-Isopropyl-1-isothiocyanato-1,4 <i>a</i> -dimethyl-1,2,3,4,4 <i>a</i> ,9,10,10 <i>a</i> -octahydrophenanthrene, for chiral derivatization	89394-100MG	100 mg
3966-32-3	(<i>R</i>)-(-)-α-Methoxyphenylacetic acid, for chiral derivatization, ≥99.0%	65209-1G	1 g
26164-26-1	(<i>S</i>)-(+)-α-Methoxyphenylacetic acid, for chiral derivatization, ≥99.0%	65208-250MG	250 mg
139658-04-1	(<i>R</i>)-6-Methoxy-2,5,7,8-tetramethylchromane-2-carboxylic acid, for chiral derivatization, ≥99.0%	93509-50MG	50 mg
24277-44-9	(-)-α-Methylbenzyl isothiocyanate, for chiral derivatization, ≥99.0%	89568-250MG-F	250 mg
24277-43-8	(<i>S</i>)-(+)-α-Methylbenzyl isothiocyanate, for chiral derivatization, ≥99.0%	75491-1G-F	1 g
10420-89-0	(<i>S</i>)-(-)-1-(1-Naphthyl)ethylamine, ≥99%	237450-1G 237450-5G	1 g 5 g
73671-79-1	(<i>S</i>)-(+)-1-(1-Naphthyl)ethyl isocyanate, 99%	295957-250MG 295957-1G	250 mg 1 g
159717-68-7	<i>N</i> -(7-Nitro-4-benzofurazanyl)- <i>L</i> -prolyl chloride, for fluorescence	84999-50MG-F	50 mg
5978-70-1	(<i>R</i>)-(-)-2-Octanol, for chiral derivatization, 99%	147990-1G 147990-5G 147990-10G	1 g 5 g 10 g
6169-06-8	(<i>S</i>)-(+)-2-Octanol, 99%	147982-5G 147982-10G	5 g 10 g
7782-24-3	(<i>S</i>)-(+)-2-Phenylpropionic acid, 97%	279900-250MG 279900-1G	250 mg 1 g
-	Quaternary β-cyclodextrin, 100mg, neat	33805	100 mg
-	Sulphated β-cyclodextrin, 100mg, neat	33806	1 amp
14152-97-7	2,3,4,6-Tetra- <i>O</i> -acetyl-β- <i>D</i> -glucopyranosyl isothiocyanate, for HPLC derivatization	T5783-100MG T5783-1G	100 mg 1 g
-	2,3,4,6-Tetra- <i>O</i> -(2-naphthoyl)-β- <i>D</i> -galactopyranosyl isothiocyanate, for derivatization, ~90% (HPLC)	04669-25MG-F 04669-100MG-F	25 mg 100 mg
147948-52-5	2,3,4,6-Tetra- <i>O</i> -pivaloyl-β- <i>D</i> -galactopyranosyl isothiocyanate, for chiral derivatization, ≥95% (HPLC, sum of enantiomers)	88102-100MG 88102-500MG	100 mg 500 mg
958300-06-6	2,3,4,6-Tetra- <i>O</i> -pivaloyl-β- <i>D</i> -glucopyranosyl isothiocyanate, for chiral derivatization, ≥95.0% (HPLC)	44891-100MG-F	100 mg
62414-75-9	2,3,4-Tri- <i>O</i> -acetyl-α- <i>D</i> -arabinopyranosyl isothiocyanate, for chiral derivatization, ≥98.0%	90245-100MG	100 mg
10531-50-7	(<i>R</i>)-(-)-α-(Trifluoromethyl)benzyl alcohol, puriss., ≥99.0% (GC, sum of enantiomers)	79231-1ML	1 mL
340-06-7	(<i>S</i>)-(+)-α-(Trifluoromethyl)benzyl alcohol, 99%	411140-250MG 411140-1G	250 mg 1 g
14645-24-0	(-)-Tröger's base, for chiral derivatization, ≥99.0%	40765-100MG	100 mg
21451-74-1	(+)-Tröger's base, for chiral derivatization, ≥99.0%	40764-100MG	100 mg
135806-59-6	(<i>S</i>)-Trolox methyl ether, for chiral derivatization, ≥98.0%	93510-50MG	50 mg

Chiral Derivatization Reagents

ChiraSelect™ GC Derivatization Reagents

ChiraSelect™ GC Derivatization Reagents

CAS No.	Compound	Cat. No.	Qty
36394-75-9	(S)-(-)-2-Acetoxypropionyl chloride, for chiral derivatization, ≥99.0%	00877-500MG	500 mg
104530-16-7	(1R)-(+)-Camphanic chloride, for chiral derivatization, ≥97.0%	21286-250MG-F	250 mg
39637-74-6	(1S)-(-)-Camphanic chloride, for chiral derivatization, ≥98.0%	21287-1G-F 21287-5G-F 21287-25G-F	1 g 5 g 25 g
3347-90-8	(S)-2-Hydroxybutyric acid, for chiral derivatization, ≥99.0%	54918-1G-F	1 g
20445-31-2	(R)-(+)-α-Methoxy-α-trifluoromethylphenylacetic acid, for chiral derivatization, ≥99.0%	65361-250MG 65361-1G	250 mg 1 g
17257-71-5	(S)-(-)-α-Methoxy-α-trifluoromethylphenylacetic acid, for chiral derivatization, ≥99.0%	65369-250MG-F	250 mg
39637-99-5	(R)-(-)-α-Methoxy-α-(trifluoromethyl)phenylacetyl chloride, for chiral derivatization, ≥99.0%	65363-100MG 65363-500MG	100 mg 500 mg
20445-33-4	(S)-(+)-α-Methoxy-α-trifluoromethylphenylacetyl chloride, for chiral derivatization, ≥99.0%	65365-100MG-F 65365-500MG-F	100 mg 500 mg
3886-69-9	(R)-(+)-α-Methylbenzylamine, for chiral derivatization, ≥99.0%	77879-5ML 77879-25ML	5 mL 25 mL
2627-86-3	(S)-(-)-α-Methylbenzylamine, for chiral derivatization, ≥99.0%	77869-5ML 77869-25ML	5 mL 25 mL
33375-06-3	(R)-(+)-α-Methylbenzyl isocyanate, for chiral derivatization, ≥99.0%	77968-1ML 77968-5ML	1 mL 5 mL
14649-03-7	(S)-(-)-α-Methylbenzyl isocyanate, for chiral derivatization, ≥99.0%	77970-1ML 77970-5ML	1 mL 5 mL
104371-21-3	(R)-(+)-α-Methyl-2,3,4,5,6-pentafluorobenzyl alcohol, for chiral derivatization, ≥99.0%	76744-1G	1 g
104371-20-2	(S)-(-)-α-Methyl-2,3,4,5,6-pentafluorobenzyl alcohol, for chiral derivatization, ≥99.0%	76746-1G	1 g
3886-70-2	(R)-(+)-1-(1-Naphthyl)ethylamine, for chiral derivatization, ≥99.5%	70710-1ML	1 mL
42340-98-7	(R)-(-)-1-(1-Naphthyl)ethyl isocyanate, for chiral derivatization, ≥99.0%	70725-1ML	1 mL
1517-69-7	(R)-(+)-1-Phenylethanol, for chiral derivatization, ≥99.0%	77848-1ML 77848-5ML	1 mL 5 mL
1445-91-6	(S)-(-)-1-Phenylethanol, for chiral derivatization, ≥99.0%	77849-1ML 77849-5ML	1 mL 5 mL

Chiral Mobile Phase Additives

Chiral Mobile Phase Additives

Enantiomers of the same parent compound differ in the way they interact with other chiral molecules, like chiral stationary phases. However, it is possible to affect an enantiomeric separation using conventional HPLC and CE stationary phases by adding the chiral selector to the mobile phase (1,2). These chiral selector additives generally interact via ion pair, ligand exchange or inclusion interactions with enantiomer analytes, forming mobile diastereomeric complexes that are therefore separable by conventional normal or reversed-phase columns. When free cyclodextrins are added to the mobile phase, inclusion complexes are formed and separations can approach those obtained on cyclodextrin-based CSPs. Note that this approach often leads to a reversal in the elution order obtained on a cyclodextrin CSP. Sigma-Aldrich carries a number of highly-pure cyclodextrin derivatives for this application.

(1) Armstrong, D. W. Pseudophase Liquid Chromatography: Applications to TLC. *J. Liq. Chromatogr.* **1980**, 3(6), 895-900.

(2) Ameyibor, E.; Stewart, J. T. Enantiomeric HPLC Separation of Selected Chiral Drugs Using Native and Derivatized β -Cyclodextrins as Chiral Mobile Phase Additives. *J. Liq. Chromatogr.* **1997**, 20(6), 855-869.

CAS No.	Compound	Cat. No.	Qty
-	(2-Carboxyethyl)- β -cyclodextrin sodium salt	21872-1G-F 21872-5G-F	1 g 5 g
-	Carboxymethyl- β -cyclodextrin sodium salt	21906-1G 21906-5G	1 g 5 g
10016-20-3	α -Cyclodextrin, purum, $\geq 98.0\%$ (HPLC)	28705-5G 28705-25G 28705-100G	5 g 25 g 100 g
68168-23-0	β -Cyclodextrin hydrate, 99%	856088-5G 856088-25G 856088-100G	5 g 25 g 100 g
68168-23-0	β -Cyclodextrin hydrate, puriss., $\geq 99.0\%$ (HPLC)	28707-5G 28707-25G 28707-100G	5 g 25 g 100 g
91464-90-3	γ -Cyclodextrin hydrate	861413-100MG 861413-1G	100 mg 1 g
699020-02-5	α -Cyclodextrin, sulfated sodium salt hydrate	494542-5G	5 g
37191-69-8	β -Cyclodextrin, sulfated sodium salt, extent of labeling: 7-11 mol per mol β -CD	389153-5G 389153-25G	5 g 25 g
51166-71-3	Heptakis(2,6-di-O-methyl)- β -cyclodextrin	H0513-1G H0513-5G	1 g 5 g
51166-71-3	Heptakis(2,6-di-O-methyl)- β -cyclodextrin, $\geq 98.0\%$ (TLC)	39915-1G	1 g
55216-11-0	Heptakis(2,3,6-tri-O-methyl)- β -cyclodextrin, $\geq 90\%$	H4645-5G	5 g
55216-11-0	Heptakis(2,3,6-tri-O-methyl)- β -cyclodextrin, $\geq 98.0\%$	51707-1G 51707-5G	1 g 5 g
128446-32-2	(2-Hydroxyethyl)- β -cyclodextrin, extent of labeling: ~ 0.7 mol per mol cellulose	389137-10G	10 g
128446-33-3	(2-Hydroxypropyl)- α -cyclodextrin, average $M_w \sim 1,180$	390690-5G 390690-25G	5 g 25 g
128446-35-5	(2-Hydroxypropyl)- β -cyclodextrin, average $M_w \sim 1,380$	332593-5G 332593-25G 332593-100G	5 g 25 g 100 g
128446-35-5	(2-Hydroxypropyl)- β -cyclodextrin, average $M_w \sim 1,460$	332607-5G 332607-25G 332607-100G 332607-500G	5 g 25 g 100 g 500 g
128446-35-5	(2-Hydroxypropyl)- β -cyclodextrin, average $M_w \sim 1,540$	389145-5G 389145-25G	5 g 25 g
128446-35-5	(2-Hydroxypropyl)- β -cyclodextrin, $M_n \sim 1380$	56332	
128446-34-4	(2-Hydroxypropyl)- γ -cyclodextrin, solid	H125-5G-I H125-100G-I	5 g 100 g
128446-34-4	(2-Hydroxypropyl)- γ -cyclodextrin, extent of labeling: 0.6 molar substitution	390704-5G 390704-25G	5 g 25 g
128446-36-6	Methyl- β -cyclodextrin, average M_n 1310	332615-5G 332615-25G	5 g 25 g
-	Succinyl- β -cyclodextrin	85990-500MG 85990-5G	500 mg 5 g
23739-88-0	Triacetyl- β -cyclodextrin	332623-10G	10 g



CHIRAL APPLICATIONS

Chiral Applications

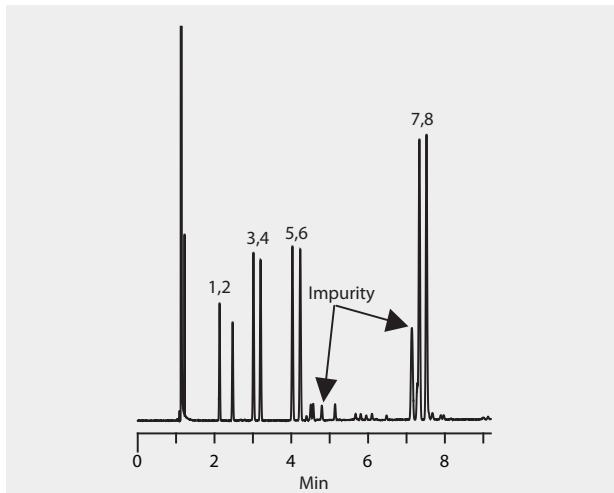
2

Chiral Applications

GC Analysis of 1,2-Alkyldiol Enantiomers (O-Trifluoroacetyl Derivatives) on Astec® CHIRALDEX® G-TA

▶ application for GC

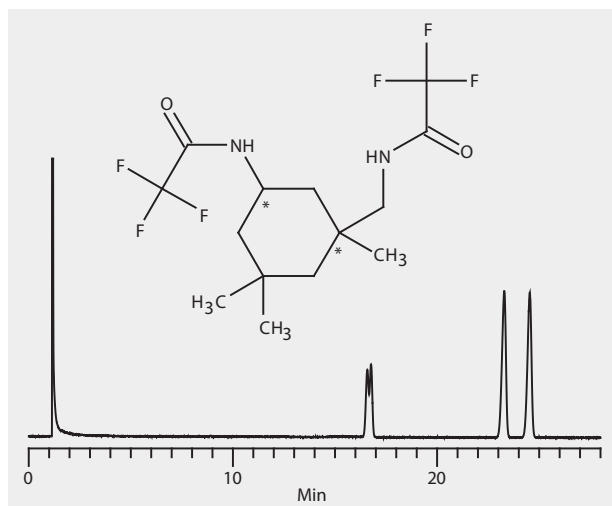
column Astec CHIRALDEX G-TA, 30 m x 0.25 mm I.D., 0.12 µm (73033AST)
 oven 80 °C, 5 °C/min. to 130 °C
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas helium, 30 psi
 injection 1 µL, 80:1 split
 sample various alkyldiol enantiomers (O-TFA derivatives)
 Application No. **G005093**



GC Analysis of 5-Amino-1,3,3-Trimethylcyclohexanemethylamine Enantiomers (N-TFA Derivatives) on Astec® CHIRALDEX® A-TA

▶ application for GC

column Astec CHIRALDEX A-TA, 30 m x 0.25 mm I.D., 0.12 µm (73003AST)
 oven 160 °C
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas helium, 30 psi
 injection 1 µL, 80:1 split
 sample 3 mg/mL racemate in methanol
 peaks 1 & 2: first enantiomer pair
 peaks 3 & 4: second enantiomer pair
 Application No. **G005105**

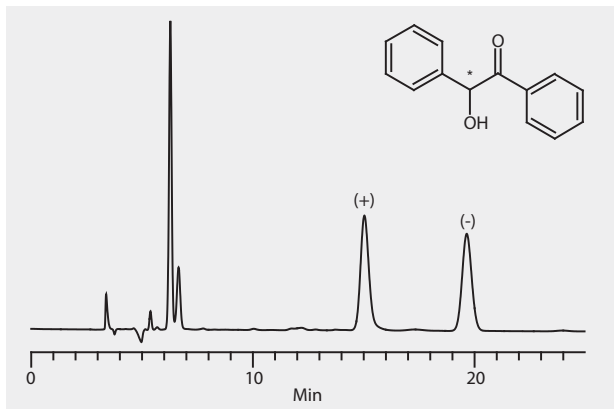


Chiral Applications

HPLC Analysis of Benzoin Enantiomers on Astec® Cellulose DMP

▶ application for HPLC

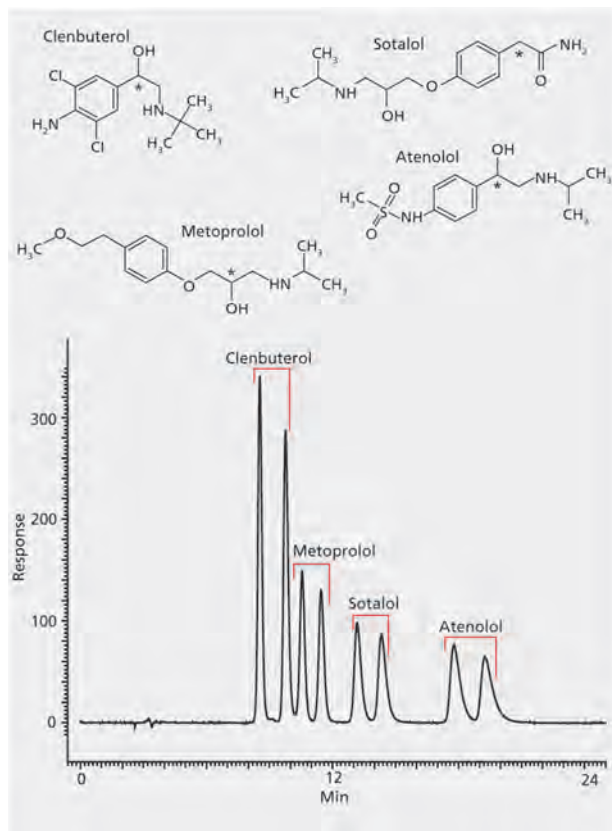
..... compound class: antibiotics/antimicrobials
 column Astec Cellulose DMP, 15 cm x 4.6 mm I.D., 5 µm particles (51098AST)
 mobile phase A: heptane
 B: IPA
 C: TFA
 Ratio: 90:10:0.1 (A:B:C)
 flow rate 0.5 mL/min
 column temp. 25 °C
 detector UV at 254 nm
 injection 2 µL
 sample 2 mg/mL in mobile phase
 Application No. G004986



HPLC Analysis of Beta-Receptor Agonist Enantiomers on Astec® CHIROBIOTIC® T

▶ application for HPLC

column Astec CHIROBIOTIC® T, 25 cm x 4.6 mm, 5 µm particles (12024AST)
 mobile phase 15 mM ammonium formate in methanol
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV at 220 nm
 Application No. G004337

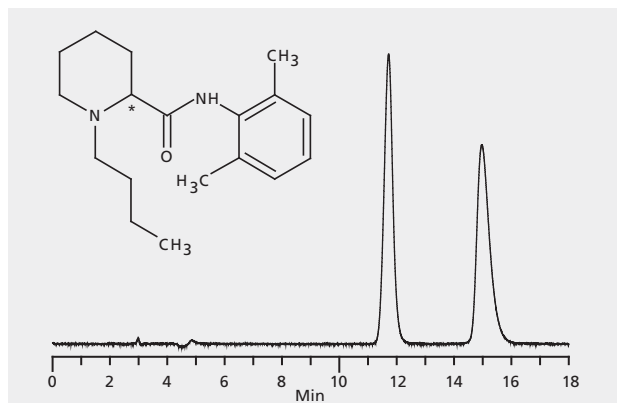


Chiral Applications

HPLC Analysis of Bupivacaine Enantiomers on Astec® CHIRO-BIOTIC® V2 (Formate Mobile Phase)

► application for HPLC

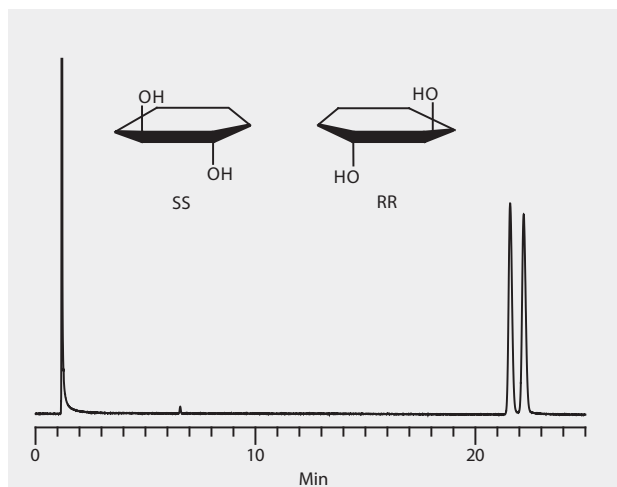
..... compound class: anesthetics
column Astec CHIROBIOTIC® V2, 25 cm x 4.6 mm I.D., 5 µm particles (15024AST)
mobile phase A: 20 mM ammonium formate, pH 4.1
..... B: methanol
..... Ratio: 5:95 (A:B)
flow rate 1 mL/min
column temp. 20 °C
detector UV at 220 nm
injection 5 µL
sample 1 mg/mL in methanol
Application No. G004619



GC Analysis of trans-1,2-Cyclohexanediol Enantiomers on Astec® CHIRALDEX® B-PH

► application for GC

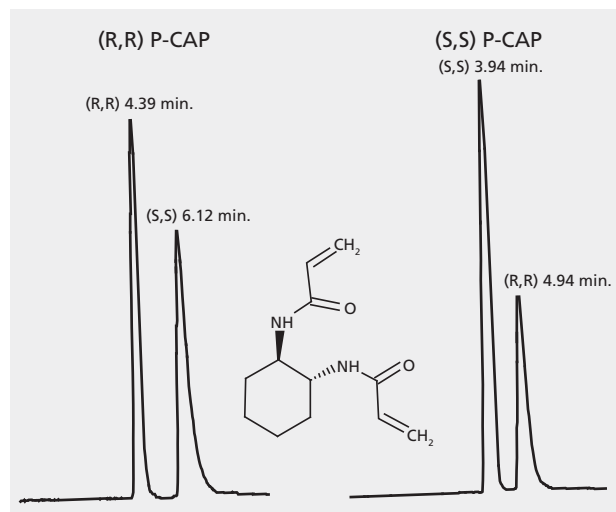
column Astec CHIRALDEX B-PH, 30 m x 0.25 mm I.D., 0.12 µm (71023AST)
oven 120 °C
inj. temp. 250 °C
detector FID, 250 °C
carrier gas helium, 30 psi
sample peaks 1 & 2: trans-1,2-cyclohexanediol enantiomers
Application No. G005083



HPLC Analysis of DACH-ACR Enantiomers on Astec® P-CAP™

► application for HPLC

column Astec (R,R) P-CAP or (S,S) P-CAP, 25 cm x 4.6 mm I.D., 5 µm particles (31024AST, 33024AST)
mobile phase A: acetonitrile
..... B: methanol
..... Ratio: 97:3 (A:B)
flow rate 1 mL/min
column temp. 25 °C
detector UV at 254 nm
injection 10 µL
sample (R,R)- and (S,S)-DACH-ACR (N-(2-acryloylamino-(1R,2R)-cyclohexyl)-acrylamide)
Application No. G004401

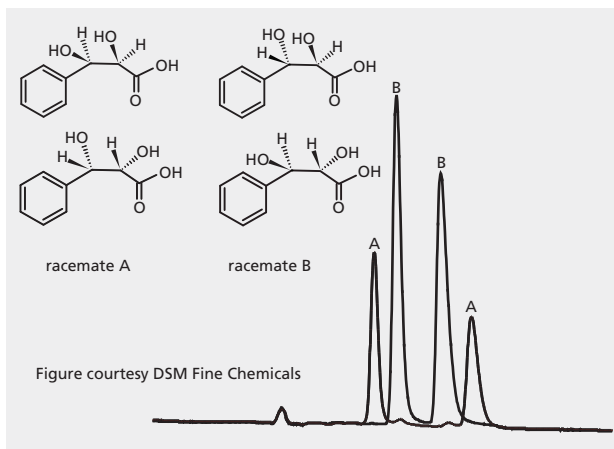


HPLC Analysis of 2,3-Dihydroxy-3-phenylpropionic Acid Enantiomers on Astec® CHIROBIOTIC® R

► application for HPLC

..... compound class: organic acids
 column Astec CHIROBIOTIC® R, 25 cm x 4.6 mm I.D., 5 µm particles (13024AST)
 mobile phase A: 0.1% ammonia, pH 4.1 with formic acid
 B: methanol
 Ratio: 50:50
 flow rate 1 mL/min
 column temp. ambient
 detector UV at 258 nm
 injection 10 µL
 sample 2,3-dihydroxy-3-phenyl-propionic acid isomers:
 (A) racemate A (4.85 and 6.95 min.)
 (B) racemate B (5.33 and 6.29 min.)

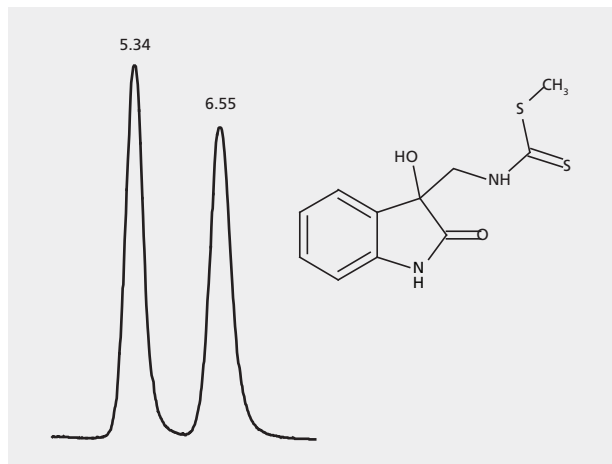
Application No. G004409



HPLC Analysis of Dioxibrassinin Enantiomers on Astec® P-CAP™

► application for HPLC

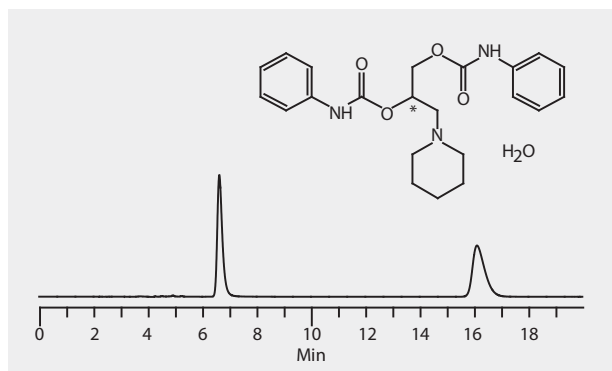
column Astec (R,R) P-CAP-DP, 25 cm x 4.6 mm I.D., 5 µm particles (35024AST)
 mobile phase A: acetonitrile
 B: methanol
 Ratio: 97:3 (A:B)
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV at 255 nm
 injection 1 µL
 sample 1 mg/mL in methanol
 Application No. G004400



HPLC Analysis of Dipiperdon Enantiomers on Astec® Cellulose DMP (LC/MS Conditions)

► application for HPLC

..... compound class: anesthetics
 column Astec Cellulose DMP, 15 cm x 4.6 mm I.D., 5 µm particles (51098AST)
 mobile phase A: methanol
 B: ammonium formate
 Ratio: 100:0.1(A:B) (Note: 0.1 w/v ammonium formate, 0.1 g/100 mL)
 flow rate 0.5 mL/min
 column temp. 25 °C
 detector UV at 230 nm
 injection 2 µL
 sample 2 mg/mL in mobile phase
 Application No. G004987

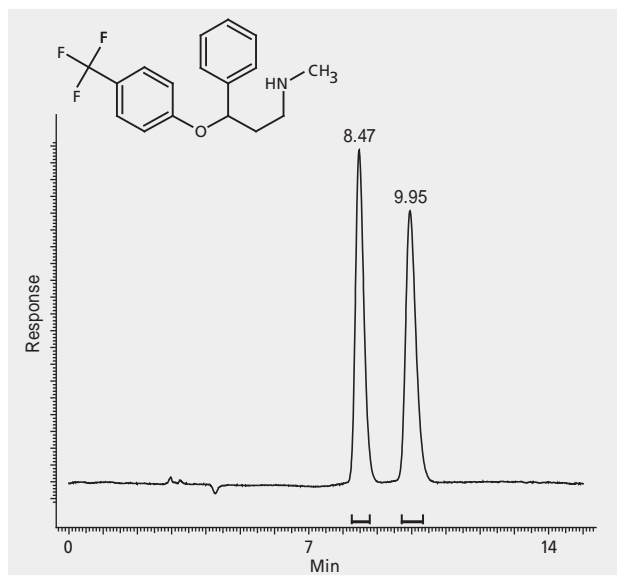


Chiral Applications

HPLC Analysis of Fluoxetine Enantiomers on Astec® CHIROBIOTIC® V2

► application for HPLC

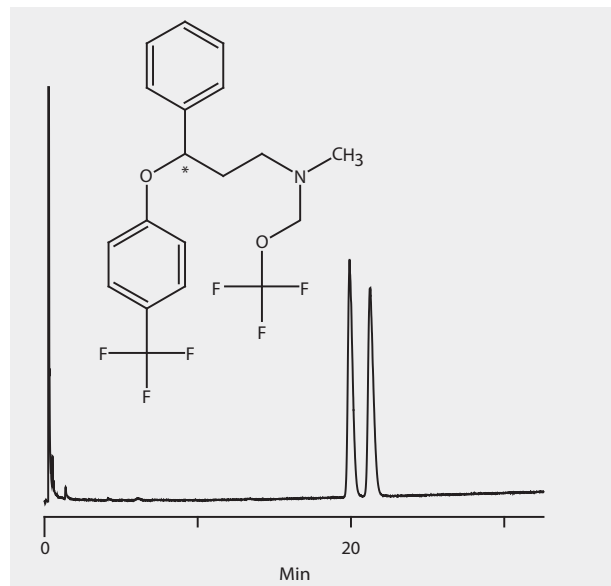
..... compound class: antidepressants
 column Astec CHIROBIOTIC® V2, 25 cm x 4.6 mm I.D., 5 µm particles (15024AST)
 mobile phase 15 mM ammonium acetate in methanol
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV at 230 nm
 injection 5 µL
 sample gas 1 mg/mL in methanol
 Application No. G004465



GC Analysis of Fluoxetine Enantiomers (N-TFA Derivative) on Astec® CHIRALDEX® B-DA

► application for GC

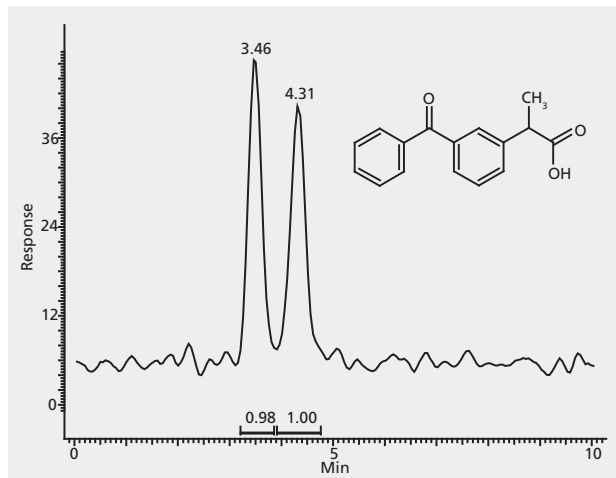
..... compound class: antidepressants
 column Astec CHIRALDEX B-DA, 10 m x 0.25 mm I.D., 0.12 µm (72021AST)
 oven 175 °C
 detector FID, 250 °C
 carrier gas helium, 15 psi
 inj. temp. 250 °C
 sample peaks 1 & 2: fluoxetine enantiomers (N-TFA derivatives)
 Application No. G005063



HPLC Analysis of Ketoprofen Enantiomers on Astec® CHIROBIOTIC® R (MS Detection)

► application for HPLC

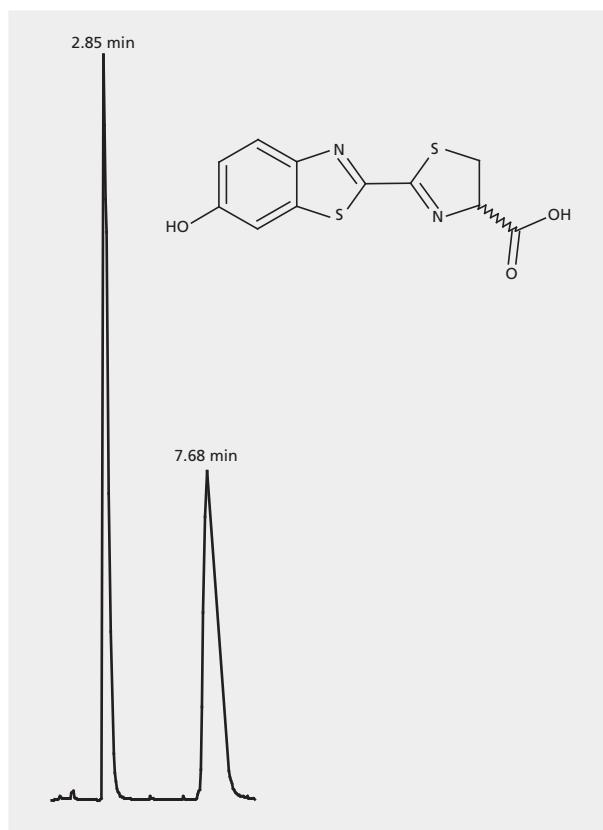
column Astec CHIROBIOTIC® R, 15 cm x 2.1 mm, 5 µm particles (13019AST)
 mobile phase A: 20 mM ammonium acetate, pH 5.6 B: methanol Ratio: 70:30 (A:B)
 flow rate 0.2 mL/min
 column temp. 35 °C
 detector ESI(-)
 sample ketoprofen
 Application No. G004331



HPLC Analysis of Luciferin Enantiomers on CHIRALPAK® AGP

► application for HPLC

column CHIRALPAK AGP, 10 cm x 4 mm I.D., 5 µm particles (58150AST)
 mobile phase 10 mM sodium phosphate, pH 6.0
 flow rate 0.9 mL/min
 column temp. 25 °C
 detector UV at 225 nm
 sample Luciferin
 Application No. G004398

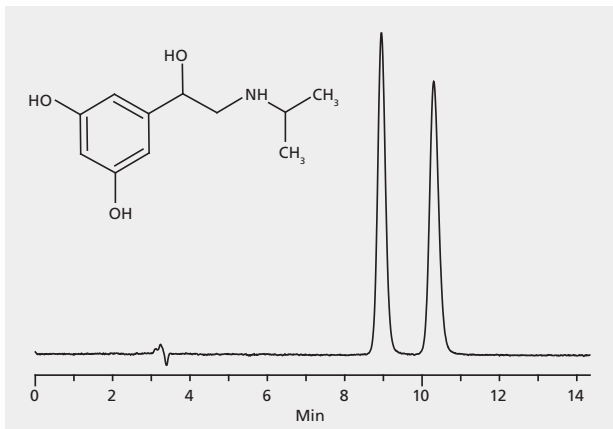


Chiral Applications

HPLC Analysis of Metaproterenol Enantiomers on Astec® CHIROBIOTIC® T

► application for HPLC

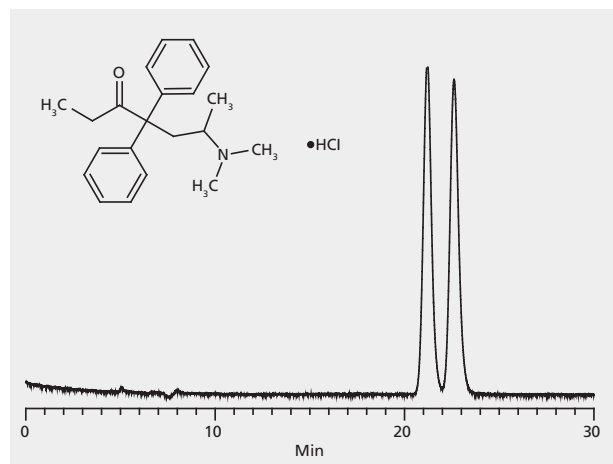
column Astec CHIROBIOTIC® T, 25 cm x 4.6 mm I.D., 5 µm particles (12024AST)
 mobile phase 15 mM ammonium formate in methanol
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV at 220 nm
 sample 1 mg/mL in mobile phase
 Application No. G004406



HPLC Analysis of Methadone Enantiomers on Astec® CHIROBIOTIC® V2

► application for HPLC

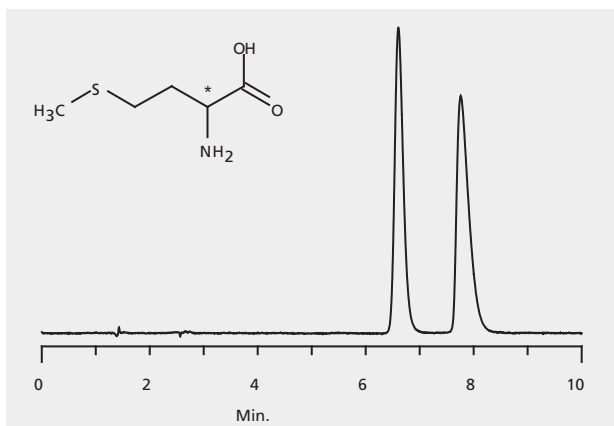
column Astec CHIROBIOTIC® V2, 25 cm x 4.6 mm I.D., 5 µm particles (15024AST)
 mobile phase A: methanol
 B: 20 mM ammonium formate
 Ratio: 95:5 (A:B)
 flow rate 1 mL/min
 column temp. 20 °C
 detector UV at 205 nm
 injection 2 µL
 sample methadone, 1 mg/mL in mobile phase
 Application No. G004403



HPLC Analysis of Methionine Enantiomers on Astec® CHIROBIOTIC® T

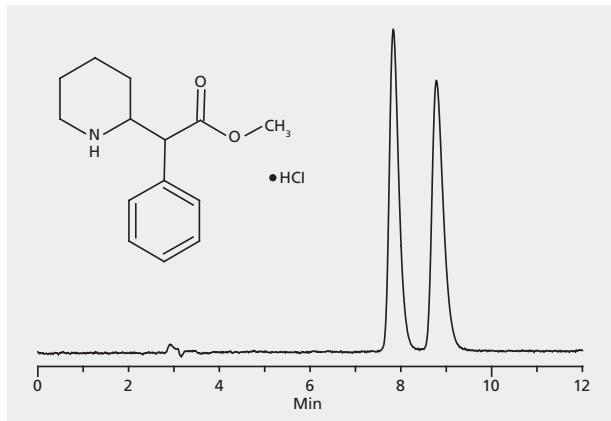
▶ application for HPLC

..... compound class: amino acids
 column Astec CHIROBIOTIC® T, 25 cm x 4.6 mm I.D., 5 µm particles (12024AST)
 mobile phase A: water
 B: acetonitrile
 Ratio: 30:70 (A:B)
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV at 220 nm
 injection 5 µL
 sample 1 mg/mL in methanol
 Application No. G004503

**HPLC Analysis of Methylphenidate (Ritalin) Enantiomers on Astec® CHIROBIOTIC® T2**

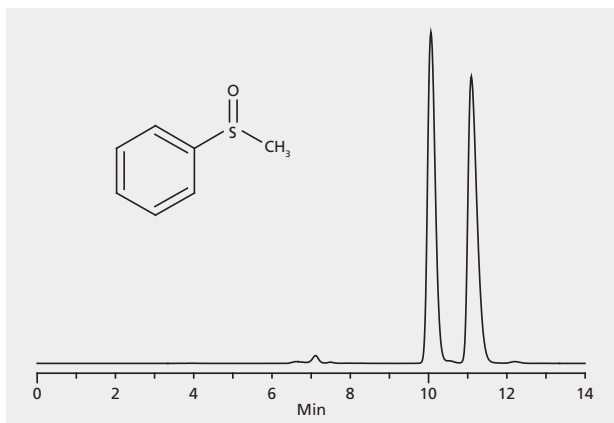
▶ application for HPLC

column Astec CHIROBIOTIC® T2, 25 cm x 4.6 mm I.D., 5 µm particles (16024AST)
 mobile phase 15 mM ammonium formate in methanol
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV at 220 nm
 injection 5 µL
 sample methylphenidate, 1 mg/mL in mobile phase
 Application No. G004405

**HPLC Analysis of Methyl Phenyl Sulfoxide Enantiomers on Astec® CHIROBIOTIC® TAG**

▶ application for HPLC

column Astec CHIROBIOTIC® TAG, 25 cm x 4.6 mm I.D., 5 µm particles (14024AST)
 mobile phase methanol
 flow rate 0.48 mL/min
 column temp. 25 °C
 injection 10 µL
 sample 1 mg/mL in mobile phase
 Application No. G004407

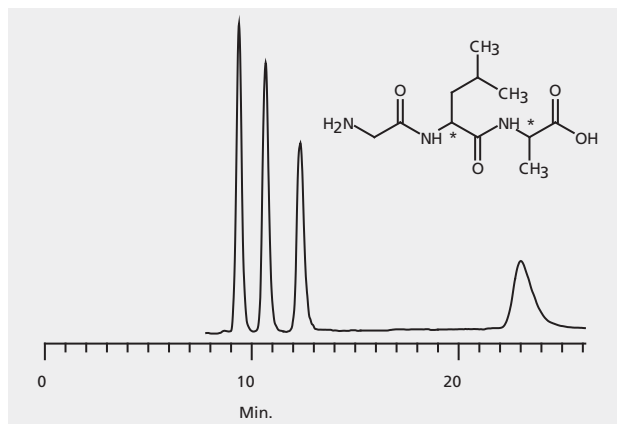


Chiral Applications

HPLC Analysis of the Peptide Glycine-Leucine-Alanine Enantiomers on Astec® CHIROBIOTIC® TAG

► application for HPLC

..... compound class: peptides
 column Astec CHIROBIOTIC® TAG, 25 cm x 4.6 mm I.D., 5 µm particles (14024AST)
 mobile phase A: 5 mM ammonium acetate, pH 4.1
 B: acetonitrile
 Ratio: 35:65 (A:B)
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV at 220 nm
 injection 5 µL
 sample 2 mg/mL in methanol
 Application No. G004617



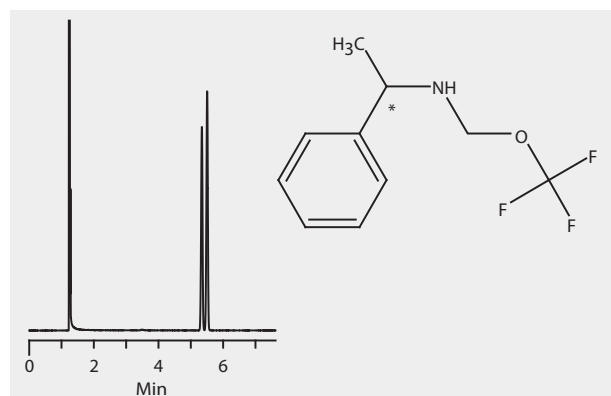
GC Analysis of 1-Phenylethylamine Enantiomers (N-Trifluoroacetyl Derivatives) on Astec® CHIRALDEX® B-DM

► application for GC

Can reverse elution order by using N-acetyl derivative on CHIRALDEX B-DM and B-PM, the N-chloroacetyl derivative on B-PM, or the N-TFA derivative on B-PH.

column Astec CHIRALDEX B-DM, 30 m x 0.25 mm I.D., 0.12 µm (77023AST)
 oven 120 °C
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas helium, 30 psi
 injection 1 µL, 80:1 split
 sample 3 mg/mL in methylene chloride
 peak 1: R(+)-1-phenylethylamine (N-TFA derivative)
 peak 2: S(-)-1-phenylethylamine (N-TFA derivative)

Application No. G005080

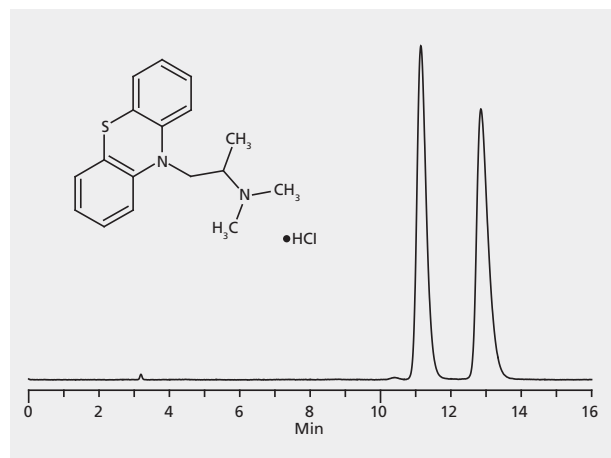


HPLC Analysis of Promethazine Enantiomers on Astec® CHIROBIOTIC® V

► application for HPLC

column Astec CHIROBIOTIC® V, 25 cm x 4.6 mm I.D., 5 µm particles (11024AST)
 mobile phase A: methanol
 B: acetic acid
 C: triethylamine
 Ratio: 99.8:0.1:0.1 (A:B:C)

flow rate 1 mL/min
 column temp. 23 °C
 detector UV at 254 nm
 injection 10 µL
 sample 1 mg/mL in mobile phase
 Application No. G004404

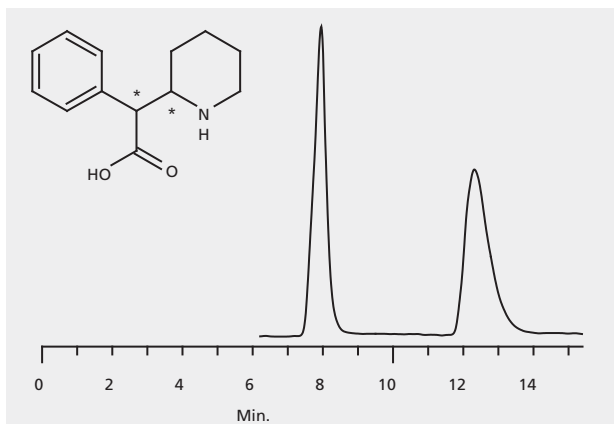


Chiral Applications

HPLC Analysis of Ritalinic Acid Enantiomers on Astec® CHIROBIOTIC® T2

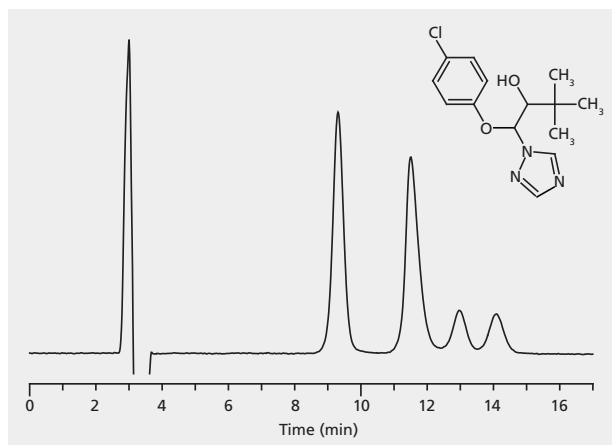
▶ application for HPLC

..... compound class: ADHD drugs
 column Astec CHIROBIOTIC® T2, 25 cm x 4.6 mm I.D., 5 µm particles (16024AST)
 mobile phase A: 10 mM ammonium acetate, pH 5.5
 B: acetonitrile
 Ratio: 70:30 (A:B)
 flow rate 0.9 mL/min
 column temp. 25 °C
 detector UV at 230 nm
 injection 2 µL
 sample 1 mg/mL in methanol
 Application No. G004600

**HPLC Analysis of Triadimenol Enantiomers on Astec® CYCLOBOND® I 2000 HP-RSP**

▶ application for HPLC

column Astec CYCLOBOND I 2000 HP-RSP, 25 cm x 4.6 mm I.D., 5 µm particles (24024AST)
 mobile phase A: 20 mM ammonium acetate, pH 4.0
 B: acetonitrile
 Ratio: 70:30 (A:B)
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV at 220 nm
 injection 10 µL
 sample 1 mg/mL in methanol
 Application No. G004396

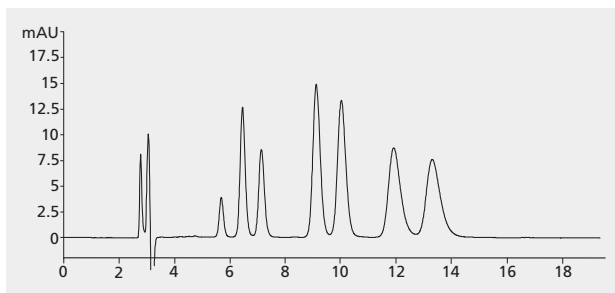


Chiral Applications

HPLC Analysis of Triazole Antifungal Agent Enantiomers on Astec® CYCLOBOND® I 2000 HP-RSP

► application for HPLC

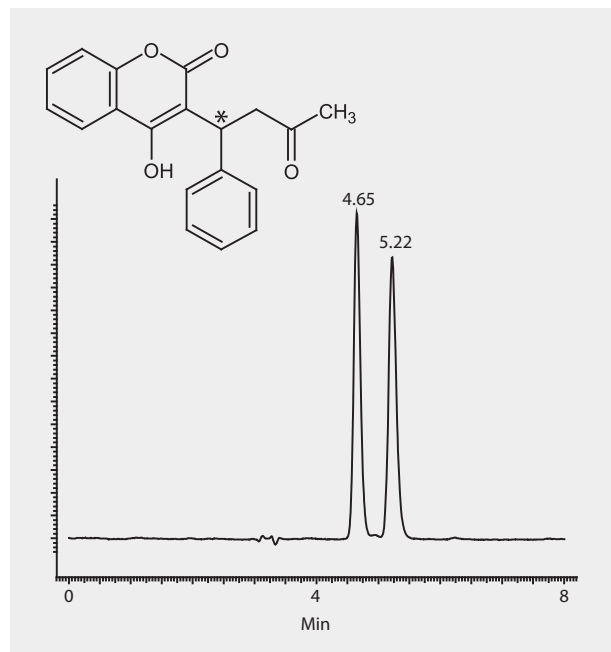
column Astec CYCLOBOND I 2000 HP-RSP, 25 cm x 4.6 mm I.D., 5 μm particles (24024AST)
 mobile phase A: 0.1% formic acid
 B: acetonitrile
 Ratio: 70:30 (A:B)
 flow rate 1 mL/min
 detector UV at 230 nm
 injection 1 μL
 sample 0.1 mg/mL in methanol
 peaks 1&2: enilconazole
 peaks 2&3: eberconazole
 peaks 4&5: miconazole
 peaks 6&7: ketoconazole
 Application No. G004737



HPLC Analysis of Warfarin™ Enantiomers on Astec® CHIROBIOTIC® V

► application for HPLC

..... compound class: anticoagulants
 column Astec CHIROBIOTIC® V, 25 cm x 4.6 mm I.D., 5 μm particles (11024AST)
 mobile phase A: 5 mM ammonium acetate, pH 4.1
 B: acetonitrile
 Ratio: 70:30 (A:B)
 flow rate 1 mL/min
 column temp. 25 °C
 detector UV at 254 nm
 injection 10 μL
 sample 1 mg/mL in methanol
 Application No. G004349





SAMPLE PREPARATION

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Solid Phase Extraction

Solid Phase Extraction



Solid phase extraction (SPE) is a form of step-wise chromatography designed to extract, partition, and (or) adsorb one or more components from a liquid phase (sample) onto a stationary phase (sorbent or resin). Over the last twenty years, SPE has become the most powerful technique available for the rapid and selective sample preparation prior to analytical chromatography. SPE extends the lifetime of chromatographic systems and improves qualitative and quantitative analysis. By switching sample matrices from the original matrix to a simpler matrix environment, subsequent analysis is often simplified, and the demand placed on an analytical system is considerably lessened.

Available SPE Products & Hardware

Supelco SPE products comprise of an array of sorbents, resins and hardware configurations including polypropylene tubes, glass tubes, 96-well plates, and various positive pressure cartridges. Supelco offers custom manufacturing services so you can optimize your sample processing procedure to the parameters dictated by your sample prep objectives. If there is a certain permutation of phase chemistry, bed weight and hardware configuration you require that is not listed within our standard product line, please inquire.

To request a price quote or inquire on the feasibility of Supelco **manufacturing a custom SPE product**, please contact our Order Processing representatives:

Telephone: 800-247-6628, 814-359-3441

Fax: 800-447-3044, 814-359-3044

Email: supelco@sial.com

Polypropylene SPE Tubes

Standard Design: Supelco Discovery® and Supelclean SPE tubes are comprised primarily of straight-walled serological grade polypropylene syringe barrels. Each of the 20+ available bonded phases and resins are available in an array of bed weights and volumes including 1, 3, 6, 12, 20, and 60 mL.

Reversible Design: Our reversible SPE tubes allows for both forward and reverse flow capabilities offering great utility in trace enrichment applications. The tubes consist of a female luer inlet and a male luer outlet. Reversible tubes are available in 0.5, 1, and 2 mL configurations.



Example of Polypropylene SPE tubes

Glass SPE Tubes

Inert glass tubes (3 and 6 mL) are available for preparations that demand high purity extracts and increased solvent compatibility.



PTFE and Stainless Steel Frits

Use PTFE or stainless steel frits when solvent compatibility and tube cleanliness are of concern. Stainless steel frits are not available for glass SPE tubes.



96-well SPE Plates

Process up to 96 samples at once using Discovery®, Supel-Select HLB SPE, and HybridSPE-Phospholipid 96-Well Plates. The well plates are a one-piece 2 mL polypropylene square well design which will fit most standard well plate manifolds. Available bed weights include 15 - 100 mg/well. The well plates are compatible with most robotic and automated liquid handling systems.

- TomTec Quadra 96
- Packard Multi-Probe
- Gilson SPE 215
- Hamilton MICROLAB STAR



Solid Phase Extraction

Available SPE Products & Hardware

Dispersive SPE Vials and Tubes

Dispersive SPE (dSPE) is an emerging sample prep technique that is becoming increasingly popular in the area of multi-residue pesticide analysis. Unlike traditional techniques using SPE tubes or cartridges, in dispersive SPE, bulk amounts of salts and SPE sorbents are added directly to a liquid extract of a food or agricultural sample to drive liquid-liquid phase partitioning and sample clean up. Upon extraction, the sample is centrifuged and the resulting supernatant is ready for further processing and analysis.

Dispersive SPE tubes consist of bulk SPE sorbents and salts pre-packed in centrifuge tubes.



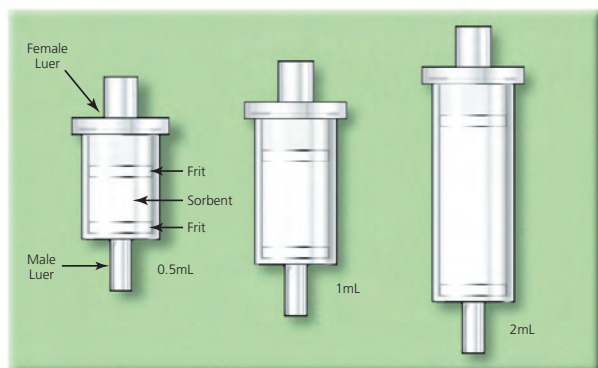
Rezorian Cartridges

Our disposable Rezorian Luer-Lock syringe-tip cartridges are fast and convenient for isolating, purifying, and concentrating molecules from a variety of sample matrices. Use where positive pressure is preferred. Rezorian cartridges, pre-packed with the Supelco bonded-phase or resin of your choice, are available in 1 and 5 mL configurations.



Reversible SPE Tubes

Our reversible SPE tubes provide good utility in trace enrichment applications by permitting forward and reverse flows. These tubes consist of a female luer inlet and a male luer outlet, and are constructed of polypropylene. Reversible tubes are available in 0.5, 1, and 2 mL configurations with maximum bed weights of 175, 350, and 700 mg respectively. Tubes are available pre-packed with the Supelco bonded-phase or resin of your choice through our custom service.



Use SPE for samples that:

- Contain particulate matter causing system clogging and high back pressure
- Contain components that cause high background, misleading peaks or responses, and (or) poor sensitivity
- Require clean up, trace enrichment or concentration, or purification
- Require sample matrix or solvent exchange

Benefits of SPE:

- Switch sample matrices to a form more compatible with chromatographic analysis
- Concentrate analytes for increased sensitivity
- Remove interferences to simplify chromatography and improve quantitation
- Protect the analytical column from contaminants

Common SPE applications:

- Pharmaceutical compounds and metabolites in biological fluids
- Drugs of abuse in biological fluids
- Pesticides and antibiotics in food and agricultural matrices
- Desalting of proteins and peptides
- Water and fat soluble vitamins
- For more applications, please contact our technical service department

HybridSPE® - Phospholipid Technology

NEW PRODUCTS



HybridSPE-PL 96-well Plate & PlatePrep Vacuum Manifold

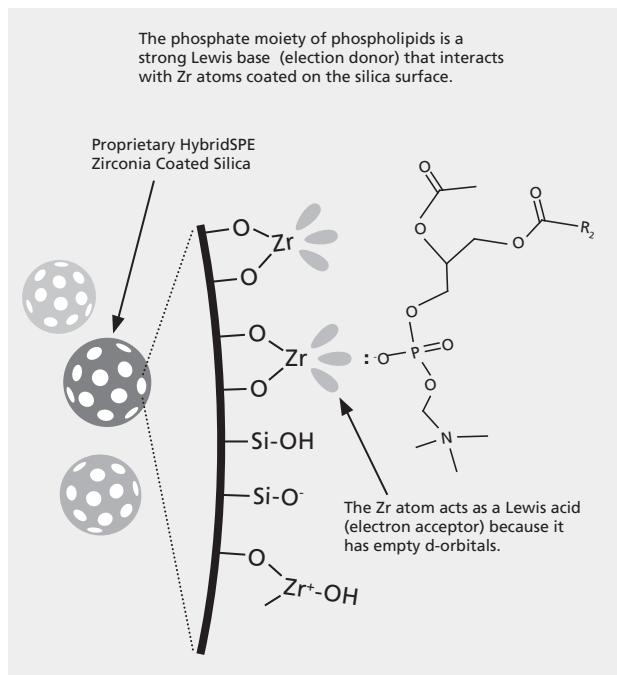
HybridSPE-Phospholipid (HybridSPE-PL) technology is a simple and generic sample prep platform designed for the gross level removal of endogenous proteins and phospholipid interferences from biological plasma and serum prior to LC-MS or LC-MS/MS analysis. Biological plasma or serum is first subjected to protein precipitation via the addition of acidified acetonitrile. Precipitated proteins are then removed by centrifugation and the resulting supernatant is loaded on the HybridSPE-PL cartridge or 96-well plate which acts a chemical filter that specifically targets the removal of endogenous sample phospholipids. The phospholipid retention mechanism is based on a highly selective Lewis acid-base interaction between the proprietary zirconia ions functionally bonded to the HybridSPE-PL stationary phase and the phosphate moiety consistent with all phospholipids. The resulting eluent is ready for immediate LC-MS or LC-MS/MS analysis.

Solid Phase Extraction

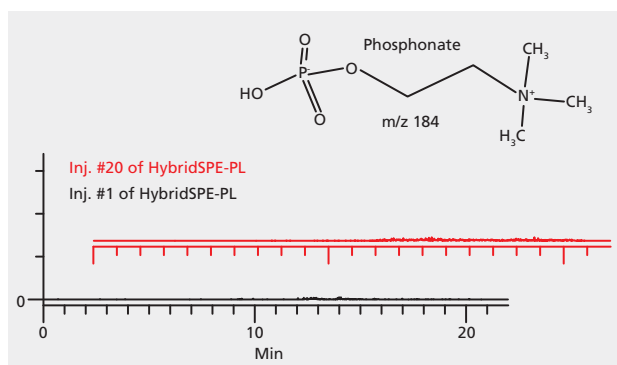
HybridSPE® - Phospholipid Technology

Features & Benefits:

- Merges the simplicity of protein precipitation and the selectivity of SPE via the targeted removal of phospholipids
- Reduce ion-suppression through the complete removal of phospholipids and precipitated proteins
- 2-3 step generic procedure
- Minimal to no method development

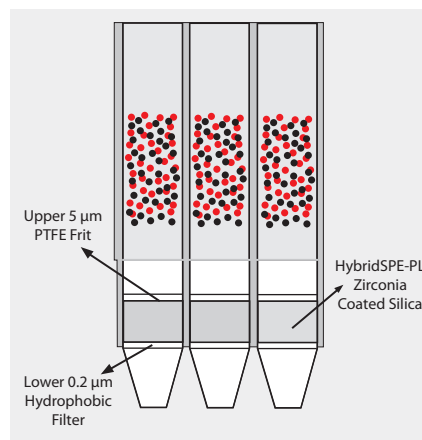


Lewis Acid Base Interaction Between HybridSPE Zirconia Ions & Phospholipids



No Accumulation of Phospholipids Using HybridSPE-PL

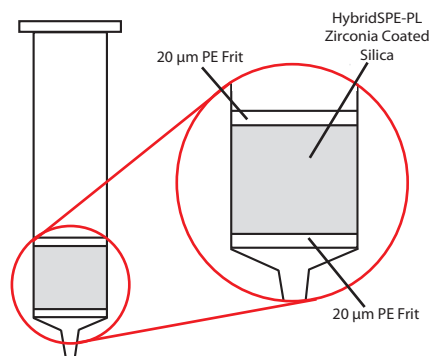
An alternative "In-well Precipitation" method is available for the HybridSPE-PL 96-well and HybridSPE-PL Ultra cartridge version in which biological plasma/serum is first added to the 96-well plate/cartridge followed by acidified acetonitrile (precipitation agent). After a brief mixing/vortexing step, vacuum is applied to the 96-well plate/cartridge. Because the 96-well version/Ultra cartridge contains a series of low porosity hydrophobic filters/frits, the packed well or Ultra cartridge filter/frit assembly acts as a depth filter facilitating the concurrent removal of both phospholipids and precipitated proteins during the extraction process.



HybridSPE-PL 96-well Plate Schematics

"In-Well Precipitation" Method for 96-well Format and Ultra cartridge:

- Apply 100 µL plasma followed by 300 µL 1% formic acid in acetonitrile to 96-well HybridSPE-PL Plate or Ultra cartridge
- Vortex / mix well-plate briefly.
- Apply vacuum to HybridSPE-PL 96-well plate or Ultra cartridge
- Resulting filtrate / eluent is ready for LC-MS analysis.



HybridSPE-PL 1 mL Cartridge Schematics

"Off-Line Precipitation" Method for Cartridge & 96-well Format:

- Combine 100 µL plasma + 300 µL 1% formic acid in acetonitrile
- Vortex for 30-60 seconds and centrifuge
- Process supernatant through HybridSPE-PL cartridge or 96-well plate via vacuum manifold
- Resulting filtrate/eluent is ready for LC-MS analysis

Solid Phase Extraction

HybridSPE® - Phospholipid Technology: *HybridSPE®-Phospholipid Enrichment*

HybridSPE®-Phospholipid Enrichment

HybridSPE-PL can also be used to enrich phospholipids for analysis and profiling. The interaction between the HybridSPE-PL sorbent and phospholipids is based on Lewis acid-base chemistry, and can be disrupted with a strong Lewis base, such as ammonium hydroxide.

Phospholipid Enrichment Method:

- Combine 100 μ L plasma + 900 μ L solvent with 1% formic acid or ammonium formate
- Vortex for 30-60 seconds and centrifuge
- Process supernatant through HybridSPE-PL cartridge or 96 well plate via vacuum manifold
- Wash with solvent
- Elute with 5% Ammonium Hydroxide in ACN or Methanol
- Dry and reconstitute

HybridSPE®-Phospholipid

	Cat. No.	Qty
HybridSPE®-Phospholipid		
96-well Plate, bed wt.: 50 mg, volume 2 mL	575656-U	1 ea
Cartridge, bed wt.: 30 mg, volume 1 mL	55261-U	100 ea
96-well Plate, bed wt.: 15 mg, volume 0.8 mL	52794-U	1 ea
Cartridge, bed wt.: 500 mg, volume 6 mL	55267-U	30 ea

HybridSPE®-Phospholipid 96-Well Essentials Kit

	Cat. No.	Qty
HybridSPE®-Phospholipid 96-Well Essentials Kit		
96-Well Essentials Kit	52813-U	1 kit

HybridSPE®-Phospholipid Ultra

	Cat. No.	Qty
HybridSPE®-Phospholipid Ultra		
cartridge, bed wt.: 30 mg, volume 1 mL	55269-U	100 ea

96-Well Protein Precipitation Filter Plate

The 96-well protein precipitation filter plate is ideal for removing precipitated proteins from biological plasma/serum. The plate consists of a 0.2 μ m hydrophobic graded filter/frit. Biological plasma is first added to the 96-well plate followed by a protein precipitating agent (e.g., acetonitrile). After a brief mixing step, vacuum is applied to the plate, and the filter/frit removes precipitated proteins from the sample. The resulting filtrate is ready for further processing and/or analysis.

hydrophobic graded filter/frit (0.2 μ m porosity)

volume	2 mL
55263-U	1 ea

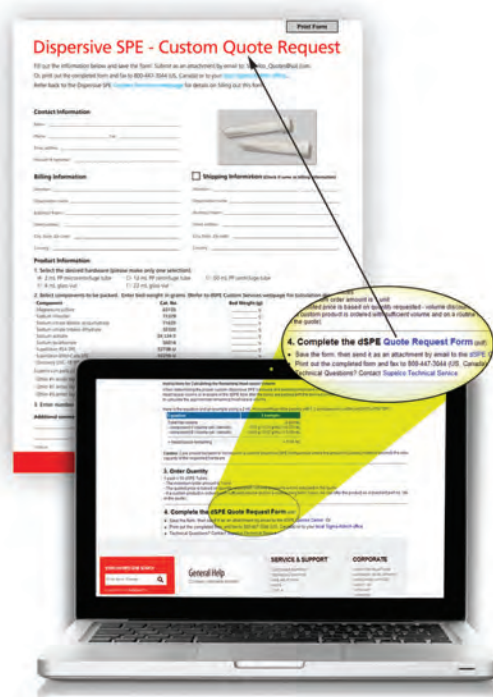
Note: The 96-well Protein Precipitation Filter Plate (55263-U) is packed with a 0.2 μ m hydrophobic graded filter/frit and is ideal for removing precipitated proteins only.

Supel™ QuE Dispersive (QuEChERS) SPE Products

NEW PRODUCTS

Dispersive SPE (dSPE), often referred to as the "QuEChERS" method (Quick, Easy, Cheap, Effective, Rugged, and Safe), is an emerging sample prep technique that is becoming increasingly popular in the area of multi-residue pesticide analysis in food and agricultural products.

The QuEChERS approach is gaining popularity not only for foodstuffs but also for other sample matrices. Analysts may want to create custom mixtures of salts and adsorbents to fit their unique sample preparation challenges better. Supelco has introduced a custom service for these tubes that enables users to easily design their own dispersive SPE tube(s). Customers can choose from five different tube dimensions/types, as well as a large selection of adsorbents from Supelco and salts from Fluka and Aldrich to create customized tubes for introduction into their routine applications.



EN 15662:2008 (12 mL centrifuge tubes)

	Cat. No.	Qty
Supel™ QuE		
Citrate/Sodium Bicarbonate Tube	55237-U	50 ea
Citrate Extraction Tube, suitable for EN 15662:2008 per BS	55227-U	50 ea
PSA Tube, suitable for EN 15662:2008 per BS	55228-U	50 ea
PSA/C18 Tube, suitable for EN 15662:2008 per BS	55229-U	50 ea
PSA/ENVI-Carb Tube 1, suitable for EN 15662:2008 per BS	55230-U	50 ea
PSA/ENVI-Carb Tube 2, suitable for EN 15662:2008 per BS	55233-U	50 ea

Solid Phase Extraction

Supel™ QuE Dispersive (QuEChERS) SPE Products: AOAC 2007.01 (12 mL centrifuge tubes)

AOAC 2007.01 (12 mL centrifuge tubes)

	Cat. No.	Qty
Supel™ QuE		
Acetate Tube, suitable for 2007.01 per AOAC	55234-U	50 ea
PSA Tube, suitable for 2007.01 per AOAC	55282-U	50 ea
PSA/C18 Tube, suitable for 2007.01 per AOAC	55283-U	50 ea
PSA/C18/ENVI-Carb Tube, suitable for 2007.01 per AOAC	55286-U	50 ea

AOAC 2007.01 (2 mL centrifuge tubes)

	Cat. No.	Qty
Supel™ QuE		
PSA Tube, suitable for 2007.01 per AOAC	55287-U	100 ea
PSA/C18 Tube, suitable for 2007.01 per AOAC	55288-U	100 ea
PSA/C18/ENVI-Carb Tube, suitable for 2007.01 per AOAC	55289-U	100 ea

Unbuffered Extraction Tubes

The following products contain various ratios of magnesium sulfate and sodium chloride.

- Non-Buffered Tube 1 is composed of magnesium sulfate (4 g) and sodium chloride (1 g).
- Non-Buffered Tube 2 is composed of magnesium sulfate (6 g) and sodium chloride (1.5 g).

	Cat. No.	Qty
Supel™ QuE		
Non-Buffered Tube 1	55294-U	50 ea
Non-Buffered Tube 2	55295-U	50 ea

Specialty Products for Challenging Matrices

The following products contain various ratios of the proprietary Z-Sep and/or Z-Sep+ adsorbents with or without Discovery DSC-18.

- The Z-Sep/C18 Tube is a 2 mL centrifuge tube composed of Z-Sep (20 mg) and Discovery DSC-18 (50 mg).
- The Z-Sep+ Tube is a 12 mL centrifuge tube composed of Z-Sep+ (500 mg).
- Z-Sep+ Bulk is Z-Sep+ (20 g) of bulk adsorbent shipped in a vial.

	Cat. No.	Qty
Supel™ QuE		
Z-Sep/C18 Tube	55284-U	100 ea
Z-Sep+ Tube	55296-U	50 ea
Z-Sep+ Bulk	55299-U	20 ea

Empty 50 mL Tubes for Extraction

	Cat. No.	Qty
Supel™ QuE		
Empty Centrifuge Tube with Lid, centrifuge tube volume 50 mL, suitable for EN 15662:2008 per BS	55248-U	50 ea

Dispersive SPE Bulk Adsorbents and Salts

	Cat. No.	Qty
Supelclean™ PSA SPE Bulk Packing		
-	52738-U	100 g
Supelclean™ ENVI-Carb™ SPE Bulk Packing		
-	57210-U	50 g
Discovery® DSC-18 SPE Bulk Packing		
-	52600-U	100 g
Magnesium sulfate		
purum, anhydrous, ≥97% (KT), grit, slightly gray	63135-250G-F	250 g
	63135-1KG-F	1 kg
Sodium citrate dibasic		
purum p.a., ≥99.0% (T)	71635-250G	250 g
	71635-1KG	1 kg
Sodium citrate tribasic		
puriss. p.a., ACS reagent, reag. ISO, reag. Ph. Eur., ≥99.5%	32320-250G-R	250 g
	32320-6X250G-R	6 × 250 g
	32320-500G-R	500 g
	32320-6X500G-R	6 × 500 g
	32320-1KG-R	1 kg
	32320-6X1KG-R	6 × 1 kg
	32320-5KG-R	5 kg
	32320-4X5KG-R	4 × 5 kg
Sodium chloride		
puriss. p.a., ACS reagent, ≥99.5% (AT)	71379-500G	500 g
	71379-1KG	1 kg
	71379-5KG	5 kg
Sodium acetate		
ACS reagent, ≥99.0%	241245-5G	5 g
	241245-100G	100 g
	241245-500G	500 g
	241245-1KG	1 kg
	241245-2.5KG	2.5 kg

Supel™ Sphere Carbon/NH₂

Supel™ Sphere Carbon/NH₂ SPE Tube

Supel™ Sphere

The need for SPE cartridges with improved flow characteristics and reduced susceptibility to the formation of fines has brought about the development of a family of SPE tubes packed entirely with spherical, non-friable particles. The faster, more consistent flow produced by the spherical design produces accelerated gravity filtration, thus, eliminating the need for a vacuum manifold to process samples.

- SPE tube packed entirely with spherical, non-friable particles
- Improved flow characteristics and faster flow for gravity filtration
- Reduced susceptibility to the formation of fines

	Cat. No.	Qty
Supel™ Sphere Carbon/NH₂ SPE Tube		
-	54283-U	30 ea

Solid Phase Extraction

Supel™ Tox SPE for Mycotoxin Analysis

Supel™ Tox SPE for Mycotoxin Analysis

The need for a quick, simplistic sample cleanup approach prior to chromatographic mycotoxin analysis has brought about SPE cartridges that significantly decrease sample prep time, increase reproducibility, and are more user friendly as compared to the industry standard immunoaffinity columns. In addition the Supel Tox SPE approach requires less equipment and fewer consumables, providing an additional cost savings.

Unlike the multiple step "bind and elute" strategy implemented when using immunoaffinity columns, the Supel Tox AflaZea, DON, and Tricho SPE cartridges employ an "interference removal" strategy which saves time by eliminating wash steps prior to elution of aflatoxin, zearalenone, deoxynivalenol, and tricothecenes (type A and B), respectively. Cartridges removing interferences associated with analysis of the above and fumonisins (B1 and B2) as well as ochratoxin A are also available as a part of our Supel Tox product offering.

	Cat. No.	Qty
AflaZea		
volume 6 mL	55314-U	30 ea
DON		
volume 6 mL	55316-U	30 ea
Tricho		
volume 6 mL	55308-U	30 ea
TrichoBind		
LRC	55307-U	25 ea
FumoniBind		
LRC	55315-U	25 ea
OchraBind		
LRC	55318-U	25 ea

SupelMIP® SPE - Molecularly Imprinted Polymers

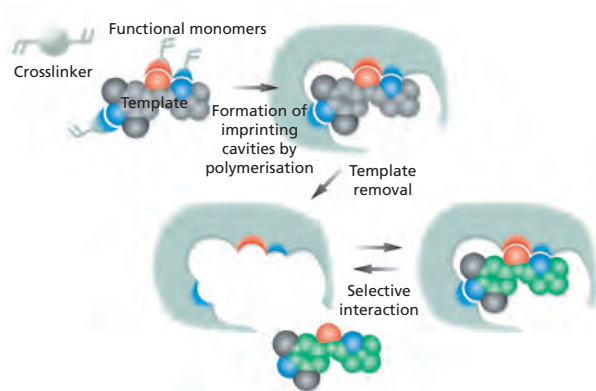
NEW PRODUCTS

SupelMIP SPE phases consist of highly cross-linked molecularly imprinted polymers (MIPs) that are engineered to extract a specific analyte of interest or a class of structurally related analytes with an extremely high degree of selectivity. This is possible because selectivity is introduced during MIP synthesis in which a template molecule, designed to mimic the analyte, guides the formation of specific cavities (imprints) that are sterically and chemically complementary to the analyte(s) of interest.

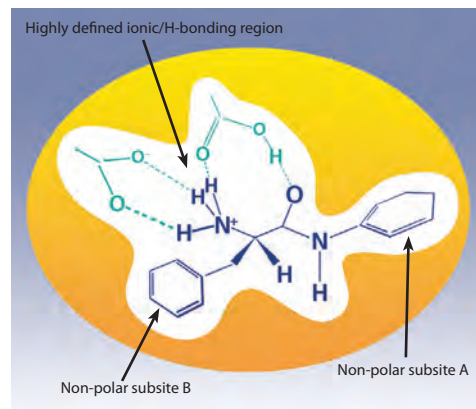
By careful design of the imprinting site, either by molecular modeling, experimental design, or screening methods, the binding cavities can be engineered to offer multiple interaction points (ion-exchange, reversed-phase, and hydrogen bonding) with the analyte(s) of interest. This leads to a stronger interaction between the solid phase and the analyte(s). As a consequence, harsher wash conditions can be tolerated during SPE methodology resulting in cleaner extracts. Because extraction selectivity is significantly improved, lower background is observed allowing analysts to achieve lower limits of detection.

Features & Benefits:

- Achieve lower detection limits through superior selectivity
- Reduce ion-suppression
- Save time and reduce cost via robust and rapid methodology
- Minimal to no method development required
- Stringent quality control conditions



Synthesis / Formation Strategy of MIPs



Typical MIP Binding Site

Each SupelMIP phase is application specific. SupelMIP methods are available for:

- Fluoroquinolones in bovine kidney, honey, and milk
- PAHs (polyaromatic hydrocarbons) in edible oils
- Nitroimidazoles in milk, eggs, and other food matrices
- Amphetamine and related compounds in urine
- Chloramphenicol in milk, plasma, honey, urine, and shrimp/prawns
- NNAL in urine
- TSNA in urine and tobacco
- β -agonists and β -blockers in tissue, urine, and waste water
- Clenbuterol in urine
- Triazines in water
- Riboflavin in milk

• To learn more visit sigma-aldrich.com/supelmip

Solid Phase Extraction

SupelMIP® SPE - Molecularly Imprinted Polymers



10 mL LRC (large reservoir cartridge) & 3 mL SPE Tubes

	Cat. No.	Qty
SupelMIP® SPE - NSAIDs		
bed wt: 25 mg, volume 3 mL	52769-U	50 ea
SupelMIP® SPE - Nitroimidazoles		
bed wt: 50 mg, volume 3 mL	52734-U	50 ea
SupelMIP® SPE - PAHS		
bed wt: 50 mg, volume 3 mL	52773-U	50 ea
SupelMIP® SPE - Fluoroquinolones		
bed wt: 25 mg, volume 3 mL	53269-U	50 ea
SupelMIP® SPE - Amphetamine		
bed wt: 25 mg, volume 3 mL	53228-U	50 ea
SupelMIP® SPE - Clenbuterol		
bed wt: 25 mg, volume 10 mL, (LRC)	53201-U	50 ea
SupelMIP® SPE - Beta-agonists		
bed wt: 25 mg, volume 10 mL, (LRC)	53202-U	50 ea
bed wt: 25 mg, volume 3 mL	53225-U	50 ea
SupelMIP® SPE - Beta-blockers		
bed wt: 25 mg, volume 10 mL, (LRC)	53218-U	50 ea
bed wt: 25 mg, volume 3 mL	53213-U	50 ea
SupelMIP® SPE - Full Beta-receptor (beta-blockers and beta-agonists)		
bed wt: 25 mg, volume 10 mL, (LRC)	53223-U	50 ea
bed wt: 25 mg, volume 3 mL	53224-U	50 ea
SupelMIP® SPE - Chloramphenicol		
bed wt: 25 mg, volume 10 mL, (LRC)	53210-U	50 ea
bed wt: 25 mg, volume 3 mL	53209-U	50 ea
SupelMIP® SPE - NNAL		
bed wt: 25 mg, volume 10 mL, (LRC)	53206-U	50 ea
bed wt: 25 mg, volume 3 mL	53203-U	50 ea
SupelMIP® SPE - TSNA s		
bed wt: 50 mg, volume 10 mL, (LRC)	53221-U	50 ea
bed wt: 50 mg, volume 3 mL	53222-U	50 ea
SupelMIP® SPE - Riboflavin (vitamin B2)		
bed wt: 25 mg, volume 10 mL, (LRC)	53207-U	50 ea
SupelMIP® SPE - Triazines (class selective)		
bed wt: 25 mg, volume 10 mL, (LRC)	53208-U	50 ea

Supel™ - Select SPE Products

NEW PRODUCTS



Supel™-Select SPE is a series of hydrophilic modified styrene based polymer SPE phases (HLB/SCX/SAX) ideal for extracting a broad range of compounds from aqueous samples. The retention mechanisms for the different phases range from reverse phase to a combination of reverse phase and ion exchange. However because the phase is hydrophilic modified, the phase is also selective for more polar compounds.

Features & Benefits

- Excellent sample prep performance at a lower price
- Amenable to generic methodology - save time, money, and headache during method development
- Greater capacity allows for smaller bed weights = smaller elution volumes = time savings in sample processing
- Resistance to overdrying allows for more robust methodology
- Low UV and MS extractables for lower background and greater sensitivity
- Stringent production and QC guidelines offer greater lot-to-lot, tube-to-tube, and well-to-well consistency for improved accuracy and precision

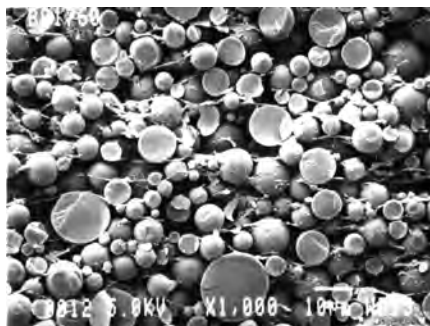
	Cat. No.	Qty
Supel™-Select HLB SPE Tube		
bed wt: 30 mg, volume 1 mL	54181-U	100 ea
bed wt: 200 mg, volume 6 mL	54183-U	30 ea
bed wt: 1 g, volume 20 mL	54186-U	20 ea
bed wt: 500 mg, volume 12 mL	54184-U	20 ea
bed wt: 60 mg, volume 3 mL	54182-U	50 ea
Supel™-Select SCX SPE Tube		
bed wt: 30 mg, volume 1 mL	54240-U	100 ea
bed wt: 60 mg, volume 3 mL	54241-U	50 ea
bed wt: 200 mg, volume 6 mL	54242-U	30 ea
bed wt: 500 mg, volume 12 mL	54243-U	20 ea
bed wt: 1 g, volume 20 mL	54245-U	20 ea
Supel™-Select SAX SPE Tube		
bed wt: 30 mg, volume 1 mL	54231-U	100 ea
bed wt: 60 mg, volume 3 mL	54233-U	50 ea
bed wt: 200 mg, volume 6 mL	54235-U	30 ea
bed wt: 500 mg, volume 12 mL	54236-U	20 ea
bed wt: 1 g, volume 20 mL	54237-U	20 ea
Supel™ - Select HLB SPE 96-well Plate		
bed wt: 30 mg/well	575661-U	1 ea
bed wt: 60 mg/well	575662-U	1 ea
Supel™-Select SCX SPE 96-well Plate		
bed wt: 30 mg/well	575664-U	1 ea
bed wt: 60 mg/well	575665-U	1 ea
Supel™-Select SAX SPE 96-well Plate		
bed wt: 30 mg/well	575660-U	1 ea
bed wt: 60 mg/well	575663-U	1 ea

Solid Phase Extraction

Empore™ Solid Phase Extraction (SPE) Products

Empore™ Solid Phase Extraction (SPE) Products

Empore membrane SPE technology comprises of SPE particles tightly enmeshed within a network of inert PTFE fibrils. The SPE-membrane fabrication process results in a highly dense and uniform extraction medium that offers distinct advantages over traditional sorbent/packed-bed SPE products. Empore SPE technology allows for smaller bed weights, shorter analyte to pore diffusion paths, and more efficient extractions.



Empore™ SPE Products



	Cat. No.	Qty
Empore™ SPE Cartridges		
C18 (standard density), bed I.D. 4 mm, volume 1 mL	66871-U	100 ea
C18 (standard density), bed I.D. 7 mm, volume 3 mL	66872-U	50 ea
C18 (standard density), bed I.D. 10 mm, volume 6 mL	66873-U	30 ea
UR (Universal Resin), bed I.D. 7 mm, volume 3 mL	66874-U	50 ea
Empore™ SPE 96-well		
C18	66875-U	1 ea
UR (Universal Resin)	66877-U	1 ea
MPC (Mixed-Phase Cation)	66876-U	1 ea
Empore™ SPE Disks		
C18, diam. 47 mm	66883-U	20 ea
C8, diam. 47 mm	66882-U	20 ea
Oil & Grease, diam. 47 mm	66887-U	20 ea
Oil & Grease, diam. 90 mm	66898-U	10 ea
SDB-RPS (Reversed-Phase Sulfonate), diam. 47 mm	66886-U	20 ea
SDB-XC, diam. 47 mm	66884-U	20 ea
Cation Exchange-SR, diam. 47 mm	66889-U	20 ea
Anion-SR, diam. 47 mm	66888-U	20 ea
Chelation, diam. 47 mm	66894-U	20 ea
Carbon, diam. 47 mm	66896-U	20 ea
Empore™ Filter Aid 400		
-	66897-U	1 ea
Empore™ 96-well Vacuum Manifold		
-	66879-U	1 ea
Empore™ Sealing Tape for 96-well		
-	66881-U	10 ea
Empore™ 96-Well Filter Plate		
volume 1.2 mL	66878-U	1 ea

Solid Phase Extraction

Supel-Tips Pipette Tips

Supel-Tips Pipette Tips

NEW PRODUCTS



The Supel-Tips SPE product line is designed for the micro-scale extraction, concentration, and recovery of small molecules and biological macromolecules. These 10 μL polypropylene pipette tips contain a sorbent bed bonded at the working end of the tip using an inert high-purity adhesive. The bed acts as a solid phase extraction medium to adsorb molecules of interest from the sample matrix. Subsequently, the concentrated and desalted analytes are eluted for downstream analysis.

Supel-Tips Offer:

- Superior recovery
- Exceptional binding capacity and enhanced affinity
- Excellent sorbent bed stability for cleaner samples
- Fast and effective analyte retention/elution

Supel-Tips Zr or Ti Pipette Tips

Application: microextraction of Phosphopeptides and other phosphate containing molecules

- Stationary Phase: Zirconia-silica or Titania-silica composite
- Particle Size: 50-60 μm
- Pore Size: 300 \AA
- Capacity: Mono phosphopeptide 1 (MMP1) - 1 μg

Supel-Tips C18 Pipette Tips

- Application: microextraction & desalting of peptides and proteins
- Stationary Phase: C18 bonded onto spherical silica
- Particle Size: 50-60 μm
- Pore Size: 200 \AA
- Capacity: Insulin, Chain B, Oxidized - 17 μg ; β -amyloid - 17 μg ; Bradykinin, Fragment 1-7 - 7.6 μg

Supel-Tips Carbon Pipette Tips

- Application: microextraction of Oligosaccharides and other sugar containing macromolecules
- Stationary Phase: graphitized carbon adsorbent
- Particle Size: 50-60 μm
- Pore Size: 175 \AA
- Capacity: Maltotriose - 10.2 μg ; Glycopeptide (mol. wt. 1300-3500) - > 10 μg

	Cat. No.	Qty
Supel-Tips Zr Pipette Tips		
volume 10 μL	54266-U	96 ea
Supel-Tips Ti Pipette Tips		
volume 10 μL	54263-U	96 ea
Supel-Tips C18 Pipette Tips		
C18 bonded on spherical silica, endcapped, volume 10 μL	TPSC18-96EA	96 ea
Supel-Tips Carbon Pipette Tips		
volume 10 μL	54227-U	96 ea

Discovery® SPE

Designed to meet the exacting requirements of pharmaceutical and clinical analysis, Discovery® SPE products are ideal for all application areas including: Food and Beverage, Environmental, Petrochemical, Agriculture, Consumer Products and more...

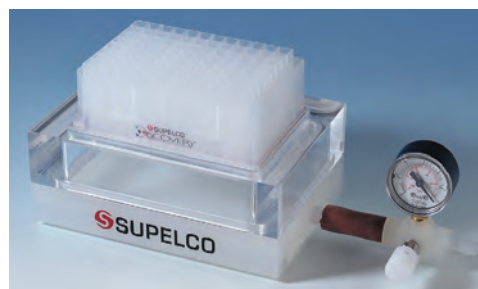
The multitude of phase chemistries and hardware configurations available within the Discovery® SPE line offer a comprehensive level of selection and flexibility required to handle the increasingly complex and diverse sample prep challenges seen today.

Each Discovery® SPE product includes an extensive Certificate of Analysis ensuring optimal performance and reproducibility.

Discovery® SPE allows you to:

- Achieve greater and more reproducible recoveries for diverse compounds from difficult sample matrices
- Remove endogenous sample interference for improved accuracy and sensitivity
- Concentrate target analytes for increased sensitivity
- Protect analytical instruments from unwanted sample matrix components

Discovery® SPE offers the quality and performance you need to bridge the sample prep gap between sample collection and analysis.



Discovery® SPE Features and Benefits:

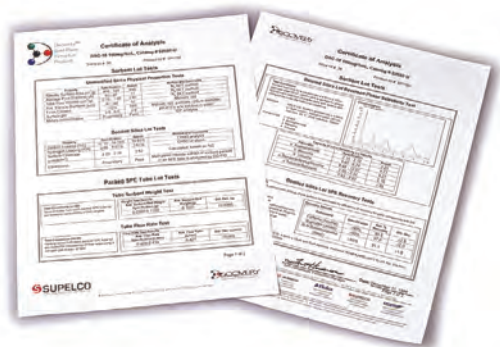
- Developed, tested and quality controlled for pharmaceutical and clinical applications
- Twelve different phase chemistries ranging from polymerically bonded C18 to polyamide adsorbents
- Available in 96-well plate configurations for high throughput parallel processing
- Ultra clean phases for highly sensitive analyses
- Narrower pore size distribution for improved extraction selectivity
- Acid washed to reduce metal chelating activity
- Consistent particle size and specific surface area coverage to ensure reproducible recoveries
- Low fines (<12 μm) content to minimize injection port fouling

Solid Phase Extraction

Discovery® SPE

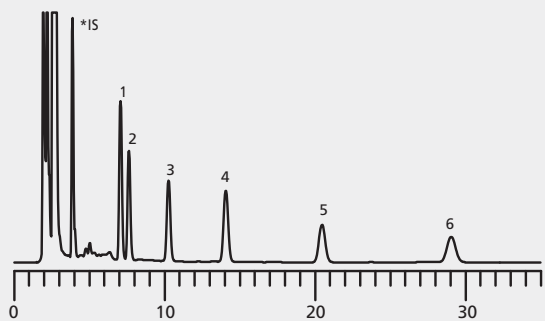
Discovery® SPE Specifications:

- Base Silica: *Irregular shape, acid washed*
- Mean Particle Size: *50 μm*
- Mean Pore Diameter: *70 Å*
- Total Pore Volume: *0.9 cm³/g*
- Specific Surface Area: *480 m²/g*
- Endcapped: *Yes*
- Hardware: *Polypropylene*
- Frit: *Polyethylene (PE), 20 μm porosity*



Each Discovery SPE product comes complete with an extensive Certificate of Analysis (CofA). The CofA describes tests parameters/results used to ensure quality and performance across tube to tube, and lot to lot reproducibility.

Barbiturates from serum, using 500 mg/3 mL Discovery DSC-18Lt SPE tubes and Zymark RapidTrace SPE Workstation.



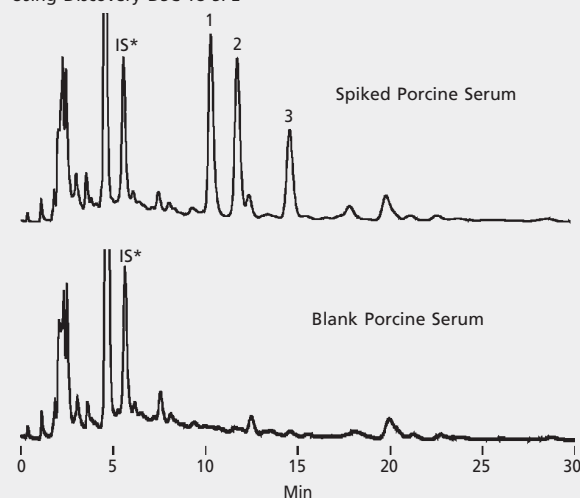
Analyzed with a Discovery C18 HPLC column, 15 cm x 4.6 mm ID, 5 μm particles.

Efficiency of Recovery

Compound	Concentration (μg/mL)	%Recovery	%RSD (n=6)
1. Phenobarbital	0.5	96.2	±1.6
	1.0	94.9	±1.7
2. Aprobarbital	0.5	98.5	±2.1
	1.0	100.8	±0.8
3. Butobarbital	0.5	97.2	±1.9
	1.0	98.7	±1.8
4. Mephobarbital	0.5	99.7	±2.4
	1.0	101.0	±2.0
5. Pentobarbital	0.5	96.4	±1.7
	1.0	96.4	±1.9
6. Secobarbital	0.5	98.2	±1.7
	1.0	97.7	±1.8

* IS = Barbitol (internal standard).

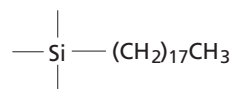
Extraction of Anti-Ulcer Compounds from Porcine Serum Using Discovery DSC-18 SPE



Compound	Concentration (μg/mL)	%Recovery ± RSD (n = 6)
1. Ranitidine	0.25	92.5 ± 5.4
	0.50	95.5 ± 5.1
2. Cimetidine	0.25	94.5 ± 5.2
	0.50	98.2 ± 3.2
3. Nizatidine	0.25	97.0 ± 7.0
	0.50	94.8 ± 3.4

Analyzed with a Discovery C18 HPLC Column, 15 cm x 4.6 mm ID, 5 μm particles
* IS = Famotidine (internal standard)

Discovery® DSC-18 SPE Products



Retention Mechanism: Reversed-phase

Sample Matrix Compatibility: Aqueous solutions (biological fluids, water)

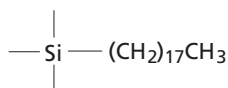
- Polymerically bonded, octadecyl, endcapped
- Higher (18% C) loading for increased binding capacities and higher recoveries
- The least selective phase: retains most organic analytes from aqueous matrices
- Can also be used for desalting aqueous matrices
- Beneficial for extracting structurally diverse analytes from the same sample

	Cat. No.	Qty
Discovery® DSC-18 SPE Tube		
bed wt: 50 mg, volume 1 mL	52601-U	108 ea
bed wt: 100 mg, volume 1 mL	52602-U	108 ea
bed wt: 500 mg, volume 3 mL	52603-U	54 ea
bed wt: 500 mg, volume 6 mL	52604-U	30 ea
bed wt: 1 g, volume 6 mL	52606-U	30 ea
bed wt: 2 g, volume 12 mL	52607-U	20 ea
bed wt: 5 g, volume 20 mL	52608-U	20 ea
bed wt: 10 g, volume 60 mL	52609-U	16 ea
bed wt: 500 mg, volume 6 mL	52599-U	5 ea
Discovery® DSC-18 SPE 96-well Plate		
bed wt: 100 mg/well	575603-U	1 ea
bed wt: 25 mg/well	575601-U	1 ea
Discovery® DSC-18 SPE Bulk Packing		
-	52600-U	100 g

Solid Phase Extraction

Discovery® SPE: *Discovery® DSC-18Lt SPE Products*

Discovery® DSC-18Lt SPE Products



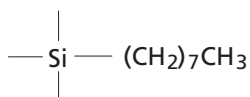
Retention Mechanism: Reversed-phase

Sample Matrix Compatibility: Aqueous solutions (biological fluids, water)

- Monomerically bonded, octadecyl (11% C), endcapped
- Increased retention for moderately polar hydrophobic molecules
- Used to elute very large hydrophobic molecules that are too strongly retained on DSC-18.
- Offers opportunity to differentiate between drug metabolites in bioanalysis applications
- Use this less retentive phase for the rapid release of hydrophobic compounds using weaker organic solvents at lower volumes

	Cat. No.	Qty
Discovery® DSC-18Lt SPE Tube		
bed wt: 50 mg, volume 1 mL	52610-U	108 ea
bed wt: 100 mg, volume 1 mL	52611-U	108 ea
bed wt: 500 mg, volume 3 mL	52613-U	54 ea
bed wt: 500 mg, volume 6 mL	52615-U	30 ea
bed wt: 1 g, volume 6 mL	52616-U	30 ea
bed wt: 2 g, volume 12 mL	52618-U	20 ea
bed wt: 5 g, volume 20 mL	52621-U	20 ea
bed wt: 10 g, volume 60 mL	52622-U	16 ea
Discovery® DSC-18Lt Bulk Packing		
-	52623-U	100 g

Discovery® DSC-8 SPE Products



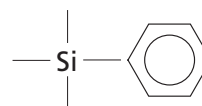
Retention Mechanism: Reversed-phase

Sample Matrix Compatibility: Aqueous solutions (biological fluids, water)

- Monomerically bonded, octyl (9% C), endcapped; lower carbon content than DSC-18Lt
- Used to elute very large hydrophobic molecules too strongly retained on DSC-18 or DSC-18Lt
- Use this less retentive phase for the rapid release of hydrophobic molecules using weaker organic solvents at lower volumes
- Inorganic buffers of sufficient ionic strength may be used for elution

	Cat. No.	Qty
Discovery® DSC-8 SPE Tube		
bed wt: 50 mg, volume 1 mL	52703-U	108 ea
bed wt: 100 mg, volume 1 mL	52707-U	108 ea
bed wt: 500 mg, volume 3 mL	52713-U	54 ea
bed wt: 500 mg, volume 6 mL	52714-U	30 ea
bed wt: 1 g, volume 6 mL	52716-U	30 ea
bed wt: 2 g, volume 12 mL	52717-U	20 ea
bed wt: 5 g, volume 20 mL	52718-U	20 ea
bed wt: 10 g, volume 60 mL	52722-U	16 ea
Discovery® DSC-8 SPE Bulk Packing		
-	52723-U	100 g

Discovery® DSC-Ph SPE Products



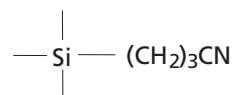
Retention Mechanism: Reversed-phase

Sample Matrix Compatibility: Aqueous solutions (biological fluids, water)

- Monomerically bonded, phenyl (7% C), endcapped
- Similar in polarity to DSC-8; however, electron dense aromatic ring offers unique selectivity and retention
- Offers improved retention of conjugated ring structures over aliphatic functional groups.

	Cat. No.	Qty
Discovery® DSC-Ph SPE Tube		
bed wt: 50 mg, volume 1 mL	52723-U	108 ea
bed wt: 100 mg, volume 1 mL	52725-U	108 ea
bed wt: 500 mg, volume 3 mL	52727-U	54 ea
bed wt: 500 mg, volume 6 mL	52728-U	30 ea
bed wt: 1 g, volume 6 mL	52731-U	30 ea
Discovery® DSC-Ph SPE Bulk Packing		
-	52727-U	100 g

Discovery® DSC-CN SPE Products



Retention Mechanism: Reversed-phase or Normal phase

Sample Matrix Compatibility: Aqueous solutions (biological fluids, water) when used in reversed-phase; or organic solvents, oils, and lipids when used in normal phase

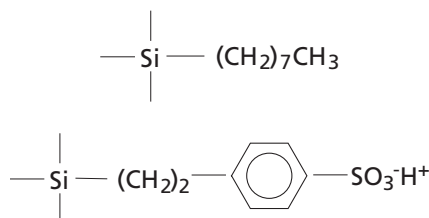
- Monomerically bonded, cyanopropyl (7 %C), endcapped
- Can be used in either reversed-phase or normal phase
- Ideal for very hydrophobic analytes that may be irreversibly retained on more hydrophobic sorbents such as DSC-18
- Less retentive than DSC-Si or DSC-Diol when used in normal phase (organic matrices such as hexane or oils)
- Allows for the rapid release of very polar molecules irreversibly retained on very polar sorbent

	Cat. No.	Qty
Discovery® DSC-CN SPE Tube		
bed wt: 50 mg, volume 1 mL	52693-U	108 ea
bed wt: 100 mg, volume 1 mL	52694-U	108 ea
bed wt: 500 mg, volume 3 mL	52695-U	54 ea
bed wt: 500 mg, volume 6 mL	52696-U	30 ea
bed wt: 1 g, volume 6 mL	52697-U	30 ea
bed wt: 2 g, volume 12 mL	52698-U	20 ea
bed wt: 5 g, volume 20 mL	52699-U	20 ea
bed wt: 10 g, volume 60 mL	52700-U	16 ea
Discovery® DSC-CN SPE Bulk Packing		
-	52722-U	100 g

Solid Phase Extraction

Discovery® SPE: Discovery® DSC-MCAX (Mixed-Mode Cation Exchange) SPE Products

Discovery® DSC-MCAX (Mixed-Mode Cation Exchange) SPE Products



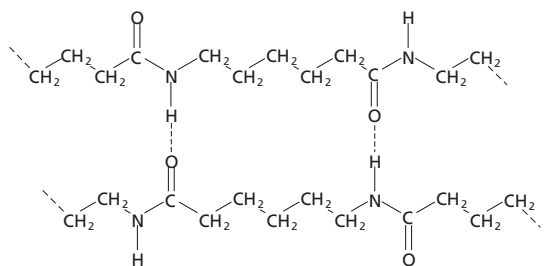
Retention Mechanism: Mixed-Mode Cation Exchange (reversed-phase and cation-exchange)

Sample Matrix Compatibility: Aqueous Solutions (biological fluids, water)

- Packed bed contains both octyl (C8) and benzene sulfonic acid (SCX) bondings
- Dual retention mechanism broadens retention for a range of neutral, basic, acidic and zwitterionic compounds
- Developed for superior selectivity/sample clean up when isolating basic compounds from biological fluids
- Greater ion-exchange capacity for isolating polar basic and zwitterionic compounds
- Can be used to fractionate basic/zwitterionic compounds from acidic and neutral compounds

	Cat. No.	Qty
Discovery® DSC-MCAX SPE Tube		
bed wt: 50 mg, volume 1 mL	52781-U	108 ea
bed wt: 100 mg, volume 1 mL	52782-U	108 ea
bed wt: 100 mg, volume 3 mL	52783-U	54 ea
bed wt: 300 mg, volume 3 mL	52784-U	54 ea
bed wt: 300 mg, volume 6 mL	52786-U	30 ea
bed wt: 1 g, volume 6 mL	52788-U	30 ea
Discovery® DSC-MCAX SPE 96-well Plate		
bed wt: 25 mg/well	575639-U	1 ea
bed wt: 50 mg/well	575640-U	1 ea
bed wt: 100 mg/well	575641-U	1 ea

Discovery® DPA-6S SPE Products



Retention Mechanisms: Reversed-phase

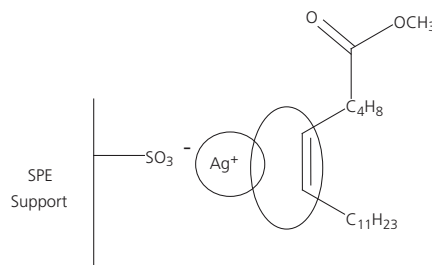
Sample Matrix Compatibility: Aqueous or methanolic solutions

- Polyamide Resin - particle size: 50-160 µm; surface pH: 4.5-7.5; density: 0.2-0.3 g/cm³; water content: <5%
- Used to adsorb polar compounds containing multi-OH and -COOH groups (esp. phenolic compounds) from aqueous or methanolic solutions under reversed-phase mechanisms and strong hydrogen bonding between the compound hydroxyl groups and amide groups of the resin

- Useful for extracting tannins, chlorophyll, humic acid, pharmacologically active terpenoids, flavonoids, gallic acid, catechol A, protocatechuic acid, and phloroglucinol
- Also useful for extracting aromatic carboxylic acids and nitroaromatic compounds
- Irreversibly retains quinones

	Cat. No.	Qty
Discovery® DPA-6S SPE Tube		
bed wt: 50 mg, volume 1 mL	52624-U	108 ea
bed wt: 250 mg, volume 3 mL	52625-U	54 ea
bed wt: 250 mg, volume 6 mL	52626-U	30 ea
bed wt: 500 mg, volume 6 mL	52627-U	30 ea
bed wt: 1 g, volume 12 mL	52629-U	20 ea
bed wt: 2 g, volume 20 mL	52631-U	20 ea
bed wt: 5 g, volume 60 mL	52632-U	16 ea
Discovery® DPA-6S SPE Bulk Packing		
-	52633-U	100 g

Discovery® Ag-ION SPE Products



Retention Mechanism: Normal phase (charge-transfer)

Sample Matrix Compatibility: Organic solvents, oils, and lipids

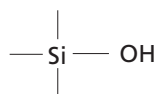
- Developed for the fractionation of FAMES based on degree of unsaturation, and for the resolution of cis/trans isomers.
- Silver counter-ions are anchored onto an SCX support using a proprietary procedure to offer optimal resolution, performance, and capacity
- Each lot is tested and quality controlled for cis/trans FAME resolution

	Cat. No.	Qty
Discovery® Ag-ION SPE Tube		
bed wt: 750 mg, volume 6 mL	54225-U	30 ea
polypropylene hardware (Rezorian Cartridge), bed wt: 750 mg, volume 1 mL	54226-U	10 ea

Solid Phase Extraction

Discovery® SPE: *Discovery® DSC-Si SPE Products*

Discovery® DSC-Si SPE Products



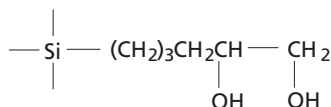
Retention Mechanism: Normal phase

Sample Matrix Compatibility: Organic solvents, oils, and lipids

- Unbonded acid washed silica sorbent ideal for normal phase SPE and other modified flash techniques
- Often used to separate or remove structurally similar molecules through successive elutions with increasingly polar solutions
- The most polar normal phase sorbent available
- Excellent capacity for purifying solution phase combinatorial chemistry reactions when removing target molecules from reaction by-products and excess reagents
- Available in Büchner Funnel configurations for easy scalability

	Cat. No.	Qty
Discovery® DSC-Si SPE Tube		
bed wt: 50 mg, volume 1 mL	52652-U	108 ea
bed wt: 100 mg, volume 1 mL	52653-U	108 ea
bed wt: 500 mg, volume 3 mL	52654-U	54 ea
bed wt: 500 mg, volume 6 mL	52655-U	30 ea
bed wt: 1 g, volume 6 mL	52656-U	30 ea
bed wt: 2 g, volume 12 mL	52657-U	20 ea
bed wt: 5 g, volume 20 mL	52658-U	20 ea
bed wt: 10 g, volume 60 mL	52659-U	16 ea
bed wt: 20 g, volume 60 mL	1771-U	16 ea
Discovery® DSC-Si SPE 96-well Plate		
bed wt: 100 mg/well	575609-U	1 ea
bed wt: 50 mg/well	575608-U	1 ea
bed wt: 25 mg/well	575607-U	1 ea
Discovery® DSC-Si SPE Bulk Packing		
-	52651-U	100 g

Discovery® DSC-Diol SPE Products



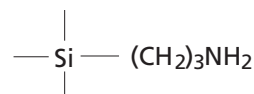
Retention Mechanism: Normal phase

Sample Matrix Compatibility: Organic solvents, oils, and lipids

- Polymerically bonded, 2,3-Dihydroxypropoxypropyl (7% C)
- Polar sorbent most commonly used for normal phase applications (polar extractions from non-polar matrices)
- The sorbent dihydroxy groups facilitate strong hydrogen bonding
- Excellent selectivity when extracting structurally similar molecules

	Cat. No.	Qty
Discovery® DSC-Diol SPE Tube		
bed wt: 50 mg, volume 1 mL	52747-U	108 ea
bed wt: 100 mg, volume 1 mL	52748-U	108 ea
bed wt: 500 mg, volume 3 mL	52751-U	54 ea
bed wt: 500 mg, volume 6 mL	52752-U	30 ea
bed wt: 5 g, volume 20 mL	52571-U	20 ea
bed wt: 10 g, volume 60 mL	52572-U	16 ea
Discovery® DSC-Diol SPE 96-well Plate		
bed wt: 25 mg/well	575638-U	1 ea
Discovery® DSC-Diol SPE Bulk Packing		
-	57229-U	100 g

Discovery® DSC-NH₂ SPE Products



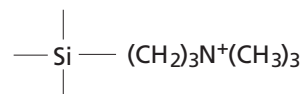
Retention Mechanism: Normal phase or Anion-exchange

Sample Matrix Compatibility: Organic or aqueous solutions

- Polymerically bonded, aminopropyl phase that is very polar in nature (hydrogen bonding) allowing for both normal phase and ion exchange applications
- A weak anion exchanger with a pKa of 9.8. At pH 7.8 or below, the functional groups are positively charged
- Ion exchange capacity is ~ 0.43 meq/g.
- Allows the rapid release of very strong anions such as sulfonic acids that may be retained irreversibly by strong anion exchangers
- Can be used in some reversed-phase applications (due to ethyl spacer); however, it is predominately used as an ion-exchange or normal phase sorbent due to its polar nature

	Cat. No.	Qty
Discovery® DSC-NH₂ SPE Tube		
bed wt: 50 mg, volume 1 mL	52635-U	108 ea
bed wt: 100 mg, volume 1 mL	52636-U	108 ea
bed wt: 500 mg, volume 3 mL	52637-U	54 ea
bed wt: 500 mg, volume 6 mL	52638-U	30 ea
bed wt: 1 g, volume 6 mL	52640-U	30 ea
bed wt: 2 g, volume 12 mL	52641-U	20 ea
bed wt: 5 g, volume 20 mL	52642-U	20 ea
bed wt: 10 g, volume 60 mL	52644-U	16 ea
Discovery® DSC-NH₂ SPE 96-well Plate		
bed wt: 100 mg/well	575615-U	1 ea
Discovery® DSC-NH₂ SPE Bulk Packing		
-	57212-U	100 g

Discovery® DSC-SAX SPE Products



Retention Mechanism: Anion-exchange

Sample Matrix Compatibility: Organic or aqueous solutions

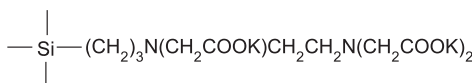
- A polymerically bonded quaternary amine that remains positively charged at all pH levels
- Counter ion is Cl⁻
- Ion exchange capacity is ~ 0.14 meq/g
- Commonly used when extracting weaker anions (e.g., carboxylic acids) that may not bind strongly enough to weaker anion-exchangers
- Selectivity can be modified by changing the counter ion with the appropriate buffer during conditioning

	Cat. No.	Qty
Discovery® DSC-SAX SPE Tube		
bed wt: 50 mg, volume 1 mL	52661-U	108 ea
bed wt: 100 mg, volume 1 mL	52662-U	108 ea
bed wt: 500 mg, volume 3 mL	52664-U	54 ea
bed wt: 500 mg, volume 6 mL	52665-U	30 ea
bed wt: 1 g, volume 6 mL	52666-U	30 ea
bed wt: 2 g, volume 12 mL	52667-U	20 ea
bed wt: 5 g, volume 20 mL	52668-U	20 ea
bed wt: 10 g, volume 60 mL	52669-U	16 ea
Discovery® DSC-SAX SPE Bulk Packing		
-	57214-U	100 g

Solid Phase Extraction

Discovery® SPE: Discovery® DSC-WCX SPE Products

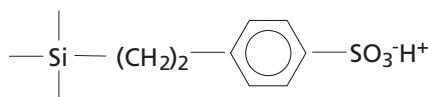
Discovery® DSC-WCX SPE Products

**Retention Mechanism:** Cation exchange**Sample Matrix Compatibility:** Organic or aqueous solutions

- A polymerically bonded, ethylenediamine triacetic acid phase with a pKa of 4.8
- Counter ion is K⁺
- Ion exchange capacity is ~ 0.15 meq/g
- Carries a negative charge at pH 6.8 or above
- A pH of 2.8 or below neutralizes this phase for easier elution of strong cationic analytes that are neutralized only at extreme basic conditions
- Typically used when dealing with very strong cationic (high pKa) compounds that may be irreversibly retained on strong cation exchangers

	Cat. No.	Qty
Discovery® DSC-WCX SPE Tube		
bed wt: 50 mg, volume 1 mL	52737-U	108 ea
bed wt: 100 mg, volume 1 mL	52739-U	108 ea
bed wt: 500 mg, volume 3 mL	52741-U	54 ea
bed wt: 500 mg, volume 6 mL	52742-U	30 ea
bed wt: 1 g, volume 6 mL	52743-U	30 ea
bed wt: 2 g, volume 12 mL	52744-U	20 ea
bed wt: 5 g, volume 20 mL	52745-U	20 ea
bed wt: 10 g, volume 60 mL	52746-U	16 ea
Discovery® DSC-WCX SPE Bulk Packing		
-	57228-U	100 g

Discovery® DSC-SCX SPE Products

**Retention Mechanism:** Cation exchange**Sample Matrix Compatibility:** Organic or aqueous solutions

- A polymerically bonded, benzene sulfonic acid functional group, pKa (<1.0)
- Counter ion is H⁺
- Silica support allows for use with organic solvents (no shrinking/swelling)
- Excellent capacity (0.8 meq/g) for cleaning up solution phase combinatorial chemistry reactions (removing target molecules from reaction by-products and excess reagents)
- The presence of the benzene ring offers some mixed-mode capabilities (hydrophobic interactions) that should be considered when extracting cations from aqueous matrices

	Cat. No.	Qty
Discovery® DSC-SCX SPE Tube		
bed wt: 50 mg, volume 1 mL	52684-U	108 ea
bed wt: 100 mg, volume 1 mL	52685-U	108 ea
bed wt: 500 mg, volume 3 mL	52686-U	54 ea
bed wt: 500 mg, volume 6 mL	52688-U	30 ea
bed wt: 1 g, volume 6 mL	52689-U	30 ea
bed wt: 2 g, volume 12 mL	52690-U	20 ea
bed wt: 5 g, volume 20 mL	52691-U	20 ea
bed wt: 10 g, volume 60 mL	52692-U	16 ea
bed wt: 1 g, volume 6 mL	57167-U	1000 ea
bed wt: 500 mg, volume 3 mL	57168-U	1000 ea
Discovery® DSC-SCX SPE Bulk Packing		
-	57221-U	100 g

Discovery® SPE 96-Well Plates



Discovery® 96-well plates answer the challenge of high throughput pharmaceutical screening and analysis. The uniform flow dynamics inherent with well plate technology offers a higher level of reproducibility and throughput while maintaining excellent recoveries and increased sensitivity. These plates are packed with the same high-quality phases used in our Discovery® SPE line.

96-well plate Specifications:

- One-piece polypropylene square well design
- 2 mL sample volume
- Polyethylene frit, 20 μm porosity
- Compatible with TomTec Quadra 96, Packard Multi-Probe, Gilson SPE 215, Hamilton MICROLAB STAR, and most other 96-well automated SPE systems

	Cat. No.	Qty
96-well SPE MD (Method Development) Plate		
- BAN, configured for extracting basic, acidic, and neutral compounds (BAN), bed wt: 25 mg/well	577522-U	1 ea
Discovery® DSC-18 SPE 96-well Plate		
bed wt: 100 mg/well	575603-U	1 ea
bed wt: 25 mg/well	575601-U	1 ea
Discovery® DSC-Si SPE 96-well Plate		
bed wt: 50 mg/well	575608-U	1 ea
Discovery® DSC-NH₂ SPE 96-well Plate		
bed wt: 100 mg/well	575615-U	1 ea

Solid Phase Extraction

Supelclean™ ENVI and Supelclean™ SPE

Supelclean™ ENVI and Supelclean™ SPE



Supelclean ENVI SPE Features and Benefits

- Developed, highly tested, and quality controlled for environmental applications
- Over seven different phase chemistries ranging from our unique ENVI-Carb carbon adsorbents to ENVI-18 DSKs – reversed-phase SPE membranes for large volume water sample
- Available in glass tubes, PTFE, and stainless steel frit configurations for EPA compliance
- Ultra clean phases for highly sensitive analyses
- Documented applications in compliance to standardized EPA methodology
- Consistent particle size and specific surface area to ensure reproducible recoveries

Supelclean ENVI and Supelclean SPE Specifications

- Base Silica: *Irregular shape, acid washed for Supelclean ENVI*
- Mean Particle Size: *45 μm*
- Mean Pore Diameter: *60 Å*
- Total Pore Volume: *0.8 cm³/g*
- Specific Surface Area: *475 m²/g*
- Endcapped: *Yes (for Supelclean ENVI)*
- Hardware: *Polypropylene (unless otherwise noted)*
- Frit: *Polyethylene (unless otherwise noted), 20μm porosity*

Supelclean™ ENVI-18 SPE Products

Retention Mechanism: Reversed-phase

Sample Matrix Compatibility: Aqueous solutions (drinking, ground, waste water)

- Polymerically bonded, octadecyl (17% C), endcapped
- Excellent for cleaning, extracting and concentrating pollutants from aqueous environmental samples
- Higher 17% C loading for increased binding capacities and higher recoveries
- Higher carbon loading also offers greater resistance to extreme pH conditions
- Used for extracting herbicides, fungicides, and pesticides from waste material

	Cat. No.	Qty
Supelclean™ ENVI-18 SPE Tube		
bed wt: 100 mg, volume 1 mL	57062	108 ea
bed wt: 500 mg, volume 3 mL	57063	54 ea
bed wt: 500 mg, volume 6 mL	57064	30 ea
bed wt: 1 g, volume 6 mL	505706	30 ea
bed wt: 2 g, volume 12 mL	57114	20 ea
bed wt: 5 g, volume 20 mL	57137	20 ea
bed wt: 10 g, volume 60 mL	57138	16 ea
glass hardware, PTFE frit, bed wt: 500 mg, volume 6 mL	54331-U	30 ea
Supelclean™ ENVI-18 SPE Bulk Packing		
-	57219	100 g

Supelclean™ ENVI-8 SPE Products

Retention Mechanism: Reversed-phase

Sample Matrix Compatibility: Aqueous solutions (drinking, ground, waste water)

- High 14% C loading for increased binding capacities and higher recoveries
- Higher carbon loading also offers greater resistance to extreme pH conditions
- Excellent for cleaning, extracting and concentrating pollutants from aqueous environmental samples
- Used for extracting herbicides, fungicides, and pesticides from waste material

	Cat. No.	Qty
Supelclean™ ENVI-8 SPE Tube		
bed wt: 100 mg, volume 1 mL	57230-U	108 ea
bed wt: 500 mg, volume 3 mL	57231	54 ea
bed wt: 500 mg, volume 6 mL	57232	30 ea
bed wt: 1 g, volume 6 mL	57233	30 ea
bed wt: 5 g, volume 20 mL	57139	20 ea
bed wt: 10 g, volume 60 mL	57140-U	16 ea
glass hardware, PTFE frit, bed wt: 500 mg, volume 3 mL	57106	27 ea
glass hardware, PTFE frit, bed wt: 500 mg, volume 6 mL	57107	20 ea

Supelclean™ ENVI-18 and ENVI-8 SPE Disks



ENVI-8 DSK SPE Disk, 47 mm diam. (57172)

Retention Mechanism: Reversed-phase

Sample Matrix Compatibility: Aqueous solutions (drinking water)

- The SPE membrane equivalents of ENVI-18 and ENVI-8 packed bed SPE sorbents
- Porous glass fiber membranes embedded with C18 or C8 modified silica particles
- Provides faster flow rates and exhibits less clogging than PTFE discs for the extraction of organic contaminants from drinking water samples
- Typical applications include polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), phthalates, semivolatile organics, paraquat and diquat, pesticides and herbicides

	Cat. No.	Qty
ENVI-8 DSK SPE Disk		
diam. 47 mm	57172	24 ea
ENVI-18 DSK SPE Disk		
diam. 90 mm	57170-U	12 ea
diam. 47 mm	57171	24 ea

Solid Phase Extraction

Supelclean™ ENVI and Supelclean™ SPE: *Supelclean™ ENVI-Carb SPE Products**Supelclean™ ENVI-Carb SPE Products*

Graphitized Non-Porous Carbon

Retention Mechanism: Reversed-phase**Sample Matrix Compatibility:** Aqueous solutions (drinking, ground, waste water)

- Surface area: 100 m²/g, Particle size: 100-400 mesh
- Extreme affinity for organic polar and non-polar compounds from both non-polar and polar matrices when used under reversed-phase conditions
- Carbon surface comprised of hexagonal ring structures, interconnected and layered into graphitic sheets
- Non-porous nature of the carbon phase allows for rapid processing, adsorption does not require analyte dispersion into solid phase pores
- Independent investigators have found ENVI-Carb extremely useful for the rapid sample preparation of over 200 pesticides from various matrices including ground water, fruits, and vegetables

	Cat. No.	Qty
Supelclean™ ENVI-Carb™ SPE Tube		
bed wt.: 100 mg, volume 1 mL	57109-U	108 ea
bed wt.: 250 mg, volume 3 mL	57088	54 ea
bed wt.: 250 mg, volume 6 mL	57092	30 ea
bed wt.: 500 mg, volume 6 mL	57094	30 ea
bed wt.: 1 g, volume 12 mL	57127-U	20 ea
bed wt.: 2 g, volume 12 mL	57128	20 ea
bed wt.: 5 g, volume 20 mL	57129	20 ea
bed wt.: 10 g, volume 60 mL	57130	16 ea
Supelclean™ ENVI-Carb™ SPE Bulk Packing		
-	57210-U	50 g
Supelclean™ ENVI-Carb™ C SPE Tube		
bed wt.: 1 g, volume 12 mL	57149	20 ea

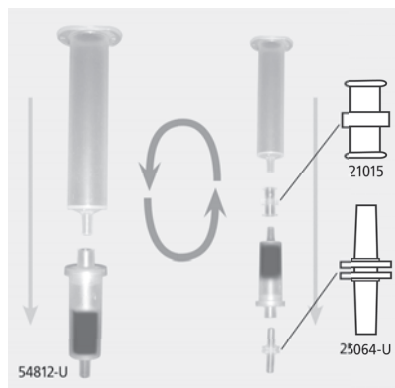
*Supelclean™ ENVI-Carb Plus SPE Products***Supelclean™ ENVI-Carb™ Plus SPE Tube**

Spherical Carbon Particles (Carbon Molecular Sieve)

Retention Mechanism: Reversed-phase**Sample Matrix Compatibility:** Aqueous solutions (drinking, ground, waste water)

- Developed and engineered for the solid phase extraction of highly polar compounds from aqueous samples such drinking and ground water
- Extreme affinity for organic polar and non-polar compounds from both non-polar and polar matrices when used under reversed-phase conditions
- Unlike traditional graphitized carbon black (GCB) phases (e.g., Supelclean ENVI-Carb) which are granular and friable, ENVI-Carb Plus consists of strong high surface area spherical particles.
- Examples of highly polar compounds recovered ($\geq 70\%$) using Supelclean ENVI-Carb Plus include (but not limited to) acephate ($\log P = -0.85$), phenol ($\log P = 1.51$), 1,4-dioxane ($\log P = -0.27$), and oxamly ($\log P = -1.2$).
- When used in conjunction with an SPE vacuum manifold, a male luer coupler (Cat. No. 25064-U), female luer coupler (Cat. No. 21015), and empty SPE tube(s) are required but not included.

matrix	Amorphous Carbon Molecular Sieve (CMS) Polymer Carbon or Graphitized Polymer Carbon (GPCs)
surface area	1149 m ² /g
density	2.27 g/mL
pore volume	0.782 mL/g
pore size	27.2 Å

▶ **Reversible Tube, bed wt.: 400 mg, volume 1 mL**

54812-U

30 ea

*Supelclean™ Coconut Charcoal SPE Products***Supelclean™ Coconut Charcoal SPE Tube**▶ **bed wt.: 2 g, volume 6 mL****Retention Mechanism:** Reversed-phase**Sample Matrix Compatibility:** Aqueous solutions (drinking, ground, waste water)

- Particle Sz.: 80/120 mesh
- Developed specifically for EPA Method 521 - "Determination of Nitrosamines in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography with Large Volume Injection and Chemical Ionization Tandem Mass Spectrometry (MS/MS)"



57144-U

30 ea

Supelclean™ ENVI-Chrom P SPE Products

Styrene/divinylbenzene co-polymer

Retention Mechanism: Reversed-phase or Adsorption**Sample Matrix Compatibility:** Aqueous solutions

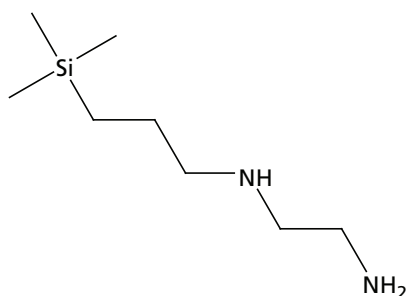
- Particle Size: 80-160 μm , Spherical Shape, Pore Size: 110- 175 Å, Surface Area: 900 m²/g
- Highly crosslinked, neutral, specially cleaned styrene/ divinylbenzene resin used to retain hydrophobic compounds with some hydrophilic functionality under reversed phase conditions
- Highly resistant to extreme pH conditions
- Typical applications include aromatics and phenolic compounds from aqueous sample matrices
- Used for priority pollutant phenols from aqueous samples

	Cat. No.	Qty
Supelclean™ ENVI-Chrom P SPE Bulk Packing		
-	57217	50 g
Supelclean™ ENVI-Chrom P SPE Tube		
bed wt.: 100 mg, volume 1 mL	57143	108 ea
bed wt.: 250 mg, volume 3 mL	57224	54 ea
bed wt.: 250 mg, volume 6 mL	57225-U	30 ea
bed wt.: 500 mg, volume 6 mL	57226	30 ea
volume 6 mL, bed wt.: 500 mg, for use with Gerstel® MPS 3	57239-U	30 ea

Solid Phase Extraction

Supelclean™ ENVI and Supelclean™ SPE: Supelclean™ PSA SPE Products

Supelclean™ PSA SPE Products



Retention Mechanism: Normal-phase and anion-exchange

Sample Matrix Compatibility: Organic or aqueous solutions

- Polymerically bonded, ethylenediamine-N-propyl phase that contains both primary and secondary amines
- A weak anion exchanger with a pKa of 10.1 and 10.9
- Similar to aminopropyl SPE phases (NH₂) in terms of selectivity, but has a much higher capacity due to presence of secondary amine (0.98-1.05 meq/g)
- Strong affinity and high capacity for removing fatty acids, organic acids, and some polar pigments and sugars when conducting multi-residue pesticide analysis in foods
- Has been shown to significantly reduce matrix-enhancement effects encountered during the GC analysis of food products
- Tested for superior cleanliness using GC-FID and GC-MS
- Bidentate nature of ligand allows chelation

	Cat. No.	Qty
Supelclean™ PSA SPE Tube		
bed wt.: 200 mg, volume 3 mL	52578-U	54 ea
bed wt.: 500 mg, volume 6 mL	52579-U	30 ea
Supelclean™ PSA SPE Bulk Packing		
-	52738-U	100 g

Supelclean™ ENVI-Florisil® SPE Products

Magnesium Silicate

Retention Mechanism: Normal phase or Adsorption

Sample Matrix Compatibility: Organic solutions

- Mesh: 100/200, Available with PTFE or stainless steel frits
- Tested for US Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) statement of work for pesticides
- Highly polar material that strongly adsorbs to polar compounds from nonpolar matrices under normal phase conditions
- Typical applications include alcohols, aldehydes, amines, herbicides, pesticides, PCBs, ketones, nitro compounds, organic acids, and phenols

	Cat. No.	Qty
Supelclean™ ENVI-Florisil® SPE Tubes		
PTFE frit, bed wt.: 500 mg, volume 3 mL	57058	54 ea
stainless steel frit, bed wt.: 500 mg, volume 6 mL	57046	30 ea
stainless steel frit, bed wt.: 1 g, volume 6 mL	57053	30 ea

Supelclean™ ENVI-Carb-II/PSA SPE Products



Retention Mechanism: Reversed-phase and anion-exchange

Sample Matrix Compatibility: Organic or aqueous solutions

- Dual layer SPE tube that contains both Supelclean ENVI-Carb (upper layer) & PSA (lower layer) SPE sorbents (separated by PE frit)
- Developed to offer superior clean up when conducting multi-residue pesticide analysis from food (e.g. agricultural products, meats, etc.).
- ENVI-carb has a strong affinity towards planar molecules, and can isolate/remove pigments (e.g., chlorophyll and carotinoids) and sterols commonly present in foods and natural products
- Supelclean PSA is a polymerically bonded, ethylenediamine-N-propyl phase that contains both primary and secondary amines
- Supelclean PSA has a strong affinity and high capacity for fatty acids, organic acids, and some polar pigments and sugars
- Tested for superior cleanliness using GC-FID and GC-MS

	Cat. No.	Qty
Supelclean™ ENVI-Carb™ II/PSA SPE Tube		
bed B: 600 mg, bed A: 300 mg, volume 6 mL	54058-U	30 ea
bed A: 500 mg, bed B: 500 mg, volume 6 mL	54067-U	30 ea
bed B: 300 mg, bed A: 500 mg, volume 6 mL	55119-U	30 ea
bed B: 500 mg, bed A: 500 mg, volume 20 mL	54217-U	20 ea
bed A: 500 mg, bed B: 500 mg, volume 6 mL	54103-U	300 ea

Supelclean™ ENVI-Carb/NH₂ SPE Products



Retention Mechanism: Reversed-phase and anion-exchange

Sample Matrix Compatibility: Organic or aqueous solutions

- Dual layer SPE tube that contains both Supelclean ENVI-Carb (upper layer) & LC-NH₂ (lower layer) SPE sorbents (separated by PE frit)
- Developed to offer superior clean up when conducting multi-residue pesticide analysis from food (e.g. agricultural products, meats, etc.).
- ENVI-carb has a strong affinity towards planar molecules, and can isolate/remove pigments (e.g., chlorophyll and carotinoids) and sterols commonly present in foods and natural products
- Supelclean LC-NH₂ is an aminopropyl phase that retains fatty acids, organic acids, and some polar pigments and sugars common in food matrices

	Cat. No.	Qty
Supelclean™ ENVI-Carb/NH₂ SPE Tube		
bed B: 500 mg, bed A: 500 mg, volume 6 mL	54035-U	30 ea
bed B: 500 mg, bed A: 500 mg, volume 20 mL	54216-U	20 ea
bed B: 500 mg, bed A: 500 mg, volume 6 mL	54024-U	300 ea
bed B: 500 mg, bed A: 500 mg, volume 20 mL	54096-U	200 ea
bed A: 1000 mg, bed B: 500 mg, volume 6 mL	54117-U	30 ea
bed B: 500 mg, bed A: 1000 mg, volume 12 mL	54118-U	20 ea
bed B: 200 mg, bed A: 200 mg, volume 6 mL	54104-U	20 ea

Solid Phase Extraction

Supelclean™ ENVI and Supelclean™ SPE: *Supelclean™ ENVI-Carb-II/SAX/PSA SPE Products*

Supelclean™ ENVI-Carb-II/SAX/PSA SPE Products

Supelclean™ ENVI-Carb-II/SAX/PSA SPE Tube

Retention Mechanism: Reversed-phase and anion-exchange

Sample Matrix Compatibility: Organic or aqueous solutions

- Tri-layer SPE tube that contains Supelclean ENVI-Carb (upper layer), SAX (middle layer) & PSA (lower layer) SPE sorbents (separated by PE frit)
- Developed to offer superior clean up when conducting multi-residue pesticide analysis from food (e.g. agricultural products, meats, etc.).
- ENVI-carb has a strong affinity towards planar molecules, and can isolate/remove pigments (e.g., chlorophyll and carotenoids) and sterols commonly present in foods and natural products
- Supelclean PSA has a strong affinity and high capacity for fatty acids, organic acids, and some polar pigments and sugars
- Supelclean SAX offers additional ion-exchange capacity for removing matrix components that may induce ion-suppression or enhancement during GC analysis.

PE frit (20 µm porosity)

polypropylene hardware

► **bed B: 500 mg, bed C: 500 mg, bed A: 500 mg, volume 12 mL**

52574-U

20 ea

Supelclean™ SAX/PSA SPE Products

Retention Mechanism: Normal-phase and anion-exchange

Sample Matrix Compatibility: Organic or aqueous solutions

- Dual layer SPE tube that contains both Supelclean SAX (upper layer) and PSA (lower layer) SPE sorbents (separated by PE frit)
- Supelclean SAX is a quarternary amine, Cl⁻ counter-ion.
- Supelclean PSA is an ethylenediamine-N-propyl phase that contains both primary and secondary amines.
- Ideal for removing matrix components (fatty acids, organic acids, polar pigments, and some sugars) when conducting multi-residue pesticide analysis in foods
- In compliance with the Luke II method which uses SPE to remove matrix interference and enhancement of pesticides from food for GC-ITMS analysis

	Cat. No.	Qty
Supelclean™ SAX/PSA SPE Tube		
bed A: 250 mg, bed B: 250 mg, volume 6 mL	52576-U	30 ea
bed A: 500 mg, bed B: 500 mg, volume 6 mL	52577-U	30 ea

Supelclean™ Sulfoxide SPE Products

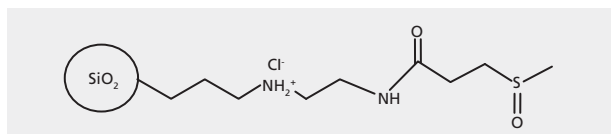
Supelclean™ Sulfoxide SPE

Retention Mechanism: Normal-Phase

Sample Matrix Compatibility: Hexane extracts of transformer, waste, and mineral oil

- Consists of a patent pending silica-bonded sulfoxide (-SO) SPE phase
- Developed specifically for the extraction of polychlorinated biphenyls (PCBs) from transformer, waste and mineral oil
- PCB retention is facilitated via interaction between the SPE phase's electrophilic sulfur atom and the pi-electron cloud formed from aromatic rings inherent with PCBs.

- This unique SPE phase offers a simple and efficient sample prep method for identifying PCBs at quantitation limits of 0.5 ppm
- When using the polypropylene SPE tube version, a large volume reservoir is recommended for increasing SPE volume headspace
- The glass SPE version is of unique design and is threaded on the mouth of the SPE tube. This allows for a screw-top cap and female luer plug to reduce moisture contamination during shipment and storage.



Supelclean Sulfoxide SPE Bonded Phase



Supelclean Sulfoxide SPE Glass Tube, 6g/20 mL (55252-U)

	Cat. No.	Qty
Supelclean™ Sulfoxide SPE Tube		
glass hardware, PE frit, bed wt: 6 g, volume 20 mL	55252-U	5 ea
PE frit, bed wt: 3 g, volume 6 mL	55253-U	30 ea
Supelclean™ Sulfoxide SPE Bulk Packing		
-	55254-U	100 g
Glass SPE Tube w/Frits		
for use with Supelclean Sulfoxide Glass SPE Tube (55252-U), I.D. 15.6 mm × O.D. 190 mm	55255-U	5 ea
Large Volume SPE Reservoir		
polypropylene body, for use with 6 mL polypropylene SPE tubes, volume 25 mL	54258-U	30 ea
PTFE body, for use with 6 mL polypropylene SPE tubes, volume 25 mL	54259-U	3 ea

Supelclean™ LC-Florisil®/Si SPE Products

Supelclean™ Florisil®/Si SPE Tube

► **bed B: 2 g, bed A: 2 g, volume 12 mL**

Retention Mechanism: Normal-phase or adsorption

Sample Matrix Compatibility: Organic solutions

- Dual layer SPE tube that contains Supelclean LC-Florisil (magnesium silicate; upper layer) and Supelclean LC-Si (silica; lower layer) separated and packed with PE frits (PP tubes)
- Developed specifically for Japan Electric Association Committee Method (JEAC 1201-1901) - "PCBs in Oil"

polypropylene hardware

PE frit

57154-U

20 ea

Solid Phase Extraction

Supelclean™ ENVI and Supelclean™ SPE: Dual Layer Florisil®/Sodium Sulfate SPE Products

Dual Layer Florisil®/Sodium Sulfate SPE Products

Dual Layer Florisil®/Na₂SO₄ SPE Tube

Retention Mechanism: Normal-phase or adsorption

Sample Matrix Compatibility: Organic solutions

- Dual layer SPE tube that contains Na₂SO₄ (upper layer) and Florisil (magnesium silicate; lower layer) separated and packed with PTFE frits (glass tubes) or PE frits (PP tubes)
- Florisil particle size- 60/100 mesh (150-200µm); Na₂SO₄ Purity- 99.99+%, density- 2.68 g/mL
- Excellent for removing/isolating polar compounds from organic matrices
- Na₂SO₄ layer aids in removing aqueous sample residues that may hinder Florisil performance and/or subsequent GC analysis
- Available in glass SPE hardware allowing users to reactivate Florisil through heating at 140°C, 16 hours
- Use in conjunction with Visiprep Large Volume Sampler (Cat No. 57275) and Visiprep SPE Vacuum Manifolds for processing larger volume samples

	Cat. No.	Qty
Dual Layer Florisil®/Na₂SO₄ SPE Tube		
glass hardware, PTFE frit, bed A: 2 g, bed B: 2 g, volume 6 mL	52582-U	48 ea
polypropylene hardware, PE frit, bed A: 2 g, bed B: 2 g, volume 6 mL	54116-U	48 ea

Multi-Layer SPE Products for US EPA Method 8290

Multi-Layer SPE for US EPA Method 8290

Developed specifically for use with US EPA Method 8290 - "Polychlorinated Dibenzodioxins (PCDDs) and Polychlorinated Dibenzofurans (PCDFs) by High-Resolution Gas Chromatography/High-Resolution Mass Spectrometry (HRGC/HRMS)"

The sample clean-up employed in EPA Method 8290 requires a series of hand-packed glass chromatography steps involving: 1) a multi-layer silica gel class column, 2) a sodium sulfate/alumina glass column, and 3) a multi-layer celite 545-activated carbon glass column.

Cat. No. 52732-U can be used in place of the required multi-layer silica gel glass column, and Cat. No. 52733-U can be used in place of the required multi-layer celite 545-activated carbon glass column.

Note that the bed weights packed into these SPE tubes are smaller than what is described in EPA Method 8290. Therefore, to use these SPE tubes, sample volumes need to be scaled down accordingly.

	Cat. No.	Qty
Multi-Layer Celite/Activated Carbon SPE Tube		
configured for US EPA Method 8290, PTFE frit, glass hardware, volume 6 mL	52733-U	30 ea
Multi-Layer Silica Gel SPE Tube		
configured for US EPA Method 8290, PTFE frit, glass hardware, volume 6 mL, bed A: 0.1 g	52732-U	30 ea

Glass SPE Products

Glass SPE Tubes with PTFE Frits

A select line of our Supelclean SPE phase chemistries is also available in inert glass and PTFE hardware configurations.

Features & Benefits:

- Resistant to harsh chemicals and aggressive solvents
- Absence of leachables such as phthalates and plasticizers
- Hygroscopic adsorbents (e.g. Florisil) can be easily heat treated/activated (e.g., 105-120 °C oven, overnight) prior to use



	Cat. No.	Qty
Supelclean™ ENVI-18 SPE Tube		
glass hardware, PTFE frit, bed wt: 500 mg, volume 6 mL	54331-U	30 ea
Supelclean™ ENVI-8 SPE Tube		
glass hardware, PTFE frit, bed wt: 500 mg, volume 3 mL	57106	27 ea
glass hardware, PTFE frit, bed wt: 500 mg, volume 6 mL	57107	20 ea
Dual Layer Florisil®/Na₂SO₄ SPE Tube		
glass hardware, PTFE frit, bed B: 2 g, bed A: 2 g, volume 6 mL	52582-U	48 ea
Supelclean™ LC-Florisil® SPE Tube		
glass hardware, PTFE frit, bed wt: 500 mg, volume 6 mL	54333-U	30 ea
glass hardware, PTFE frit, bed wt: 1 g, volume 6 mL	54334-U	30 ea
Supelclean™ LC-Si SPE Tube		
glass hardware, PTFE frit, bed wt: 1 g, volume 6 mL	54335-U	30 ea
Supelclean™ ENVI-Florisil® SPE Tubes		
glass hardware, PTFE frit, bed wt: 1 g, volume 6 mL	54095-U	30 ea

Solid Phase Extraction

Reversed-Phase Supelclean™ SPE Products

Reversed-Phase Supelclean™ SPE Products

Used to extract non-polar to moderately polar compounds from aqueous samples.

Supelclean™ LC-18 SPE

- Octadecyl, monomerically bonded
- Loading ~11.5% C
- Endcapped

	Cat. No.	Qty
Supelclean™ LC-18 SPE Tube		
bed wt: 100 mg, volume 1 mL	504270	108 ea
bed wt: 500 mg, volume 3 mL	57012	54 ea
bed wt: 500 mg, volume 6 mL	57054	30 ea
bed wt: 1 g, volume 6 mL	505471	30 ea
bed wt: 2 g, volume 12 mL	57117	20 ea
bed wt: 5 g, volume 20 mL	57135-U	20 ea
bed wt: 10 g, volume 60 mL	57136	16 ea
Supelclean™ LC-18 SPE Bulk Packing		
-	57202	100 g

Supelclean™ LC-8 SPE

- Octyl, monomerically bonded
- Loading ~7% C
- Endcapped

	Cat. No.	Qty
Supelclean™ LC-8 SPE Bulk Packing		
-	57201	100 g
Supelclean™ LC-8 SPE Tube		
bed wt: 100 mg, volume 1 mL	504157	108 ea
bed wt: 500 mg, volume 3 mL	505145	54 ea
bed wt: 500 mg, volume 6 mL	57052	30 ea

Supelclean™ LC-4 (Wide Pore) SPE

Supelclean™ LC-4 SPE Tube

- Larger pore size to accommodate larger macromolecules (e.g. proteins and peptide)
- Commonly used for desalting and extracting proteins/peptides in aqueous samples

polypropylene hardware

PE frit (20 µm porosity)

base material silica gel (irregularly shaped)
 bonding butyldimethyl
 endcapped Yes
 particle size 45 µm
 pore size 500 Å

▶ **Wide Pore, bed wt.: 500 mg, volume 3 mL**

57089	54 ea
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Supelclean™ HISEP SPE

Supelclean™ Hisep™ SPE Tube

- Hydrophobic sites shielded by a hydrophilic surface for protein exclusion
- Hydrophobicity similar to C8 SPE phases

▶ **bed wt.: 500 mg, volume 3 mL**

57076-U	54 ea
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Supelclean™ LC-Ph SPE

- Phenyl, monomerically bonded
- Loading ~5.5% C
- Endcapped

	Cat. No.	Qty
Supelclean™ LC-Ph SPE Tube		
bed wt: 100 mg, volume 1 mL	504599	108 ea
bed wt: 500 mg, volume 3 mL	505269	54 ea

Normal-Phase Supelclean™ SPE Products

Used to extract moderately polar to polar compounds from nonaqueous samples.

Supelclean™ LC-CN SPE

- Cyanopropyl, monomerically bonded
- Loading ~7% C
- Endcapped

	Cat. No.	Qty
Supelclean™ LC-CN SPE Tube		
bed wt: 100 mg, volume 1 mL	504386	108 ea
bed wt: 500 mg, volume 3 mL	57013	54 ea
bed wt: 500 mg, volume 6 mL	57056	30 ea
bed wt: 5 g, volume 20 mL	57141	20 ea
Supelclean™ LC-CN, 100g		
-	57218	100 g

Supelclean™ LC-Diol SPE

- Diol, monomerically bonded
- Loading ~7% C

	Cat. No.	Qty
Supelclean™ LC-Diol SPE Tube		
bed wt: 100 mg, volume 1 mL	504718	108 ea
bed wt: 500 mg, volume 3 mL	57016	54 ea

Supelclean™ LC-NH₂ SPE

- Aminopropyl, monomerically bonded
- Loading ~5% C

	Cat. No.	Qty
Supelclean™ LC-NH₂ SPE Bulk Packing		
-	57205	100 g
Supelclean™ LC-NH₂ SPE Tube		
bed wt: 100 mg, volume 1 mL	504483	108 ea
bed wt: 500 mg, volume 3 mL	57014	54 ea
bed wt: 500 mg, volume 6 mL	54059-U	30 ea

Solid Phase Extraction

Adsorption Supelclean™ SPE Products

Adsorption Supelclean™ SPE Products

No bonded phase; used to adsorb moderately polar to polar compounds from nonaqueous samples.

Supelclean™ LC-Alumina A SPE

- Alumina for acidic pH (~5), 60/325 mesh
- Brockman Act. I

	Cat. No.	Qty
Supelclean™ LC-Alumina A SPE Bulk Packing		
-	57206	100 g
Supelclean™ LC-Alumina-A SPE Tube		
bed wt: 1 g, volume 3 mL	57082-U	54 ea
bed wt: 2 g, volume 6 mL	57083-U	30 ea

Supelclean™ LC-Alumina B SPE

- Alumina for basic pH (~8.5), 60/325 mesh
- Brockman Act. I

	Cat. No.	Qty
Supelclean™ LC-Alumina-B SPE Bulk Packing		
-	57207	100 g
Supelclean™ LC-Alumina-B SPE Tube		
bed wt: 1 g, volume 3 mL	57084	54 ea
bed wt: 2 g, volume 6 mL	57085	30 ea

Supelclean™ LC-Alumina-N SPE

- Alumina for neutral pH (~6.5), 60/325 mesh
- Brockman Act. I

	Cat. No.	Qty
Supelclean™ LC-Alumina SPE Bulk Packing		
-	57208	100 g
Supelclean™ LC-Alumina-N SPE Tube		
bed wt: 1 g, volume 3 mL	57086	54 ea
bed wt: 2 g, volume 6 mL	57087	30 ea

Supelclean™ LC-Florisil® SPE

- Magnesium silicate, 100/120 mesh

	Cat. No.	Qty
Supelclean™ LC-Florisil® SPE Tube		
bed wt: 1 g, volume 6 mL	57057	30 ea
bed wt: 2 g, volume 12 mL	57115	20 ea
bed wt: 5 g, volume 20 mL	57131	20 ea
bed wt: 10 g, volume 60 mL	57132	16 ea
glass hardware, PTFE frit, bed wt: 500 mg, volume 6 mL	54333-U	30 ea
glass hardware, PTFE frit, bed wt: 1 g, volume 6 mL	54334-U	30 ea
Supelclean™ LC-Florisil® SPE Bulk Packing		
-	57209	100 g

Supelclean™ LC-Si SPE

- Silica gel

	Cat. No.	Qty
12mL Si/1G-44%H2SO4/Si SPE Tube		
-	57145-U	20 ea
12mL Si-5G-44%H2SO4/Si SPE Tube		
-	57148-U	20 ea
Supelclean™ LC-Si Bulk Packing		
-	57200	100 g
Supelclean™ LC-Si SPE Tube		
bed wt: 100 mg, volume 1 mL	504041	108 ea
bed wt: 500 mg, volume 3 mL	505048	54 ea
bed wt: 500 mg, volume 6 mL	505374	30 ea
bed wt: 1 g, volume 6 mL	57051	30 ea
bed wt: 2 g, volume 12 mL	57116	20 ea
bed wt: 5 g, volume 20 mL	57133	20 ea
packing: 10 g, volume 60 mL	57134	16 ea
glass hardware, PTFE frit, bed wt: 1 g, volume 6 mL	54335-U	30 ea
glass hardware, PTFE frit, bed wt: 500 mg, volume 6 mL	54046-U	30 ea

Ion Exchange Supelclean™ SPE Products

Interaction based on ionic attraction.

Supelclean™ LC-SAX SPE

- Quarternary amine, Cl⁻ counter-ion

	Cat. No.	Qty
Supelclean™ LC-SAX SPE Bulk Packing		
-	57203	100 g
Supelclean™ LC-SAX SPE Tube		
bed wt: 100 mg, volume 1 mL	504815	108 ea
bed wt: 500 mg, volume 3 mL	57017	54 ea

Supelclean™ LC-SCX SPE

- Aliphatic sulfonic acid, Na⁺ counter-ion
- Endcapped

	Cat. No.	Qty
Supelclean™ LC-SCX SPE Bulk Packing		
-	57204	100 g
Supelclean™ LC-SCX SPE Tube		
bed wt: 100 mg, volume 1 mL	504920	108 ea
bed wt: 500 mg, volume 3 mL	57018	54 ea

Supelclean™ LC-WCX SPE

- Carboxylic acid, Na⁺ counter-ion

	Cat. No.	Qty
Supelclean™ LC-WCX SPE Tube		
bed wt: 100 mg, volume 1 mL	505595	108 ea
bed wt: 500 mg, volume 3 mL	57061	54 ea

Solid Phase Extraction

SPE Method Development Kits

SPE Method Development Kits

Supelclean™ SPE Method Development Kit

Supelclean SPE Method Development Kits consist of an assortment of SPE phase chemistries and cartridge configurations ideal for SPE method development. The range of phase chemistries available for each kit allows the user to profile for compound retention, elution and sample matrix selectivity.

	Cat. No.	Qty
Supelclean™ SPE Method Development Kit		
Kit A	57019	1 ea
Kit B	57009-U	1 ea
Kit C	57075-U	1 ea
Kit NP-3	57074-U	1 ea
Kit IX-3	57073	1 ea

Note: Please see below table for Supelclean SPE Method Development Kit descriptions

Supelclean SPE Method Development Kits

SPE Method Development Kit	Kit A	Kit B	Kit C	Kit NP-3	Kit IX-3
Cat. No.	57019	57009-U	57075-U	57074-U	57073
Qty. Ea. Tube	6	12	3	6	12
Supelclean Packing	Sorbent Qty./Tube Size				
LC-Si	500 mg/3 mL	100 mg/1 mL	500 mg/6 mL 1 g/6 mL	500 mg/3 mL	
LC-8	500 mg/3 mL	100 mg/1 mL	500 mg/6 mL		
LC-18	500 mg/3 mL	100 mg/1 mL	500 mg/6 mL		
LC-CN	500 mg/3 mL	100 mg/1 mL	500 mg/6 mL		500 mg/3 mL
LC-Diol	500 mg/3 mL	100 mg/1 mL		500 mg/3 mL	
LC-NH2	500 mg/3 mL	100 mg/1 mL		500 mg/3 mL	500 mg/3 mL
LC-Ph	500 mg/3 mL	100 mg/1 mL			
LC-SAX	500 mg/3 mL	100 mg/1 mL			500 mg/3 mL
LC-SCX	500 mg/3 mL	100 mg/1 mL			500 mg/3 mL
LC-WCX	500 mg/3 mL	100 mg/1 mL			500 mg/3 mL
LC-Alumina-A			2 g/6 mL	1 g/3 mL	
LC-Alumina-B			2 g/6 mL	1 g/3 mL	
LC-Alumina-N			2 g/6 mL	1 g/3 mL	
LC-Florisil			1 g/6 mL		

Solid Phase Extraction

SPE Method Development Kits

96-well SPE MD (Method Development) Plate

Supelco 96-well SPE Method Development Plates contain an assortment of SPE phase chemistries ideally suited for method development. The mix of phase chemistries contained within this 96-well SPE plate allows researchers to screen for analyte retention, recovery, and selectivity when achieving one's sample prep objectives.



► - BAN, configured for extracting basic, acidic, and neutral compounds (BAN), bed wt.: 25 mg/well

	1	2	3	4	5	6	7	8	9	10	11	12
A	Discovery® DSC-PS/DVB (polystyrene divinyl benzene) ¹											
B	Discovery DSC-18 (tC18) ¹											
C	Discovery DSC-8 (C8) ¹											
D	Discovery DSC-CN (cyanopropyl) ¹											
E	Discovery DSC-MCAX (mixed-mode cation exchange) ²											
F	Discovery DSC-WCX (weak cation exchange) ²											
G	Discovery DSC-SAX (strong anion exchange) ³											
H	Discovery DSC-NH ₂ (aminopropyl weak anion exchange) ³											

¹Reversed-phase; ²Cation-exchange; ³Anion-exchange

577522-U

1 ea

Free SPE MultiPaks for Method Development

FREE SPE MultiPaks for Method Development

SPE MultiPaks consist of an assortment of SPE phase chemistries and tube dimensions ideally suited for method development. The mix of phase chemistries available in these MultiPaks allows you to screen for optimal retention and selectivity required to achieve your sample prep objectives.

Available SPE MultiPaks

- Supel-Select HLB SPE MultiPaks
- SupelMIP SPE MultiPaks
- HybridSPE-PL MultiPaks
- Supel™ QuE Dispersive & Dual-Layer SPE MultiPaks
- Discovery® Ag-ION SPE MultiPaks
- Discovery® Reversed-Phase SPE MultiPaks
- Discovery® Normal-Phase SPE MultiPaks
- Discovery® Ion-Exchange SPE MultiPaks
- Discovery® DSC-MCAX (Mixed-Mode Cation Exchange) SPE MultiPak
- Discovery® DPA-6S (Polyamide) SPE MultiPak
- Supelclean ENVI-Carb (Graphitized Carbon) SPE MultiPak
- Supel™ Sphere Carbon/NH₂ SPE MultiPak
- Supelclean PSA SPE MultiPaks

SPE Products For Combinatorial Chemistry

In recent years, advances in combinatorial chemistry (CombiChem) have made a tremendous impact on the pharmaceutical industry by dramatically accelerating the drug discovery process. However, for each synthesis a purification step is required to remove the target molecule from reaction by-products and excess reagents. Because many reactions contain polar to moderately polar reagents, by-products, and products that can be selectively extracted with normal phase SPE, modified flash techniques utilizing silica packed SPE hardware have become a routine procedure for purifying solution-phase combinatorial reactions.

Discovery® SPE products offer combinatorial chemists an excellent opportunity for developing a simple and standardized high throughput purification method for their combinatorial libraries.

In normal phase SPE, polar compounds are retained or adsorbed onto the sorbent via polar-polar interactions when loaded in the presence of an organic sample matrix. Provided that the products, by-products, and reagents display varying polarities, choosing solvents with increasing polarity will allow for sequential elution of key compounds. In most combinatorial flash purification techniques, compounds not of interest are retained on the stationary phase. The products are then collected for analysis in the load flow through, or if weakly adsorbed, they can be selectively removed with a subsequent wash step.

Many combinatorial chemistry labs are synthesizing and characterizing extensive drug libraries. Chemists are therefore employing modified flash chromatography techniques in a 96-well SPE format for the purpose of sample clean-up and baseline impurity removal. In many combinatorial chemistry labs, capacity is a primary concern for such applications. In our studies, we have determined the binding capacity of 4-Fluoro-3-nitrobenzoic acid when loaded into a DSC-Si SPE 96-well plate (100mg/well). Our results show that ~12.5mg of the Fluoro compound can be loaded onto 100mg DSC-Si before breakthrough occurs. Breakthrough determination was analyzed via HPLC analysis.

Results:

Load Amount*	Breakthrough Amount
2.5 mg	No Breakthrough
5.0 mg	No Breakthrough
10.0 mg	No Breakthrough
12.5 mg	No Breakthrough
15.0 mg	0.10% Breakthrough Occurred

* Sample Matrix in 200 µL Methylene Chloride

n = 3 for each load amount

Discovery® DSC-Si SPE Products

	Cat. No.	Qty
Discovery® DSC-Si SPE Tube		
bed wt.: 50 mg, volume 1 mL	52652-U	108 ea
bed wt.: 100 mg, volume 1 mL	52653-U	108 ea
bed wt.: 500 mg, volume 3 mL	52654-U	54 ea
bed wt.: 500 mg, volume 6 mL	52655-U	30 ea
bed wt.: 1 g, volume 6 mL	52656-U	30 ea
bed wt.: 2 g, volume 12 mL	52657-U	20 ea
bed wt.: 5 g, volume 20 mL	52658-U	20 ea
bed wt.: 10 g, volume 60 mL	52659-U	16 ea
bed wt.: 20 g, volume 60 mL	1771-U	16 ea
Discovery® DSC-Si SPE 96-well Plate		
bed wt.: 100 mg/well	575609-U	1 ea
bed wt.: 50 mg/well	575608-U	1 ea
bed wt.: 25 mg/well	575607-U	1 ea
Discovery® DSC-Si SPE Bulk Packing		
-	52651-U	100 g

Solid Phase Extraction

SPE Products For Combinatorial Chemistry: *Empty Glass Reaction (SPE) Tubes & Accessories**Empty Glass Reaction (SPE) Tubes & Accessories*

Inert Glass Tubes, PTFE Frits and PTFE Closures

- Reduce interferences and contamination of your reaction mixtures
- Resistant to aggressive solvents and chemical solutions
- High flow frit porosity allows for gravity or rapid vacuum rinsing



Description	Cat. No.	Qty
SPE Tube Cap (encloses top of SPE tubes), PTFE solid, for use with 6mL glass SPE tube	504343	24 ea
Male Luer Plug, configured for plugging Luer holes	504351	12 ea
Empty glass SPE Tube with PTFE frits, 20 µm porosity, volume 6 mL	504394	24 ea
SPE Tube Adapter, PTFE (with female luer port), for use with 6 mL glass SPE tubes	504335	24 ea
PTFE Frit, 20 µm porosity, for use with 6mL glass SPE tubes	504327	60 ea
Female Luer Cap, polypropylene, configured for capping luer tips	57098	12 ea

*High Capacity Support and Ion-Exchange Resins***Combigel™ XE-305**

Support for combinatorial chemistry.
Adsorbent for liquid separations.

- Underivatized polystyrene, mesh size 50-100
- Our answer to Amberlite® XE-305
- Unique swelling properties.

matrix	underivatized polystyrene
particle size	50-100 mesh
502537B	50 g

Polymer SAX Rezorian™ Cartridge

Retention Mechanism: Anion exchange

Sample Matrix Compatibility: Organic or aqueous samples

- A quarternary amine functional group bonded to styrene gel, 200/400 mesh (Dowex 1x8)
- Offers high capacity (3.5 meq/g) for extracting acidic compounds
- OH⁻ counter ion; 8% cross linking; ~42% moisture; max temp. 99°C
- Excellent resistance to extreme pH conditions



store at: 2-8°C

	Cat. No.	Qty
Polymer SAX Rezorian™ Cartridge		
bed wt.: 6 g, volume 5 mL	2832-U	10 ea
bed wt.: 14.4 g, volume 13 mL	2833-U	10 ea

Polymer SCX Reversible SPE Tube

Retention Mechanism: Cation exchange

Sample Matrix Compatibility: Organic or aqueous solutions

- A sulfonic acid functional group bonded to styrene gel, 200/400 mesh (Dowex 50Wx8)
- Offers high capacity (4.8 meq/g) for extracting basic compounds
- H⁺ counter ion; 8% cross linking; ~54% moisture; max temp. 150 °C
- Excellent resistance to extreme pH conditions (1-14)



▶ bed wt.: 700 mg, volume 1 mL

54037-U	54 ea
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Solid Phase Extraction

SPE Tube Components & Tube Accessories: *SPE Tube Components*

SPE Tube Components & Tube Accessories

SPE Tube Components



Note: PE, PTFE, and stainless steel frits for use with polypropylene SPE tubes unless otherwise noted

	Cat. No.	Qty
Empty polypropylene SPE Tube with PE frits, 20 µm porosity		
volume 1 mL	57023	108 ea
volume 1 mL, pre-fritted	54220-U	100 ea
volume 3 mL	57024	54 ea
volume 3 mL, pre-fritted	54221-U	100 ea
volume 6 mL	57026	30 ea
volume 6 mL, pre-fritted	54222-U	100 ea
volume 12 mL	57176	20 ea
volume 12 mL, pre-fritted	54223-U	100 ea
volume 20 mL	57177	20 ea
volume 20 mL, pre-fritted	57118-U	20 ea
volume 60 mL	57178	16 ea
volume 60 mL, pre-fritted	57119-U	16 ea
Empty SPE Tube (no frits)		
volume 1 mL	57240-U	108 ea
volume 3 mL	57241	54 ea
volume 6 mL	57242	30 ea
volume 12 mL	57179	20 ea
volume 20 mL	57021	12 ea
volume 60 mL	57022	12 ea
Empty glass SPE Tube with PTFE frits, 20 µm porosity		
volume 6 mL	504394	24 ea
Empty Reversible SPE Tube, non-fluorous polypropylene		
volume 0.5 mL, PE frit included	57602-U	50 ea
volume 1 mL, PE frit included	57607-U	50 ea
volume 2 mL, PE frit included	57608-U	50 ea
Empty Rezorian™ Tube Kit with PE frits		
volume 1 mL, luer plugs and caps included	57609-U	50 ea
volume 5 mL, luer caps and plugs included	57613-U	50 ea
Polyethylene (PE) Frit, 20 µm porosity		
for use with 1 mL SPE Tube	57244	216 ea
for use with 3 mL SPE Tube	57180-U	108 ea
for use with 6 mL SPE Tube	57181	60 ea
for use with 12 mL SPE Tube	57182-U	40 ea
for use with 20 mL SPE Tube	57183	40 ea
for use with 60 mL SPE Tube	57184	32 ea
PTFE Frit, 20 µm porosity		
for use with 1 mL SPE tubes	57185	216 ea
for use with 3 mL SPE tubes	57186	108 ea
for use with 6 mL SPE tubes	57187	60 ea
for use with 6 mL glass SPE tubes	504327	60 ea
for use with 12 mL SPE tubes	57188	40 ea
for use with 60 mL SPE tubes	57190-U	32 ea

	Cat. No.	Qty
Stainless Steel Frit, 20 µm porosity		
for use with 6 mL polypropylene SPE tubes	57246-U	60 ea
SPE Tube Cap (encloses top of SPE tubes)		
for use with 1 mL SPE tube	52171-U	108 ea
for use with 3 mL SPE tube	52172-U	30 ea
for use with 6 mL SPE tube	52173-U	30 ea
for use with 12 mL SPE tube	52174-U	20 ea
for use with 20 mL SPE tube	52175-U	20 ea
for use with 60 mL SPE tube	52176-U	20 ea
Female Luer Cap		
polypropylene, configured for capping luer tips	57098	12 ea
Male Luer Plug		
configured for plugging luer holes	504351	12 ea

Large Volume SPE Reservoirs

Large Volume SPE Reservoir

Large volume SPE reservoirs are designed to increase the head space volume of standard polypropylene SPE tubes. Because these reservoirs are designed to connect directly to the mouth of the SPE tube, they are ideal for gravity applications where increased headspace volume is required.



► **polypropylene body, for use with 6 mL polypropylene SPE tubes, volume 25 mL**

54258-U 30 ea

► **PTFE body, for use with 6 mL polypropylene SPE tubes, volume 25 mL**

54259-U 3 ea

Frit Insertion Tool and Tube Adapters

SPE Frit Insertion Tool

Used to tighten or insert frits into SPE tubes.
polypropylene material



	Cat. No.	Qty
SPE Frit Insertion Tool		
for use with 1 mL SPE tubes	55217-U	1 ea
for use with 3 mL SPE tubes	55218-U	1 ea
for use with 6 mL PP SPE tubes	55219-U	1 ea

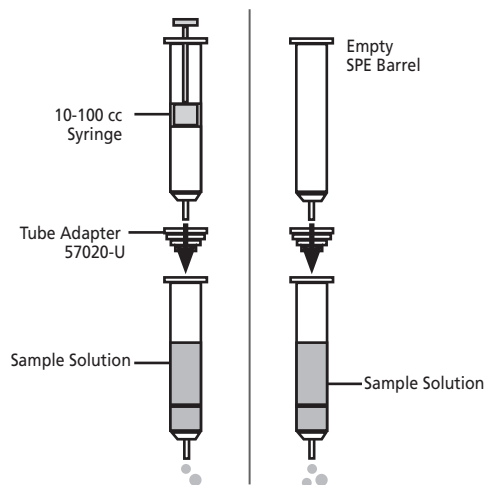
Solid Phase Extraction

SPE Tube Components & Tube Accessories: *Frit Insertion Tool and Tube Adapters*

	Cat. No.	Qty
for use with 12 mL SPE tubes	55221-U	1 ea
for use with 20 and 60 mL SPE tubes	55224-U	1 ea
includes 1, 3, 6, 12, and 20/60 mL SPE frit insertion tools	55226-U	5 ea

SPE Tube Adapter

Tube adapters serve many purposes. They can be used to stack one SPE tube on top of another to provide different selectivities. A larger empty syringe barrel can be stacked on top of a smaller SPE tube to act as a larger load reservoir. Or, they can serve as an adapter for positive pressure methods (e.g. from a syringe or air/ N₂ line).



Left to Right: SPE Tube Adapter for 12, 20, 60 mL SPE Tubes (57267); SPE Tube Adapter for 1, 3, 6 mL SPE tubes (57020-U)

	Cat. No.	Qty
SPE Tube Adapter		
for use with 1, 3, & 6 mL tubes	57020-U	12 ea
configured for AutoTrace Automated Systems, for use with 3mL tubes	57123	6 ea
configured for AutoTrace Automated Systems, for use with 6mL tubes	57126	6 ea
PTFE (with female luer port), for use with 6 mL glass SPE tubes	504335	24 ea

Cartridge Adapter for H300 Cartridges

for use with 12, 20, & 60 mL SPE tubes

57267	6 ea
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SPE Vacuum Manifolds & Replacement Parts

Visiprep™ SPE Vacuum Manifold

SPE is a form of chromatography, and, as with other chromatographic techniques, control of flow rate is critical for maintaining reproducible extractions. Unlike other vacuum manifolds, the Visiprep system contains a patented valve system that allows for precise flow control through each SPE tube via rotating, independent, screw-type valves situated in each port within the manifold cover. Visiprep vacuum manifolds allow you to process up to 12 (12-port version) or 24 (24-port version) SPE samples simultaneously. Spacing between ports are slightly smaller on the 24-port versions than the 12-port versions so consideration of tube sizes is recommended.

Features and Benefits

- Patented screw-type valves within each SPE port for precise flow control
- Glass basin will not dissolve, fog, or discolor when exposed to solvents
- Legs on cover allow user to easily rest cover on work surface when removed from the manifold
- Screw-type solvent-resistant vacuum bleed gauge and valve offer better sealing and vacuum control. Valve takes 1/4" vacuum tubing.
- PP collection vessel rack accommodates autosampler vials; small scintillation vials (22.75 mm O.D. recommended); 10 and 16 mm test tubes; and 1, 2, 5, and 10 mL volumetric flasks. An optional plate for 20 mL scintillation vials is available for 12-port models.

► DL (Disposable Liner), 12-port model

The Visiprep DL (Disposable Liner) Vacuum Manifold eliminates the possibility of cross-contamination when processing a new sample on the same port. The liner consists of a PP female luer hub that attaches to the SPE, and thin-walled PTFE tubing that is threaded through the SPE port. This ensures that all SPE port and valve surfaces coming in contact with the sample can be replaced following each extraction.



Visiprep DL (Disposable Liner), 12-port model (57044)

57044	1 ea
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Solid Phase Extraction

SPE Vacuum Manifolds & Replacement Parts

Visiprep™ SPE Vacuum Manifold (*continued*)

▶ DL (Disposable Liner), 24-port model

The Visiprep DL (Disposable Liner) Vacuum Manifold eliminates the possibility of cross-contamination when processing a new sample on the same port. The liner consists of a PP female luer hub that attaches to the SPE, and thin-walled PTFE tubing that is threaded through the SPE port. This ensures that all SPE port and valve surfaces coming in contact with the sample can be replaced following each extraction.



Visiprep DL (Disposable Liner), 24-port model (57265)

57265

1 ea

▶ standard, 12-port model



57030-U

1 ea

▶ standard, 24-port model



Visiprep 24-Port Vacuum Manifold (57250-U)

57250-U

1 ea

Long Stem Flow Control Valves

Equip alternative valves in your 12-port or 24-port standard Visiprep vacuum manifold with these long stem flow control valves if you intend to use all ports of the manifold with 12, 20, or 60 mL SPE tubes.

Note: Not for use with Visiprep DL (Disposable Liner) models



57048

6 ea

Solid Phase Extraction

SPE Vacuum Manifolds & Replacement Parts

Visiprep™ Manifold Components



Bottom left- Retaining Clips for Visiprep Collection Racks (57041); **Bottom center-** Visiprep DL (Disposable Liner) Replacement Liner Guide Needles, stainless steel (57027); **Left center-** Visiprep Standard Solvent Guide Needles, PTFE (57047); **Top center-** Visiprep Standard Solvent Guide Needles, stainless steel (57036); **Top right-** Visiprep Manifold Replacement Flow Control Valve, for use with DL (Disposable Liner) models (57028); **Right center-** Pyrex disposable culture (collection) tubes: 10 mm I.D., 4 mL (Z281026) and 16 mm I.D., 15 mL (Z281069)

	Cat. No.	Qty
Visiprep™ Manifold Cover (flow control valves and gasket included)		
for use with standard, 12-port model	57031-U	1 ea
for use with DL (Disposable Liner), 12-port model	57029	1 ea
for use with standard, 24-port model	57251	1 ea
for use with DL (Disposable Liner), 24-port model	57266	1 ea
Visiprep™ Manifold Replacement Gasket		
for use with 12-port model (standard and DL)	57033	2 ea
for use with 24-port model (standard and DL)	57254	2 ea
Visiprep™ Manifold Replacement Glass Basin		
for use with 24-port model (standard and DL), vacuum gauge and bleed valve included	57252	1 ea
for use with 24-port model (standard and DL)	57253	1 ea

	Cat. No.	Qty
Visiprep™ Manifold Collection Rack (included with standard and DL models)		
for use with 12-port model, includes base, 3 support rods, center plate, plate for 10 mm test tubes, 12 retaining clips	57037	1 ea
for use with 24-port model, includes base, 2 support rods, center plate, plate for 10 mm test tubes, 8 retaining clips	57255	1 ea
Visiprep™ Manifold Plate (included with standard and DL models unless otherwise noted)		
for use with 12-port model (standard and DL), 16 mm test tubes	57039	1 ea
for use with 12-port model, 2 mL autosampler vials	57040-U	1 ea
for use with 12-port model, 20 mL scintillation vials, not included with standard and DL models	57043	1 ea
for use with 24-port model, 16 mm test tubes	57257	1 ea
for use with 24-port model, 2 mL autosampler vials	57258	1 ea
Visiprep™ Manifold Flow Control Valve		
for use with standard 12- and 24-port models	57032	2 ea
for use with DL (Disposable Liner) 12- and 24-port models	57028	2 ea
Visiprep™ Manifold Replacement Flow Control Valve Stem		
for use with DL (Disposable Liner) 12- and 24-port models	57146-U	24 ea
for use with standard 12- and 24-port models	57147-U	24 ea
Visiprep™ SPE Manifold Replacement Solvent Guide Needles		
for use with standard, 12- and 24-port models (included with 57030-U & 57250-U)), PTFE	57047	12 ea
for use with standard, 12- and 24-port models (optional use with 57030-U & 57250-U), stainless steel	57036	12 ea
SPE Manifold Gauge/Bleed Valve		
for use with Visiprep 12-port and 24-port models	57035-U	1 ea
Disposable Liners for Visiprep DL Manifolds (included with 57044 and 57265)		
PTFE	57059	100 ea
Gum rubber laboratory tubing		
tubing I.D. 1/4 in. x O.D. 1 in.	Z255998-1PAK	10 ft
Retaining Clips For Visiprep™ SPE Manifold Collection Racks		
included with standard and DL, 12- and 24-port models	57041	12 ea
Visiprep™ DL (Disposable Liner) Replacement Liner Guide Needles (included with 57044 and 57265)		
for use with DL (Disposable Liner), 12- and 24-port models, stainless steel	57027	12 ea
Visiprep Manifold Splash Guard (not included with standard and DL models)		
for use with standard and DL, 12- port model	57045-U	1 ea

Solid Phase Extraction

SPE Vacuum Manifolds & Replacement Parts

Visiprep™ 5-port Flask Vacuum Manifold

The Visiprep 5-Port Flask Vacuum Manifold enables analysts using Supelco solid phase extraction tubes to simultaneously prepare up to 5 samples. Unlike conventional vacuum manifolds, the Visiprep 5-Port Flask Manifold allows users to collect their SPE eluate directly into 50 mL round or flat bottom flasks for direct Rotovap evaporation. The manifold consists of a chemical resistant 5-port cover (DL or standard available), gasket, base, a glass basin, vacuum gauge and bleed valve, 5 flow control valves, 5 replaceable solvent guide needles, and a base plate that supports up to five 50 mL round or flat bottom flasks.

Each port on both the standard and DL Visiprep models are equipped with flow control valves.

Recommended Flasks: Aldrich™ single-neck flask, 50 mL, joint: ST/NS 24/40

- Round Bottom (Cat. No. Z414484)
- Flat Bottom (Cat. No. Z418773)



Visiprep 5-Port Vacuum Manifold Conversion Kit - upper left (57105-U); and Visiprep standard 5-port Flask Vacuum Manifold (57103-U)

	Cat. No.	Qty
Visiprep™ 5-port Flask Vacuum Manifold		
DL (Disposable Liner)	57101-U	1 ea
standard	57103-U	1 ea

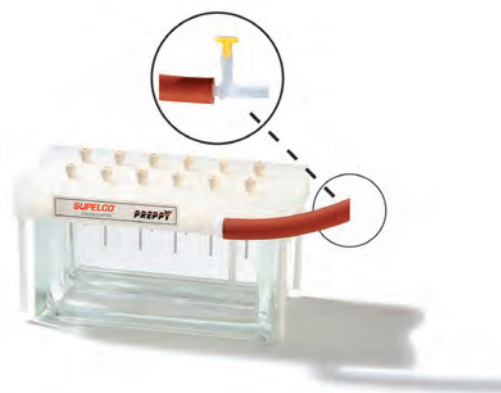
Visiprep™ 5-Port Vacuum Manifold Conversion Kit

	Cat. No.	Qty
Visiprep™ 5-Port Vacuum Manifold Conversion Kit		
for converting 24-port model into DL 5-port flask model, includes DL 5-port lid and flask base plate	57104-U	1 kit
for converting 24-port model into standard 5-port flask model, includes standard 5-port lid and flask base plate	57105-U	1 kit

Preppy™ 12-Port Vacuum Manifold

The Preppy manifold is our simplest and most economical manifold. It too enables the analyst to simultaneously prepare up to 12 samples. It consists of a chemical-resistant cover and gasket, a glass basin, a vacuum release vent, 12 individual control valves with knurled tops, and stainless steel solvent guide needles.

Two optional collection racks are available; one holds both 2 and 4 mL autosampler vials, and the other holds 15 and 20 mL vials. An optional vacuum gauge/bleed valve assembly can be installed to allow precise control of the vacuum used with the Preppy manifold.



Preppy 12-port Vacuum Manifold

57160-U	1 ea
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Preppy™ Vacuum Manifold Replacement Parts

	Cat. No.	Qty
Preppy™ Vacuum Manifold Replacement Cover		
polypropylene, includes solvent needle guides	57158-U	1 ea
Preppy™ Vacuum Manifold Collection Rack		
for use with 2 mL (12 mm OD x 32 mm H) or 4 mL (15 mm OD x 45 mm H) vials	57159-U	1 ea
for use with 15 mL (21 mm OD x 70 mm H) or 20 mL (28 mm OD x 61 mm H) vials.	57162-U	1 ea
SPE Manifold Gauge/Bleed Valve		
Remote In-Line Design	57161-U	1 ea

PlatePrep 96-well Vacuum Manifold

The PlatePrep vacuum manifold consists of a clear acrylic top allowing for easier inspection of flow rates during SPE 96-well plate processing. The polypropylene base offers excellent chemical resistance while a single remote vacuum gauge/bleed valve controls flow through all the wells.

Use this compact vacuum manifold in conjunction with a Discovery SPE 96-well plate to process up to 96 samples concurrently. The single valve control, parallel processing capabilities, and uniform flow dynamics allow for easier method development, reduce clutter, and improve reproducibility. Unused wells can be covered and used at a later date.

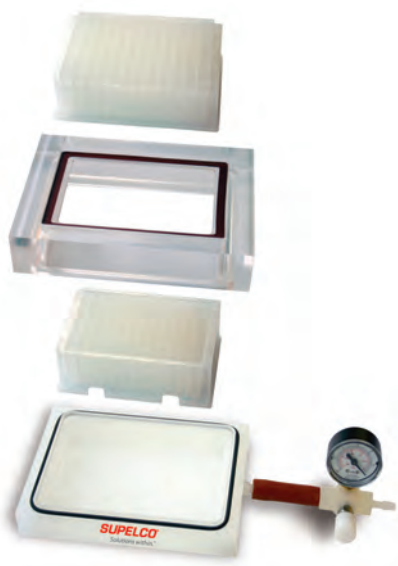
Solid Phase Extraction

SPE Vacuum Manifolds & Replacement Parts

A PlatePrep 96-Well Starter Kit (Cat. No. 575650-U) is available to analysts new to 96-well SPE technology. Included with the Starter Kit is PlatePrep Vacuum Manifold and sample units of key accessory items necessary for 96-well SPE.



PlatePrep 96-Well Vacuum Manifold Starter Kit (575650-U)



Schematic of PlatePrep Vacuum Manifold with 96-well SPE Plate & Deep 96-well Collection Plate

► Starter kit

Starter Kit includes:

- 1 PlatePrep vacuum manifold
- 1 96 square well collection plate, 2 mL, polypropylene
- 2 disposable reservoir/waste trays, PVC
- 1 96 sq. well pierceable cap mat
- 5 reagent reservoirs
- 1 cluster tube rack

575650-U 1 ea

► Manifold only

57192-U 1 ea

PlatePrep Vacuum Manifold Replacement Parts

	Cat. No.	Qty
Replacement Gaskets, Connectors and Tubing		
for use with Supelco Plateprep Vacuum Manifold	57195-U	1 ea
SPE Manifold Gauge/Bleed Valve		
Remote In-Line Design	57161-U	1 ea

96-well SPE Accessory Items

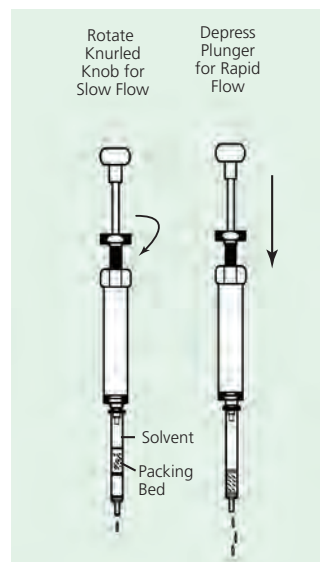
	Cat. No.	Qty
Disposable Reservoir / Waste Tray		
configured for collecting eluate waste during PlatePrep SPE processing, PVC	575654-U	25 ea
96 Square Well Pierceable Cap Mats		
configured for sealing Discovery SPE and square well collection plates	575655-U	50 ea
SPE 96-Deep Square Well Collection Plate		
well volume 0.35 mL, polypropylene	575651-U	50 ea
well volume 1 mL, polypropylene	575652-U	50 ea
well volume 2 mL, polypropylene	575653-U	50 ea
Texan™ reagent reservoir for multichannel pipettes		
without lid, non-sterile	R9259-100EA	100 ea

Visi-1 Single SPE Tube Processor

Visi-1 processor provides two rates of flow control

Our Visi-1 Single SPE Tube Processor provides precise flow control through a single 1mL, 3mL, or 6mL SPE tube. There is no faster, more convenient, or more reliable method for processing one or a few samples.

Simply fill the SPE tube with the appropriate solution, attach it to the Visi-1 processor, and rotate the knurled knob clockwise. The solution will pass through the tube in a slow, uniform rate, consistent with the most reproducible results for SPE. Use the plunger to expel the last drop of solvent from the tip of the tube. Remove the tube from the processor, introduce the next solution, and repeat the process.



7130539

57080-U 1 ea

Solid Phase Extraction

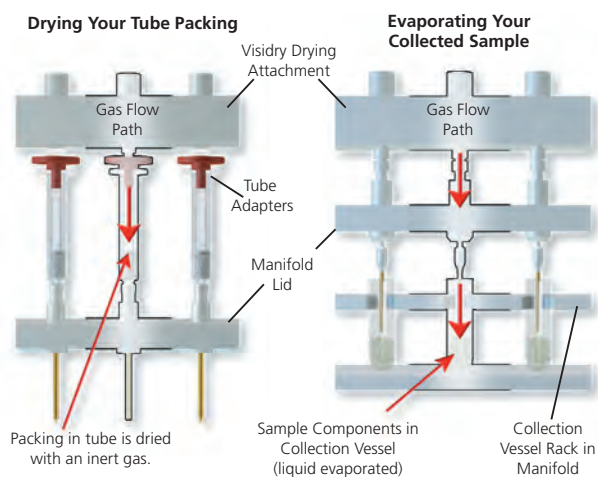
Vacuum Manifold Accessories

Vacuum Manifold Accessories

Visidry™ Drying Attachment

The Visidry Drying Attachment was designed for our Visiprep Vacuum Manifold (Cat. No. 57100-U also fits our economical Preppy manifold). The Visidry unit installs in minutes, dries up to 12 or up to 24 SPE tubes at one time, and can be used with any inert gas supply. It is also useful for evaporating and concentrating recovered samples. Gas flow to each port can be independently adjusted.

Note: The Visidry drying attachment cannot be used to dry 12mL, 20mL, or 60mL SPE tubes.



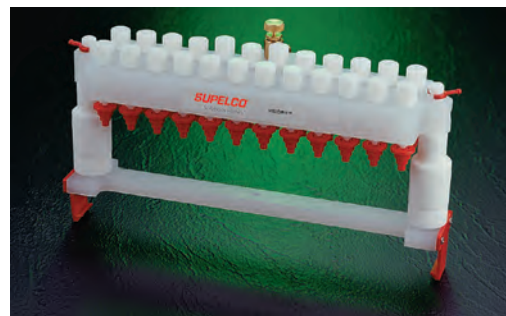
▶ for use with Visiprep 12-port model



57100-U

1 ea

▶ for use with Visiprep 24-port model



57124

1 ea

Universal Elution Rack for LpDNPH Cartridges

for use with LpDNPH Cartridges

21043-U

1 ea

Replacement Parts for Visidry™ Drying Attachment

	Cat. No.	Qty
Control Knobs For Visidry™ Drying Attachment		
-	57095	2 ea
Female Luer Cap		
polypropylene, configured for capping luer tips	57098	12 ea
Visidry™ Retaining C-clips		
-	57096	2 ea

Visidry™ Long Stem Flow Control Knob

If you have equipped your Visiprep Vacuum Manifold with long stem flow control valves (57048), these control knobs will enable you to attach the Visidry Drying Attachment without removing the long stem valves.

Note: These knobs cannot be used with a 24-port manifold being used to process 12mL, 20mL, or 60mL tubes.

57093

6 ea

Visiprep™ Large Volume Sampler

For continuous "hands off" direct transfer of multiple liquid samples

A Visiprep large volume sampler enables you to transfer low viscosity samples directly from any sample container to conventional solid phase extraction tubes on a Visiprep SPE vacuum manifold.

Two samplers are available. One sampler has three tube adapters compatible with 12mL, 20mL, or 60mL polypropylene SPE tubes. Simultaneous extraction of 12 samples on a 12-port Visiprep manifold requires four of these samplers. The other sampler has four tube adapters for 3mL or 6mL SPE tubes. To simultaneously extract 12 samples, three samplers are required.

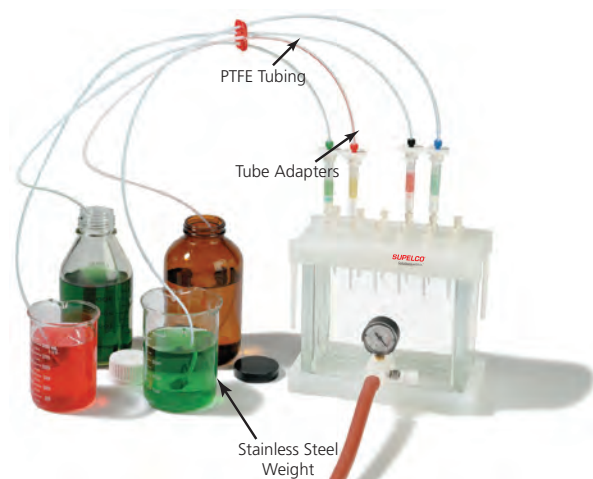
Solid Phase Extraction

Vacuum Manifold Accessories

The samplers consist of 1/8-inch PTFE tubing with a screw fitting at one end and a stainless steel weight at the other end. To use the sampler, feed the weighted end into a sample container until it touches the bottom. Insert the tube adapters into the conditioned SPE tubes on your Visiprep manifold. Turn on the vacuum to the Visiprep manifold and open the manifold flow control valves, and the samples will be delivered to the SPE tubes. The flow rate of sample through each tube can be independently controlled by using the flow control valves. Both the screw fittings and the PTFE tubing on the samplers are color-coded for easy sample identification.

Also fits Preppy SPE Vacuum Manifold.

Note: The Visiprep Large Volume Sampler can only be used with polypropylene SPE tubes. You must equip alternate manifold valves with long stem flow control knobs to accommodate 12 mL, 20 mL, or 60 mL SPE tubes.



	Cat. No.	Qty
Visiprep™ Large Volume Sampler		
for use with 3 or 6 mL SPE tubes (includes 4 adapters)	57275	1 ea
for use with 12, 20, or 60mL SPE tubes (includes 3 adapters)	57272	1 ea

Replacement Parts For Visiprep™ Large Volume Sampler

	Cat. No.	Qty
1/8" PTFE tubes, Color Coded		
for use with Supelco Visiprep Large Volume Sampler	57276	4 ea
Ferrules/Nuts for Visiprep™ Large Volume Sampler		
color-coded	57277	4 ea
Stainless Steel Weights For Visiprep™ Large Volume Sampler		
weight fitting, for tubing 1/8 in. O.D.	57278	4 ea
Visiprep™ Large Volume Sampler Tube Adapters, 1/4-28 Threads		
for use with 3 or 6 mL SPE tubes	57273-U	4 ea
for use with 12, 20, or 60mL SPE tubes	57274-U	3 ea

SPE Vacuum Pump Trap Kit

When installed between a Visiprep SPE vacuum manifold and the vacuum source, a Supelco SPE Vacuum Pump Trap collects all liquids that are aspirated through the SPE tubes, preventing contamination of the vacuum pump. The easily assembled kit contains a polypropylene filtering flask, a one-hole rubber stopper, 4 in. (10 cm) of polypropylene tubing and 5 ft. (1.5 m) of red rubber vacuum hose. The volume capacity of the Trap is approximately 1 L.



When installed between a Visiprep SPE vacuum manifold and the vacuum source, a Supelco SPE Vacuum Pump Trap collects all liquids that are aspirated through the SPE tubes, preventing contamination of the vacuum pump. The easily assembled kit contains a polypropylene filtering flask, a one-hole rubber stopper, 4 in. (10 cm) of polypropylene tubing and 5 ft. (1.5 m) of red rubber vacuum hose. The volume capacity of the Trap is approximately 1 L.

57120-U	1 ea
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SPE Manifold Gauge/Bleed Valve

▶ Remote In-Line Design



57161-U	1 ea
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Visiprep SPE Manifold Test Tubes, 10 x 75 mm

size	10 mm x 75 mm
57042	12 ea

Solid Phase Extraction

ENVI-Disk Holder & Accessories

ENVI-Disk Holder & Accessories

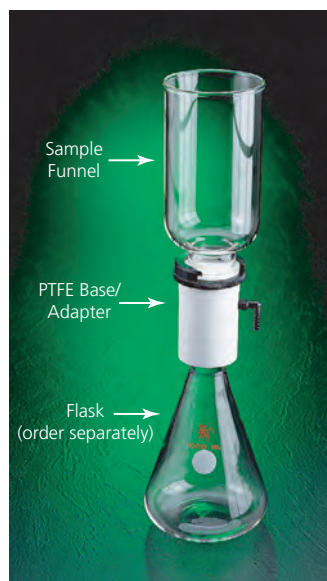
ENVI-Disk™ Holder

Use the ENVI-Disk Holder with 47 mm ENVI-DSK SPE disks.

The unique design of the holder allows each disk to be installed and held firmly in place without wrinkling and tearing. A screw clamp provides uniform pressure on the disk and the sealing surfaces to prevent troublesome leaks - spring-loaded clamps cannot offer the sealing integrity of the ENVI-Disk Holder.

The unit consists of a 1 L sample funnel, a threaded screw clamp, a PTFE disk support, and a PTFE filter base/adaptor with a vacuum attachment fitting. The filter base fits onto any 1 L flask that has a 40/35 tapered ground glass neck. Use 25 x 250 mm test tubes to collect disk eluates.

To use the holder, place the base/adaptor on the 1 L flask and center an ENVI-DSK on the disk support in the base. Loosen the screw clamp to install the funnel, then tighten to secure the unit. Attach the base/adaptor to a vacuum source, and the unit is ready to use.



► for use with 47 mm ENVI-Disk disks

57173

1 ea

Required ENVI-Disk™ Holder Accessories

Collection flask and collection tube not included with ENVI-Disk Holder. They must be ordered separately.

	Cat. No.	Qty
Vacuum filtration assembly flasks		
Collection flask, 1000 mL	Z290610-1EA	1 ea
Collection Tube		
I.D. 25 mm x L 250 mm, borosilicate glass	57175	1 ea

ENVI-Disk™ Holder Manifold

The ENVI-Disk Holder Manifold holds one to six ENVI-Disk Holders with flasks, allowing you to simultaneously extract up to six 1-liter samples. Each of the six stations is controlled through an independent flow control valve. These valves are designed to vent the flask to the atmosphere when moved from the open to the closed position. The flow rate is controlled by the needle valve on the manifold.

The unit includes a sturdy polymer base with six stations, six flow control valves, a needle valve, a vacuum gauge, and vacuum tubing. A 1-liter glass bottle in the manifold acts as a trap, to protect the vacuum source in the event of an overflow from one of the sample flasks.



► Process up to 6x 1L samples simultaneously

57174

1 ea

ENVI-Disk™ 47 mm Filter Clamp and Stage

When used with a standard 47mm glass filtration apparatus, the ENVI-Disk Clamp creates a better seal, eliminating leaks with SPE extraction disks or when filtering HPLC mobile phase solvents.

Use only with a filtration glassware funnel base that has a removable filtration stage, such as Supelco Mobile Phase Filtration Apparatus 1 (Cat. No. 58061) or 2 (Cat. No. 58062-U), or with a funnel base (Cat. No. 58064 or 58068). It cannot be used with a permanent fritted glass filtration stage or stainless steel holder screen.

Features and Benefits

- Eliminates leaks
- Attaches to any 34/45 tapered flasks



Solid Phase Extraction

ENVI-Disk Holder & Accessories



57260-U 1 ea

Replacement PTFE Stage for 47 mm ENVI-Disk™ Clamp

PTFE stage

57261 1 ea

Vacuum Manifold Pumps

KNF Laboport® solid PTFE vacuum pump

Quiet, high performance diaphragm vacuum pumps can be used alone or as the center of a modular laboratory vacuum system. Replaces noisy rotary-vane pumps for vacuum distillation, drying, filtration, rotary evaporation, degassing of liquids, and applications where water aspirators are used.

- Solid PTFE heads
- Molded PTFE diaphragm
- Kalrez® parts eliminate chemical attack to the pump
- Oil-free operation ensures pumped medium will stay pure
- New multi-port valve system with Kalrez disks improves flow and reliability
- Two stages
- 10 mm I.D. hose barbs on ports

CE compliant



Pumping Speed (L/min)	AC	Cat. No.	Qty
vacuum ≤6 torr			
10	115 V	Z262250-1EA	1 ea
10	230 V	Z262285EU-1EA Z262285-1EA	1 ea 1 ea
20	115 V	Z262269-1EA	1 ea
20	230 V	Z262293EU-1EA Z262293-1EA	1 ea 1 ea
34	115 V	Z262277-1EA	1 ea
34	230 V	Z262307-1EA	1 ea
vacuum ≤1.5 torr			
34	115 V	Z288209-1EA	1 ea
34	230 V	Z288217-1EA	1 ea

KNF Laboport® mini-pump

The ideal pump for vacuum and pressure filtration, solid phase extraction, and blotting. High performance diaphragm vacuum/pressure pumps for moderately corrosive applications and any filtration or procedure that requires clean evacuation, transfer and compression of air, gases, and vapors. Pumps are available with gauges and regulators for precise control of vacuum and pressure.

- Portable
- Oil-free
- Quiet operation
- Maintenance-free, Ryton® pump head
- Molded PTFE diaphragm
- Kalrez® multi-port valves
- Single stage

CE compliant
 vacuum ~120 torr
 pumping speed 5.5 L/min
 max. pressure 35 psig
 weight 4.2 lb



	Cat. No.	Qty
KNF Laboport® mini-pump		
Pump only, 230 V	Z288292-1EA Z288292EU-1EA Z288292GB-1EA	1 ea 1 ea 1 ea
Pump with vacuum gauge and regulator, 230 V	Z288268-1EA	1 ea
Pump with pressure gauge and regulator, 230 V	Z288314EU-1EA Z288314-1EA	1 ea 1 ea

Dioxin Sample Prep System

Dioxin Sample Prep System

The Dioxin Sample Prep System provides an efficient means for extracting and isolating dioxins, furans, and co-planar PCBs from stack gases, water (waste, industrial, and surface), soil, blood, food, and milk. Designed to meet the Japanese Industrial Standards (JIS) Methods K-0311 and K-0312, the prep system consists of three key components: a multi-layer silica gel dioxin column, a dual layer carbon reversible SPE tube connected in series with the multi-layer silica gel column, and integrated glassware/hardware to support a variety of application modes.

The modular glassware and hardware design permits you to select a few pieces or the entire prep system for your specific extraction needs. A vacuum manifold and adapter provide the option of running single or multiple samples at one time, using vacuum or gravity feed.

Features and Benefits:

- Remove GC interferences
- Concentrate and classify coplanar PCBs, dioxins, and furans
- Obtain extraction recoveries greater than 85%
- Decrease prep time by 1-2 days
- Minimize solvent usage



Multi-layer Silica Gel Dioxin Column

The multi-layer silica gel column is key to the Dioxin Prep sample prep process. Seven layers of treated silica gel remove compounds from the extract which would interfere with the gas chromatographic analysis of the dioxin sample. Sulfuric acid-treated layers prevent chars from plugging the column while removing unsaturated hydrocarbons, phthalates, organochlorides, pigment, and polynuclear aromatic hydrocarbons (PAHs) from the sample. A potassium hydroxide treated layer removes lipids, proteins, phenols, and acidic compounds, while a silver nitrate treated layer removes sulfur compounds, elemental sulfur, pesticides, and aliphatic hydrocarbons. Dioxins, furans, and PCBs pass through the column unretained.

The column design includes an elongated tapered end that slips inside the dual-layer carbon reversible tube, preventing leakage of solvent and sample as well as contamination by the PTFE fittings.

Dual-layer Carbon Reversible Tube

The dual-layer carbon reversible tube isolates and concentrates the coplanar PCBs, dioxins, and furans with a minimum of hexane and toluene solvents. Performance is based on the unique selectivities of two different carbon adsorbents, Carboxen® 1016 with a low surface area (75 m²/g) and Carboxen 1000 which has a high surface area (1200 m²/g).

The dual-layer carbon reversible tube may be used alone or directly connected in series to the multi-layer silica gel column. Dioxins, furans, and coplanar PCBs are trapped on the Carboxen® 1016 bed. Some PCBs elute through to the second bed, Carboxen® 1000, depending upon solvent elution conditions. Aliphatic hydrocarbons and non-coplanar PCBs pass completely through the carbon tube and can be collected for analysis. The carbon tube is then removed and flushed in reverse direction with toluene to collect the dioxins, furans, and coplanar PCBs.



Dual-Layer Carbon Reversible Tube

Dioxin Prep System – Florisil® Version

In 1998, the World Health Organization has identified 12 polychlorinated biphenyls (PCBs) exhibiting dioxin-like activities. These WHO-12 PCBs are now included as part of the overall dioxin concentration and should be systematically investigated in industrial emissions.

Although the original Dioxin Sample Prep System (Multi-layer Silica Gel Dioxin Column plus Dual-layer Carbon Reversible Tube) is ideal for the rapid clean-up and isolation of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/Fs), the extraction of PCBs can prove more difficult. Because the Carboxen® layers packed within the Dual-layer Carbon Reversible tubes offer varying affinities to the different classes of PCBs, isolation of PCBs requires multiple fractionation steps during elution and often co-elute with PCDD/Fs.

In a collaborative effort with Corus Research, Development and Technology, Rotherham, UK, and Hall Analytical Laboratories, Manchester, UK, a "Dioxin Prep System – Florisil® Version" was developed to address this issue. This new system is based on the original Dioxin Prep System; however, the Dual-Layer Carbon Reversible Tube is replaced with a micro-column (reversible tube) packed with Pre-Activated Florisil®. As sample extracts pass through the multi-layer silica gel column into the Florisil® micro-column, PCBs are only weakly retained on the Florisil® bed and can be further eluted with n-hexane and/or n-hexane/dichloromethane. Subsequent elution of the Florisil® micro-column with dichloromethane is used to collect PCDD/F fractions. As a result, the new "Dioxin Prep System – Florisil® Version" can rapidly fractionate PCBs from PCDD/Fs prior to analysis for simpler quantitative determination.

Dioxin Sample Prep System

For your convenience, the Pre-Activated Florisil® is thermally activated and ampouled prior to shipment to maintain Florisil® activity during storage. To use with the Dioxin Prep System, the Florisil® ampoule is snapped open and emptied into an Empty Micro-Column (reversible tube), 6.35/10 mm O.D.



Pre-Activated Florisil (48924-U)

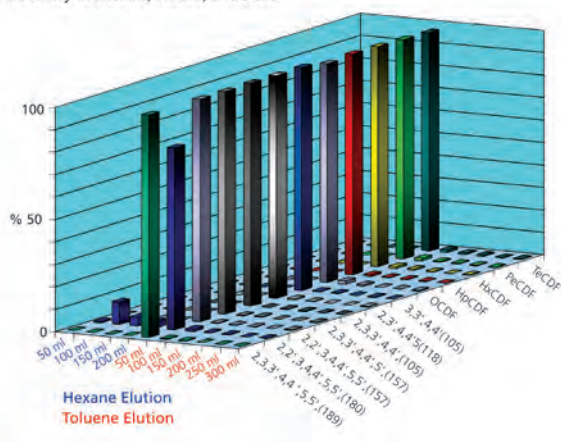


Empty Glass Micro-Column (reversible tube) (28309-U)

Extraction Recoveries

The multi-layer silica gel column in series with the dual-layer carbon reversible tube provides extraction recoveries of 85% or better with less than 200 mL of toluene as illustrated below. For more information or extraction recoveries on additional dioxins, furans, and PCBs, please e-mail the Technical Service department at techservice@sil.com.

Recovery of Dioxins, Furans, and PCBs



Acknowledgements: We wish to thank Koji Takayana *et al.* from Kawaju Techno Service Corporation and Masaaki Maeoka *et al.* from the Japan Quality Assurance Organization (JQA) for their involvement in the development and evaluation of the Dioxin Prep System.

System Components

Dioxin Sample Preparation Kit

Kit includes all glassware and connectors.

Note: Requires, but does not include, Multi-Layer Silica Gel Dioxin Column (28397-U) and Dual-Layer Carbon Reversible Tubes (28399-U) for "Standard Version", and Pre-Activated Florisil (48924-U) and Empty Micro-Column (Reversible Tube) (28309-U) for "Florisil Version".

28423-U 1 ea

Required Consumables for Standard Version

glass hardware

Description	Cat. No.	Qty
Multi-Layer Silica Gel Dioxin Column, for use with Dioxin Sample Preparation Kit, O. D. 6.35 mm x L 35 cm	28397-U	5 ea
Dual-Layer Carbon Reversible Tube (Micro-Column), for use with Dioxin Sample Preparation Kit, O.D. 6.35-10 mm	28399-U	10 ea

Required Consumables for Florisil® Version

Description	Cat. No.	Qty
Pre-Activated Florisil®, ampulized, 1 g, for use with Dioxin Sample Preparation Kit, particle size 60-100 mesh	48924-U	10 ea
Empty Glass Micro-Column (Reversible Tube), for use with Dioxin Sample Preparation Kit, O.D. 6.35-10 mm	28309-U	10 ea
Multi-Layer Silica Gel Dioxin Column, for use with Dioxin Sample Preparation Kit, O. D. 6.35 mm x L 35 cm	28397-U	5 ea

Replacement Kit Parts

Instructions included with the Dioxin Sample Prep System include detail and descriptions of the following replacement parts. Please refer to the instructions with your kit for details and descriptions of the following replacement parts

Glassware

Description	Cat. No.	Qty
Dioxin Vacuum Manifold	28403-U	1 ea
Vacuum Adapter, I.D. 10 mm	28408-U	1 ea
Top Flask with Stopcock, volume 250 mL, neck 24 mm	28449-U	1 ea
Empty Dioxin Column, O.D. 6.35 mm x L 35 cm	28404-U	5 ea
Syringe Luer Adapter, I.D. 10 mm	28405-U	3 ea
Collection Flask/Beaker, flat bottom, volume 300 mL	21266-U	3 ea
Collection Flask, round bottom, volume 250 mL	21269-U	3 ea
Long Stem Stopcock, I.D. 10 mm	28425-U	3 ea

Dioxin Sample Prep System

Replacement Kit Parts

Connectors

Description	Cat. No.	Qty
6.35 mm/6.35 mm Union, PTFE	28411-U	3 ea
6.35 mm/10 mm Reducing Union, PTFE	28398-U	3 ea
10 mm/10 mm Union, PTFE	28412-U	3 ea
24 mm/24 mm Polypropylene Viton® Connector	28432-U	6 ea

Optional components (not included with kit)

Description	Cat. No.	Qty
Clear Seal Top Flask Adapter, neck 24 mm	21002-U	3 ea
Short Stem Stop Cock, I.D. 10 mm	28402-U	3 ea
Empty Dioxin Column, I.D. 6.35-10 mm × L 20 cm, to be used with 6.35/10mm Reducing Union (Cat. No. 28398-U)	28409-U	5 ea

Bulk Treated Silica Gels/Sodium Sulfate

The same treated silica gels found in the pre packed multi-layer silica gel columns are available in bulk packages. These materials are useful for customizing your own columns to more efficiently clean very dirty samples, or to prepare shorter columns when samples are relatively clean, i.e. drinking water.

Description	Cat. No.	Qty
Sodium sulfate, ACS reagent, ≥99.0%, anhydrous, granular	239313-500G	500 g
	239313-6X500G	6 × 500 g
	6X500G	1 kg
	239313-1KG	2.5 kg
	239313-2.5KG	4 × 2.5 kg
	2.5KG	5 kg
	239313-12KG	12 kg
	4X2.5KG	50 kg
239313-5KG		
239313-12KG		
239313-50KG		
10% AgNO ₃ Coated Silica Gel	21319-U	100 g
22% H ₂ SO ₄ Coated Silica Gel	21341-U	100 g
44% H ₂ SO ₄ Coated Silica Gel	21334-U	100 g
2% KOH Coated Silica Gel	21318-U	100 g
Washed Silica Gel	21342-U	250 g

Purge and Trap

Purge and Trap

Tubes used in purge and trap analyses generally are packed with multiple beds of adsorbent materials (see figure), so that a broad range of polar and nonpolar, high and low molecular weight compounds can be trapped in a single tube. Each bed protects the next, increasingly active bed, by preventing compounds from being held so strongly that they cannot be desorbed quickly without decomposition. During the purge phase of sampling, lower molecular weight compounds pass through the initial adsorbent beds, but are trapped by succeeding beds. During desorption, the carrier gas passes through the trap in the reverse direction of purge flow, so that higher molecular weight compounds never come in contact with the stronger (innermost) adsorbents.

In selecting adsorbents, the primary concern is the ability of the materials to efficiently trap and release the compounds to be monitored. An adsorbent material that traps and then releases a group of compounds efficiently will help provide high recoveries, sharp peaks, and good resolution, allowing accurate quantification of those analytes. Absence of interference by contaminants or water vapor also is essential for accurate quantification.

VOCARB 3000 purge traps efficiently trap analytes in US EPA Methods 502.2 and 524. Use higher desorption temperatures (250°C) than other traps listed for these methods (180°C), for more rapid transfer of analytes and improved chromatography.

VOCARB 4000 purge traps offer the same general advantages as VOCARB 3000 traps, but can be used with samples containing larger molecular size compounds.

BTEXTRAP purge traps are for analyses of benzene, toluene, ethylbenzene, and xylene. The trap can be baked at high temperatures, making for easier cleanup. Adsorbents in the trap are very stable and do not bleed potentially interfering compounds.

Modified BTEXTRAP purge traps are for analyses of benzene, toluene, ethylbenzene, xylene, and MTBE. Use an M trap for analytes as small as pentane.

VOCARB and BTEXTRAP purge traps contain hydrophobic adsorbents, which significantly reduce the dry purge time needed to remove moisture.

Purge/Trap Apparatus: Manufacturer and Model All traps are constructed of $\frac{1}{8}$ in. O.D. stainless steel and each is produced to the instrument manufacturer's specifications. Each trap is stamped with a letter designation for easy identification of contents.

Purge Traps

Amount of Adsorbents in Trap



Purge and Trap

Purge Traps

Vocarb® 4000 Purge Trap I, CDS

Purge/Trap I Vocarb® 4000

▶ for use with CDS Peakmaster

stainless steel purge trap

composition

Carbopack B 10 cm

Carbopack C 8.5 cm

Carboxen 1000 6 cm

Carboxen 1001 1 cm

VOCARB 4000 Purge Trap I

purge trap L 11¼ in. (28.6 cm)

21156

1 ea

Purge/Trap Apparatus: Manufacturer and Model

Trap	Tekmar		OI Analytical		Dynatech	CDS
	Velocity XPT LSC-1, LSC-2, LSC-2000, 4000 ¹	3000, 3100 ²	4460 ³	Eclipse 4660, 4560 ⁴	"Dyna" Models ⁵	Peak Master
A	21059-U	24910-U	21135	24930-U	21075-U	21148
B	21060-U	—	—	24931	21076	—
C	21061-U	24912-U	21137	24932	21077	—
D	21062-U	24913-U	21138	24933	—	—
E	20294	24914	21139	24934	21079-U	—
F	20293	24915	21140	—	21080-U	—
G	20295	24916	21141	24936	21081	—
H	20321	24917	21142-U	24937	21082	—
I- VOCARB 4000	20308	24918	21143	24938	21083	21156
J- BTEXTRAP	21064	24919	21145	24939	21084	21158
K- VOCARB 3000	21066-U	24920-U	21131-U	24940-U	21085-U	21159
L- Modified BTEX	20076-U	20078-U	—	—	—	—
M- Modified BTEX	20077-U	20079-U	—	—	—	—

¹Straight, 12 in./30.5 cm, Swagelok fitting

²Straight, 12 in./30.5 cm, Valco fitting

³U-shaped, 11.5 in./29.2 cm, attached thermocouple

⁴Coiled, attached thermocouple

⁵Straight, 12 in./30.5 cm, attached thermocouple



Related Information

Ask for our free "Purge and Trap System Guide" (Bulletin 916), with troubleshooting guide.

EPA Method	Specified Trap	Supelco-Recommended Trap
502.1	E	I, K (VOCARB 3000)
502.2	E	K
503.1	G	K
524.1	E	K
601	E	K
602	G	J (BTEXTRAP)
603	G	G
624	F	K
1624	F	K
8010	E	K
8015	—	K, J
8020	G	K
8021	G	K
8030	G	G, I (VOCARB 4000)
8031	G	K
8240	E	K
8260	E	K
CLP ⁶	B	B

⁶Contract Laboratory Program

Glassware and Accessories

Fritted Purge Samplers for LSC-2 & LSC-3 Concentrators

For standard aqueous analysis.
for use with Tekmar LSC-2 and LSC-3



Description	Cat. No.	Qty
5 mL, product of Tekmar, 14-0042-024	22425	1 ea
25 mL, product of Tekmar, 14-0043-024	22426	1 ea

Purge and Trap

Glassware and Accessories

Fritted Purge Sampler with Injection Port

Optional injection port is built into the glassware, allowing standard injections in either liquid or gas form.

Fritted Sparge Sampler

▶ with injection port, 5 mL

for use with 2000/3000 & Velocity XPT

22783

1 ea

Fritted Purge Samplers for 2000/3000 & Velocity XPT Concentrators

for use with standard aqueous analysis



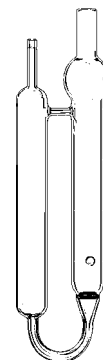
Description	Cat. No.	Qty
5 mL, product of Tekmar, 14-2337-024	22781	1 ea
25 mL, product of Tekmar, 14-2334-024	22789	1 ea

Fritless Purge Sampler Glassware

for use with Tekmar 2000/3000

Description	Cat. No.	Qty
5 mL, product of Tekmar, 14-2336-024	22780	1 ea
25 mL, product of Tekmar, 14-2333-024	22788-U	1 ea
5 mL, with Injection Port	22782	1 ea
25 mL, with Injection Port	22790-U	1 ea

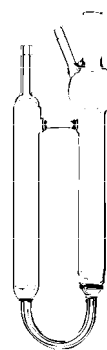
Fritted Purge Samplers for AQUATEk™ 50 & 2050 Autosamplers



Description	Cat. No.	Qty
5 mL, right stem, product of Tekmar, 14-3544-124	22742-U	1 ea
25 mL, sparge, left stem, product of Tekmar, 14-6546-024	22745	1 ea
25 mL, right stem, product of Tekmar, 14-3546-124	22744	1 ea

Fritted Purge Samplers for EPA Method 603

Instrument: Aquatek 50 & 2050 Autosamplers suitable for 603 per US EPA

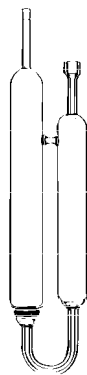


Description	Cat. No.	Qty
5 mL, top stem, product of Tekmar, 14-4006-024	22748	1 ea
25 mL, top stem, product of Tekmar, 14-4007-024	22749	1 ea

Purge and Trap

Glassware and Accessories

Fritted Purge Samplers for ALS Autosampler

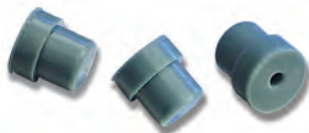


Description	Cat. No.	Qty
25 mL, product of Tekmar, 14-0957-024	22430	1 ea

Septum for Purge Samplers with Injection Port

Thermogreen® LB-1 Septa, cylindrical

For use in Shimadzu GCs that require plug septa, glass gas sampling bulbs, and purge & trap glassware.



▶ septum type cylindrical with half-hole

diam. × L	~6 mm × 9 mm
20668	100 ea

Needle Sparge Glassware, One-Piece Design

for use with Tekmar LSC-2, LSC-3, 4000, and ALS Concentrators

one-piece design Yes

Description	Cat. No.	Qty
5 mL × 6 in., product of Tekmar, 14-2052-024	22724	1 ea
25 mL × 8.25 in., product of Tekmar, 14-2053-024	22725-U	1 ea
5 mL × 5.5 in., short style	22682	1 ea

Glassware for ALS 2016/2032 & Velocity XPT Samplers

Description	Cat. No.	Qty
Needle Purge Tube, 223 mm × 6 mm, product of Tekmar, 14-3913-024	21996	1 ea
Soil Sampler, 150 mm × 19 mm, product of Tekmar, 12-0507-024	22718-U	1 ea

Concentrator Sample Valve

Order female & male luer connectors separately

Description	Cat. No.	Qty
Sample Valve for Tekmar® concentrator, Hamilton Purge and Trap (HVP) plug valve, Distribution flow path, 2 ports, product of Tekmar, 14-0036-050	20971	1 ea
Female Luer Connector, Tekmar® equivalent 14-0216-016, Female Luer connector, product of Hamilton Tekmar®, 14-0216-016, Kel-F™ (CTFE) fitting, thread, 1/4-28, port diam. 0.059 in.	20942-U	1 ea
Male Luer Connector, Tekmar® equivalent 14-0122-016, Male Luer connector, product of Hamilton Tekmar®, 14-0122-016, Kel-F™ (CTFE) fitting, port diam. 0.059 in., thread, 1/4-28	20941	1 ea

Purge and Trap Syringes

The Hamilton 1005SLPT is the purge and trap version of the SampleLock syringe designed for analyzing drinking water samples according to US EPA purge and trap concentration techniques (EPA methods 502.1, 502.2, 503.1, 524.1, and 524.2).

The Hamilton 1005 TLL and 1025 TLL do not have a valve attachment. Only the Hamilton 1701N comes with a needle - 26s gauge, bevel tip - to be used for standard calibration.



Left to right: Sample Valve (20971), 1005SLPT, 1005TLL, 1701N

Volume	Description	Needle	Needle	Hamilton No.	Cat. No.	Qty
5.0 mL	1005TLL	(not included)	L (n/a)	81520	20999	1 ea
25.0 mL	1025TLL	(not included)	L (n/a)	82520	20683	1 ea
-	1005SLPT	(not included)	volume 5.0 mL	81570	26294	1 ea
10 µL	1701N	26s ga (bevel tip)	L 51 mm (2 in.)	80000	20972	1 ea

Extraction Glassware

Liquid/Liquid Extraction

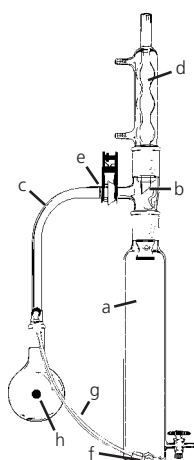
Extraction Glassware

Liquid/Liquid Extraction

US EPA methods specify solvent extraction procedures for semivolatile, pesticide, PCB, and dioxin contaminants in water and hazardous waste samples. Although analysts encounter a wide range of sample matrices and compounds of interest, the various solvent extraction and concentration techniques depend on the same basic principles.

Choice of glassware depends on many factors: sample matrix, analyte characteristics, economy, ease of assembly and cleaning, and compatibility with other glassware. Our selection of glassware includes products for a number of extraction techniques as well as accessories for sample cleanup and solvent recovery. We offer a range of sizes, modular designs for ease of cleaning, and a choice of connector types.

Modular LLE Replacement Components



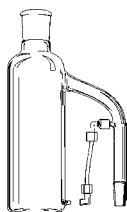
(a) Extraction chamber; (b) Fritted drip spout union; (c) Side arm elbow; (d) Condenser
(e) Ball and socket clamp, number 35; (f) Elbow union, PTFE; (g) Tubing, PTFE;
(h) Round bottom flask (all components glass, unless noted)

Kit contains items a-h.

Description	Cat. No.	Qty
Drip Spout Union, fritted	64771	1 ea
Extraction Chamber	64770-U	1 ea
Side Arm Elbow	64772-U	1 ea
Condenser, 250 mL	64739	1 ea
Round Bottom Flask, 500 mL	64678-U	1 ea
Stopcock Plug, PTFE	64779-U	1 ea
Elbow Union 1/4 in. x 1/4 in.	64775-U	1 ea
PTFE Tubing 1/4 in. x 13 in.	64776	2 ea
PTFE Sleeve, for use with 24/40 ♂	64761	5 ea
Plastic Clip, for use with 24/40 ♂	64764	5 ea

Liquid/Liquid Extractor

Order support base, flask, and condenser separately.

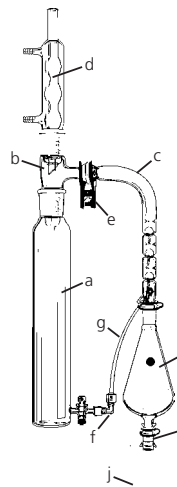


Description	Cat. No.	Qty
Condenser, 250 mL	64739	1 ea
Plastic Clip, for use with 24/40 ♂	64764	5 ea
Round Bottom Flask, 500 mL	64678-U	1 ea
PTFE Sleeve, for use with 24/40 ♂	64761	5 ea
PTFE Sleeve, for use with 45/50 ST	64789	2 ea

Extractor-concentrator Kit

Combine extraction and concentration functions in one device - This apparatus provides efficient, continuous extraction of organic compounds from a 1-liter water sample into a heavier-than-water solvent such as methylene chloride. The extracted sample then can be concentrated for analysis.

- Eliminates the need to transfer extracted sample for concentration
- Saves set-up and clean-up time
- Allows recovery of extraction solvent for proper disposal
- Specially designed heating block included (requires heat source)



(a) Extraction chamber; (b) Drip spout union; (c) Side arm elbow; (d) Condenser;
(e) Ball and socket clamp, number 35; (f) Elbow union, PTFE; (g) Tubing, PTFE; (h) K-D flask;
(i) Receiving flask; (j) Heating block (all components glass, unless noted)

Kit contains items a-j.

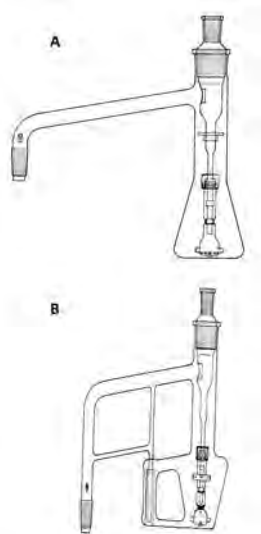
Description	Cat. No.	Qty
Condenser, 250 mL	64739	1 ea
Drip Spout Union	64809-U	1 ea
Extraction Chamber	64808	1 ea
Flask for Kuderna-Danish, 500 mL, ground joint	64710-U	1 ea
Liquid/Liquid Extractor-Concentrator Kit	64807-U	1 ea
Plastic Clip, for use with ST 19/22 ground joint	64763	5 ea
Plastic Clip, for use with 24/40 ♂	64764	5 ea
Receiving Vessel, 10 mL, ground joint	64695	1 ea
Side Arm Elbow	64810-U	1 ea
Elbow Union 1/4 in. x 1/4 in.	64775-U	1 ea
PTFE Tubing 1/4 in. x 13 in.	64776	2 ea
Liquid/Liquid Heater Block	64811-U	1 ea

Extraction Glassware

Liquid/Liquid Extraction

Normag™ liquid-liquid extractor

A rotating distributor in the extractor vessel is driven by a magnetic stirring plate. The extractor solvent fed from the condenser to the distributor is centrifugally forced through the small holes in the distributor ring as fine droplets into the liquid to be extracted, producing optimum exchange of matter. The liquid to be extracted also rotates in the extractor. The process is continuous and extraction is performed much more quickly than in traditional equipment. The rotary distributor on the inlet tube has a magnetic agitating rod, pivot nipple, bearings, antislip lock and separating ring with retaining ring.



A. Solvents lighter than water
B. Solvents heavier than water

	Cat. No.	Qty
Normag™ liquid-liquid extractor		
capacity 500 mL, For solvents lighter than water	Z124230-1EA	1 ea
capacity 1,000 mL, For solvents heavier than water	Z124249-1EA	1 ea

MIXXOR Liquid-Liquid Extraction Systems

MIXXOR liquid-liquid extraction system

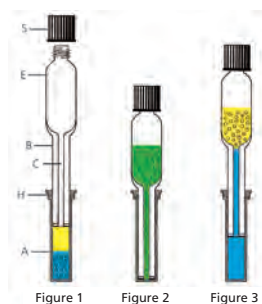
For the quantitative extraction of organics from aqueous solutions and separations in immunoassays. The MIXXOR system has been applied successfully in many laboratory solvent extraction operations and is ideal for the rapid screening of alternative solvents for specific extraction problems. System includes plastic support stand. See the website at sigma-aldrich.com/labware for a listing of replacement parts.

Sample Prep Benefits

- For sample volumes from 2 to 50 mL
- Minimal amount of solvent required
- Rapid, simple-to-use
- Safe, closed system prevents spills
- Precise, allows for easy separation of phases
- Flexible, comes in five sizes and will fit in interlocking stands

The MIXXOR Concept (seven easy steps)

1. Introduce sample and extraction solvent into reservoir A (Fig. 1)
2. Insert mixer-separator piston B into reservoir A, tighten cap S.
3. Pump four or more times to mix (Fig. 2)
4. Pull mixer-separator up slightly above liquid level and secure with holder spacer H. Loosen cap.
5. After separation, slide down the mixer-separator to transfer the upper phase into collection chamber E.
6. Adjust lower phase to top of axial channel C. (Fig. 1 and 3) Use fine adjustment on holder-spacer to secure setting.
7. Top phase can now be decanted safely, while lower phase stays in the axial chamber.



	Cat. No.	Qty
MIXXOR liquid-liquid extraction system		
capacity 2 mL	Z408956-1EA	1 ea
capacity 5 mL	Z408964-1EA	1 ea
capacity 20 mL	Z408980-1EA	1 ea
capacity 50 mL	Z408999-1EA	1 ea

MIXXOR system replacement parts

Description	Cat. No.	Qty
capacity 5 mL	Z420689-1EA	1 ea
capacity 20 mL	Z420972-1EA	1 ea

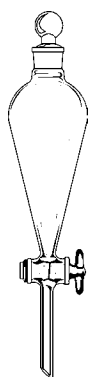
Extraction Glassware

Separatory Funnel, Soxhlet Extraction

Separatory Funnel, Soxhlet Extraction

Separatory Funnel

Squibb-type, with glass or PTFE stopcock plug.



Description	Cat. No.	Qty
glass stopcock plug, 250 mL	64803-U	1 ea
glass stopcock plug, 2000 mL	64804-U	1 ea
PTFE stopcock, 250 mL	64805-U	1 ea
PTFE stopcock, 2000 mL	64806	1 ea

Thimble

High-purity cellulose, approximately 1.5mm wall thickness, or high-quality borosilicate glass, 40-60µm porous disk.



Description	Cat. No.	Qty
cellulose, 25 mm × 80 mm	64840-U	25 ea
cellulose, 33 mm × 94 mm	64841-U	25 ea
cellulose, 43 mm × 123 mm	64842	25 ea
glass, 25 mm × 85 mm	64836-U	1 ea
glass, 35 mm × 90 mm	64837	1 ea
glass, 45 mm × 130 mm	64838	1 ea

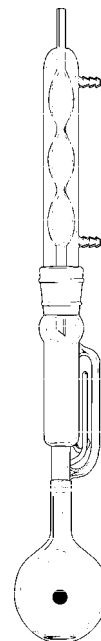
Soxhlet Extraction Apparatus

For continuous solvent extraction of semivolatiles from solid matrices.

Use this inert all-glass system for extracting semivolatiles from a solid or semi-solid sample matrix - soil, for example - into an organic extraction solvent, such as hexane, acetone, or methylene chloride. The Soxhlet apparatus is simple to set up and use, and it features ground glass joints for easy dismantling and cleaning.

Soxhlet Apparatus Kits

Order glass or cellulose thimbles separately.



Size	Cat. No.	Qty
Soxhlet Extraction Apparatus		
small	64824	1 ea
<i>extractor volume 50 mL extractor I.D. 30 mm flask volume 125 mL</i>		
medium	64825	1 ea
<i>extractor I.D. 38 mm extractor volume 85 mL flask volume 250 mL</i>		
large	64826	1 ea
<i>extractor I.D. 50 mm extractor volume 200 mL flask volume 300 mL</i>		

Soxhlet Apparatus Replacement Components

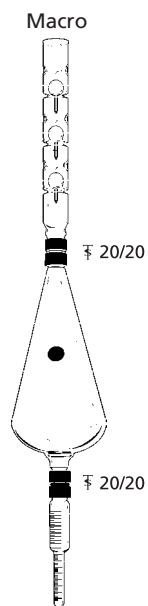
	Cat. No.	Qty
Condenser		
size small	64815-U	1 ea
size medium	64816-U	1 ea
size large	64817-U	1 ea
Extractor		
size small	64818	1 ea
size medium	64819-U	1 ea
size large	64820-U	1 ea
Flat Bottom Flask		
125 mL	64821-U	1 ea
250 mL	64822-U	1 ea
300 mL	64823	1 ea

Extraction Glassware

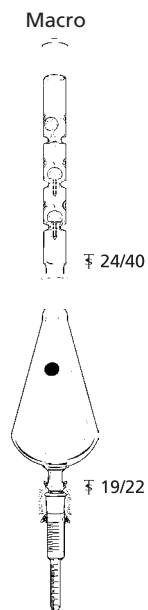
Sample Concentration Apparatus

Sample Concentration Apparatus

Macro Kuderna-Danish Sample Concentrators



64704-U



64685-U

	Cat. No.	Qty
Flask for Kuderna-Danish		
250 mL, threaded joint	64708-U	1 ea
250 mL, ground joint	64729	1 ea
500 mL, ground joint	64710-U	1 ea
500 mL, threaded joint	64706-U	1 ea
Glass Stopper		
Joint: ∇ 19/22	64644	1 ea
Kuderna-Danish Sample Concentrator		
Macro design, ground joint	64685-U	1 ea
Macro design, threaded joint	64704-U	1 ea
Receiving Vessel		
4 mL, ground joint	64687-U	1 ea
10 mL, ground joint	64695	1 ea
4 mL, threaded joint	64702	1 ea
10 mL, threaded joint	64703	1 ea
25 mL, threaded joint	64726	1 ea
25 mL, ground joint	64731-U	1 ea
15 mL, ground joint	64684-U	1 ea
15 mL, threaded joint	64707	1 ea
Snyder Column		
2-ball design, ground joint	64727-U	1 ea
3-ball design, ground joint	64693-U	1 ea
3-ball design, threaded joint	64705-U	1 ea

Widely used in semivolatile and pesticide analysis

For US EPA protocol

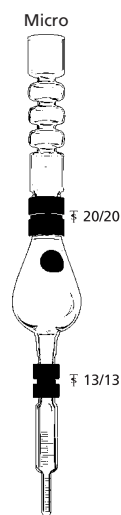
Developed for concentrating compounds dissolved in volatile solvents

Made in our own glass shop

Macro ground kit (64685-U) includes: 64693-U, 64710-U, and 64684-U.

Macro threaded kit (64704-U) includes: 64705-U, 64706-U, 64707-U, and 64700-U.

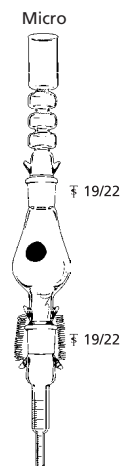
Micro Kuderna-Danish Sample Concentrators



64688-U

Extraction Glassware

Sample Concentration Apparatus



64718

	Cat. No.	Qty
Flask for Kuderna-Danish		
250 mL, threaded joint	64708-U	1 ea
250 mL, ground joint	64719-U	1 ea
40 mL, ground joint	64722	1 ea
40 mL, threaded joint	64698	1 ea
Kuderna-Danish Sample Concentrator		
Micro design, threaded joint	64688-U	1 ea
Micro design, ground joint	64718	1 ea
Receiving Vessel		
4 mL, ground joint	64687-U	1 ea
10 mL, ground joint	64695	1 ea
4 mL, threaded joint	64702	1 ea
10 mL, threaded joint	64703	1 ea
2 mL, ground joint	64723	1 ea
2 mL, threaded joint	64689-U	1 ea
Snyder Column		
2-ball design, ground joint	64694	1 ea
3-ball design, threaded joint	64696	1 ea
3-ball design, ground joint	64720-U	1 ea
0-ball design, ground joint	64721	1 ea

Widely used in semivolatile and pesticide analysis

For US EPA protocol

Developed for concentrating compounds dissolved in volatile solvents

Made in our own glass shop

Micro ground kit (64718-U) includes: 64721, 64722, and 64723.

Micro threaded kit (64688-U) includes: 64698, 64689-U, 64700-U, and 64699-U.

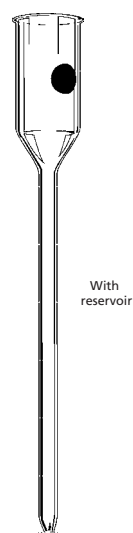
Kuderna-Danish Sample Concentrator Accessories

	Cat. No.	Qty
Micro Connector		
for connecting 13mm to 13mm threaded joint	64699-U	6 ea
for connecting 13mm to 20mm threaded joint	64701-U	6 ea
for connecting 20mm to 20mm threaded joint	64700-U	6 ea
Plastic Clip		
for use with ST 19/22 ground joint	64763	5 ea
for use with 24/40 ⌀	64764	5 ea

	Cat. No.	Qty
Springs, 1/2 in.		
ground joint	64711	20 ea
PTFE Sleeve		
for use with 24/40 ⌀	64761	5 ea
for use with ST 19/22 ground joint	64762	5 ea

Sample Cleanup Apparatus

Described in US EPA Protocol - Fill these columns with appropriate adsorbents when cleaning or drying environmental samples for pesticide or priority pollutant analyses.

Column With Reservoir

64747

Column L x O.D. x I.D. (mm)	Cat. No.	Qty
200 x 9 x 7 (280mm overall)	64748	1 ea
200 x 11 x 9 (280mm overall)	64747	1 ea

Column With Coarse Frit

Specialty Glass Column

Features and Benefits

Described in US EPA Protocol - Fill these columns with appropriate adsorbents when cleaning or drying environmental samples for pesticide or priority pollutant analyses.

for use with US EPA Protocol

L x O.D. (mm)	Cat. No.	Qty
300 x 10	64749	1 ea
400 x 22	64750	1 ea
400 x 19	64751	1 ea

Extraction Glassware

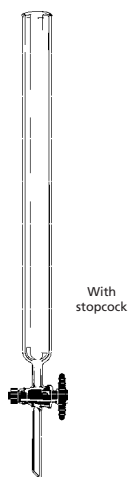
Sample Cleanup Apparatus

Specialty Glass Column

Features and Benefits

Described in US EPA Protocol - Fill these columns with appropriate adsorbents when cleaning or drying environmental samples for pesticide or priority pollutant analyses. for use with US EPA Protocol

- ▶ PTFE stopcock, column L 300 mm x O.D. 25 mm x I.D. 22 mm, 415mm overall

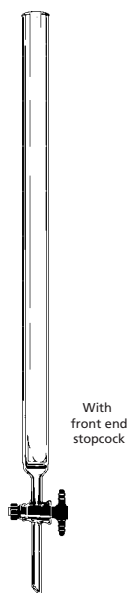


64760-U

64760-U

1 ea

Column With Coarse Frit and PTFE Stopcock



64752

Column L x O.D. x I.D. (mm)	Cat. No.	Qty
300 x 13 x 10.5 (415mm overall)	64752	1 ea
400 x 22 x 19 (515mm overall)	64753-U	1 ea

Column L x O.D. x I.D. (mm)	Cat. No.	Qty
300 x 25 x 22 (415mm overall)	64754	1 ea
400 x 25 x 22 (515mm overall)	64755	1 ea

Column With Coarse Frit, PTFE Stopcock and Inlet Joint

Replacement PTFE stopcock plug (64779-U)



64756

Column L x O.D. x I.D. (mm)	Cat. No.	Qty
300 x 13 x 10.5 (415mm overall)	64756	1 ea
300 x 25 x 22 (415mm overall)	64758-U	1 ea
400 x 25 x 22 (515mm overall)	64759-U	1 ea

Drying/Cleanup Columns



64785-U

Description	Cat. No.	Qty
Drying Column with Reservoir, 100mm x 19mm x 60mL, Reservoir/Drying design	64785-U	1 ea
Reusable Sample Cleanup Columns, Champagne Design	58099	6 ea
Specialty Glass Column, Miniature Champagne design	58098	10 ea

Extraction Glassware

Sample Cleanup Apparatus

Each of these glass "champagne" columns consists of a reservoir and a stem ending in a ground tip. The reservoir of the large columns (Cat. No. 58099, 160mm long, 36mm I.D., 6mm stem I.D.) is approximately 30mL; minicolumns (Cat. No. 58098, 81mm long, 17.5mm I.D., 3.5mm stem I.D.) have a 4mL reservoir.



Helpful Hints

For materials to use in these columns, see Adsorbents in the index or visit the website at sigma-aldrich.com/adsorbents.

Sample Concentration/Extraction Accessories

Static Dilution Bottle

- Two-liter, round-bottom flask with a threaded neck
- Accommodates a Mininert valve

Use the static dilution bottle to prepare gaseous volatile organic standards, using a technique developed by the US EPA for air analyses. Simply inject neat compound through the valve and allow it to vaporize; then withdraw the aliquots using a gas-tight syringe. Multicomponent standards are conveniently prepared and may be stored for at least one week.



21992 cork base not included

Description	Cat. No.	Qty
Static Dilution Bottle w/ Mininert® Valve	21992	1 ea
Septum inserter for Mininert® Valve, Tool for inserting septa	33311	1 ea
Replacement septa for Mininert® valves, Replacement Mininert Septa, L 0.308 in. x O.D. 0.125 in.	33310-U	50 ea
Mininert® Valve, screw thread, for use with 24/400 mm thread	33304	12 ea

Liquid/Liquid Extraction Flasks

Heat resistant borosilicate glass flasks, excellent for extracting trihalo-methanes from drinking water. Also useful for collecting samples, preparing solutions, derivatization reactions, extractions, and many other applications.



Left to right: 64715, 64716-U

Description	Cat. No.	Qty
Mininert® Valve, screw thread, for use with 20/400 mm thread	33303	12 ea
Screw Top Mini Flask with Hole Cap and Septum, 10 mL	64715	12 ea
Screw Top Mini Flask with Hole Cap and Septum, 25 mL	64716-U	12 ea
Septa, tan PTFE/silicone, white tan PTFE/silicone, diam. 18 mm x total thickness 0.060 in. x PTFE thickness 5 mil, for use with 22 mL vial	27177	100 ea

Glass Marking Pen

Writes on virtually any surface, even glass, without fading or smearing. The 0.33mm fineline marker uses a permanent oilbased black ink that is waterproof, and fade and bleed resistant.

64800-U	1 ea
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Liquid/Liquid Heater Block

Order hot plate separately.
for use with Liquid/Liquid Extractor-Concentrator Kit



64811-U	1 ea
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Extraction Glassware

Custom Glassware Fabrication

Custom Glassware Fabrication



If you need a unique creation to fit a special job, just let us know about it. We can make a one-of-a-kind piece of apparatus or meet any other unusual request. We will be pleased to provide you with a quote on custom glassware. All we need is a dimensional drawing or sketch, details of any special design requirements, and your name, address, and phone number.

Eliminate Analyte Adsorption and Decomposition—have us deactivate your glassware and containers

High concentrations of silanol groups (Si-O-H) on untreated glass surfaces can catalyze decomposition of unstable compounds or adsorb polar compounds through hydrogen bonding. Quantitative analyses of these sensitive compounds become unreliable: recoveries are reduced and analyses can be complicated by decomposition by-products.

Our elevated temperature organosilanization process derivatizes many of the surface groups, creating a more inert surface. Remaining active groups are shielded from contact with the chemicals in the container. Sigma-Aldrich has approved our process for their demanding biological products; we use it to treat the containers for all of our quantitative standards.

Our process is environmentally friendly – it does not require solvents for diluting the silanization reagent or rinsing the deactivated surface, and an elaborate trapping system confines the reagent vapors. The process also is highly mechanized, making the cost very reasonable.

We offer our deactivation treatment for all of your glassware, vials, and other glass storage containers. Simply send us your glassware – or request silanol deactivation when you purchase Supelco glassware. We will have a quote to you within two days. If you wish, we can provide a certificate of treatment with your deactivated glassware.

Glassware Repairs — save up to 75% of the cost of replacement

Our staff of talented and experienced glassblowers will consider any glass repair job, regardless of size or complexity. Just ask, and within two days (normally) we will give you our repair quotation. You can save as much as 75% compared to the cost of a new purchase.

If you do not agree the savings are worthwhile, your package will be returned. Your only cost will be to pay the return shipping charges.

Important Note About Glass Item Repairs

Some glass items shipped to us for repair are damaged during shipment. Original damage also can be a result of extensive heating and cooling during use. Items damaged in these ways may be deemed unrepairable and, at your option, will be returned in their existing condition. **There will be no charge for examining these items – you pay the return postage only.** Supelco cannot assume responsibility for any such damage, nor for further damage while attempting to repair the item; nor will we replace the item.



SAMPLE PREP APPLICATIONS

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Solid Phase Extraction Applications

Pharmaceuticals & Phospholipid Removal

Solid Phase Extraction Applications Pharmaceuticals & Phospholipid Removal

HPLC Analysis on the Ascentis® Express C18 after Phospholipid Removal using HybridSPE®-Phospholipid

▶ application for SPE, application for LC-MS

HybridSPE-Precipitation:

Precipitate proteins by first adding 100 µL rat plasma to the HybridSPE-PPT plate followed by 300 µL 1% formic acid in acetonitrile. Do not apply vacuum.

Mix by vortexing the HybridSPE-PPT plate briefly.

Apply vacuum using a 96-well vacuum manifold and collect the resulting eluate for analysis.

Standard Protein Precipitation:

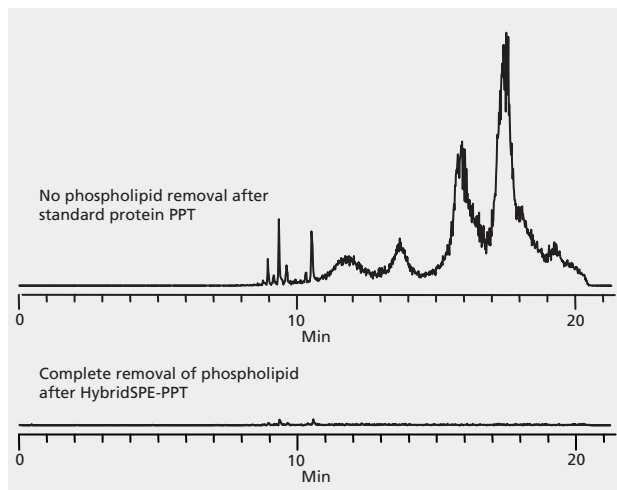
Combine 100 µL rat plasma with 300 µL 1% formic acid in acetonitrile.

Mix by vortexing and centrifuge.

Isolate resulting supernatant for analysis.

SPE tube HybridSPE-Precipitation 96-well Plate, 50 mg/well (575656-U)
column Ascentis Express C18, 5 cm x 2.1 mm I.D. (53822-U)
mobile phase (A) 10 mM ammonium acetate; (B) 10 mM ammonium acetate in acetonitrile
gradient .. 0 min. - 95% (A); 10 min. - 50% (A); 18 min. - 50% (A); 18.1 min. - 95% (A); 22 min. - 95% (A)

flow rate 0.5 mL/min
column temp. 35 °C
detector ABI 3200QT; ESI (+), MRM (184/103 m/z)
injection 5 µL
Application No. G004243



HPLC Analysis of Verapamil and Metabolites in Rat Plasma on the Ascentis® Express C18 after Phospholipid Removal using HybridSPE®-Phospholipid

▶ application for SPE, application for LC-MS

Sample Pre-treatment:

Spike rat plasma with verapamil and metabolites at the level of 10 ng/mL

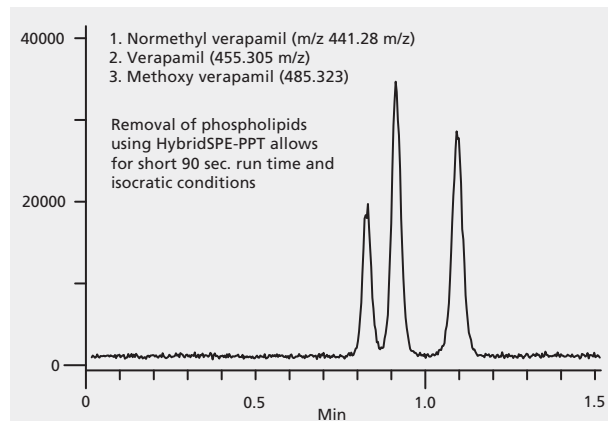
HybridSPE-Precipitation:

Precipitate proteins by first adding 100 µL spiked rat plasma to the HybridSPE-PPT plate followed by 300 µL 1% formic acid in acetonitrile. Do not apply vacuum.

Mix by vortexing the HybridSPE-PPT plate briefly.

Apply vacuum using a 96-well vacuum manifold and collect the resulting eluate for analysis.

..... compound class: antihypertensives
SPE tube HybridSPE-Precipitation 96-well Plate, 50 mg/well (575656-U)
column Ascentis Express C18, 5 cm x 2.1 mm I.D. (53822-U)
mobile phase water:acetonitrile, pH 2.55 adjust with formic acid (30:70)
flow rate 0.6 mL/min
column temp. 35 °C
detector TOF/MS
injection 1 µL
Application No. G004366



Solid Phase Extraction Applications

Pharmaceuticals

Pharmaceuticals

HPLC Analysis of Chloramphenicol in Milk on the Ascentis® C18 after SPE using SupelMIP® SPE-Chloramphenicol

▶ application for SPE, application for LC-MS

Sample Pre-Treatment

Whole pasteurized milk (purchased from the local supermarket) was centrifuged for 15 min. at 5k rpm. The aqueous lower layer was spiked with chloramphenicol at the level of 15 ng/mL and 38 ng/mL.

Condition SupelMIP SPE tube with 1 mL methanol followed by 1 mL DI water

Load 1 mL pretreated milk sample

Wash with:

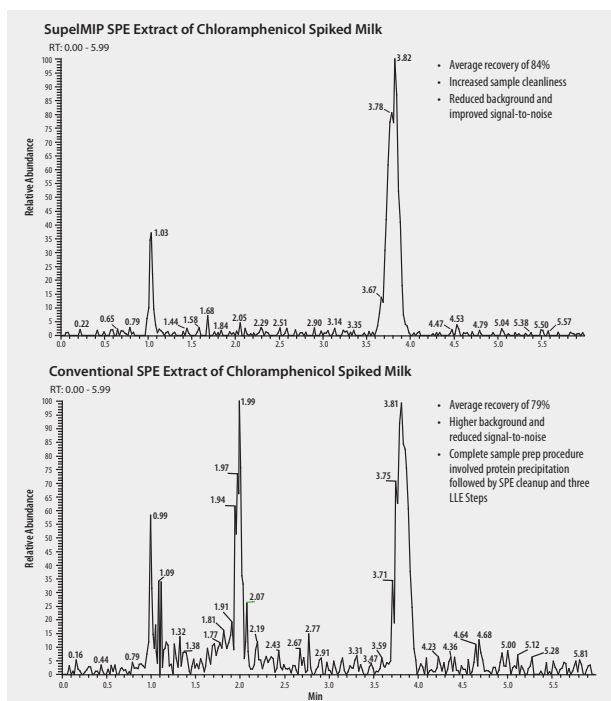
- 2 x 1 mL MS-grade water
- 1 mL 5% acetonitrile in 0.5% acetic acid
- 2 x 1 mL MS-grade water
- 1 mL 20% acetonitrile in 1% ammonium hydroxide
- Dry SPE tubes for 15 min. under gentle vacuum
- 3 x 1 mL dichloromethane
- Dry SPE tubes for 1 min. under gentle vacuum

Elute chloramphenicol with 2 x 1 mL methanol:acetic acid:MS-grade water (89:1:10, v/v/v)

Evaporate combined eluate to dryness at 50 °C under nitrogen.

Reconstitute 150 µL LC mobile phase prior to LC-MS analysis.

SPE tube SupelMIP SPE - Chloramphenicol, 25 mg/10mL (LRC) (53210-U)
 column Ascentis C18, 2.1 mm x 10 cm I.D., 3 µm particles (581301-U)
 mobile phase 100 mM ammonium acetate:MS-grade water:acetonitrile (10:60:30)
 flow rate 0.2 mL/min
 column temp. 35 °C
 detector MS, ESI(-), 320-323 m/z range
 injection 5 µL
 Application No. G004433



Solid Phase Extraction Applications

Pharmaceuticals

HPLC Analysis of β -Blockers and β -Agonists in Urine and Wastewater on a C18 Column after SPE using SupelMIP® SPE-Beta-Receptor

► application for SPE, application for LC-MS

Sample Pre-treatment:

Horse urine was centrifuged at 3000 g for 10 min., diluted with DI water 1:1 (v/v), adjusted to pH 7.

Wastewater was filtered with 1 μ m filter paper and adjusted to pH 6-7.

Samples were spiked with 10 beta-agonists and beta-blockers at the level of 1 ng/mL.

Condition and equilibrate MIP phase with 1 mL acetonitrile and 1 mL DI water.

Load 1 mL pre-treated urine sample.

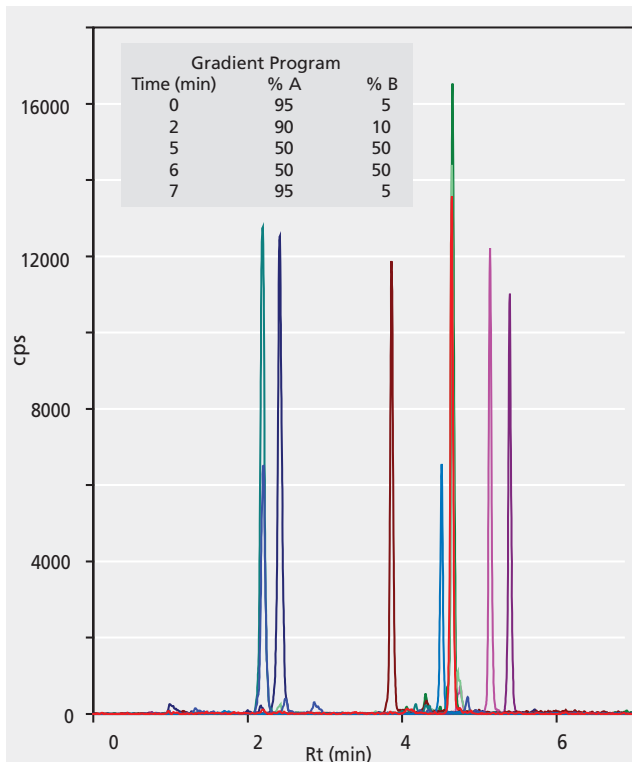
Wash (elute interferences) using the following wash scheme:

- 3 x 1 mL DI water (elution of salt and matrix interferences)
- Apply 2 min. of full vacuum to dry the tube.
- 1 mL acetonitrile (selective removal of hydrophobic interferences)
- 1 mL 60% acetonitrile/40% DI Water (selective removal of hydrophilic interferences)
- Apply 2 min. of full vacuum to dry the tube.

Elute beta-agonists and beta-blockers with 2 x 1 mL 1% formic acid in acetonitrile.

Evaporate under nitrogen and reconstitute with 150 μ L 5% acetonitrile in 10 mM ammonium acetate, pH 4.6 prior to LC-MS-MS analysis

..... compound class: bronchodilators, antihypertensives
 SPE tube SupelMIP SPE - Beta-Receptor, 25 mg/10 mL (LRC)
 column C18, 5 cm x 3 mm I.D., 3 μ m
 mobile phase (A) 10 mM ammonium acetate, pH 4.6 (adjusted with acetic acid); and (B) acetonitrile
 flow rate 0.5 mL/min
 column temp. ambient
 detector MS/MS, ESI(+)
 injection 20 μ L
 Application No. G004059



Analyte	Rt (min.)	Q1/Q3
Atenolol	3.0	267.2/145
Carazolol	6.2	299.1/194.2
Metoprolol	5.6	268.2/133
Propranolol	6.5	260.2/154.9
Timolol	5.5	317.2/188.1
Clenbuterol	5.6	277.1/202.9
Ritodrine	3.9	288.2/121
Salbutamol	2.6	240.2/147.9
Terbutaline	2.6	226.2/152
Tulobuterol	5.6	228.2/154.1

Analyte	Lower Limit of Quantitation (ng/mL, ppb, or μ g/kg)	
	1 mL Horse Urine	10 mL Wastewater
Atenolol	0.1	0.01
Carazolol	0.1	0.01
Metoprolol	0.1	0.01
Propranolol	0.1	0.01
Timolol	0.1	0.01
Clenbuterol	0.02	0.002
Ritodrine	0.05	0.005
Salbutamol	0.1	0.01
Terbutaline	0.2	0.02
Tulobuterol	0.005	0.0005

Note: Clenbuterol and Tulobuterol were spiked at the levels of 0.1 ng/mL.

Solid Phase Extraction Applications

Pharmaceuticals

HPLC Analysis of Statins in Rat Plasma on the Ascentis® Express C18 after SPE using Supel™-Select HLB

► application for SPE, application for LC-MS

Condition SPE tube with 0.5 mL methanol:acetonitrile (1:1, v/v)

Equilibrate with 0.5 mL DI water

Load 0.5 mL rat plasma spiked with pravastatin and atorvastatin at 5 and 100 ng/mL

Wash with 0.5 mL 5% methanol

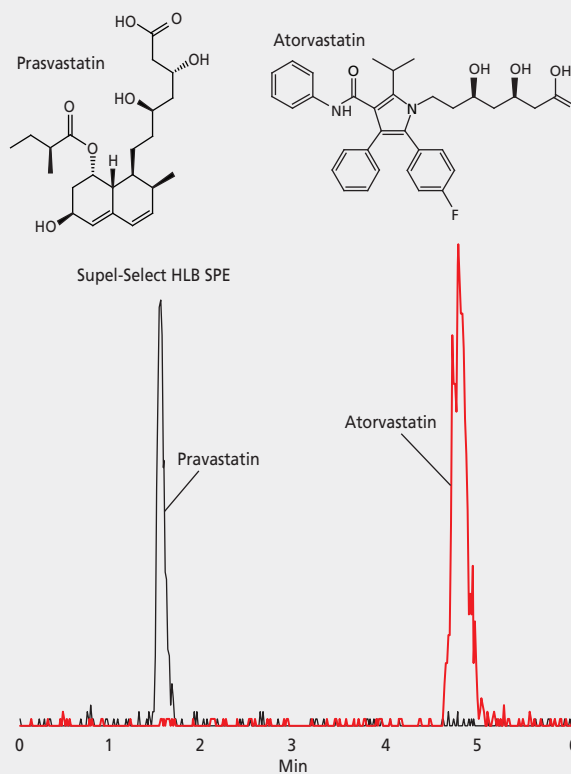
Elute with 0.5 mL methanol:acetonitrile (1:1, v/v)

Evaporate eluate with N₂ at 37°C

Reconstitute in 0.5 mL DI water

..... compound class: anticholesterolemics
 SPE tube Supel-Select HLB SPE, 30 mg/1 mL (54181-U)
 column Ascentis Express C18, 2.7 µm, 5 cm x 2.1 mm
 mobile phase 0.1% acetic acid diluted in 60% methanol
 flow rate 0.2 mL/min
 column temp. 35 °C
 detector ABI 3200 QT; ESI(+), MRM (423.3/321.3, 423.3/101.0, 557.3/397.2 and 557.3/453.4)
 injection 5 µL
 Application No. G004432

Total Ion Chromatogram (MRM, 4 pairs: 557.3/397.2)
 Rat Plasma spiked with 5 ng/mL Statins Extracted by Supel-Select HLB SPE



	Absolute Recovery ± RSD (n=3)			
	5 ng/mL spike		100 ng/mL spike	
	Pravastatin	Atorvastatin	Pravastatin	Atorvastatin
Supel-Select HLB	84 ± 8%	92 ± 5%	103 ± 4.2%	89 ± 3.9%
Competitor W	83 ± 17%	92 ± 2%	104 ± 2.2%	87 ± 1.1%
Competitor P	77 ± 5%	93 ± 2%	102 ± 3.0%	91 ± 1.3%

Solid Phase Extraction Applications

Pharmaceuticals

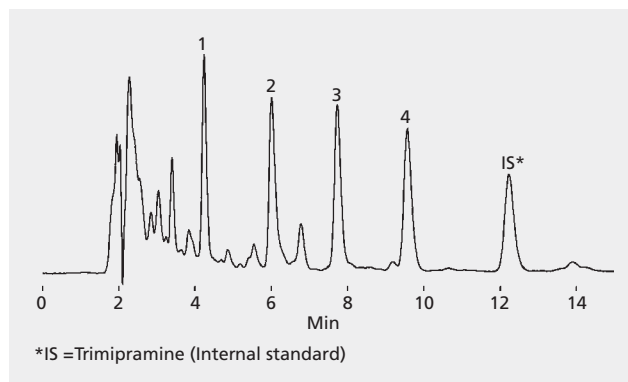
HPLC Analysis of Tricyclic Antidepressants in Serum on the Discovery® C18 after SPE using Discovery® DSC-18

▶ application for SPE, application for HPLC

SPE tube Discovery DSC-18, 100 mg/1 mL (52602-U)
 column .. Discovery C18, 15 cm × 4.6 mm, 5 µm preceded by a 2 cm C18 guard column and 0.5 µm frit filter (504955)
 mobile phase MeCN:MeOH:25 mM KH₂PO₄ (pH 7 with triethylamine) (45:25:30)
 flow rate 1 mL/min
 column temp. ambient
 detector UV, 254 nm
 injection 50 µL, diluted porcine serum extract
 Application No. G000595

Efficiency of Recovery

Compound	Concentration (µg/mL)	% Recovery	% RSD (n=6)
1. Nortriptyline	0.10	103.6	±4.5
	0.50	97.5	±4.5
2. Doxepin	0.10	102.2	±3.0
	0.50	100.8	±1.8
3. Imipramine	0.10	92.0	±1.5
	0.50	97.5	±1.7
4. Amitriptyline	0.10	93.6	±1.2
	0.50	95.7	±1.4



SPE Procedure, Using Zymark RapidTrace SPE Workstation

Step	Solvent/Solution	Volume (mL)	Flow Rate (mL/min)	Comments
1. Condition	MeOH	2.0	5.0	conditions sorbent
2. Condition	H ₂ O	2.0	5.0	conditions sorbent
3. Load	spiked porcine serum	2.0 ^A	0.75	applies serum sample
4. Rinse	20% MeOH in H ₂ O	2.0	5.0	washes sorbent
5. Purge-Cannula	H ₂ O	4.0	30.0	cleans sample cannula
6. Rinse	vent	0.1	2.0	positions SPE tube over waste port
7. Dry	N ₂	Time = 10 min		dries sorbent
8. Purge-Cannula	MeOH	4.0	30.0	cleans sample cannula
9. Collect	MeOH	1.0	1.0	elutes analytes into collection vessel
10. Collect	vent	6.0	3.0	pushes residual eluent into vessel ^B
11. Purge-Cannula	H ₂ O	4.0	30.0	cleans sample cannula

^A 1 mL porcine serum spiked with 0.1 µg/mL each analyte basified with 3 µL 10 N KOH, then diluted with 1 mL water

^B 350 µL water added per mL methanolic eluent before analysis

HPLC Analysis of Barbiturates in Serum on the Discovery® C18 after SPE using Discovery® DSC-18Lt

▶ application for SPE, application for HPLC

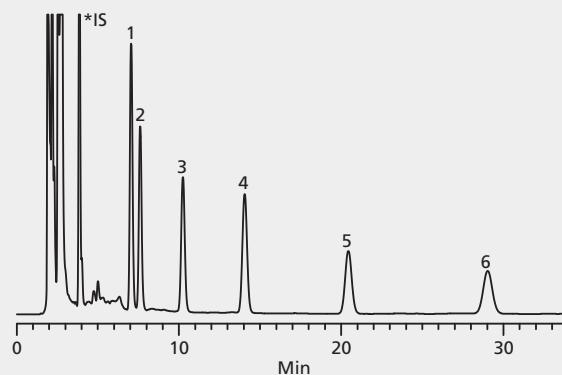
SPE tube Discovery DSC-18Lt, 500 mg/3 mL (52613-U)
 column .. Discovery C18, 15 cm × 4.6 mm, 5 µm preceded by a 2 cm C18 guard column and 0.5 µm frit filter (504955)
 mobile phase MeOH:H₂O (40:60)
 flow rate 1 mL/min
 column temp. 30 °C
 detector UV, 214 nm
 injection 30 µL, diluted porcine serum extract
 Application No. G001056

Efficiency of Recovery

Compound	Concentration (µg/mL)	% Recovery	% RSD (n=6)
1. Phenobarbital	0.5	96.2	±1.6
	1.0	94.9	±1.7
2. Aprobital	0.5	98.5	±2.1
	1.0	100.8	±0.8
3. Butabarbital	0.5	97.2	±1.9
	1.0	98.7	±1.8
4. Mephobarbital	0.5	99.7	±2.4
	1.0	101.0	±2.0
5. Pentobarbital	0.5	96.4	±1.7
	1.0	96.4	±1.9
6. Secobarbital	0.5	98.2	±1.7
	1.0	97.7	±1.8

SPE Method For RapidTrace SPE Workstation Application

- Condition & equilibrate each tube/well with 2 mL MeOH & 2 mL DI Water
- Load sample
- Wash each tube/well with 2 mL 5% MeOH
- Vacuum or air dry with for 5-10 min
*This removes any excess water from the sorbent.
 The presence of water in the final eluent may prolong eluent evaporation.*
- Elute with 1-2 mL MeOH
- Dry eluate with nitrogen purge (40 °C; 15-20 min)
- Reconstitute with 200 µL mobile phase
- Quantify against internal or external standards via HPLC analyses



Barbiturates from serum using 500 mg/3mL Discovery DSC-18Lt SPE tubes and Zymark's RapidTrace SPE Workstation.

*IS = Barbitol (internal standard).

Sample Info: 0.5 mL porcine serum spike with 0.5 µg/mL or 1.0 µg/mL each analyte then diluted with 0.5 mL water.

Solid Phase Extraction Applications

Pharmaceuticals

HPLC Analysis of Bronchodilators (Theophylline and Other Caffeine Metabolites) in Serum on the Discovery® RP-Amide C16 after SPE using Discovery® DSC-18

▶ application for SPE, application for HPLC

Sample Pre-treatment:

Porcine serum spiked with 0.1 µg/mL, 0.5 µg/mL, or 1.0 µg/mL of each analyte

Condition SPE tube with 2 mL MeOH, then 2 mL DI H₂O

Load 1 mL porcine serum sample

Wash with 2 mL 5% MeOH in DI H₂O; dry tube 10 min with N₂

Elute with 1 mL MeOH

Evaporate to dryness with N₂ at room temperature

Reconstitute in 200 µL mobile phase containing 0.2 µg/mL 7-methylxanthine (IS)

SPE tube Discovery DSC-18, 500 mg/3 mL (52603-U)
 column Discovery RP-AmideC16, 15 cm x 4.6 mm, 5 µm preceded by a 2 cm RP-AmideC16 guard column and 0.5 µm frit filter (505013)

mobile phase MeOH:1% acetic acid (17:38)

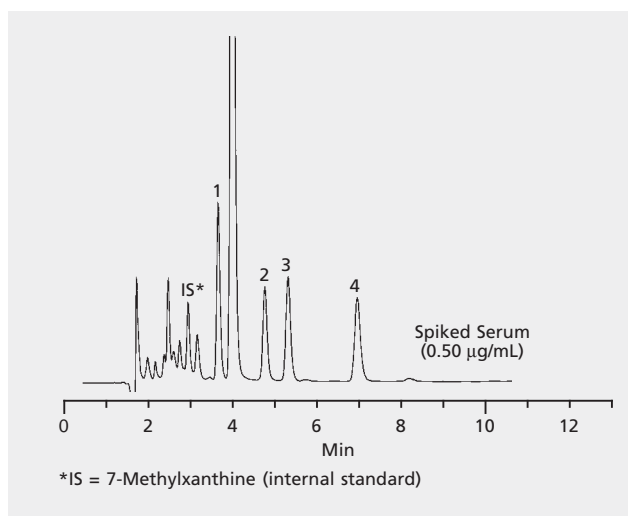
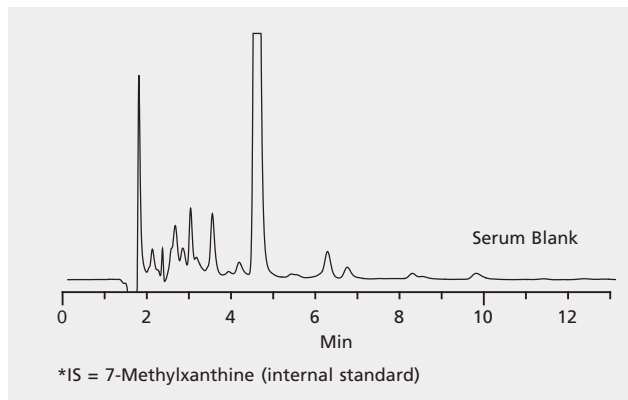
flow rate 1 mL/min

column temp. 30 °C

detector UV, 272 nm

injection 20 µL, reconstituted porcine serum extract

Application No. G000593

**Efficiency of Recovery**

Compound	Concentration (µg/mL)	% Recovery	% RSD (n=6)
1. Theobromine	0.1	97.4	±6.8
	0.5	96.4	±8.5
	1.0	96.1	±5.0
2. Paraxanthine	0.1	96.2	±8.4
	0.5	95.2	±8.7
	1.0	95.0	±8.7
3. Theophylline	0.1	97.8	±8.5
	0.5	97.8	±8.8
	1.0	98.5	±5.7
4. Caffeine	0.1	98.8	±3.9
	0.5	95.6	±6.7
	1.0	97.6	±5.8

Solid Phase Extraction Applications

Pharmaceuticals

HPLC Analysis of Amphetamines in Urine on the Discovery® HS F5 after SPE using Discovery® DSC-MCAX and Standard C18

▶ application for SPE, application for HPLC

Sample Pre-Treatment:

1 mL human urine was spiked with 2 µg/mL amphetamine and methylamphetamine. The spiked sample was diluted 1:1 with 1:1 with 50mM ammonium acetate, pH 6.0.

Condition DSC-MCAX SPE tube with 1 mL methanol, then 1 mL 50 mM ammonium acetate, pH 6.0

Load 1 mL diluted spiked urine sample

Wash with mL 50mM ammonium acetate, pH 6.0, 1mL 1M acetic acid, and 1mL methanol

Elute with 1mL 5% NH₄OH in methanol

Evaporate to dryness with N₂ at room temperature

Reconstitute in LC mobile phase

Condition DSC-18 SPE tube of equivalent bed weight/dimension with 1 mL methanol, then 1 mL DI H₂O

Load 1 mL diluted spiked urine sample

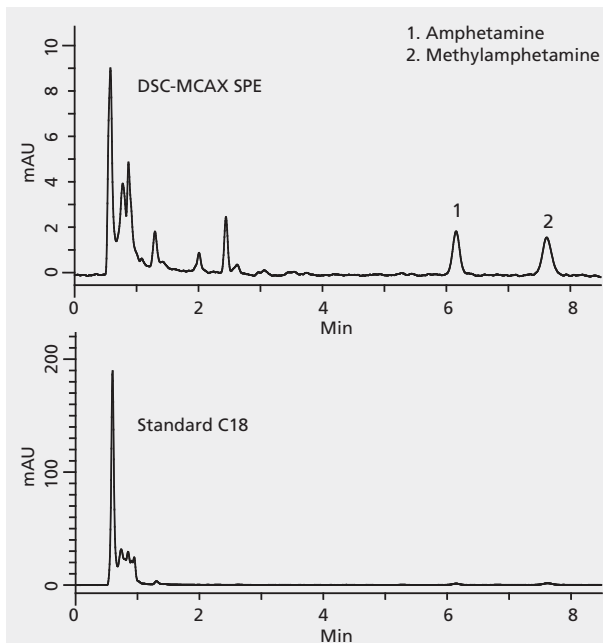
Wash with 1 mL DI H₂O and 1 mL 20% methanol

Elute with 1mL methanol

Evaporate to dryness with N₂ at room temperature

Reconstitute in LC mobile phase

SPE tube Discovery DSC-MCAX, 100 mg/3mL (52783-U)
 SPE tube standard C18 SPE, 100mg/3mL
 column Discovery HS F5, 15 cm x 4.6 mm ID, 5 µm particle size (567516-U)
 mobile phase 10 mM ammonium acetate, pH 4.5:MeCN (35:65)
 flow rate 2 mL/min
 column temp. 40 °C
 detector 210 nm UV
 injection 10 µL
 Application No. G003761



Discussion:

Note the Y-axis scale difference between DSC-MCAX and C18 SPE. DSC-MCAX SPE offered a maximum background height of ~9 mAU. In contrast, standard C18 background levels were 20 times greater than DSC-MCAX.

Also, on DSC-MCAX absolute recovery averaged at 100.3 and 101.7%, for amphetamine and methylamphetamine, respectively. On standard C18, absolute recovery averaged at 48 and 79% for the two compounds.

HPLC Analysis of 3-Methylpyrazole and 4-Methylpyrazole in Urine on the Discovery® C18 after SPE using Discovery® DSC-SCX

▶ application for SPE, application for HPLC

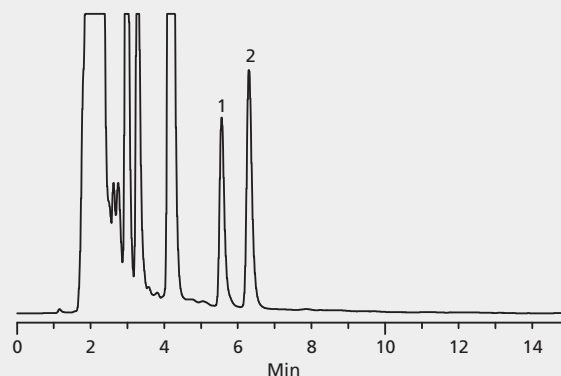
SPE tube Discovery DSC-SCX, 500 mg/3 mL (52686-U)
 column Discovery C18, 15 cm x 4.6mm, 5 µm preceded by a 2 cm guard column and 0.5 µm frit filter (504955)
 mobile phase MeOH:5 mM phosphate buffer, pH 6 (20:80)
 flow rate 1 mL/min
 column temp. 30 °C
 detector UV, 220 nm
 injection 25 µL, dilute urine extract
 Application No. G001635

Efficiency of Recovery

Compound (µg/mL)	Discovery DSC-SCX (n=3)		Leading Competitor SCX (n=2)	
	% Recovery	%RSD	%Recovery	%RSD
1. 3-methylpyrazole (1.0)	89.4	±10.2%	67.1	±20%
2. 4-methylpyrazole (1.0)	79.4	±6.8%	50.5	±30%

SPE Procedure

1. Condition & equilibrate with 2 mL MeOH & 2 mL DI water.
2. Load 1 mL urine sample spiked with 1 µg/mL of each analyte.
3. Wash with 2 mL DI water.
4. Elute with 2 mL 5% MeOH in 250 mM phosphate buffer, pH 7.4.
5. Quantify against external standards via HPLC analyses.



Solid Phase Extraction Applications

Pharmaceuticals

HPLC Analysis of Corticosteroids in Urine on the Discovery® HS F5 after SPE using Discovery® DSC-CN

► application for SPE, application for HPLC

Condition each well with 1 mL methanol and 1 mL DI H₂OLoad 0.5 and 1.0 µg/mL corticosteroids spiked in human urine diluted in DI H₂O (1:1, v/v); n = 3

Wash with 1 mL 20% methanol

Elute with 1 mL methanol

Evaporate eluate with N₂ at 30°C

Reconstitute in 200 µL LC mobile phase

SPE tube Discovery DSC-CN 96-well SPE, 100 mg/well (575636-U)

column Discovery HS F5, 5 cm x 4.6 mm ID, 3 µm particles

mobile phase methanol:DI H₂O (40:60)

flow rate 1.5 mL/min

column temp. 35 °C

detector UV, 240 nm

injection 5 µL

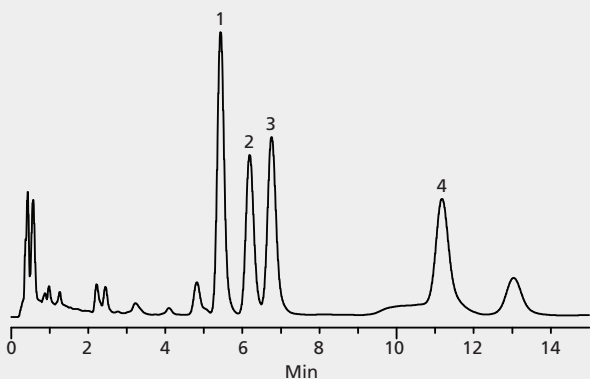
Application No. G003763

Efficiency of Recovery

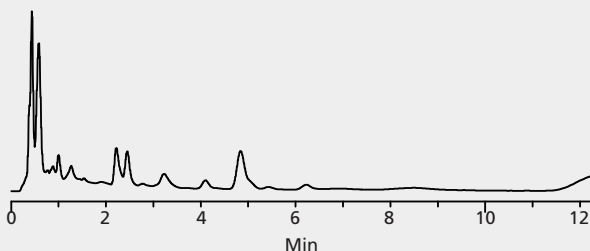
%Recovery ± RSD (n=3)

Compound	0.5µg/mL spike level	1.0µg/mL spike level
1. Hydrocortisone	123.3±1.4%	95.9±1.7%
2. Prednisilone	107.2±1.1%	91.9±1.1%
3. Prednisone	103.2±1.0%	88.4±1.8%

1µg/mL spiked urine extract on Discovery DSC-CN



Blank urine extract on Discovery DSC-CN



HPLC Analysis of Diazepam and Metabolites in Serum on the Discovery® C18 after SPE using Discovery® DSC-8

► application for SPE, application for HPLC

Condition each well with 1 mL methanol and 1 mL DI H₂O

Load 1 mL, 0.5µg/mL diazepam and metabolites spiked in goat serum diluted in 25 mM ammonium formate, pH 7.1 (1:1, v/v)

Wash with 1 mL 25% methanol in 25 mM ammonium formate, pH 2.75

Elute with 1 mL 60% methanol in 25 mM ammonium formate, pH 2.75

SPE tube Discovery DSC-8 96-well SPE Plate, 100 mg/well (575627-U)

column Discovery C18, 5 cm x 4.6 mm I.D., 5 µm particle size (504947)

mobile phase MeOH:10 mM ammonium acetate, pH 4.5 (45:55)

flow rate 1.5 mL/min

column temp. 35 °C

detector UV, 240 nm

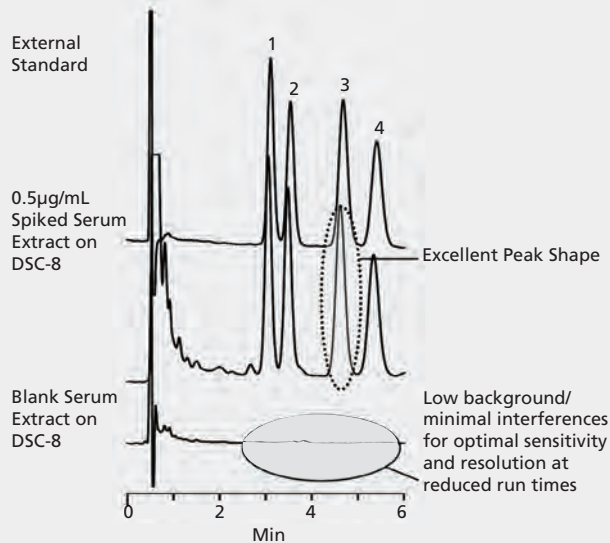
injection 25 µL

Application No. G003766

Efficiency of Recovery

%Recovery ± RSD (n=3)

Compound	Systematically Developed Method on Discovery DSC-8	Generic Method on Conventional C18
1. Oxazepam	94.7 ± 1.2%	82.8 ± 4.0%
2. Temazepam	99.9 ± 1.1%	89.1 ± 4.0%
3. Desmethyl diazepam	94.2 ± 1.8%	82.4 ± 5.0%
4. Diazepam	90.0 ± 3.4%	68.5 ± 9.1%



Solid Phase Extraction Applications

Pharmaceuticals

HPLC Analysis of Furosemide (Lasix) in Horse Serum on the Discovery® C18 after SPE using Discovery® DSC-18

▶ application for SPE, application for HPLC

Sample Pre-treatment:

Neat horse serum was acidified with 10 µL 6M HCl/mL serum. I.S. blank was prepared by spiking acidified horse serum with indapamide at 10 µg/mL.
 Sample A = 10 µg/mL furosemide in IS blank
 Sample B = 5 µg/mL furosemide in IS blank
 Sample C = 0.5 µg/mL furosemide in IS blank
 Sample D = 0.1 µg/mL furosemide in IS blank
 Sample E = 0.05 µg/mL furosemide in IS blank

Condition SPE tube with 1 mL methanol and 1 mL 10 mM KH₂PO₄, pH 3 (adjusted with H₃PO₄)

Load 1 mL sample

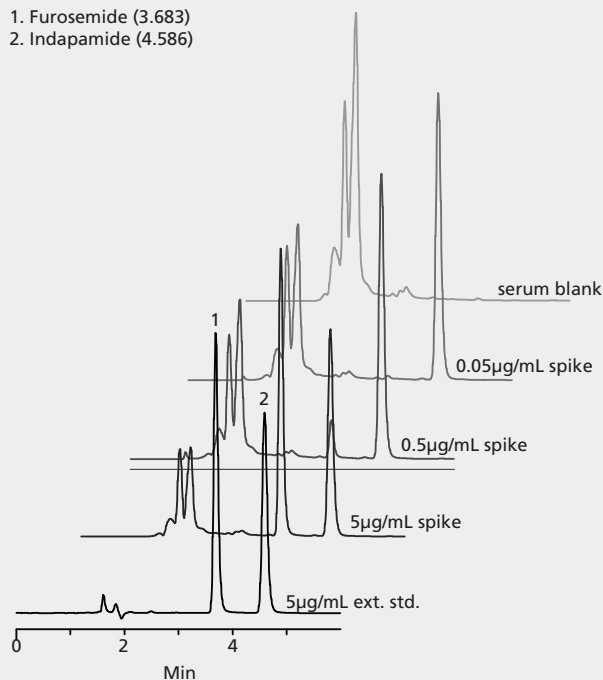
Wash with 10 mM KH₂PO₄, pH 3 (adjusted with H₃PO₄)

Elute with 1 mL 60% methanol

SPE tube Discovery DSC-18, 50 mg/1 mL (52601-U)
 column Discovery C18, 15 cm x 4.6 mm ID, 5 µm particle size (504955)
 mobile phase 10 mM KH₂PO₄, pH 3 (adjusted with H₃PO₄):MeCN (60:40)
 flow rate 1 mL/min
 column temp. 35 °C
 detector UV, 234 nm
 injection 10 µL
 Application No. G003764

Efficiency of Recovery			
Sample	Concentration (µg/mL)	Avg. Response Factor	% Recovery ± RSD (n=3)
A	10.00	2.307	93.1 ± 3.1
B	5.00	1.168	100.8 ± 1.4
C	1.00	0.107	97.4 ± 2.8
D	0.50	0.065	120.7 ± 1.3
E	0.10	0.009	132.8 ± 8.3

1. Furosemide (3.683)
2. Indapamide (4.586)



HPLC Analysis of Hydrocortisone in Topical Cream on the Discovery® HS C18 after SPE using Discovery® DSC-Si

▶ application for SPE, application for HPLC

Sample Pre-treatment:

Dissolve 1 g 1% hydrocortisone topical hand cream in 10 mL ethyl acetate. Dilute 2 mL of ethyl acetate-cream sample with 8 mL hexane:ethyl acetate (2:1, v/v).

Condition SPE tube with 1 mL hexane:ethyl acetate (2:1, v/v)

Load 1 mL pre-treated sample

Wash off lipophilic interferences with 1 mL hexane:ethyl acetate (2:1, v/v)

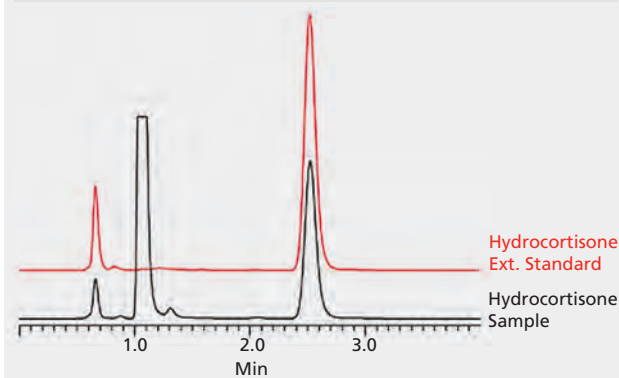
Elute with 1 mL methanol:DI H₂O (1:1, v/v)

Dilute eluate to 2 mL with methanol:DI H₂O (1:1, v/v)

SPE tube Discovery DSC-Si, 500 mg/3 mL (52695-U)
 column Discovery HS C18, 15 cm x 4.6 mm ID, 5 µm particle size (568520-U)
 mobile phase methanol:DI H₂O (1:1)
 flow rate 1 mL/min
 column temp. 35 °C
 detector UV, 220 nm
 injection 10 µL
 Application No. G003765

Efficiency of Recovery					
Sample No.	Sample Weight (g)	Theoretical Hydrocortisone Weight (g) ¹	Actual Hydrocortisone weight recovered (g)	Absolute Recovery (%)	Actual % Hydrocortisone in Cream
1	1.0258	0.0103	0.0092	89.32	0.9003
2	1.1078	0.0118	0.0111	94.07	0.9975
3	1.1151	0.0112	0.0119	106.25	1.0424
4	1.1369	0.0114	0.0119	104.39	1.0442
5	1.1390	0.0114	0.0113	99.12	1.0785
6	1.1634	0.0116	0.0123	106.03	1.0567
				Average:	1.02
				RSD:	0.06

¹Based on manufacturer's label description of 1% hydrocortisone (w/w)



Solid Phase Extraction Applications

Pharmaceuticals

HPLC Analysis of Piroxicam and 2-Aminopyridine in Urine on the Discovery® HS F5 after SPE using Discovery® DSC-MCAX

▶ application for SPE, application for HPLC

Sample Pre-Treatment:

Piroxicam and 2-aminopyridine (piroxicam's polar metabolite) was spiked into human urine at the levels of 4 and 10 µg/mL, respectively. The urine sample was diluted 1:1 with 10 mM potassium phosphate, pH 3.

Condition SPE tube with 1 mL methanol and 1 mL 10 mM potassium phosphate, pH 3

Load 1 mL diluted spiked urine sample

Wash with 1 mL 10 mM potassium phosphate, pH 3, and 1 mL methanol

Elute with 1 mL 5% ammonium hydroxide in methanol

Evaporate to dryness with N₂ at room temperature

Reconstitute in 1 mL LC mobile phase

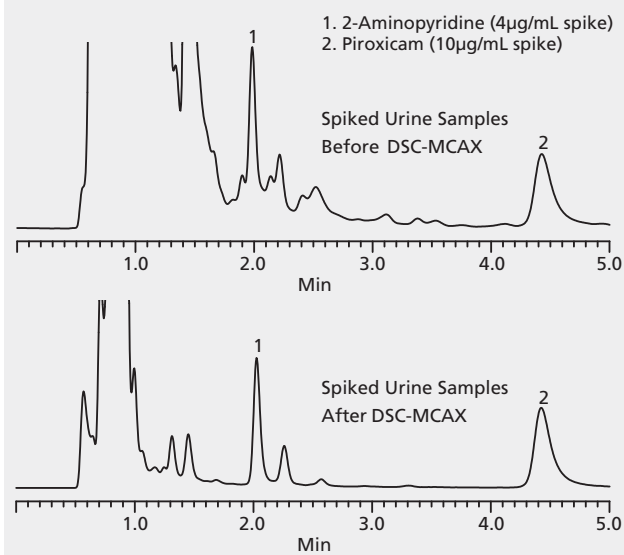
Repeat the above method using two competitor mixed-mode cation-exchange phases of equivalent bed weight/hardware dimension

SPE tube Discovery DSC-MCAX, 100 mg/3 mL (52783-U)
 column Discovery HS F5, 15 cm x 4.6 mm, 5 µm particle size (567516-U)
 mobile phase 10 mM potassium phosphate, pH 6:MeCN (85:15)
 flow rate 2 mL/min
 column temp. 25 °C
 detector UV, 220 nm
 injection 10 µL
 Application No. G003762

Efficiency of Recovery

%Recovery ± RSD (n=4)

	2-Aminopyridine	Piroxicam
Discovery DSC-MCAX	102 ± 3.5%	101 ± 1.2%
Leading Competitor	A30 ± 52.5%	98 ± 3.2%
Leading Competitor	B36 ± 24.2%	83 ± 4.3%



Solid Phase Extraction Applications

NNAL (Tobacco Specific Nitrosamines)

NNAL (Tobacco Specific Nitrosamines)

HPLC Analysis of NNAL in Urine on the Ascentis® Express C18 after SPE using SupelMIP® SPE-NNAL

► application for SPE, application for LC-MS

Sample Pre-treatment:

Human urine samples were centrifuged at 3000 rpm. The resulting supernatant was spiked at the levels 0.0 (blank), 60, and 100 pg/mL NNAL and acidified to pH 6 with acetic acid.

Condition and equilibrate MIP phase with 1 mL dichloromethane, 1 mL methanol, and 1 mL DI water.

Load pre-treated urine sample onto the cartridge.

- 2 mL sample volume used for 60 pg/mL spike level
- 5 mL sample volume used for 100 pg/mL spike level

Wash (elute interferences) using the following wash scheme:

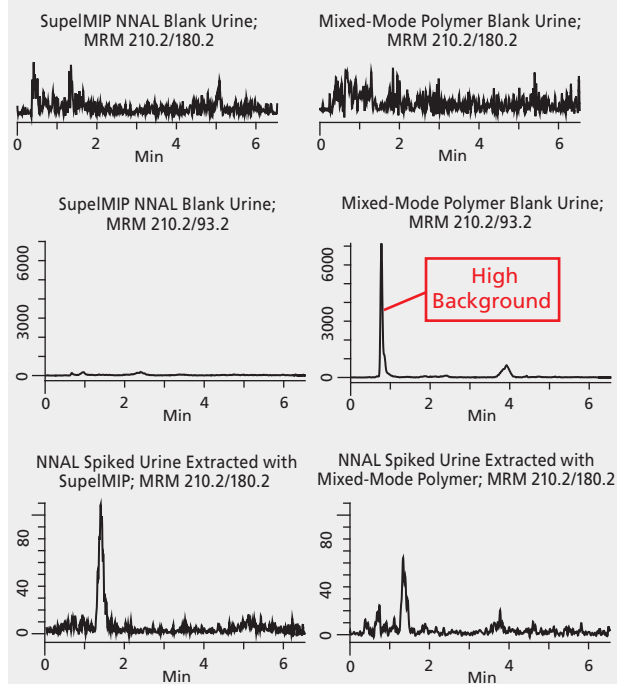
- 2 x 1 mL DI water followed by 10 min. vacuum
- 1 mL toluene
- 1 mL toluene:dichloromethane (9:1, v/v)
- 1 mL toluene:dichloromethane (4:1, v/v) followed by 2 min. vacuum to remove residual solvent

Elute NNAL with 2 x 1 mL 10% methanol in dichloromethane. Apply gentle vacuum between each fraction.

Evaporate under nitrogen and reconstitute with 0.15-0.25 mL LC mobile phase prior to LC-MS-MS analysis

SPE tube SupelMIP SPE - NNAL, 25 mg/10 mL (LRC) (53206-U)
 column Ascentis Express C18, 5 cm x 2.1 mm I.D., 2.7 µm (581307-U)
 mobile phase .. (A) 10 mM ammonium acetate; and (B) 10 mM ammonium acetate in acetonitrile
 flow rate 0.3 mL/min
 column temp. 35 °C
 detector MS/MS, MRM Transitions, ESI(+) (210.2/180 and 210.2/93.2 m/z)
 injection 20 µL
 Application No. [G004434](#)

Gradient Program		
Time (min.)	% A	% B
0.0	90	10
1.5	70	30
2.5	70	30
2.6	90	10
6.0	90	10



SPE Procedure	% Recovery		
	50 pg/mL Spike	60 pg/mL Spike	100 pg/mL Spike
SupelMIP SPE – NNAL	*	67%	87%
Mixed-Mode Polymer SPE	47%	*	*

* Not analyzed

Solid Phase Extraction Applications

Acrylamide

Acrylamide

HPLC Analysis of Acrylamide in Fried Potato Chips on the Discovery® HS F5 after SPE using Discovery® DSC-MCAX and DSC-18

▶ application for SPE, application for HPLC

Sample Pre-Treatment:

Finely grind 2.0 g of potato chips, place in 20 mL vial and add 10 mL water. Mix using vortex until mixture forms a thick paste. Place sample in centrifuge tubes and centrifuge at 16.1 rcf for 5 min. Extract aqueous portion of sample leaving oil layer and solids.

Condition by stacking Discovery DSC-MCAX SPE tube on top of Discovery DSC-18 SPE tube using an SPE tube adapter. Pass 1 mL methanol, then 1 mL DI H₂O through both SPE tubes until the tubes are dry.

Load 1 mL of aqueous extract through both SPE tubes in series

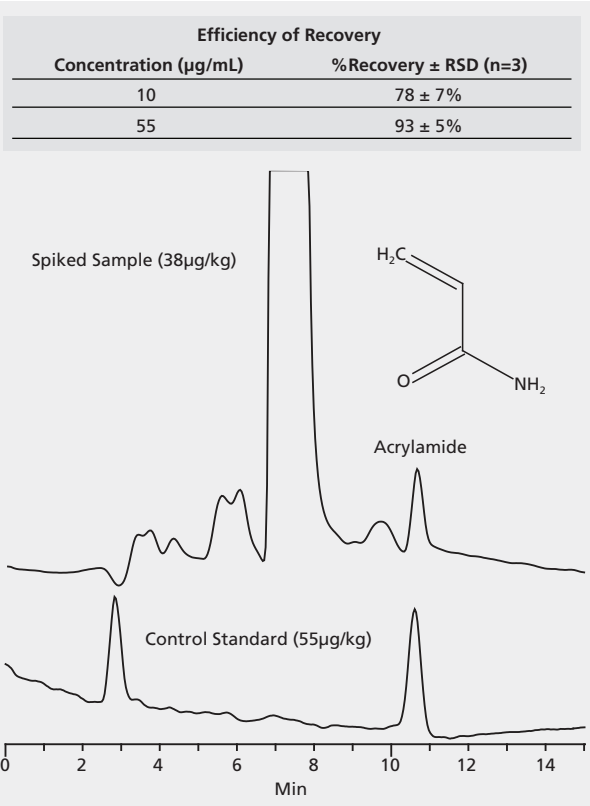
Wash both SPE tubes 1 mL DI H₂O

Elute by first removing upper MCAX SPE tube and passing 2 mL MeOH through lower DSC-18 SPE tube

Evaporate to dryness with N₂ at 30 °C

Reconstitute in 0.5 mL DI H₂O

SPE tube Discovery DSC-MCAX, 300 mg/3mL (52784-U)
 SPE tube Discovery DSC-18, 1g/6mL (52606-U)
 column Discovery HS F5, 15 cm x 4.6 mm I.D., 3 µm particle size (567507-U)
 mobile phase 100% ultra-pure water
 column temp. 35 °C
 detector ESI+
 injection 5 µL
 Application No. G003759



Solid Phase Extraction Applications

FAMES

FAMES

GC Analysis of cis/trans FAMES in Popcorn Oil on the SP™-2560 after Fractionation using Discovery® Ag-ion

► application for SPE, application for GC

Sample Pre-Treatment:

1 g of popcorn oil was scraped from a popped microwave oven popcorn bag, and mixed with 8 mL DI H₂O. The oil/water extract was further extracted with 4 mL petroleum ether, centrifuged to remove particulates, and the ether supernatant was isolated. The petroleum ether extraction step was repeated four times, and the supernatant was combined, evaporated, and reconstituted in 16 mL toluene.

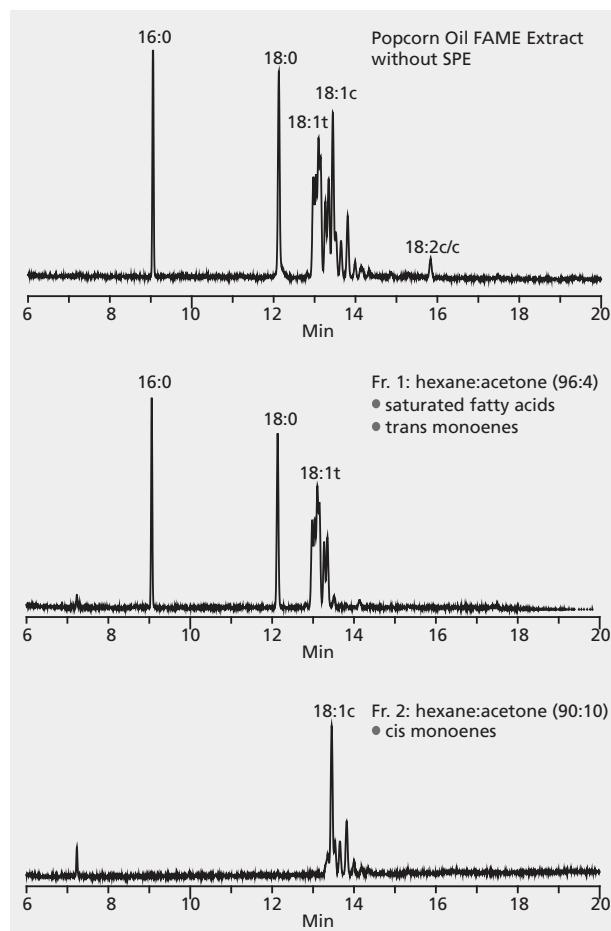
1 mL of the toluene extract was transferred to conical reaction vial to which 2 mL 7% BF₃ in methanol was added. The reaction was incubated at 80 °C for 15 minutes using a heating block and subsequently cooled to room temperature. 1 mL DI H₂O was added, and FAMES were extracted twice using 1 mL hexane each time. The upper hexane layers were combined into a fresh vial, evaporated, and reconstituted with 5 mL hexane and 50 mg anhydrous Na₂SO₄.

Condition SPE tube with 4 mL acetone and 4 mL hexane

Load 1 mL of the hexane FAME extract

Fractionate classes of FAMES by eluting with 6 mL hexane:acetone (96:4, v/v); and 4 mL hexane:acetone (90:10, v/v)

SPE tube Discovery Ag-Ion, 750mg/6mL (54225-U)
 column SP-2560, 75 m x 0.18mm I.D., 0.14 µm (23348-U)
 oven 180 °C isothermal
 inj. temp. 220 °C
 detector FID, 220 °C
 carrier gas hydrogen, 40 cm/sec. at 180 °C
 injection (0.5 µL, 100:1 split)
 liner 0.5 µL, 100:1 split
 Application No. G003760



Solid Phase Extraction Applications

Mycotoxins

Mycotoxins

HPLC Analysis of Aflatoxins in Cornmeal on the SUPELCOSIL™ LC-18 after SPE using Supelclean™ LC-CN

▶ application for SPE, application for HPLC

Sample Pre-treatment:

Cornmeal spiked with aflatoxins (30 ppb G₂ and B₂, 100 ppb G₁ and B₁). Blend 50 g sample for 1 min in 100 mL methanol:H₂O (8:2) and filter.

Condition SPE tube with 2 mL 0.5% aqueous acetic acid

Load 1 mL filtered extract + 4 mL 0.5% aqueous acetic acid

Wash with 0.5 mL 20% THF in 0.5% aqueous acetic acid, then 2 mL hexane

Dry SPE tube with N₂ purge

Wash with 3 mL 25% THF in hexane

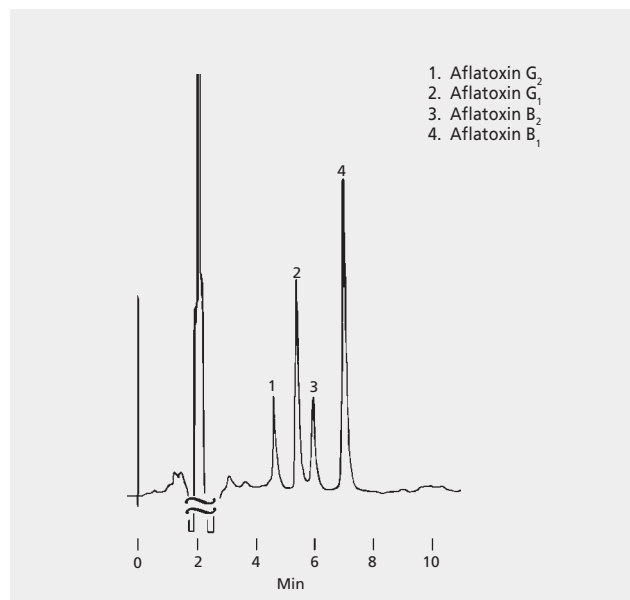
Dry SPE tube for 1 min with N₂ purge

Elute with 2 × 2 mL 1% THF in methylene chloride

Reconstitute with 0.1 mL methanol

Dilute with 0.1 mL 0.5% aqueous acetic acid

SPE tube Supelclean LC-CN, 500 mg/3 mL (57013)
 column SUPELCOSIL LC-18, 25 cm × 4.6 mm I.D., 5 μm with guard column (58298)
 mobile phase MeOH:MeCN:H₂O (22.5:22.5:55)
 flow rate 1.5 mL/min
 detector VIS, 365 nm
 injection 100 μL
 Application No. 713-0874A



Herbicides

HPLC Analysis of Acidic Herbicides in Water on a Polymeric C18 Column after SPE using Supelclean™ ENVI™-Carb

▶ application for SPE, application for HPLC

using Zymark AutoTrace Extraction WorkStation 1.20

Sample Pre-treatment

Fresh 1 L water samples, dechlorinated with sodium thiosulfate when necessary, at ambient temperature and pH

Wash syringe with 8 mL water

Condition SPE tube with 10 mL DI H₂O at 20 mL/min

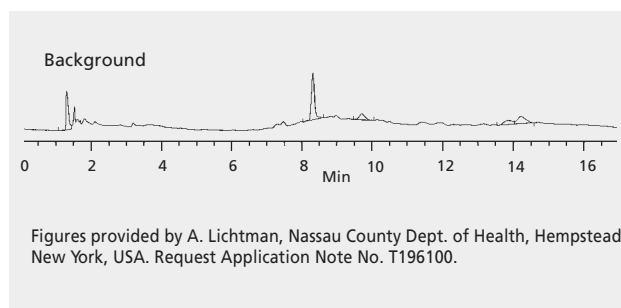
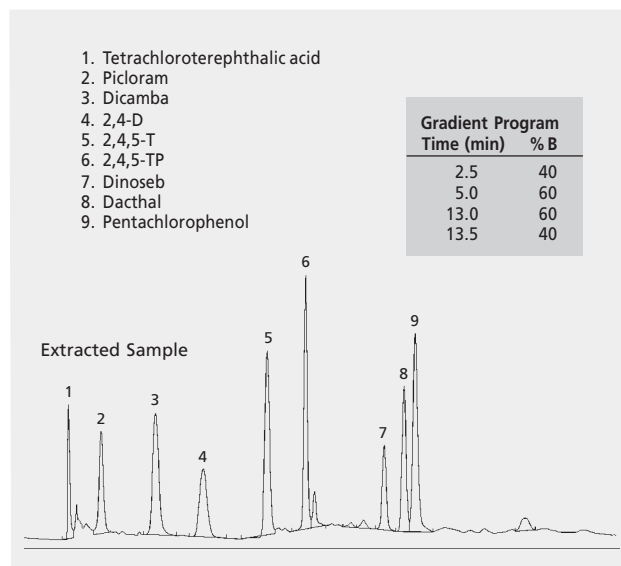
Load 0.9 L water sample at 20 mL/min

Wash SPE tube with 10 mL DI H₂O at 20 mL/min

Dry tube with clean gas for 10 min.

Elute with 10 mL 0.1% phosphoric acid in methylene chloride:MeOH (80:20) at 5 mL/min

SPE tube ENVI-Carb, 250 mg/6 mL (57092)
 column .. polymeric-coated silica-based PAH specialty column, 20 cm × 3 mm I.D., 5 μm (Supelco equivalent, SUPELCOSIL LC-PAH, available upon request)
 mobile phase gradient, A: 0.05% H₃PO₄ in DI H₂O; B: MeCN
 flow rate 0.5 mL/min
 column temp. 50 °C
 detector .. photodiode array- peak width: 0.053 min, sampling interval: 0.320 sec, monitor 210 nm & 225 nm
 injection 10 μL of extract (4-5 ppb each analyte in water)
 Application No. 796-0150



Figures provided by A. Lichtman, Nassau County Dept. of Health, Hempstead, New York, USA. Request Application Note No. T196100.

Solid Phase Extraction Applications

Herbicides

HPLC Analysis of Paraquat and Diquat on the SUPELCOSIL™ LC-18 after SPE using ENVI™-8 DSK

► application for SPE, application for HPLC

Refer to US EPA Method 549.1 for full details

Sample Pre-treatment:

250 mL drinking water, adjust sample pH to 10.5 ± 0.2 with 10% NaOH or 10% HCl

Condition ENVI-8 DSK with 10 mL MeOH; 2 × 10 mL reagent water; 10 mL conditioning solvent A (5 g cetyl trimethyl ammonium bromide and 5 mL conc. NH_4OH in 500 mL DI H_2O , dilute to 1 L); 2 × 10 mL reagent water; 10 mL conditioning solvent B (10 g hexanesulfonic acid, sodium salt and 10 mL conc. NH_4OH in 250 mL DI H_2O , dilute to 500 mL)

Load sample, 100 mL/min.

Elute with 0.5-1.0 mL MeOH (to cover/solvate disk); 2 × 4 mL eluting solution (13.5 mL orthophosphoric acid and 10.3 mL diethylamine in 500 mL DI water, dilute to 1 L)

column SUPELCOSIL LC-18, 15 cm × 4.6 mm I.D., 5 μm (58230-U)
mobile phase .. 3.5 mL triethylamine and 1.0 g 1-hexane-sulfonic acid, sodium salt to 800 mL DI
 H_2O add orthophosphoric acid to pH 2.5, dilute to 1 L

flow rate 1.0 mL/min

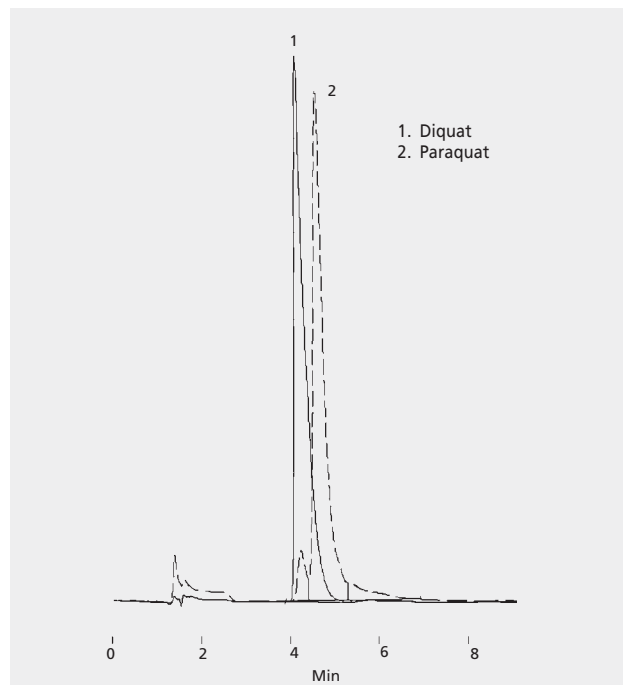
column temp. 35 °C

detector photodiode array, diquat - 308 nm, paraquat - 257 nm

injection 100 μL

sample preparation ENVI-8 DSK, 47 mm (57172)

Application No. 794-0715



Solid Phase Extraction Applications

Herbicides

HPLC Analysis of Triazine Herbicides in Grass on the SUPELCOSIL™ LC-8-DB after SPE using Supelclean™ LC-SCX

▶ application for SPE, application for HPLC

Sample Pre-treatment:

5 g fresh grass clippings spiked with 2 ppm each herbicide. Add 4 g anhydrous Na₂SO₄ and 20 mL methylene chloride:acetone (80:20). Shake 20 min and allow mixture to stand 1 min.

Condition SPE tube with 1mL methylene chloride

Load 2 mL glass extract

Wash with 2 × 2 mL acetonitrile

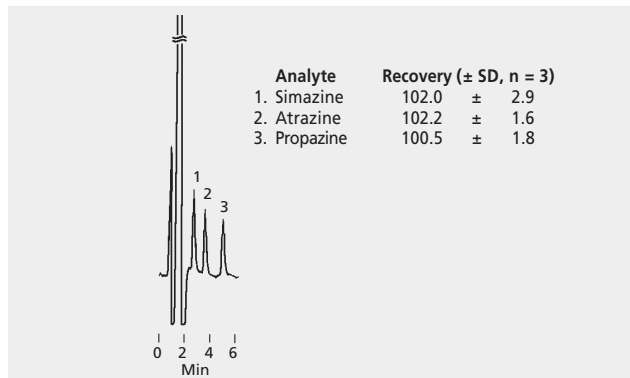
Dry packing for 5 min. under nitrogen purge

Wash with 2 × 2 mL DI H₂O

Elute with 1.5 mL methanol

Dilute to 2 mL with DI water

SPE tube Supelclean LC-SCX, 500 mg/3 mL (57018)
 column SUPELCOSIL LC-8-DB, 15 cm × 4.6 mm I.D., 5 μm with guard column (58347)
 mobile phase acetonitrile:water (45:55)
 flow rate 1.5 mL/min
 detector UV, 254 nm
 injection 100 μL
 Application No. 84-109



Solid Phase Extraction Applications

PCBs

PCBs

GC Analysis of PCBs in Transformer Oil on a 5% Phenyl Column after SPE using Supelclean™ Sulfoxide

▶ application for SPE, application for GC

Sample Pre-treatment:

Commercial insulation oil (Japan Industrial Standard JIS C2320-1999, insulating oil, Class 1-2/4, paraffin oil) was spiked with a Kanechlor PCB mix at the total levels of 3.7 ppm (mg/kg) and diluted with hexane (1:1 v/v).

Condition the SPE phase with 20 mL acetone (removes residual moisture from the phase).

Equilibrate the SPE phase with 40 mL of hexane.

Load 0.4 mL diluted oil sample.

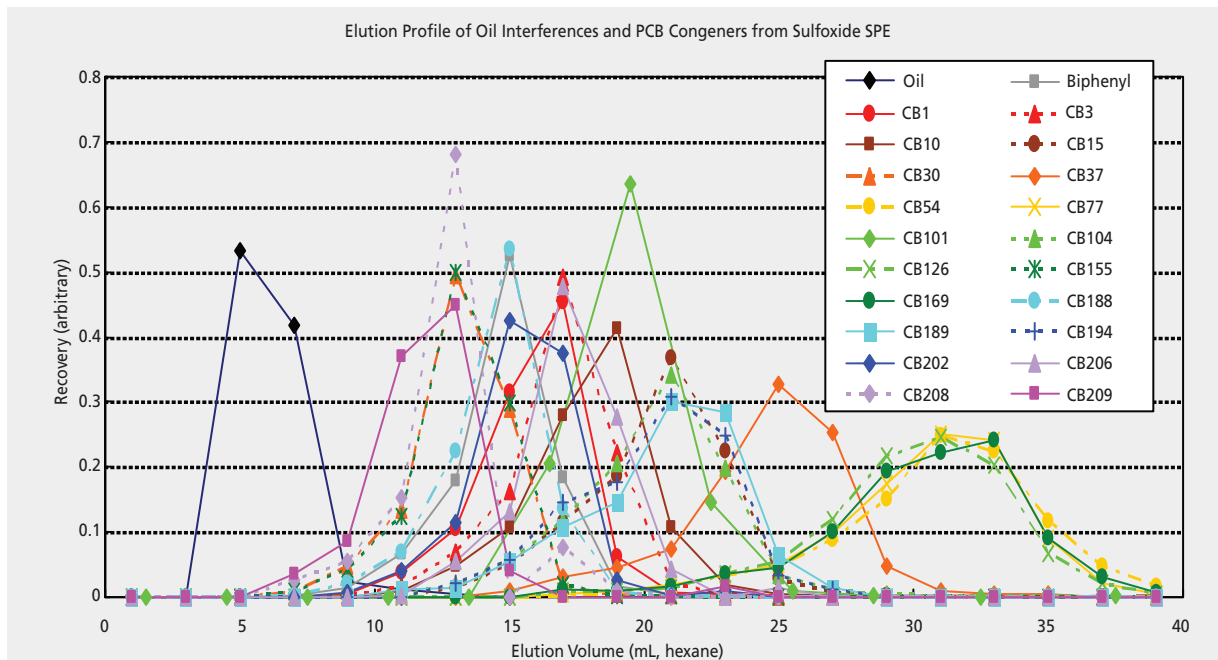
Elute aliphatic hydrocarbons (oil interferences) with 12 mL hexane

Elute PCBs with 25 mL hexane

Collect PCB fraction and concentrate under nitrogen for subsequent GC-QMS analysis (1)

(1) Numata et al. Anal. Chem. 2003, 75, 1450-1457

SPE tube Supelclean Sulfoxide SPE Tube, Glass 6 g/20 mL (55252-U)
 column 5% phenyl/ 95% methylpolysiloxane column
 detector QMS (For full method details, please see reference (1))
 Application No. G004220



Observed Concentrations of PCB Homologues of a PCB-fortified Insulation Oil Sample (n = 3).

		mono-CBs	di-CBs	tri-CBs	tetra-CBs	penta-CBs	hexa-CBs	hepta-CBs	octa-CBs	nona-CBs	deca-CBs	total CBs
Conc. mg/kg	Mean	0.045	0.29	0.80	0.87	0.90	0.35	0.55	0.13	nd	nd	3.9
	SD	0.003	0.05	0.08	0.06	0.08	0.002	0.01	0.004	-	-	0.13
Recovery %	Mean	102	91	92	108	106	95	97	97	95	9	-
	SD	5.2	2.6	5.1	5.4	6.8	2.8	2.7	3.3	1.2	3.4	-

Solid Phase Extraction Applications

PCBs

GC Analysis of PCBs in Transformer and Waste Oil on the SPB®-5 after SPE using Supelclean™ LC-Si and LC-Florisil®

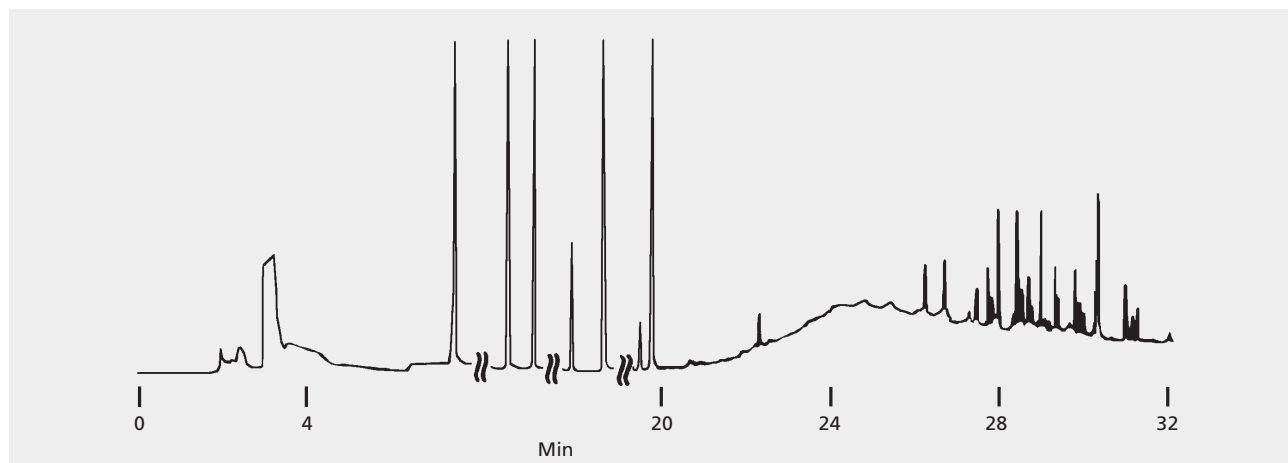
▶ application for SPE, application for GC

Sample Pre-treatment:

Used transformer oil containing 50 ppb Aroclor 1254

Connect Supelclean LC-Si SPE tube (1 g/6 mL) in series to male luer outlet of Supelclean LC-Florisil SPE tube (1 g/6 mL) using an SPE Tube Adapter (57020-U).**Condition** upper Florisil tube with 0.5 mL isooctane**Apply** up to 0.2 g transformer oil or 0.1 g waste oil to upper frit of Florisil SPE tube**Pass** 5 × 2 mL isooctane through both Florisil and LC-Si SPE tubes. Oil interferences will be retained on SPE tubes whereas PCBs will elute with isooctane fractions.**Collect** and combine isooctane fractions using 10 mL volumetric flask.**Analyze** isooctane extract using GC-ECD

SPE tube	Supelclean LC-Si, 1.0 g/6 mL (57051)
SPE tube	Supelclean LC-Florisil, 1.0 g/6 mL (57057)
column	SPB-5, 30 m × 0.32 mm I.D., 0.25 µm film (24048)
oven	40 °C (4 min) to 300 °C at 10 °C/min, hold 5 min
detector	ECD
carrier gas	nitrogen
injection	1 µL, splitless (30 sec delay), then split (50:1)
Application No.	713-0854



Solid Phase Extraction Applications

Pesticides

Pesticides

GC Analysis of Chlorinated Pesticides in Drinking Water on the PTE™-5 after SPE using Supelclean™ ENVI-18

► application for SPE, application for GC

Sample Pre-treatment:

Drinking water spiked with pesticides

Condition SPE tube with 2 × 6 mL hexane:ethyl ether (1:1) and 6 mL MeOH

Equilibrate with 6 mL DI H₂O

Load 250 mL water sample, 10 mL/min

Dry SPE tube for 10 min with vacuum pressure

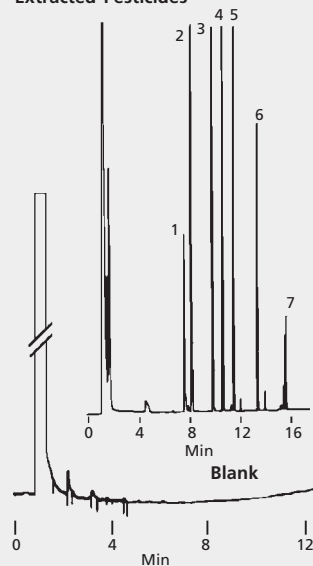
Elute with 2 × 1.5 mL hexane:ethyl ether (1:1)

Concentrate to 2 mL with N₂ stream

SPE tube Supelclean ENVI-18, 500 mg/6 mL (57064)
 column PTE-5, 30 m × 0.25 mm I.D., 0.25 µm film (24135-U)
 oven 150 °C (2 min) to 275 °C at 10 °C/min
 detector ECD, 310 °C
 carrier gas helium
 injection 1 µL
 Application No. 713-1192

Analyte	% Recovery (± CV)
1. Hexachlorobenzene	87 ± 11
2. γ-BHC (Lindane)	99 ± 13
3. Heptachlor	96 ± 12
4. Aldrin	94 ± 13
5. Heptachlor epoxide	98 ± 13
6. Endrin	93 ± 11
7. Methoxychlor	110 ± 13

Extracted Pesticides



Solid Phase Extraction Applications

Pesticides

GC Analysis of Multiresidue Pesticides in Spinach on the Equity®-1 after SPE using Supelclean™ ENVI-Carb-II/PSA

► application for SPE, application for GC

Sample Pre-treatment:

10 g of fresh spinach was spiked at the level of 0.2 ppm for each pesticide. The mixture was homogenized with 10 mL acetonitrile. The extract was evaporated to 1 mL.

Condition SPE tube with 5 mL acetonitrile:toluene (3:1, v/v)

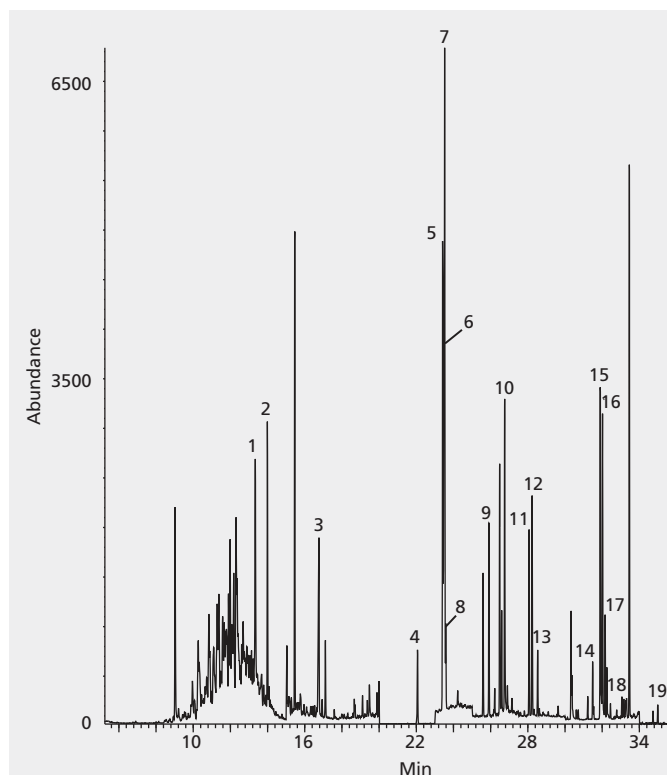
Load 1 mL concentrated extract sample

Elute with 20 mL acetonitrile:toluene (3:1, v/v)

Evaporate eluate to dryness with N₂ at 40 °C

Reconstitute in 1 mL acetone:hexane (1:1, v/v)

SPE tube Supelclean ENVI-Carb-II/PSA, 500mg/300mg/6mL (55119-U)
 column Equity-1, 30 m x 0.25 mm I.D., 0.25 µm (28046-U)
 oven 50 °C (5 min.), 25 °C/min. to 125 °C, 10 °C/min. to 30 °C (8 min.)
 inj. temp. 200 °C, aux: 325 °C (8 min.)
 detector MSD, scan range 45-450 amu
 carrier gas helium, 0.9 mL/min., constant flow mode
 injection 1 µL, splitless (splitter open at 1 min.)
 liner 4 mm I.D., single taper
 Application No. G003758



- | | |
|--------------------------|--------------------------|
| 1. Methamidophos | 11. Chlorothiophos |
| 2. Dichlorovos | 12. Tetrasul |
| 3. Acephate | 13. Endosulfan sulfate |
| 4. Quintozene | 14. Acrinathrin |
| 5. Methyl parathion | 15. Bitertanol |
| 6. Carbaryl | 16. cis-Permethrin |
| 7. Methyl chloropyriphos | 17. trans-Permethrin |
| 8. Vinclozolin | 18. Cypermethrin isomers |
| 9. Procymidone | 19. Deltamethrin |
| 10. Imazalil | |

Peak ID	Compound	Efficiency of Recovery	
		Pesticide Class	Pesticide Recovery (%)
1	Methamidophos	Organophosphorous	80
2	Dichlorovos	Organophosphorous	70
3	Acephate	Organophosphorous	60
4	Quintozene	Organochloride	92
5	Methyl parathion	Organophosphorous	97
6	Carbaryl	Carbamate	128
7	Methyl chloropyriphos	Organophosphorous	99
8	Vinclozolin	Organochloride	83
9	Procymidone	Dicarboximide	84
10	Imazalil	Imidazole	104
11	Chlorothiophos	Phophosulfi de	106
12	Tetrasul	Organochloride	87
13	Endosulfan sulfate	Organochloride	124
14	Acrinathrin	Organophosphorous	118
15	Bitertanol	Biphenol	108
16	Permethrin cis and trans	Pyrethroid	82
17	Cypermethrin isomers	Organochloride	74
18	Deltamethrin	Organobromine	134

Solid Phase Extraction Applications

Pesticides

HPLC Analysis of Nonvolatile Pesticides in Water on the SUPELCOSIL™ LC-18-DB after SPE using Supelclean™ ENVI-Carb™

► application for SPE, application for HPLC

Sample Pre-treatment:

Water spiked with pesticides (10-50 µg/L each component)

Condition SPE tube with 5 mL methylene chloride:MeOH (80:20) and 1 mL MeOH

Equilibrate with 10 mL 2% acetic acid in water (keep bed moist until sample addition)

Load 100 mL water sample, 5 mL/min

Dry SPE bed 1 min. with vacuum pressure

Elute pesticides with 0.8 mL MeOH and 2 × 3.5 mL methylene chloride: MeOH (80:20)

Dry Eluate to 500 µL under gentle N₂ stream

Reconstitute to 1 mL with MeOH

SPE tube Supelclean ENVI-Carb, 250 mg/3 mL (57088)
 column SUPELCOSIL LC-18-DB, 25 cm × 4.6 mm I.D., 5 µm (58355-U)
 mobile phase .. A: water:acetonitrile (90:10), B: acetonitrile; gradient 80% A for 5 min then to 30%
 A over 30 min

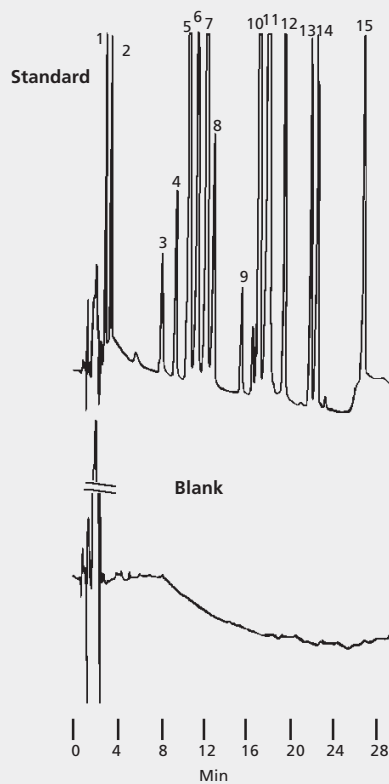
flow rate 1.5 mL/min

detector UV, 220 nm

injection 20 µL

Application No. 85-438

Analyte	% Recovery (± RSD, n = 5)
1. Oxamyl	111 ± 9.6
2. Methomyl	105 ± 5.0
3. N-1-Naphthylthiourea	—
4. Aldicarb	92 ± 0.8
5. Simazine	91 ± 6.5
6. Monuron	99 ± 3.2
7. Cyanazine	90 ± 5.4
8. Metribuzin	97 ± 3.9
9. Carbofuran	106 ± 6.2
10. Atrazine	89 ± 5.7
11. Carbaryl	97 ± 3.5
12. Diuron	88 ± 5.7
13. Propham	95 ± 3.2
14. Propachlor	96 ± 3.8
15. Linuron	88 ± 5.4



Solid Phase Extraction Applications

PAHs, Phenols, and Semivolatiles

PAHs, Phenols, and Semivolatiles

GC Analysis of PAHs in Water on the PTE™-5 after SPE using Supelclean™ ENVI-18

▶ application for SPE, application for GC

Sample Pre-treatment:

Water spiked with PAHs

Condition SPE tube with 2 × 6 mL toluene:MeOH (10:1); 6 mL MeOH

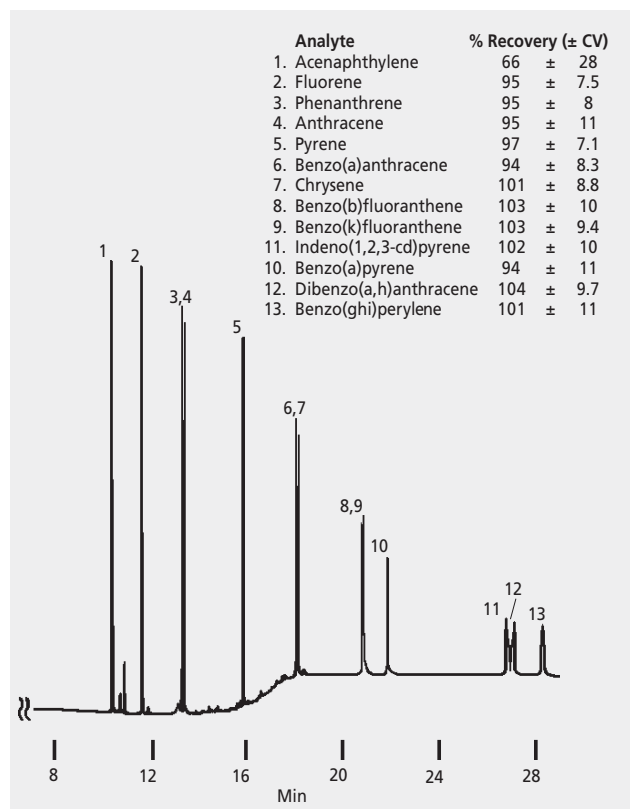
Equilibrate with 6 mL DI H₂O

Load 250 mL water sample, 10 mL/min

Dry for 10 min under vacuum pressure

Elute with 2 × 1 mL toluene:MeOH (10:1)

SPE tube Supelclean ENVI-18, 500 mg/6 mL (57064)
 column PTE-5, 30 m × 0.25 mm I.D., 0.25 µm film (24135-U)
 oven 70 °C (2 min) to 280 °C at 8 °C/min
 detector FID, 310 °C
 carrier gas helium
 injection 1 µL
 Application No. 80-207



GC Analysis of Phenols in Water on the PTE™-5 QTM after SPE using Supelclean™ ENVI-Chrom P

▶ application for SPE, application for GC

Sample Pre-treatment:

Water spiked with phenols

Condition SPE tube with 6 mL methyl t-butyl ether or ethyl acetate; 6 mL MeOH

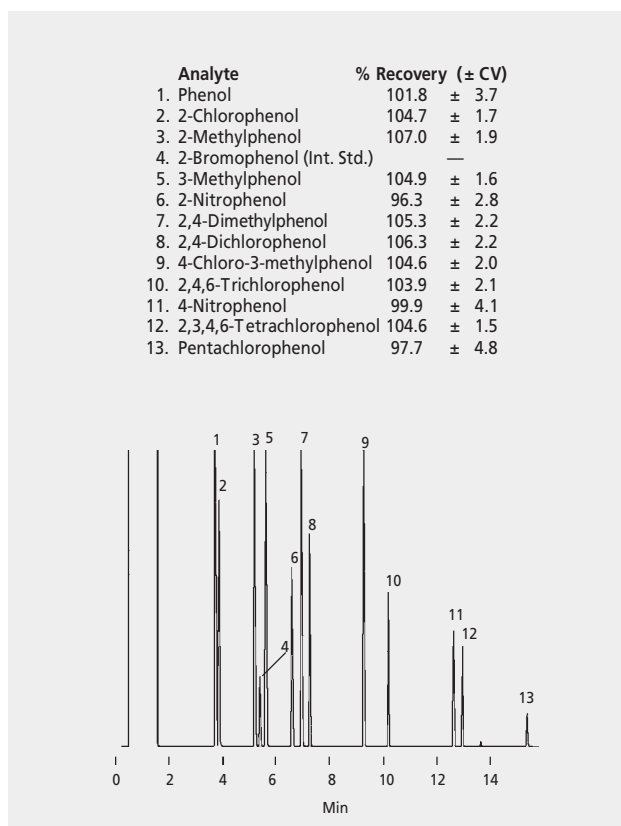
Equilibrate with 6 mL DI H₂O

Load 100 mL water sample

Dry for 10 min using vacuum pressure

Elute with 5 mL methyl t-butyl ether or ethyl acetate dropwise allowing initial 2 mL to soak in SPE bed

SPE tube Supelclean ENVI-Chrom P, 250 mg/6 mL (57225-U)
 column PTE-5 QTM, 15 m × 0.53 mm I.D., 0.5 µm film (25355)
 oven 65 °C to 185 °C at 10 °C/min, hold 1 min, then to 275 °C at 20 °C/min, hold 5 min
 detector FID, 300 °C
 carrier gas helium
 injection 1 µL, splitless (45 sec hold)
 Application No. 712-0073



Solid Phase Extraction Applications

PAHs, Phenols, and Semivolatiles

GC Analysis of Semivolatiles in Water on a 5% Pheny Column after SPE using ENVI-18 DSK

► application for SPE, application for GC

Sample Pre-treatment:

Adjust 1 L drinking to pH <2 with 6 N HCl. Add 5 mL MeOH and mix thoroughly

Condition SPE disk with 5 mL dichloromethane (pull DCM completely through disk) and 5 mL MeOH

Equilibrate with 5 mL DI H₂O

Load water sample, 100 mL/min

Elute with 2 x 5 mL MeCN rinsing internal chamber of sample reservoir thoroughly

SPE tube ENVI-18 DSK SPE Disk, 47 mm (57171)
column .. 5% diphenyl/95% dimethyl silicone capillary, 30 m x 0.25 mm I.D., 0.25 µm film (Supelco equivalent, Equity-5, 28089-U)

oven 40 °C to 160 °C (3 min), then to 300 °C (3 min) at 6 °C/min

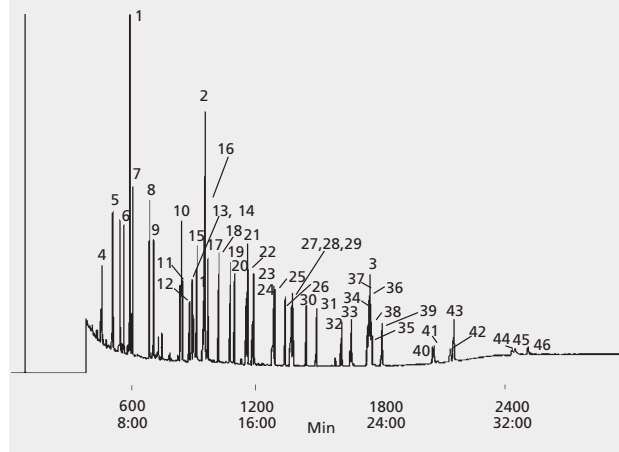
detector MS, scan range m/z = 45-450

carrier gas helium, 33 cm/sec

injection 1 µL split/splitless, 1 min delay

Application No. 749-0798

	µg/L*		g/L*
1. Acenaphthene-d ₁₀	5.0	24. Heptachlor epoxide	2.0
2. Phenanthrene-d ₁₀	5.0	25. 2,2',3',4,6-Pentachlorobiphenyl	2.0
3. Chrysene-d ₁₂	5.0	26. γ-Chlordane	2.0
4. Hexachlorocyclopentadiene	2.0	27. Pyrene	2.0
5. Dimethylphthalate	2.0	28. α-Chlordane	2.0
6. Acenaphthylene	2.0	29. trans-Nonachlor	2.0
7. 2-Chlorobiphenyl	2.0	30. 2,2',4,4',5,6'-Hexachlorobiphenyl	2.0
8. Diethylphthalate	2.0	31. Endrin	2.0
9. Fluorene	2.0	32. Butylbenzylphthalate	2.0
10. 2,3-Dichlorobiphenyl	2.0	33. di(2-ethylhexyl)Adipate	2.0
11. Hexachlorobenzene	2.0	34. 2,2',3',4,4',6-Heptachlorobiphenyl	2.0
12. Simazine	2.0	35. Methoxychlor	2.0
13. Atrazine	2.0	36. 2,2',3',4,5',6,6'-Octachlorobiphenyl	2.0
14. Pentachlorophenol	8.0	37. Benzo(a)anthracene	2.0
15. γ-BHC	2.0	38. Chrysene	2.0
16. Phenanthrene	2.0	39. Di(2-ethylhexyl)phthalate	2.0
17. Anthracene	2.0	40. Benzo(b)fluoranthene	2.0
18. 2,4,5-Trichlorobiphenyl	2.0	41. Benzo(k)fluoranthene	2.0
19. Alachlor	2.0	42. Benzo(a)pyrene	2.0
20. Heptachlor	2.0	43. Perylene-d ₁₂	5.0
21. di-n-Butylphthalate	2.0	44. Indeno(1,2,3-cd)Pyrene	2.0
22. 2,2',4,4'-Tetrachlorobiphenyl	2.0	45. Dibenz(a,h)anthracene	2.0
23. Aldrin	2.0	46. Benzo(ghi)perylene	2.0





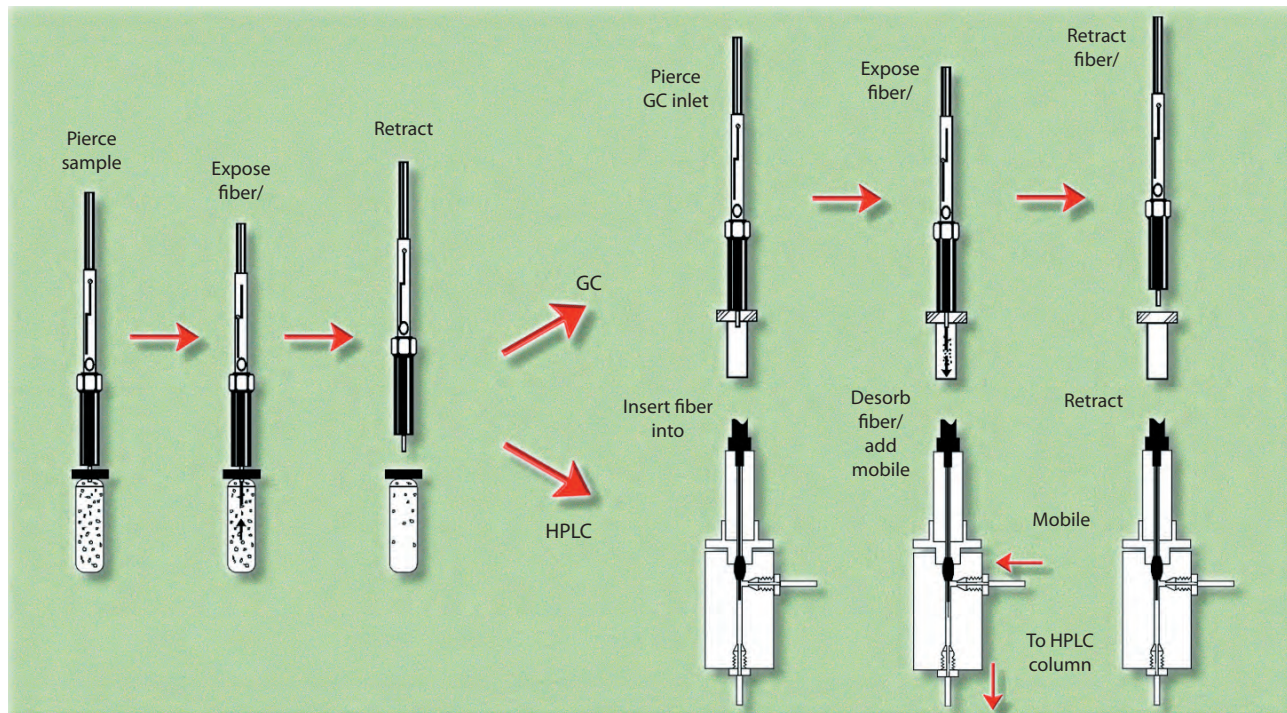
SOLID PHASE MICROEXTRACTION

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Introduction to SPME

Introduction to SPME

Solid Phase Microextraction: A Simple Sample Extraction Process



The extraction of organic compounds from a sample matrix usually consists of purge-and-trap or headspace methods for concentrating volatiles; and liquid-liquid extraction, solid phase extraction, or supercritical fluid extraction for semivolatiles and nonvolatiles. These methods have various drawbacks, including high cost and excessive preparation time. A unique sample preparation technique, SPME, eliminates most drawbacks to extracting organics.

SPME requires no solvents or complicated apparatus. It can concentrate volatile and nonvolatile compounds, in both liquid and gaseous samples, for analysis by GC, GC-MS, or HPLC.

SPME offers some important advantages:

- Fast – reduces sample preparation time by 70%
- Solvent reduction – minimizes the use of solvents, and their disposal
- Economical and reusable – more than 50 extractions per fiber on average
- Versatile – adapts to any GC or HPLC system, can be automated

An SPME unit consists of a length of fused silica fiber coated with a polymer material, in some cases mixed with a solid adsorbent (e.g., a divinylbenzene polymer or porous carbon). The fiber is attached to a stainless steel plunger sheathed by a protective needle.

The SPME operating steps are simple:

Sample Extraction

- With the fiber retracted, pass the needle through the sample vial septum.
- Depress the plunger to expose the fiber to the liquid sample or the headspace above the sample.
- Analytes adsorb to the fiber in 2 to 30 minutes.
- Retract the fiber into the needle and remove the needle from the sample vial.

GC Analysis

- Insert the needle into the GC injector port.
- Depress the plunger, exposing the fiber in the heated zone of the injector to desorb the analytes onto the column.
- Retract the fiber and remove the needle.

HPLC Analysis

- Insert the needle into the SPME/HPLC interface desorption chamber (injection valve in load position).
- Expose the fiber and close the sealing clamp.
- Switch the injection valve to "inject." Mobile phase will flow through the chamber, desorb the analytes and carry them to the column.
- Switch the injection valve to "load," retract the fiber, and remove the needle.

Introduction to SPME

**Choose a Fiber According to the Analytes You Want to Extract**

In SPME, you can adsorb analytes from a liquid sample, by immersion or headspace extraction, or a solid sample, by headspace extraction, using a polymer-coated fused silica fiber. Analytes are desorbed from the fiber by exposing the fiber in the injection port of a GC or in the desorption chamber of an SPME/HPLC interface.

Determine the type of fiber you need according to the molecular weights and polarity of the analytes.

- Low molecular weight or volatile compounds usually require a 100 μm polydimethylsiloxane (PDMS)-coated fiber.
- Larger molecular weight or semivolatile compounds are more effectively extracted with a 30 μm PDMS fiber or a 7 μm PDMS fiber.
- To extract very polar analytes from polar samples, use an 85 μm polyacrylate-coated fiber.
- More volatile polar analytes, such as alcohols or amines, are adsorbed more efficiently and released faster with a 65 μm polydimethylsiloxane/divinylbenzene (PDMS/DVB)-coated fiber.
- A 60 μm PDMS/DVB fiber is a general purpose fiber for HPLC.
- For trace-level volatiles analysis, use a 75 μm PDMS/ Carboxen[®] fiber.
- For an expanded range of analytes (C3-C20), use a 50/30 divinylbenzene/ Carboxen[®] on PDMS fiber.

Some typical applications for SPME are:

- Environmental analyses of water samples
- Headspace analysis of trace impurities in polymers and solid samples
- ppt odor analyses
- Flavor analyses of food products
- Forensic analyses of arson/explosives samples
- Toxicology analyses: blood alcohol or drugs in urine/serum
- Surfactants, other industrial applications

Most of these fibers are compatible with HPLC solvents, but the 100 μm and 30 μm PDMS-coated fibers cannot be used with hexane.

SPME fiber holders are available in two versions, one for manual use and one for use with autosamplers or with our SPME/HPLC interface. Both versions include the following features:

- A handtight needle hub assembly for quick interchange of fibers.
- A window in the barrel, to identify the fiber by its color-coded hub.

The manual holder has an adjustable needle gauge that controls the depth of fiber introduction into the sample vial or injection port. A spring retracts the fiber into the protective needle and a locking mechanism secures the fiber in the exposed position during extraction or desorption.

The automated holder is similar in design to the manual version. The autosampler controls fiber movement, allowing automatic sample extraction. The automated holder also is required for use with an SPME/HPLC interface.

A specialized type of manual SPME holder, the SPME portable sampler, allows you to concentrate organics from air or water, in the field, then store them for transport to the laboratory.



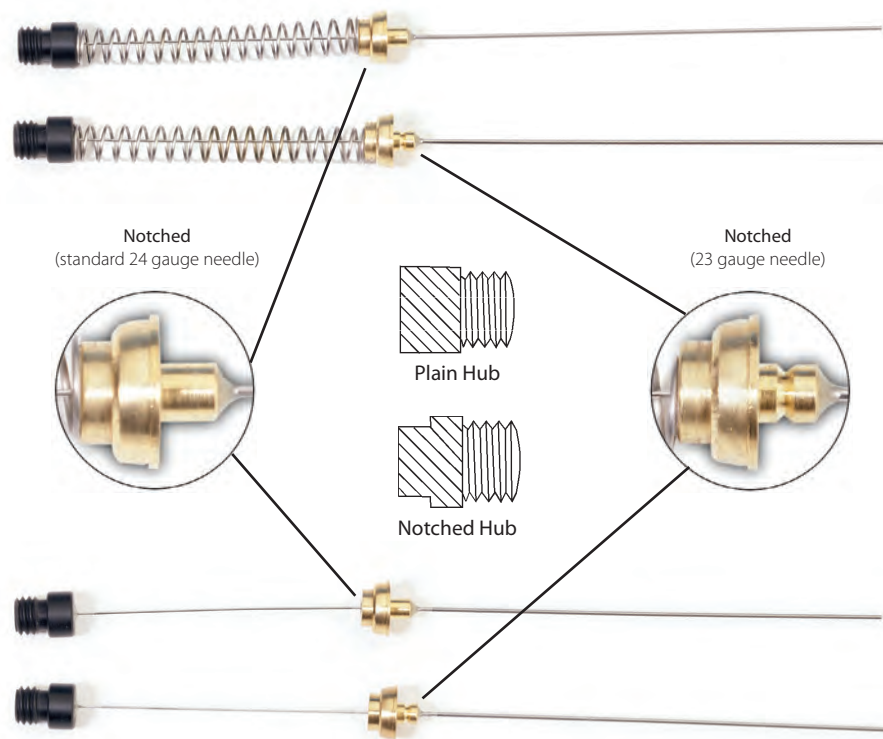
High Recovery vial

Fiber Selection Guide

Analyte Type (Molecular Weight)	Recommended Fiber
Gases and low molecular weight compounds (MW 30-225)	75 μm /85 μm Carboxen/polydimethylsiloxane
Volatiles (MW 60-275)	100 μm polydimethylsiloxane
Volatiles, amines and nitro-aromatic compounds (MW 50-300)	65 μm polydimethylsiloxane/divinylbenzene
Polar semi-volatiles (MW 80-300)	85 μm polyacrylate
Non-polar high molecular weight compounds (MW 125-600)	7 μm polydimethylsiloxane
Non-polar semi-volatiles (MW 80-500)	30 μm polydimethylsiloxane
Alcohols and polar compounds (MW 40-275)	60 μm Carbowax (PEG)
Flavor compounds: volatiles and semi-volatiles, C3-C20 (MW 40-275)	50/30 μm divinylbenzene/Carboxen on polydimethylsiloxane on a StableFlex fiber
Trace compound analysis (MW 40-275)	50/30 μm divinylbenzene/Carboxen on polydimethylsiloxane on a 2 cm StableFlex fiber
Amines and polar compounds (HPLC use only)	60 μm polydimethylsiloxane/divinylbenzene

Introduction to SPME

Fiber Assembly Used with SPME Holder 57330-U (For Manual Use)



Fiber Assembly Used with SPME Holders 57331 and 57347-U

Fiber Assemblies and Holders

SPME Metal alloy fiber assemblies

The SPME metal alloy fiber assemblies are manufactured with a flexible metal alloy used in the needle, plunger, and fiber core. The new metal alloy design includes a thicker, flexible plunger that is much less likely to kink or break, and helps to reinforce the needle especially when used in an auto-sampler with a sample agitator. Since the needle is more flexible and has a thinner wall than the standard stainless steel needle, a bevel has been placed on the needle to help it pierce septa materials more easily. As a result of this thinner needle wall and beveled tip, septa coring will occur more frequently requiring the use of the Merlin Microseal™ or similar septum-less sealing system. The alloy used in the metal fiber assemblies does not contain any iron and is more inert than stainless steel.

Coating	For Use With	Needle	Hub	Material	Cat. No.	Qty
SPME fiber assembly Polydimethylsiloxane (PDMS)						
100 µm	autosampler	23 ga	red plain	metal alloy	57928-U	1 ea
SPME fiber assembly Divinylbenzene/Carboxen/Polydimethylsiloxane (DVB/CAR/PDMS)						
50/30 µm	autosampler	23 ga	gray plain	metal alloy	57914-U	1 ea
50/30 µm	autosampler	23 ga	gray plain	metal alloy	57912-U	1 ea
SPME fiber assembly Polydimethylsiloxane/Divinylbenzene (PDMS/DVB)						
65 µm	autosampler	23 ga	pink plain	metal alloy	57902-U	1 ea
SPME fiber assembly Carboxen/Polydimethylsiloxane(CAR/PDMS)						
85 µm	autosampler	23 ga	light blue plain	metal alloy	57906-U	1 ea

SPME Fiber Assemblies

SPME fiber assemblies can be reused for up to 100 analyses, or more, depending on the application and the care they are given. For reuse, simply condition with heat before and after every analysis. Solvent can be used for HPLC applications or when heat does not sufficiently clean the fiber. Each assembly has a color-coded or notched hub indicating the type of coating on the fiber. Choose the assembly that is appropriate for the holder: manual or autosampler/HPLC. First time SPME users must order both a holder and a fiber assembly. The key to proper SPME performance is fiber selection, below are some guidelines for choosing the proper fiber.

Fiber Assemblies and Holders

Coating type and thickness

As a first step, identify the type and molecular weight range of the analytes to be extracted. Higher molecular weight compounds desorb easier from the 7 μ m or 30 μ m PDMS adsorption fiber coatings compared to the 100 μ m PDMS or adsorbent fibers (see Table A). Smaller molecules are retained in the pores of the fibers containing adsorbents in the coating; e.g. Carboxen, divinylbenzene particles. Further, refine your choice by matching the fiber coating relative to analyte polarity.

Needle gauge

The SPME fiber is protected by the needle during insertion through the septum and when not exposed for sampling. The original SPME fibers were manufactured with 24 gauge needles, and these continue to work very well for manual sampling. More recently we have developed SPME fibers with 23 gauge needles and highly recommend the 23 gauge be used for all applications utilizing an autosampler. The 23 gauge needles also work well with the Merlin Microseal septum system, as well as other septum-less seals. Try to avoid using the 23 gauge needles with standard silicone septa, as they may core the septum.

Fiber core material

SPME fibers were first coated on a fused silica core. More recently the StableFlex SPME fibers have been improved by applying the coating on a flexible fused silica core. The coating partially bonds to the flexible core which results in a more stable coating and a less breakable fiber. The extraction selectivity of StableFlex fibers however may be slightly different from the same coating on a standard fused silica core.

Coating	For Use With	Needle	Hub	Material	Cat. No.	Qty
SPME fiber assembly Carboxen/Polydimethylsiloxane(CAR/PDMS)						
75 μ m	manual holder	24 ga	black plain	fused silica	57318	3 ea
75 μ m	manual holder	23 ga	black plain	fused silica	57344-U	3 ea
75 μ m	autosampler	24 ga	black plain	fused silica	57319	3 ea
75 μ m	autosampler	23 ga	black plain	fused silica	57343-U	3 ea
85 μ m	manual holder	24 ga	light blue plain	StableFlex	57334-U	3 ea
85 μ m	autosampler	24 ga	light blue plain	StableFlex	57335-U	3 ea
85 μ m	autosampler	23 ga	light blue plain	StableFlex	57295-U	3 ea
SPME fiber assembly Polydimethylsiloxane (PDMS)						
100 μ m	manual holder	24 ga	red plain	fused silica	57300-U	3 ea
30 μ m	manual holder	24 ga	yellow plain	fused silica	57308	3 ea
100 μ m	autosampler	24 ga	red plain	fused silica	57301	3 ea
30 μ m	autosampler	24 ga	yellow plain	fused silica	57309	3 ea
7 μ m	autosampler	24 ga	green plain	fused silica	57303	3 ea
100 μ m	autosampler	23 ga	red plain	fused silica	57341-U	3 ea
7 μ m	manual holder	24 ga	green plain	fused silica	57302	3 ea
100 μ m	manual holder	23 ga	red plain	fused silica	57342-U	3 ea
7 μ m	autosampler	23 ga	green plain	fused silica	57291-U	3 ea
30 μ m	autosampler	23 ga	yellow plain	fused silica	57289-U	3 ea
SPME fiber assembly Polydimethylsiloxane/Divinylbenzene (PDMS/DVB)						
65 μ m	manual holder	24 ga	blue plain	fused silica	57310-U	3 ea
65 μ m	manual holder	23 ga	blue plain	fused silica	57346-U	3 ea
65 μ m	autosampler	24 ga	blue plain	fused silica	57311	3 ea
60 μ m	autosampler/HPLC	24 ga	brown notched	StableFlex	57317	3 ea
65 μ m	autosampler	23 ga	blue plain	fused silica	57345-U	3 ea
65 μ m	manual holder	24 ga	pink plain	StableFlex	57326-U	3 ea
65 μ m	autosampler	24 ga	pink plain	StableFlex	57327-U	3 ea
65 μ m	autosampler	23 ga	pink plain	StableFlex	57293-U	3 ea
SPME fiber assembly polyacrylate (PA)						
85 μ m	manual holder	24 ga	white plain	fused silica	57304	3 ea
85 μ m	autosampler	24 ga	white plain	fused silica	57305	3 ea
85 μ m	autosampler	23 ga	white plain	fused silica	57294-U	3 ea
SPME fiber assembly Divinylbenzene/Carboxen/Polydimethylsiloxane (DVB/CAR/PDMS)						
50/30 μ m	manual holder	24 ga	gray plain	StableFlex	57328-U	3 ea
50/30 μ m	autosampler	24 ga	gray plain	StableFlex	57329-U	3 ea
50/30 μ m	manual holder/ autosampler	24 ga	gray notched	StableFlex (2 cm)	57348-U	3 ea
50/30 μ m	autosampler	23 ga	gray plain	StableFlex	57298-U	3 ea
50/30 μ m	manual holder/ autosampler	23 ga	gray notched	StableFlex	57299-U	3 ea
SPME fiber assembly, Carbowax-Polyethylene Glycol (PEG) Coating						
60 μ m	autosampler	23 ga	purple plain	metal alloy	57354-U	3 ea
60 μ m	manual holder	23 ga	purple plain	metal alloy	57355-U	3 ea

Fiber Assemblies and Holders

SPME PTFE Sealing Caps

▶ for use with 23 GA fibers

Sealing caps protect the SPME fiber assembly from accidental damage to the needle tip and from contamination by dust and dirt. The caps also provide an airtight seal which protects the 23 gauge SPME fibers from contamination or loss of analytes when using adsorbent fiber coatings. PTFE

57454-U

3 ea

SPME Fiber Assortment Kits

For Use With	Needle	Cat. No.	Qty
SPME StableFlex™ fiber assortment kit			
manual holder	24 ga	57550-U	1 kit
autosampler	24 ga	57551-U	1 kit
autosampler	23 ga	57284-U	1 kit
SPME fiber assortment kit 1			
manual holder	24 ga	57306	1 kit
autosampler	24 ga	57307	1 kit
autosampler	23 ga	57285-U	1 kit
SPME fiber assortment kit 2			
manual holder	24 ga	57320-U	1 kit
autosampler	24 ga	57321-U	1 kit
autosampler	23 ga	57286-U	1 kit
SPME fiber assortment kit 3			
autosampler	24 ga	57323-U	1 kit
SPME fiber assortment kit 4			
manual holder	24 ga	57324-U	1 kit
autosampler	24 ga	57325-U	1 kit
autosampler	23 ga	57287-U	1 kit
SPME fiber assortment kit 5			
autosampler	23 ga	57362-U	4 ea

The SPME fiber assortment kits consist of 1 fiber each of the types listed below.

SPME StableFlex Fiber Assortment Kit

- 65 µm PDMS/DVB coating
- 50/30 µm DVB/Carboxen/PDMS coating
- 85 µm Carboxen/PDMS coating
- 85 µm polyacrylate coating

Kit 1 – For Volatiles and Semivolatiles

- 85 µm polyacrylate coating
- 100 µm polydimethylsiloxane coating
- 7 µm polydimethylsiloxane coating

Kit 2 – For Volatile or Polar Organics in Water

- 75 µm Carboxen/polydimethylsiloxane coating
- 65 µm polydimethylsiloxane/divinylbenzene coating
- 85 µm polyacrylate coating

Kit 3 – For SPME/HPLC Analysis

- 60 µm polydimethylsiloxane/divinylbenzene coating
- 85 µm polyacrylate coating
- 100 µm polydimethylsiloxane coating

Kit 4 – For Flavors and Odors

- 100 µm polydimethylsiloxane coating
- 65 µm polydimethylsiloxane/divinylbenzene coating
- 75 µm Carboxen/polydimethylsiloxane coating

Kit 5 – For Flavors and Odors

- 100 µm polydimethylsiloxane coating
- 65 µm polydimethylsiloxane/divinylbenzene coating
- 85 µm Carboxen/polydimethylsiloxane coating
- 50/30 µm Divinylbenzene/carboxen/polydimethylsiloxane coating



Related Information

Applications involving SPME are included in the Applications section at the end of this chapter. Titles of our SPME publications appear before the Applications section. For a list of SPME journal articles, contact our Technical Service chemists, or visit our website: sigma-aldrich.com/SPME.

SPME Fiber Holder

The holder protects the coated fiber, and controls exposure of the fiber during analyte adsorption and desorption. The holder is reusable indefinitely and accepts the replaceable fiber assembly. First time users must order both a holder and a fiber assembly.

Fiber Holder for Manual Sampling

An adjustable depth guide positions the fiber for sampling and for correct placement in the heated zone of the GC injection port. The fiber can be locked in the exposed position.

Fiber Holder for Automated Sampling or HPLC Analysis

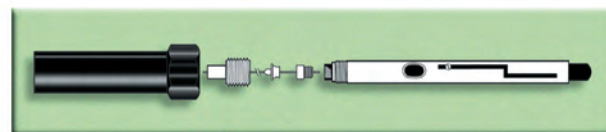
Use this fiber holder with a Varian 8100/8200 AutoSampler or with our SPME/HPLC interface. An SPME upgrade kit is necessary for operation with the Varian AutoSampler - contact Varian Instrument Division for information concerning system requirements.

Fiber Holder for CTC Combi PAL and Varian 8400/8410 Autosampler

Use this holder with SPME fiber assemblies that are designed for automated sampling. CTC autosampler distributed by Varian, Leap and Gerstel (MPS3).



Top to Bottom: 57331, 57330-U, 504831



Fiber Holder disassembled

Description	Cat. No.	Qty
SPME Fiber Holder, for use with manual sampling	57330-U	1 ea
SPME Fiber Holder, for use with Varian Autosampler or HPLC	57331	1 ea
SPME Fiber Holder, for use with CTC CombiPal, Gerstel MPS 2 and Thermo TriPlus Autosamplers	57347-U	1 ea

Fiber Assemblies and Holders

SPME Fast Fit Fiber Assemblies (FFA) and Multi-Fiber Exchanger

SPME Fast Fit Fiber Assemblies (FFA) and Multi-Fiber Exchanger

NEW PRODUCTS



Multi Fiber EXchanger (MFX) System

The Multi Fiber EXchanger (MFX) was designed to allow automated consecutive extraction and desorption for a number of SPME fibers, without the need for manual change-out of the fiber in the autosampler holder. It was developed and is produced by Chromline s.r.l. Prato/Italy. SPME Multi-Fiber stations for 3 fibers or for 25 fibers are available from GERSTEL GmbH & Co. KG.

SPME Fast Fit Fiber Assemblies (FFA)

The SPME Fast Fit Assemblies (FFA) are a new configuration of SPME fibers allowing an automated exchange of SPME fibers by the Multi Fiber eXchanger (MFX) unit of an autosampler. The barcoded SPME FFAs in use with the Multi Fiber eXchanger (MFX) system offer the following benefits:

- No manual switching out of the fiber when performing extractions with various SPME phases.
- Automated screening for optimal selectivity in SPME method development by setting up different SPME phase selectivities.
- Analyte polarity range enhancement as a result of extraction with various phases.

for use with multi fiber exchanger



Coating	For Use With	Needle	Hub	Material	Cat. No.	Qty
SPME fiber assembly Polydimethylsiloxane (PDMS)						
100 µm	multi fiber exchanger	24 ga	red plain	fused silica	FFA57301	3 ea
30 µm	multi fiber exchanger	23 ga	yellow plain	fused silica	FFA57289-U	3 ea
7 µm	multi fiber exchanger	23 ga	green plain	fused silica	FFA57291-U	3 ea
SPME fiber assembly Polydimethylsiloxane/Divinylbenzene (PDMS/DVB)						
65 µm	multi fiber exchanger	23 ga	pink plain	-	FFA57293-U	3 ea
SPME fiber assembly polyacrylate (PA)						
85 µm	multi fiber exchanger	23 ga	white plain	fused silica	FFA57294-U	3 ea
SPME fiber assembly Carboxen/Polydimethylsiloxane(CAR/PDMS)						
85 µm	multi fiber exchanger	23 ga	light blue plain	-	FFA57295-U	3 ea
SPME fiber assembly Divinylbenzene/Carboxen/Polydimethylsiloxane (DVB/CAR/PDMS)						
50/30 µm	multi fiber exchanger	23 ga	gray plain	-	FFA57298-U	3 ea
SPME fiber assembly Polydimethylsiloxane (PDMS)						
7 µm	multi fiber exchanger	24 ga	green plain	fused silica	FFA57302	3 ea
SPME fiber assembly polyacrylate (PA)						
85 µm	multi fiber exchanger	24 ga	white plain	fused silica	FFA57305	3 ea
SPME fiber assembly Polydimethylsiloxane (PDMS)						
30 µm	multi fiber exchanger	24 ga	yellow plain	fused silica	FFA57309	3 ea
SPME fiber assembly Polydimethylsiloxane/Divinylbenzene (PDMS/DVB)						
65 µm	multi fiber exchanger	24 ga	pink plain	StableFlex	FFA57327-U	3 ea
SPME fiber assembly Divinylbenzene/Carboxen/Polydimethylsiloxane (DVB/CAR/PDMS)						
50/30 µm	multi fiber exchanger	24 ga	gray plain	StableFlex	FFA57329-U	3 ea
SPME fiber assembly Carboxen/Polydimethylsiloxane(CAR/PDMS)						
85 µm	multi fiber exchanger	24 ga	light blue plain	-	FFA57335-U	3 ea
SPME fiber assembly Polydimethylsiloxane (PDMS)						
100 µm	multi fiber exchanger	23 ga	red plain	fused silica	FFA57341-U	3 ea
SPME fiber assembly, Carbowax-Polyethylene Glycol (PEG) Coating						
60 µm	multi fiber exchanger	23 ga	purple plain	metal alloy	FFA57354-U	3 ea

Fiber Assemblies and Holders

SPME Fast Fit Fiber Assemblies (FFA) and Multi-Fiber Exchanger

SPME StableFlex™ fiber assortment kit

SPME StableFlex Fiber Assortment Kit contains one fiber of each:

- 65µm PDMS/DVB coating
- 50/30µm DVB/Carboxen/PDMS coating
- 85µm Carboxen/PDMS coating
- 85µm Polyacrylate coating

▶ **needle size 23 ga, for use with multi fiber exchanger**

[FFA57284-U](#)

1 kit

SPME fiber assortment kit 1

Kit 1 - For Volatiles and Semivolatiles - contains one fiber of each:

- 85µm polyacrylate coating
- 100µm polydimethylsiloxane coating
- 7µm polydimethylsiloxane coating

▶ **needle size 23 ga, for use with multi fiber exchanger**

[FFA57285-U](#)

1 kit

SPME fiber assortment kit 2

Kit 2 - For Volatile or Polar Organics in Water - contains one of each

- 75µm Carboxen/polydimethylsiloxane coating
- 65µm polydimethylsiloxane/divinylbenzene coating
- 85µm Polyacrylate coating

for analyte group volatile and polar organics in water

▶ **needle size 23 ga, for use with multi fiber exchanger**

[FFA57286-U](#)

1 kit

SPME fiber assortment kit 4

Kit 4 - For Flavors and Odors - contains one of each:

- 100µm polydimethylsiloxane coating
- 65µm polydimethylsiloxane/divinylbenzene coating
- 75µm Carboxen/polydimethylsiloxane coating

▶ **needle size 23 ga, for use with multi fiber exchanger**

[FFA57287-U](#)

1 kit

SPME fiber assortment kit 5

SPME Fiber Assortment Kit 5 contains one fiber of each:

- 65µm PDMS/DVB coating
- 50/30µm DVB/Carboxen/PDMS coating
- 85µm Carboxen/PDMS coating
- 100µm PDMS coating

▶ **needle size 23 ga, for use with multi fiber exchanger**

[FFA57362-U](#)

1 kit

SPME FFA Field Sampler



[57554-U](#)

1 ea

Diffusive Sampling Fiber Holder for SPME FFA

A holder for SPME FFA capable of determining the time-weighted average (TWA) concentration of volatile organic compounds (VOCs) in air. Unlike conventional sampling with SPME in which the fiber is extended outside the needle, during TWAS passive sampling the fiber is retracted a known distance inside the needle. The sample collect VOCs by the mechanism of molecular diffusion and sorption onto the fiber.



[57584-U](#)

1 ea

Fiber Assemblies and Holders

SPME Fast Fit Fiber Assemblies (FFA) and Multi-Fiber Exchanger

SPME FFA Storage Device

SPME Storage Devices

Devices for safely storing conventional SPME fiber assemblies or SPME Fast Fit Assemblies (FFA) to maintain fiber conditioning prior to sampling and sample integrity after sampling. The storage containers are ideal for shipping fibers to and from sampling sites or just to keep them clean and ready for sampling in the laboratory.

► for use with SPME FFA



57592-U

1 ea

SPME Fiber Assembly Storage Device

for use with (SPME Fiber Assemblies)



57589-U

1 ea

SPME Fibers for LC Analysis

NEW PRODUCTS

SPME-LC Fiber Probe

► functional group C18

The SPME-LC fiber probes are intended as single-use devices for the extraction of small molecules out of a fluid followed by solvent desorption and LC analysis.

for use with solvent desorption

red hub plain

metal alloy

coating 45 µm



SPME probes for bioanalytical applications. Bottom image shows the fiber exposed from the needle.

57281-U

5 ea

SPME Samplers

SPME Samplers

SPME Portable Field Samplers

Concentrate and Store Analytes from Water; Sample Indoor Air - The SPME portable field sampler is an efficient and economical way of extracting and transporting volatile and semivolatile compounds from field samples. Extracted compounds storage losses for pesticides extracted and stored using a portable field sampler were significantly lower than losses from stored whole water samples. The sampler can be reused 50-100 times, and is disposed of when the fiber is no longer usable.

The portable field sampler also efficiently detects organic compounds in air. In our studies, the sampler allowed us to monitor typical HPLC and GC solvents at ppb levels in laboratory air. Three fibers are available: a polydimethylsiloxane (PDMS)/Carboxen fiber for trace levels of volatiles, a general purpose PDMS fiber and a PDMS/DVB fiber for semi-volatiles and larger volatiles. Five slots in the needle guide/depth gauge control the depth of needle insertion into a sample container, or into the injection port during fiber desorption.

Assemblies contain 24 gauge needles. 23 gauge and other coatings available as custom.

Recovery of Pesticides Extracted/Stored in SPME Field Sampler is Much Higher than for Stored Water Samples

Analyte	-% Loss on Storage ¹ -		Analyte	-% Loss on Storage-	
	SPME Stored Fiber ²	SPME Stored Water ³		SPME Stored Fiber	SPME Stored Water
Atrazine	-15	-57	Methoxychlor	-14	-88
DDE	-12	-98	Methyl parathion	-7	-68
Disulfoton	-8	-93	Parathion	-15	-83
Endrin ketone	-10	-82	Phorate	-3	-84
Famphur	-3	-60	Simazine	-10	-53
Heptachlor epoxide	-12	-83	Sulfotep	+4	-81
Lindane	-2	-74	TEPP	-8	-54
Malathion	-6	-74	Thionazin	-3	-68
			Mean	-8%	-75%

¹Relative to immediate analysis. 10 ppb each pesticide in water.

²Pesticides extracted by SPME and stored on PDMS fiber (24 hours/4 °C).

³Water sample stored in a silanized vial (24 hours/4 °C), then extracted by SPME.

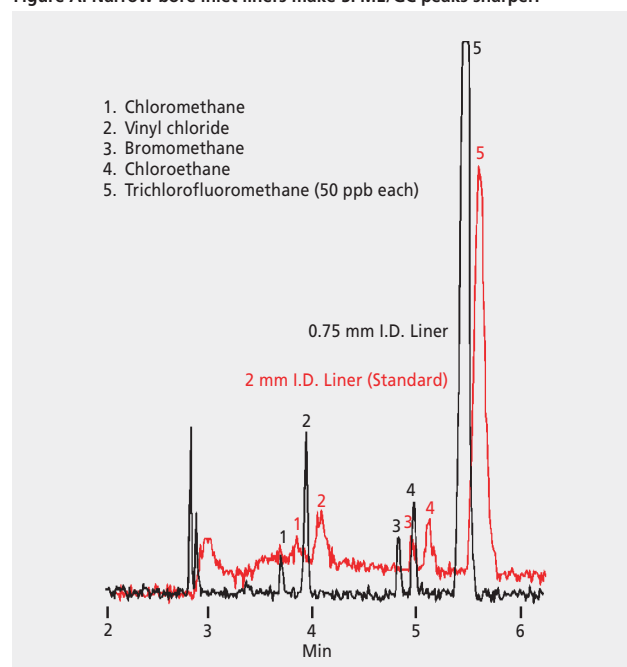
	Cat. No.	Qty
SPME Portable Field Sampler		
100 µm polydimethylsiloxane	504823	2 ea
75 µm Carboxen/polydimethylsiloxane	504831	2 ea
65 µm PDMS/DVB StableFlex fiber	57359-U	2 ea
Thermogreen® LB-2 Septa, solid discs		
diam. 5.0 mm (3/16 in.)	20638	50 ea
SPME Septum Removing Tool		
For Portable Field Sampler	504858	1 ea

SPME-GC Inlet Liners

Achieve Sharper Peak with SPME-GC Analyses, Using Supelco Inlet Liners

GC injection port liners are designed for optimum sample introduction for specific injection techniques. When using SPME, a 0.75 mm I.D. inlet liner increases linear velocity, compared to a conventional, larger volume 2 mm I. D. liner, and rapidly introduces analytes onto the column in a narrow band. The sharp peaks obtained with the 0.75 mm I.D. liner also demonstrate that the compounds are rapidly desorbed from the fiber (Figure A). To minimize sample loss or peak tailing, the inlet liner must be inert. Our proprietary, high-temperature silanization technique thoroughly deactivates Supelco inlet liners to minimize adsorption of active sample components. Using the appropriate inlet liner, combined with efficient, solvent-free sample introduction by SPME, helps to achieve excellent chromatography.

Figure A. Narrow bore inlet liners make SPME/GC peaks sharper.



SPME fiber:
column:
oven:
inj.
carrier gas:

PDMS, 10 µm (57300-U)
VOCOL, 60 m × 0.25 mm I.D. × 1.5 µm (24154)
35 °C
230 °C
helium, 40 cm/sec

SPME-GC Inlet Liners

For Agilent (5890, 6890, and 7890)

For Agilent (5890, 6890, and 7890)

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 78.5 mm x 6.5 mm x 0.75 mm



Cat. No.	Qty
2637501	1 ea
2637505	5 ea
2637525	25 ea

For Finnigan (9001GCQ)

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 78.5 mm x 6.5 mm x 0.75 mm



Cat. No.	Qty
2637501	1 ea
2637505	5 ea
2637525	25 ea

For PerkinElmer® (AutoSystem)

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 92 mm x 6.35 mm x 0.75 mm



Cat. No.	Qty
2631205	5 ea

For Shimadzu™ (9A, 15A, and 16)
[with SPL-G9/15 Injector]

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 127 mm x 5.0 mm x 0.75 mm



Cat. No.	Qty
2632901	1 ea
2632905	5 ea

For Shimadzu™ (14, 15A, and 16)
[with SPL-14 Injector]

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 99 mm x 5.0 mm x 0.75 mm



Cat. No.	Qty
2633501	1 ea
2633505	5 ea

For Shimadzu™ (17A) [with SPL-17 Injector]

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 95 mm x 5.0 mm x 0.75 mm



Cat. No.	Qty
2633901	1 ea
2633905	5 ea
2633925	25 ea

For Thermo (ThermoQuest 8000 and TRACE)

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 105 mm x 8.0 mm x 0.8 mm



Cat. No.	Qty
2876601-U	1 ea
2876605-U	5 ea

SPME-GC Inlet Liners

For Varian® (1075 and 1077 Injector)

For Varian® (1075 and 1077 Injector)

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L × O.D. × I.D. 74 mm × 6.35 mm × 0.75 mm



Cat. No.	Qty
2635801	1 ea
2635805	5 ea
2635825	25 ea

For Varian® (1078 and 1079 Injector)

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L × O.D. × I.D. 54 mm × 5.0 mm × 0.8 mm

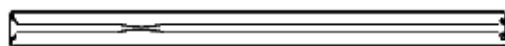


Cat. No.	Qty
2637801	1 ea
2637805	5 ea

For Varian® (1093-94 Injector)

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L × O.D. × I.D. 54 mm × 4.6 mm × 0.8 mm



Cat. No.	Qty
2636401	1 ea
2636405	5 ea
2636425	25 ea

For Varian® (CP-1177 Injector)

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L × O.D. × I.D. 78.5 mm × 6.5 mm × 0.75 mm



Cat. No.	Qty
2637501	1 ea
2637505	5 ea
2637525	25 ea

SPME Accessories

SPME Sampling Stand

Holds vials while supporting the SPME syringe for consistent fiber immersion depth. Cat. No. 57333-U accommodates 4 mL vials only; Cat. No. 57357-U accommodates 15 mL vials. Order the 15 mL vial puck (Cat. No. 57358-U) as a replacement for the 15 mL unit, or to use 15 mL vials with the 4 mL unit. Not for use with automated / HPLC fiber holders.



Description	Cat. No.	Qty
SPME Sampling Stand, for use with 4 mL vials	57333-U	1 ea
SPME Sampling Stand, for use with 15 mL vials	57357-U	1 ea
Heater block for 28 mm diameter vials, for use with 28 mm diameter vials	33313-U	1 ea
15 mL vial puck, made to hold 8 × 15 mL vials	57358-U	1 ea
Thermometer, L 5 in., -10-110 °C	57332	1 ea
Spinbar® magnetic stirring fleas, blue, L 10 mm × diam. 3 mm	Z118877-3EA	3 ea
SPME sampling stand holder & rod assembly, for use with SPME Sampling Stand	57364-U	1 ea

SPME Accessories

Corning® hotplate and stirrer with digital display

- Digital LED temperature display is adjustable in 5 °C increments and blinks until set temperature is reached
- Microprocessor maintains consistent and repeatable temperature and stir speed settings.
- Bright LED HOT TOP icon lights up when top plate temperature is over 60 °C, even when heat control is turned off.
- Separate temperature sensor provides power cut off if unit overheats
- Extremely durable and heat resistant Pyroceram glass-ceramic top
- Small footprint and low profile
- Meets UL and cUL standards

speed 60-1150 rpm
temp. range 5-550 °C



▶ 120 V, US 3-pin plug, plate L 5 in. x W 7 in.

product of Corning, Inc., 6795-420D
not available in EU

CLS6795420D-1EA 1 ea

Merlin Microseal™ System (fits Agilent)

Simply place the septum directly onto the septum cup and then add the nut (an additional adapter for the septum cup is not required for Agilent GCs). The septum incorporates a unique design with two sequential seals to provide a much longer life. Order replacement septa, or alternate versions, separately. Compatible with all Agilent autosamplers and stainless steel injection ports.

Note: Do not use with beveled tips.



Left: Septum; Right: Nut

Description	Cat. No.	Qty
1 nut and 1 Low Pressure (1-45 psi) septum	22584	1 ea
1 nut and 2 Low Pressure (1-45 psi) septa	22581-U	1 ea
1 nut and 1 General Purpose (3-100 psi) septum	24815-U	1 ea
1 nut and 2 General Purpose (3-100 psi) septa	24814-U	1 ea
1 nut	22582	1 ea

Merlin Microseal™ System (fits Varian®)

Varian GCs require an inlet adapter and an o-ring in addition to the septum and nut. The septum incorporates a unique design with two sequential seals to provide a much longer life. Order replacement septa, or alternate versions, separately. Not compatible with the Varian 8200 autosampler.

Note: Do not use with beveled tips.

Description	Cat. No.	Qty
For 1079 injector; 1 nut, 1 inlet adapter, 1 o-ring, and 1 General Purpose (3-100 psi) septum	24817-U	1 ea
For CP-1177 injector; 1 nut, 1 inlet adapter, 1 o-ring, and 1 General Purpose (3-100 psi) septum	22609-U	1 kit

Merlin Microseal™ System Replacement Septum

Three septa versions are available:

- **Low Pressure** for use with 23 gauge syringe needles, and injection port pressures between 1 and 45 psi. Do not use with syringe needles that have beveled tips.
- **General Purpose** for use with 23 gauge syringe needles, and injection port pressures between 3 and 100 psi. Do not use with syringe needles that have beveled tips.
- **SPME** for use with 23 gauge SPME fiber assemblies. Do not use with SPME fiber assemblies that have beveled tips.

Note: Do not use with beveled tips.

Description	Cat. No.	Qty
1 Low Pressure (1-45 psi) septum	22583	1 ea
1 General Purpose (3-100 psi) septum	24816-U	1 ea
1 SPME septum	24818-U	1 ea

Molded Thermogreen® LB-2 Septa, with injection hole

The injection hole helps guide the syringe needle to puncture the same location every injection, resulting in two benefits:

- Minimal coring leading to long life
- Less septum fragments that contaminate the inlet liner

Their high puncture tolerance makes these septa ideal for use with autosampler injections, manual injections, and/or SPME applications.



Diam. (mm)	Cat. No.	Qty
9.5	28331-U	50 ea
9.5	28332-U	250 ea
10	28333-U	50 ea
10	28334-U	250 ea
11	28336-U	50 ea
11	28338-U	250 ea
11.5	29446-U	50 ea
11.5	29448-U	250 ea
17	29452-U	50 ea
17	29453-U	250 ea

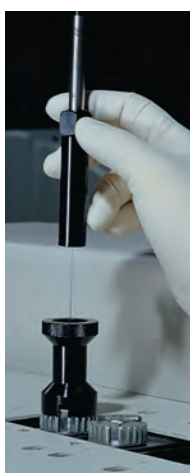
SPME Accessories

SPME inlet guide

Secures the SPME fiber holder in the injection port during the thermal desorption process. Interchangeable among Merlin Microseal sealing system and most Varian and Agilent chromatographs.



57356-U



SPME Inlet Guide

57356-U

1 ea

Vials for SPME sampling stand

	Cat. No.	Qty
Vials, screw top, amber glass (vial only)		
4 mL, amber glass vial, O.D. 15 mm × H 45 mm () × I.D. 8 mm, thread, 13-425	27115-U	100 ea
	27032	1000 ea
Vials, screw top with phenolic open-top cap, pre-assembled		
15 mL, clear glass, O.D. 21 mm × H 70 mm, tan PTFE/silicone septum	27159	100 ea
4 mL, amber glass, O.D. 15 mm × H 45 mm, tan PTFE/silicone septum	27006	100 ea
15 mL, amber glass, O.D. 21 mm × H 70 mm, tan PTFE/silicone septum	27008	100 ea
4 mL, clear glass, O.D. 15 mm × H 45 mm, tan PTFE/silicone septum	27136	100 ea
Septa, white PTFE/silicone		
white PTFE/silicone, diam. 11 mm × thickness 0.075 in., for use with 4 mL vial	27356	100 ea
	27369-U	1000 ea
Septa, Viton®		
black Viton®, diam. 11 mm × thickness 0.060 in., for use with 4 mL vial	27351	100 ea

SPME Accessories

Vials, caps, and septa for Varian® 8200 autosampler



Cat. No.	Qty
Vials, screw top with black polypropylene hole cap (10-425 thread), large opening, pre-assembled	
2 mL, clear glass, red PTFE/silicone, black polypropylene cap, thread: 10-425 27531	100 ea
2 mL, amber glass, red PTFE/silicone, black polypropylene cap, thread: 10-425 27532	100 ea
Septa, PTFE/Silicone	
blue PTFE/white silicone, O.D. 20 mm × thickness 0.75 mm 27539	100 ea
Vials, crimp top, for Thin Seal	
volume 10 mL, clear glass (Thin seal vial for thin septa), O.D. 24.5 mm × H 50 mm × I.D. 12.7 mm, crimp top (0.125 in. thick) for thin septa 27385	36 ea
27386	144 ea
Crimp seals with Viton® septa	
silver aluminum seal, open center (8 mm center hole), diam. 20 mm × thickness 0.76 mm, black Viton® septum, septum thickness 0.75 mm 33146-U	36 ea
27245	100 ea
28298-U	288 ea
27246	1000 ea

Headspace vials for CTC autosampler

Cat. No.	Qty
Hand crimper, adjustable	
Hand crimper, adjustable, for use with 20 mm crimp seals 22316-U	1 ea
Headspace vial, screw top, rounded bottom (vial only)	
10 mL, clear glass, thread: 18, O.D. 22.5 mm × H 46 mm SU860099	100 ea
10 mL, amber glass, thread: 18, O.D. 22.5 mm × H 46 mm SU860100	100 ea
20 mL, clear glass, thread: 18, O.D. 22.5 mm × H 75.5 mm SU860097	100 ea
20 mL, amber glass, thread: 18, O.D. 22.5 mm × H 75.5 mm SU860098	100 ea
Magnetic Screw Cap for Headspace Vials	
stainless steel screw cap (magnetic, open-top (8 mm center hole)), thread, 18, PTFE/silicone septum (white PTFE/transparent blue silicone), septum thickness 1.3 mm SU860101	100 ea
stainless steel screw cap (magnetic, open-top (8 mm center hole)), thread, 18, PTFE/silicone septum (white PTFE/blue silicone), septum thickness 1.5 mm SU860103	100 ea
Vials, crimp top, for Thin Seal	
20 mL, clear glass (flat top), crimp top (0.125 in. thick) for thin septa, O.D. 22.5 mm × H 75.5 mm SU860104	100 ea
Crimp seals with Viton® septa	
gold seal (magnetic with 8 mm center hole), black Viton® septum, diam. 20 mm × thickness 1.0 mm SU860106	100 ea

Vials for 40 mL Heating Block

Cat. No.	Qty
Vials, screw top, amber glass (vial only)	
40 mL, amber glass, O.D. 29 mm × H 82 mm × I.D. 17 mm, thread, 24-400 27185-U	100 ea
Vials, screw top with phenolic open-top cap, pre-assembled	
40 mL, clear glass, O.D. 29 mm × H 82 mm, tan PTFE/silicone septum 27180	100 ea
40 mL, amber glass, O.D. 29 mm × H 82 mm, tan PTFE/silicone septum 27010-U	100 ea
Septa, tan PTFE/silicone	
white tan PTFE/silicone, diam. 22 mm × thickness 0.100 in., for use with 20, 40 or 60 mL vial 27188-U	100 ea
Septa, Viton®	
black Viton®, diam. 22 mm × thickness 0.060 in., for use with 20, 40, or 60 mL vial 27355	100 ea

SPME Accessories



Related Information

No.	Title
Biochemical/Food and Beverage	
T195869	<i>Solid Phase Microextraction: Solventless Sample Preparation for Monitoring Flavor Compounds by Capillary Gas Chromatography (AYM)</i>
T196901	<i>Solid Phase Microextraction/Capillary GC Analysis of Drugs, Alcohols, and Organic Solvents in Biological Fluids (AYY)</i>
T396110	<i>SPME Reduces Extraction Time in HPLC Analysis of Food Antioxidants and Preservatives</i>
T397140	<i>Analysis of Fat Soluble Vitamins from Tablets, Using SPME/HPLC (BKK)</i>
T398147	<i>Solid Phase Microextraction of Odors in Drinking Water, for Analysis by GC/MS (BRG)</i>
Pharmaceutical	
T394062	<i>Monitor Organic Volatile Impurities (OVIs) in Pharmaceutical Products, Using Solid Phase Microextraction/Capillary GC (AQX)</i>
Forensic	
T196901	<i>Solid Phase Microextraction/Capillary GC Analysis of Drugs, Alcohols, and Organic Solvents in Biological Fluids (AYY)</i>
T198922	<i>SPME/GC for Forensic Applications: Explosives, Fire Debris, and Drugs of Abuse (BQS)</i>
T349061	<i>Solid Phase Microextraction/Capillary GC: Rapid, Sensitive Detection of Gasoline in Fire Debris (AQW)</i>
T396098	<i>SPME/HPLC Interface Combines Fast Sample Extraction with Efficient Analysis for Explosives (ASE)</i>
Environmental	
T394011	<i>Solid Phase Microextraction of Volatile Compounds in US EPA Method 524.4 (AOM)</i>
T394017	<i>Polyacrylate Film Fiber for Solid Phase Microextraction of Polar Semivolatiles from Water (AOS)</i>
T394056	<i>Fast Analysis of Volatile Organic Compounds by Solid Phase Microextraction/Capillary GC (AQL)</i>
T394058	<i>Fast Screening for Chlorinated Pesticides by Solid Phase Microextraction/Capillary GC (AQN)</i>
T395081	<i>Monitor BTEX Compounds and Fuels in Water, Using Solid Phase Microextraction and Capillary GC (ARO)</i>
T395085	<i>Solid Phase Microextraction/Capillary GC Analysis of Nitrogen-Containing Herbicides in Water (ARS)</i>
T396094	<i>Solid Phase Microextraction of Organophosphate Insecticides and Analysis by Capillary GC/MS (ASB)</i>
T396099	<i>SPME/HPLC: A Rapid and Sensitive Analysis of Polynuclear Aromatic Hydrocarbons in Water (ASF)</i>
T396106	<i>Analysis of Surfactants in Water by SPME/HPLC</i>
T397121	<i>Solid Phase Microextraction for HPLC Analysis of Carbamate and Urea Pesticides (BGU)</i>
T397141	<i>Air Sampling of VOCs Using SPME for Analysis by Capillary GC (BKF)</i>
T397143	<i>Field Sampling for Pesticides, Using Solid Phase Microextraction/Capillary GC (BJT)</i>
T398147	<i>Solid Phase Microextraction of Odors in Drinking Water, for Analysis by GC/MS (BRG)</i>
Lab Hints and Selection Guides	
T101928	<i>SPME Troubleshooting Guide</i>
T101929	<i>A Practical Guide to Quantitation with SPME</i>
T198923	<i>Solid Phase Microextraction: Theory and Optimization of Conditions</i>
T199925	<i>SPME Applications CD-ROM</i>
T396098	<i>SPME/HPLC Interface Combines Fast Sample Extraction with Efficient Analysis for Explosives (ASE)</i>
T496037	<i>Solid Phase Microextraction Sampling Stand (AWS)</i>
T496049	<i>SPME/HPLC Interface (AWV)</i>
T497105	<i>SPME Portable Field Sampler with Carboxen/PDMS Fiber (BIZ)</i>
T497174	<i>SPME Portable Field Sampler with 100 mm PDMS Fiber (BKL)</i>

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SPME APPLICATIONS

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SPME Applications

Amines, Explosives, and Nitrosamines

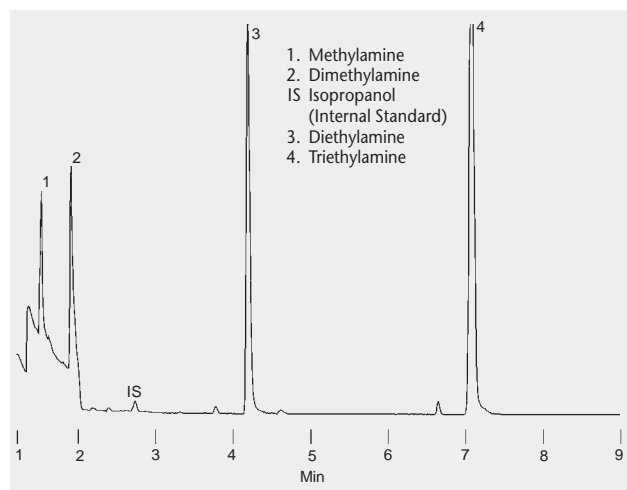
SPME Applications

Amines, Explosives, and Nitrosamines

GC Analysis of Amines on the SPB®-1 SULFUR after SPME using 65 µm PDMS/DVB

► application for SPME, application for GC

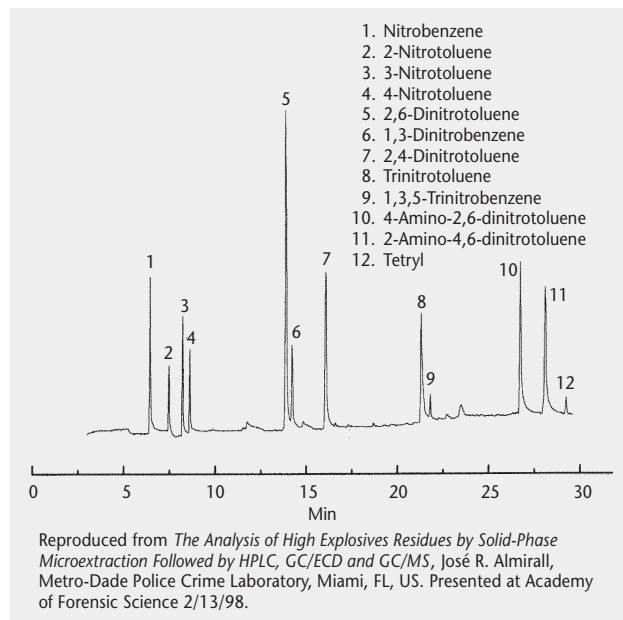
sample/matrix amines at 5 ppm in water, 27% NaCl, pH 9.5
 SPME fiber 65 µm polydimethylsiloxane/divinylbenzene (57310)
 extraction 20 min, fiber immersed in water, rapid stirring
 desorption process 270 °C for 5 min.
 column SPB®-1 SULFUR, 30 m x 0.32 mm I.D., 4.0 µm (24158)
 oven 50 °C (2 min.), 10 °C/min. to 150 °C
 inj. temp. 270 °C
 detector MSD, SIM at 0.6 sec/scan
 carrier gas helium, 25 cm/sec (set @ 50 °C)
 liner 0.75 mm I.D., SPME
 Application No. 95-0065



GC Analysis of Explosives in Water on a Cyanopropyl Silicone Column after SPME using 65 µm PDMS/DVB

► application for SPME, application for GC

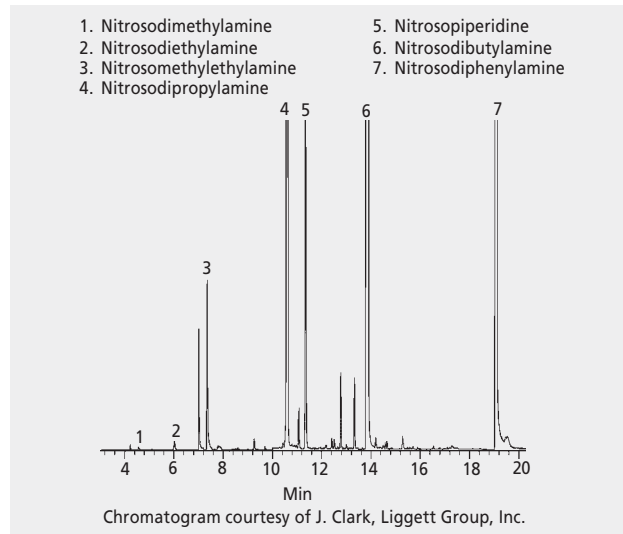
sample/matrix 50 ng/mL each explosive in water
 SPME fiber polydimethylsiloxane/divinylbenzene, 65 µm (57310-U)
 extraction immersion, 30 min
 desorption process 5 min, 250 °C
 column cyanopropyl silicone, 30 m x 0.25 mm I.D., 0.25 µm (Supelco equivalent, SPB-1701, 24113)
 oven 95 °C (3 min) to 182 °C at 8 °C/min (4 min) to 250 °C at 8 °C/min (6 min)
 inj. temp. split/splitless, 180 °C
 detector ECD, 250 °C
 carrier gas helium
 Application No. G000158



GC Analysis of Nitrosamines on the PTA-5 after SPME using 65 µm PDMS/DVB

► application for SPME, application for GC

sample/matrix analytes in water +25% KCl, pH 10.0
 SPME fiber 65 µm polydimethylsiloxane/divinylbenzene (57310-U)
 extraction immersion, 15 min (rapid stirring)
 desorption process 270 °C for 1 min.
 column PTA-5, 30 m x 0.32 mm I.D., 0.5 µm (24331)
 oven 50 °C (1 min.), 10 °C/min. to 250 °C (2 min.)
 inj. temp. 250 °C
 detector MSD, SIM
 carrier gas helium, 30 cm/sec
 liner 0.75 mm I.D., SPME
 Application No. 96-0142



SPME Applications

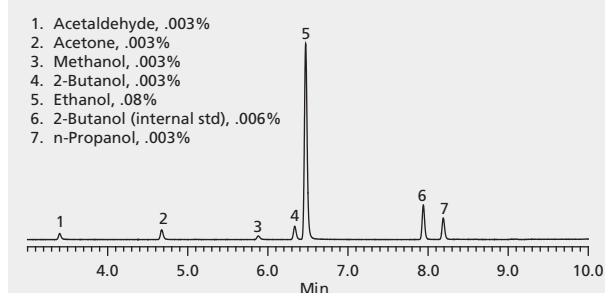
Alcohols

Alcohols

GC Analysis of Blood Alcohols on the SUPELCOWAX® 10 after SPME using 60 µm Carbowax®

▶ application for SPME, application for GC

sample/matrix blood alcohols at concentrations indicated in human plasma
 SPME fiber 60 µm Carbowax
 extraction headspace, 50 °C (5 min.)
 desorption process 220 °C, 2 min.
 column SUPELCOWAX 10, 30 m x 0.25 mm I.D., 0.50 µm (24284)
 oven 35 °C (2 min), 10 °C/min. to 125 °C (1 min.)
 detector FID, 200 °C
 carrier gas helium, 1.0 mL/min. constant
 injection 10:1 split
 liner 0.75 mm I.D. SPME liner
 Application No. G004043



GC Analysis of Cocaine in Urine on a 100% Methyl Silicone Column after SPME using 100 µm PDMS

▶ application for SPME, application for GC

sample/matrix 0.5 mL urine (250 ng each analyte, 20 µL 2.5% NaF) in 1 mL vial
 SPME fiber polydimethylsiloxane, 100 µm (57300-U)
 extraction immersion, 30 min
 desorption process 3 min, 240 °C
 column polydimethylsiloxane, 30 m x 0.32 mm I.D., 0.25 µm (Supelco equivalent, Equity-1, 28055-U)
 oven 120 °C to 280 °C at 10 °C/min
 inj. temp. splitless (splitter opened after 1 min), 240 °C
 detector NPD, 280 °C
 carrier gas helium, 3 mL/min
 Application No. 796-0156

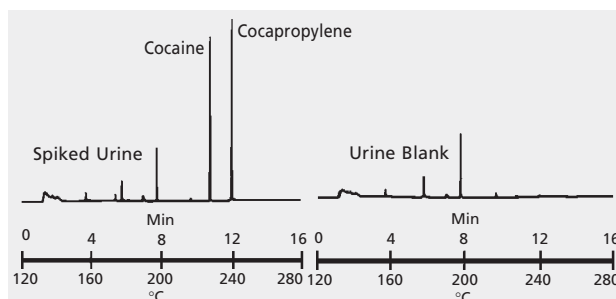


Figure provided by T. Kumazawa and K. Sato, Dept. Legal Medicine, Showa University School of Medicine, Tokyo, Japan and K. Watanabe, H. Seno, A. Ishii, and O. Suzuki, Dept. Legal Medicine, Hamamatsu University School of Medicine, Hamamatsu, Japan.

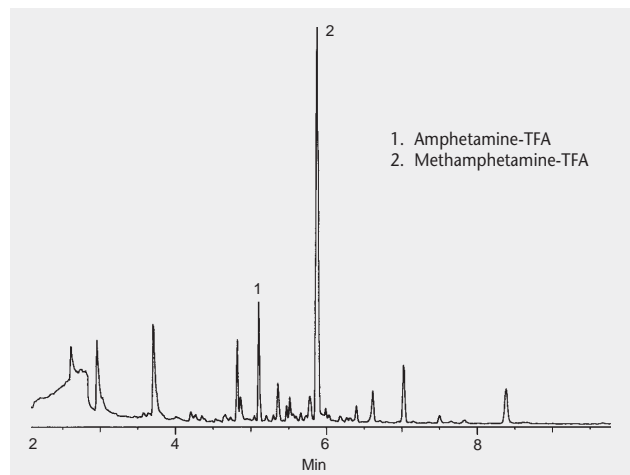
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Pharmaceuticals

GC Analysis of Amphetamines on a 100% Methyl Silicone Column after SPME using 100 µm PDMS

▶ application for SPME, application for GC

sample/matrix .. 1 mL urine + 0.7 g K₂CO₃ in 20 mL headspace vial, equilibrated at 80 °C, 30 min
 SPME fiber polydimethylsiloxane, 100 µm (57300-U)
 derivatization methyl bis-trifluoroacetamide (headspace, 0.5 min, ambient)
 extraction headspace, 3-5 min, 80 °C
 desorption process 1 min, 270 °C
 column .. methylsiloxane, 12.5 m x 0.2 mm I.D., 0.33 µm (Supelco equivalent, Equity-1, available on request)
 oven 60 °C (1 min) to 140 °C (4 min) at 30 °C/min, then to 276 °C at 20 °C/min, 4 min
 inj. temp. splitless (closed 1 min), 270 °C
 detector MS, full scan
 Application No. G000651



This figure provided by Thomas Brettell, New Jersey State Police Laboratory.

SPME Applications

Pharmaceuticals

GC Analysis of Tricyclic Antidepressants in Urine on a 100% Methyl Silicone Column after SPME using 100 μm PDMS

► application for SPME, application for GC

sample/matrix 1 mL urine (1 μg each analyte + 50 μL 5 M NaOH) in 7.5 mL vial
 SPME fiber polydimethylsiloxane, 100 μm (57300-U)
 extraction headspace, 15 min, 100 $^{\circ}\text{C}$ (sample incubated 30 min)
 desorption process 3 min, 280 $^{\circ}\text{C}$
 column polydimethylsiloxane, 30 m x 0.32 mm I.D., 0.25 μm (Supelco equivalent, Equity-1, 28055-U)
 oven 100 $^{\circ}\text{C}$ to 300 $^{\circ}\text{C}$ at 20 $^{\circ}\text{C}/\text{min}$
 inj. temp. splitless (splitter opened after 1 min), 280 $^{\circ}\text{C}$
 detector FID, 280 $^{\circ}\text{C}$
 carrier gas helium, 30 cm/sec
 Application No. 796-0275

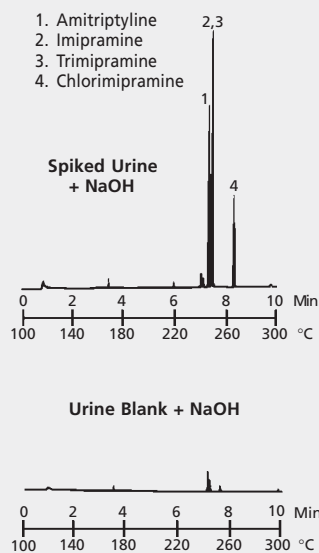


Figure provided by T. Kumazawa, X.-P. Lee, M.-C. Tsai, and K. Sato, Dept. Legal Medicine, Showa University School of Medicine, Tokyo, Japan and H. Seno and A. Ishii, Dept. Legal Medicine, Hamamatsu University School of Medicine, Hamamatsu, Japan.

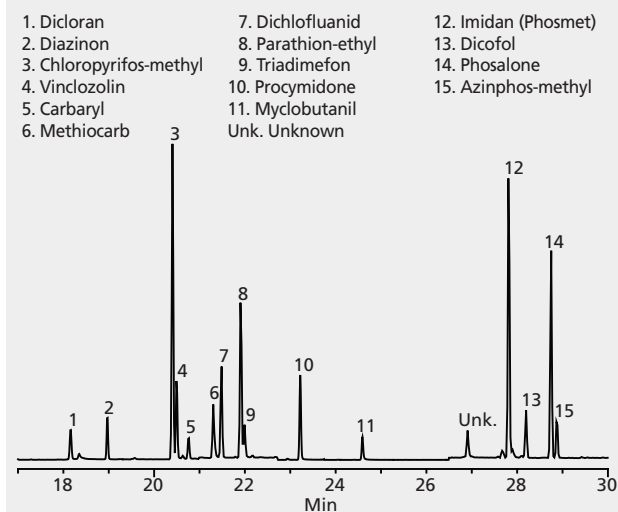
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Foods, Flavors, and Fragrances

GC Analysis of Agricultural Pesticides in Wine on the SLB®-5ms after SPME using 85 μm Polyacrylate

► application for SPME, application for GC

sample/matrix white wine spiked with 50 ppb pesticides
 SPME fiber 85 μm polyacrylate (57304)
 extraction immersion, room temp. (30 min.)
 desorption process 250 $^{\circ}\text{C}$ for 5 min.
 column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 μm (28471-U)
 oven 60 $^{\circ}\text{C}$ (1 min.), 15 $^{\circ}\text{C}/\text{min.}$ to 100 $^{\circ}\text{C}$, 7 $^{\circ}\text{C}/\text{min.}$ to 300 $^{\circ}\text{C}$ (1 min.)
 MSD interface 325 $^{\circ}\text{C}$
 scan range SIM
 carrier gas helium, 0.7 mL/min., constant
 liner 0.75 mm I.D. SPME liner
 Application No. G003642



SPME Applications

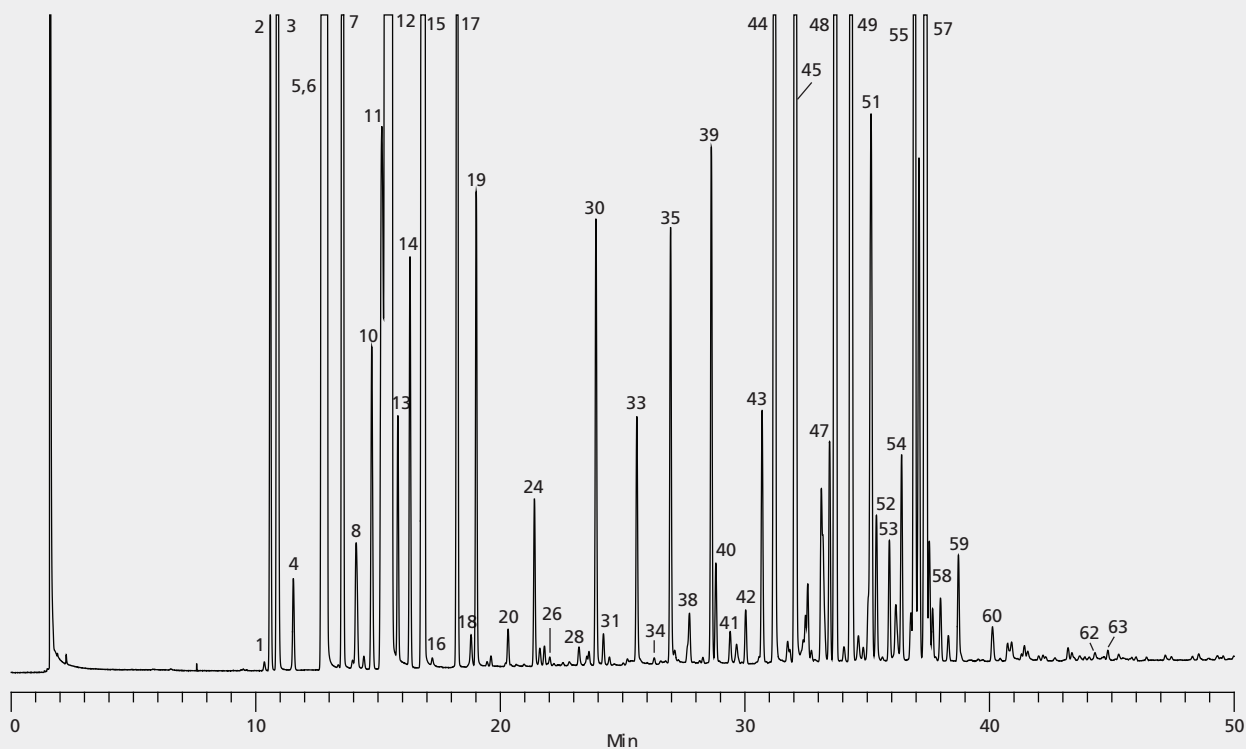
Foods, Flavors, and Fragrances

GC Analysis of Limoncello on the SLB®-5ms after SPME using 100 µm PDMS

▶ application for SPME, application for GC

sample/matrix Limoncello diluted 1:100 in water, then 5 mL of this solution transferred to a 10 mL crimped vial spiked with 100 µL of a 100 ppm solution of nonane (internal standard)
 SPME fiber 100 µm polydimethylsiloxane (57300-U)
 extraction .. headspace, with a pre-equilibration period of 10 min. at 40 °C, and then a fiber exposure of 30 min. at 40 °C, agitated in an alternate clockwise-anticlockwise rotation mode at 500 ppm
 desorption process 250 °C for 5 min.
 column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 µm (28471-U)
 oven 40 °C, 3 °C/min. to 250 °C (2 min.)
 detector FID, 260 °C (sampling rate 80 ms)
 carrier gas helium, 35.0 cm/sec
 liner 0.75 mm I.D. SPME/Splitless (2633901)
 Application No. G003781

- | | | | | |
|-----------------|--------------------------|-----------------------|-------------------------|------------------------|
| 1. Tricyclene | 11. p-Cymene | 24. Citronellal | 39. Undecanal | 52. (Z)-β-Santelene |
| 2. α-Thujene | 12. Limonene | 26. Terpinen-4-ol | 40. Nonyl acetate | 53. Geranyl propionate |
| 3. α-Pinene | 13. (Z)-β-Ocimene | 28. α-Terpineol | 41. Methyl geranoate | 54. Germacrene D |
| 4. Camphene | 14. (E)-β-Ocimene | 30. Decanal | 42. Bicycloelemene | 55. Valencene |
| 5. Sabinene | 15. γ-Terpinene | 31. Octyl acetate | 43. Citronellyl acetate | 56. Bicyclogermacrene |
| 6. β-Pinene | 16. cis-Sabinene hydrate | 33. Neral | 44. Neryl acetate | 57. β-bisabolene |
| 7. Myrcene | + Octanol | 34. Geraniol | 45. Geranyl acetate | 58. δ-Cadinene |
| 8. Octanal+ | 17. Terpinolene | 35. Geranial | 47. α-cis-Bergamotene | 59. (E)-γ-Bisabolene |
| a-Phellandrene | 18. Linalool | 36. Perillaldehyde | 48. (E)-Caryophyllene | 60. (E)-α-Bisabolene |
| 9. δ-3-Carene | 19. Nonanal | 37. Isobornyl acetate | 49. trans-α-Bergamotene | 62. Campherenol |
| 10. α-Terpinene | 20. cis-Limonene oxide | 38. Perilla alcohol | 51. α-Humulene | 63. α-Bisabolol |



Chromatogram courtesy of Prof. Luigi Mondello (Univ. of Messina, Italy)

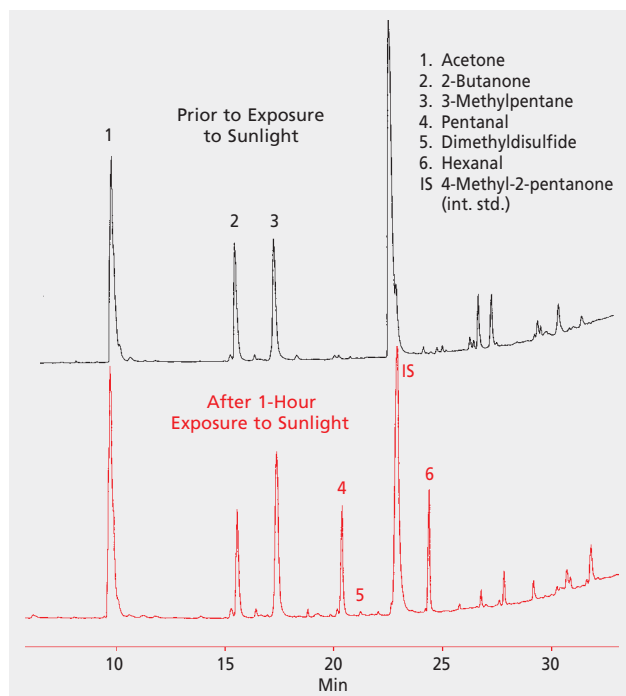
SPME Applications

Foods, Flavors, and Fragrances

GC Analysis of Milk on the Supel-Q™ PLOT after SPME using 75 μm PDMS/Carboxen

▶ application for SPME, application for GC

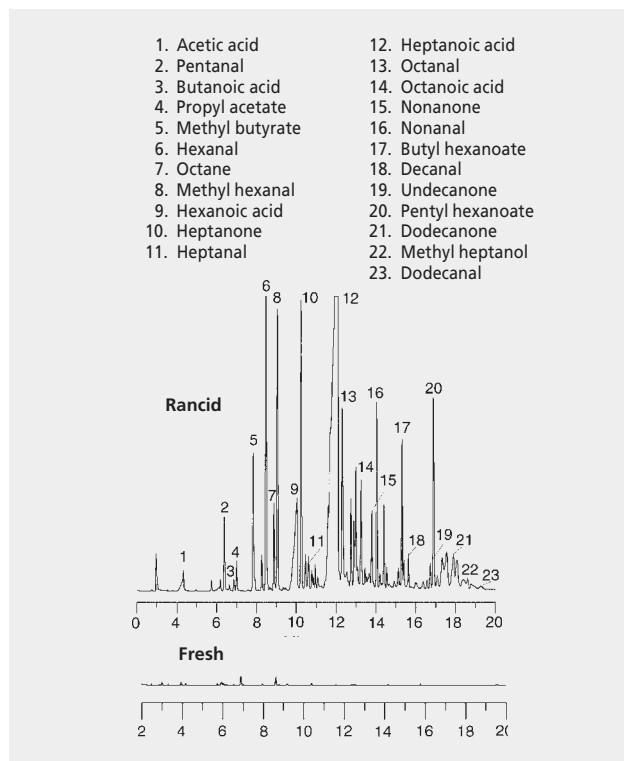
sample/matrix 3 g of 2% milk + 10 μL internal standard solution (20 μg/mL 4-methyl-2-pentanone) (9 mL GC vial)
 SPME fiber PDMS/Carboxen, 75 μm (57318)
 extraction headspace, 15 min with constant stirring at 45 °C
 desorption process 5 min, 250 °C
 column Supel-Q PLOT, 30 m × 0.32 mm I.D. (24242)
 oven 70 °C (2 min) to 140 °C at 6 °C/min (2 min hold) then to 220 °C at 6 °C/min (5 min hold)
 detector GC-MS ion trap, m/z = 33-300
 carrier gas helium, 35 cm/sec
 Application No. G000507



GC Analysis of Potato Chips on the SPB®-1 SULFUR after SPME using 50/30 μm DVB/Carboxen/PDMS

▶ application for SPME, application for GC

sample/matrix 3 g crushed potato chips in 15 mL vial
 SPME fiber DVB/Carboxen/PDMS, 50/30 μm, StableFlex (57328-U)
 extraction headspace, 65 °C, 20 min, with stirring
 desorption process 3 min, 250 °C
 column SPB-1 SULFUR, 30 m × 0.32 mm I.D., 4.0 μm (24158)
 oven 45 °C (1.5 min) to 250 °C at 12 °C/min, hold 10 min
 detector quadrupole mass spectrometer, m/z = 35-290 at 0.6 sec/scan
 carrier gas helium, 40 cm/sec
 Application No. G000075



SPME Applications

Foods, Flavors, and Fragrances

GC Analysis of Pyrazines in Peanut Butter on the SUPELCOWAX® 10 after SPME using 50/30 µm DVB/Carboxen/PDMS

▶ application for SPME, application for GC

sample/matrix 5 g peanut butter in 40 mL vial
 SPME fiber divinylbenzene-Carboxen-polydimethylbenzene StableFlex (57328-U)
 extraction headspace, 30 min at 65 °C in heating block
 desorption process 270 °C for 5 min
 column SUPELCOWAX 10, 30 m × 0.25 mm, 0.25 µm (24079)
 oven 40 °C (5 min) to 230 °C at 4 °C/min
 inj. temp. splitless/split, closed 0.5 min, 270 °C, with 0.75 mm liner
 detector ion trap mass spectrometer, m/z =30-350 at 0.6 sec/scan. Selected ions used for quantitation.

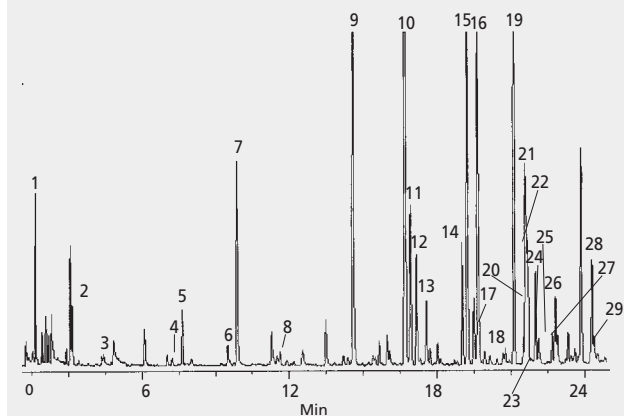
Application No. G000517

Some Volatile Components in Peanut Butter

1. Carbon disulfide
2. 3-Methylbutanal
3. Pentanal
4. Dimethyl disulfide
5. Hexanal
6. 1-Methyl pyrrole
7. 4-Methyl-pentene-2-one
8. Heptanal

Pyrazines in Peanut Butter

9. 2-Methyl pyrazine
10. 2,5-Dimethyl pyrazine
11. 2,3-Dimethyl pyrazine
12. 2-Ethyl pyrazine
13. 2,6-Dimethyl pyrazine
14. 2-Ethyl-6-methyl pyrazine
15. 2-Ethyl-5-methyl pyrazine
16. Trimethyl pyrazine
17. 2-Ethyl-3-methyl pyrazine
18. 2,6-Diethyl pyrazine
19. 2-Ethyl-3,5-dimethyl pyrazine
20. 2,3-Diethyl pyrazine
21. 2-Methyl-5-isopropyl pyrazine
22. 3-Ethyl-2,5-dimethyl pyrazine
23. 5-Methyl-2-propyl pyrazine
24. 2-Methyl-5-propyl pyrazine
25. 2-Ethenyl-6-methyl pyrazine
26. 3,5-Diethyl-2-methyl pyrazine
27. 2-Ethenyl-5-methyl pyrazine
28. 2-Methyl-6-cis propenyl pyrazine
29. 2-Allyl-5-methyl pyrazine



SPME Applications

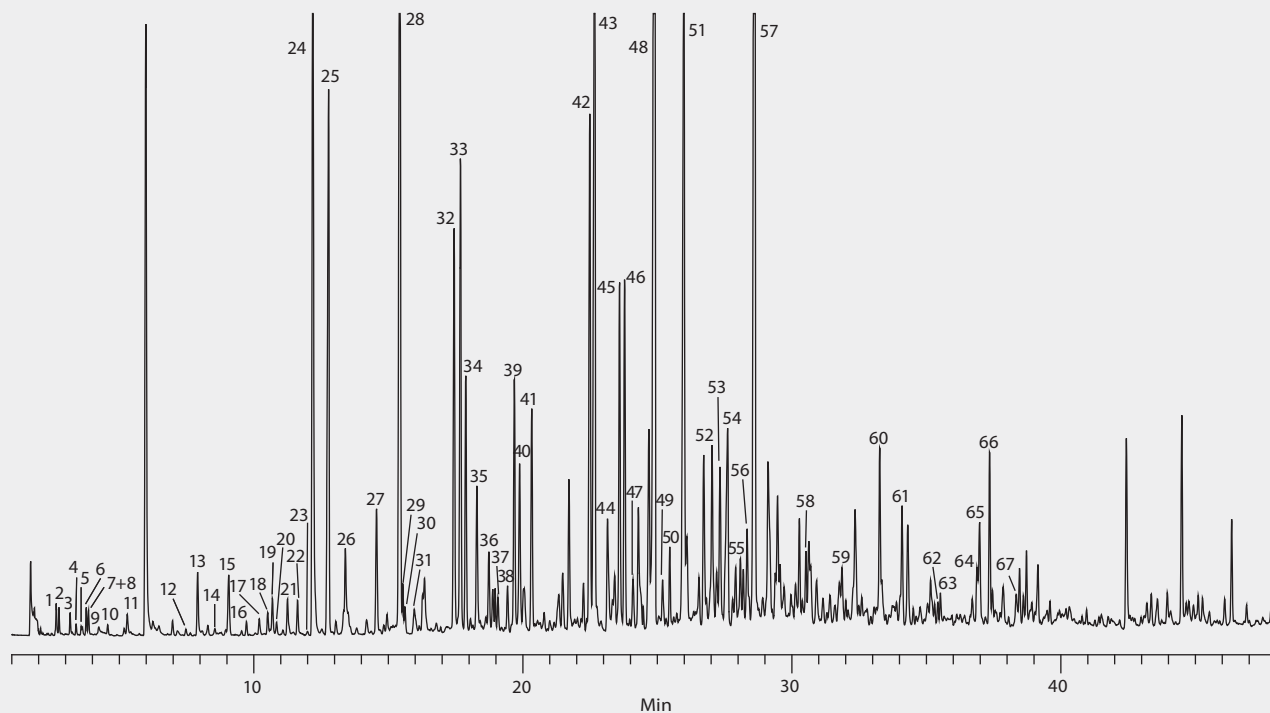
Foods, Flavors, and Fragrances

GC Analysis of Roasted Coffee Beans on the Omegawax® 250 after SPME using 50/30 µm DVB/Carboxen/PDMS

▶ application for SPME, application for GC

sample/matrix 2 g of coffee beans
 SPME fiber 50/30 µm divinylbenzene/Carboxen on polydimethylsiloxane on a StableFlex fiber (57329-U)
 extraction ... headspace, with a pre-equilibration period of 10 min. at 60 °C, and then a fiber exposure of 40 min. at 60 °C, agitated in an alternate clockwise-anticlockwise rotation mode at 500 rpm
 desorption process 260 °C for 5 min.
 column Omegawax 250, 30 m x 0.25 mm I.D., 0.25 µm (24136)
 oven 40 °C (5 min), 4 °C/min. to 230 °C, 50 °C/min. to 280 °C (2 min.)
 scan range m/z 40-400
 carrier gas helium, 34.8 cm/sec constant
 liner 0.75 mm I.D. SPME/Splitless (2633901)
 Application No. G003784

1. Dimethylformaldehyde	18. 2,3-Hexanedione	35. 2,3-Dimethylpyrazine	52. 2-Furfuryl furan
2. Methyl acetate	19. Methyl-1H-pyrrole	36. 4-Heptanone	53. N-Methyl-2-formylpyrrole
3. 2-Methylfuran	20. 3,4-Hexanedione	37. 2-Methyl-2-cyclopentenone	54. γ-Butyrolactone
4. Ethyl acetate	21. 2-Vinyl-5-methylfuran	38. 3-Ethylpyridine	55. 1-(2-furyl)-3-butanone
5. 2-Butanone	22. β-Myrcene	39. 2-Ethyl-6-methylpyrazine	56. 2-Acetyl-1-methylpyrrole
6. 2,3-Dihydro-5-methylfuran	23. α-Terpinene	40. 2-Ethyl-5-methylpyrazine	57. Furfuryl alcohol
7. 2-Methyl butanal	24. Pyridine	41. 2,3,5-Trimethylpyrazine	58. N-acetyl-4(H)pyridine
8. 3-Methyl butanal	25. Limonene	42. Furfural	59. 1-(5-methyl-2-furyl)-2-propanone
9. Ethyl alcohol	26. Pyrazine	43. Acetol acetate	60. Furfuryl pyrrole
10. 2,5-Dimethylfuran	27. γ-Terpinene	44. 2-Furfuryl-5-methylsulfide	61. 2-Methoxyphenol
11. 2,3-Butanedione	28. 2-Methylpyrazine	45. Furfuryl formate	62. 3-Butenone
12. 3-Hexanone	29. p-Cymene	46. 2-Acetylfuran	63. Phenylethyl alcohol
13. 2,3-Pentanedione	30. 2,5-Dimethylpyrrole	47. Pyrrole	64. 4-Pyran-4-one
14. Hexanal	31. Acetoin	48. Furfuryl acetate	65. 2-Acetylpyrrole
15. β-pinene	32. 2,5-Dimethylpyrazine	49. Linalool	66. Furfuryl ether
16. Sabinene	33. 2,6-Dimethylpyrazine	50. Linalyl acetate	67. Pyrrole-2-carboxaldehyde
17. 3-Penten-2-one	34. 2-Ethylpyrazine	51. 5-Methylfurfural	



Chromatogram courtesy of Prof. Luigi Mondello (Univ. of Messina, Italy)

SPME Applications

Foods, Flavors, and Fragrances

GC Analysis of Shampoo Base on a 100% Methyl Silicone Column after SPME using 100 μ m PDMS

▶ application for SPME, application for GC

SPME fiber polydimethylsiloxane, 100 μ m film (57300-U)
 extraction headspace, 5 min, 80 °C (with sample stirring)
 desorption process 5 min, 250 °C
 column .. methyl silicone, 50 m x 0.25 mm I.D., 0.25 μ m (Supelco equivalent, Equity-1, available on request)
 oven 35 °C to 240 °C at 3 °C/min
 inj. temp. split, 250 °C
 detector MSD, scan m/z = 29-350 AMU
 carrier gas helium, 0.5 mL/min
 sample .. 0.5 g shampoo base with 1% fragrance test mix, diluted 1:1 with NaCl/water in a 10 mL vial

Application No. 797-0627

Analyte	Boiling Pt. (°C)	Analyte	Boiling Pt. (°C)
1. Myrcene	167	12. Eugenol	253
2. Limonene	177	13. Methyl ionone gamma	255
3. Linalool	198	14. Hexyl cinnamic aldehyde	305
4. Citronellal	206	15. Benzyl salicylate	300
5. Benzyl acetate	215		
6. Menthol	216		
7. Methyl salicylate	223		
8. α -Terpineol	219		
9. Citronellol	225		
10. Linalyl acetate	220		
11. Heliotropine	263		

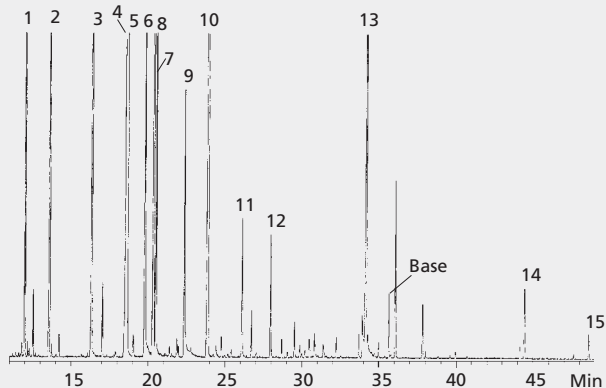


Figure provided by Eleanor Wiesenfeld, Manager, Analytical Services, Noville, Inc., 3 Empire Boulevard, South Hackensack, NJ 07606-1806 USA.

GC Analysis of Stored Apples on a 5% Phenyl Column after SPME using 100 μ m PDMS

▶ application for SPME, application for GC

sample/matrix .. 300-450 g intact fruit in a 3 liter flask at ambient temp., exposed to an air flow of 25-30 mL/min.
 SPME fiber polydimethylsiloxane, 100 μ m film (57310-U)
 column poly(5% diphenyl/95% dimethylsiloxane) type, 25 m x 0.25 mm I.D., 0.34 μ m film (Supelco equivalent, Equity-5, available on request)
 oven 40 °C (1.5 min) to 250 °C at 50 °C/min, hold 1 min
 detector mass spectrometer, m/z = 40-300 (40 spectra/sec)
 carrier gas helium, 1.5 mL/min (44 cm/min)
 Application No. G000155

- 2-Methyl butanol
- Hexanol
- Butyl acetate
- 2-Methyl butyl acetate
- Methylpropylbutanoate
- Hexyl acetate
- Butyl-2-methylbutanoate
- Pentyl butanoate
- Butyl hexanoate/Hexyl butanoate
- p-Methoxyallylbenzene
- Hexyl-2-methylbutanoate
- 3-Methylbutylhexanoate
- Pentyl hexanoate
- 2-Pentenylhexanoate
- 2-Methylpropyl-2-methylbutanoate
- Hexyl hexanoate
- α -Farnesene

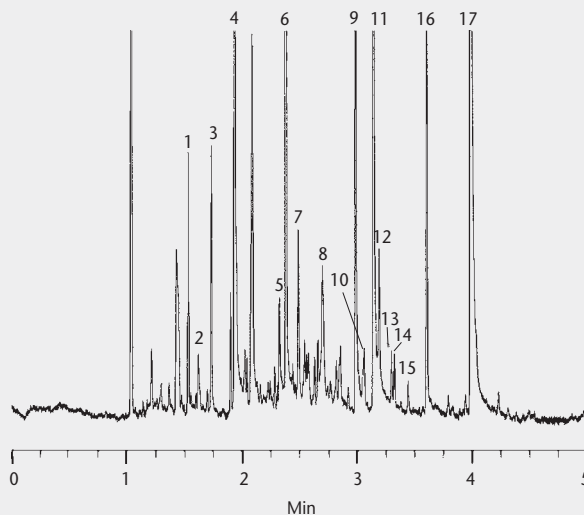
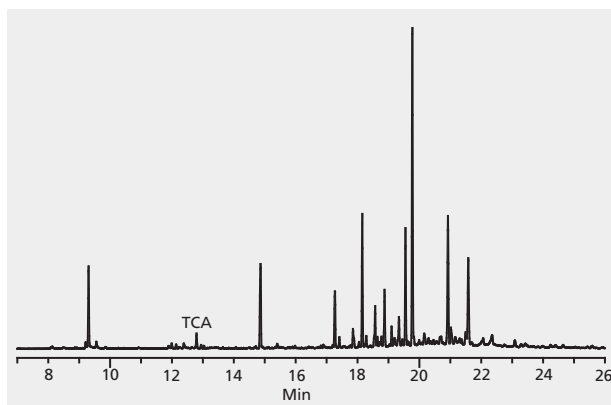


Figure provided by Jun Song, Department of Horticulture, Michigan State University, East Lansing, MI 48824, USA

GC Analysis of Trichloroanisole (TCA) in Wine on the SLB®-5ms after SPME using 100 μ m PDMS

▶ application for SPME, application for GC

sample/matrix red wine spiked with 5 ppt TCA
 SPME fiber 100 μ m PDMS metal fiber (57928-U)
 extraction headspace, room temp (30 min.)
 desorption process 250 °C for 3 min.
 column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 μ m (28471-U)
 oven 60 °C (2 min.), 8 °C/min. to 200 °C (10 min.)
 MSD interface 300 °C
 scan range SIM, m/z = 195, 197, 210, 212
 carrier gas helium, 1 mL/min. constant liner
 Application No. G003678



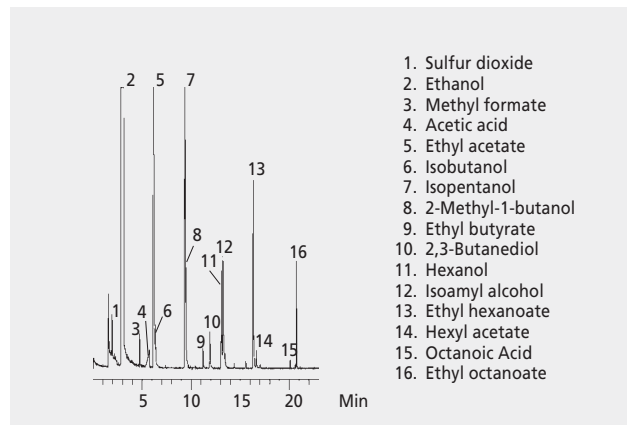
SPME Applications

Foods, Flavors, and Fragrances

GC Analysis of White Wine on the VOCOL® after SPME using 75 µm Carboxen/PDMS

▶ application for SPME, application for GC

sample/matrix white wine + 25% NaCl
 SPME fiber Carboxen/PDMS, 75 µm (57318)
 extraction 10 min, 40 °C (headspace)
 desorption process 3 min at 290 °C
 column VOCOL, 30 m × 0.25 mm I.D., 1.5 µm (24205-U)
 oven 40 °C (2 min) to 220 °C at 10 °C/min
 detector GC-MS, quadrupole, m/z = 31-240
 carrier gas helium, 35 cm/sec
 Application No. 97-0191

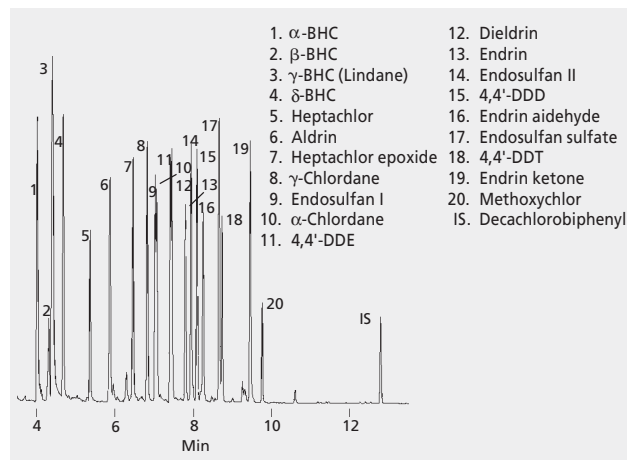


Hydrocarbons and Pesticides

GC Analysis of Chlorinated Pesticides on the SPB®-5 after SPME using 100 µm PDMS

▶ application for SPME, application for GC

sample/matrix 200 ppt each in 2 mL water
 SPME fiber polydimethylsiloxane, 100 µm (57300-U)
 extraction 15 min immersed in water with rapid stirring
 column SPB-5, 15 m × 0.20 mm I.D., 0.20 µm (24165-U)
 oven 120 °C (1 min) to 180 °C at 30 °C/min, then to 290 °C at 10 °C/min
 inj. temp. 260 °C (splitless - closed 3 min)
 detector ECD, 300 °C
 carrier gas helium, 37 cm/sec (set at 120 °C)
 Application No. 794-0441



GC Analysis of Gasoline in Arson Samples on a 100% Methyl Silicone Column after SPME using 100 µm PDMS

▶ application for SPME, application for GC

SPME fiber polydimethylsiloxane phase fiber, 100 µm headspace sampling (20 min) 10 sec desorption (splitless mode) (57300-U)
 column .. polydimethylsiloxane phase, 30 m × 0.25 mm I.D., 0.25 µm (Supelco equivalent, Equity-1, 28046)
 oven 35 °C (2 min) to 220 °C at 10 °C/min, hold 2 min, to 300 °C at 30 °C/min, hold 5 min
 inj. temp. splitless (closed 3 min), 220 °C (2 mm I.D. injector liner)
 detector FID, 300 °C
 carrier gas helium, 1 mL/min (split 50:1)
 Application No. 794-0863

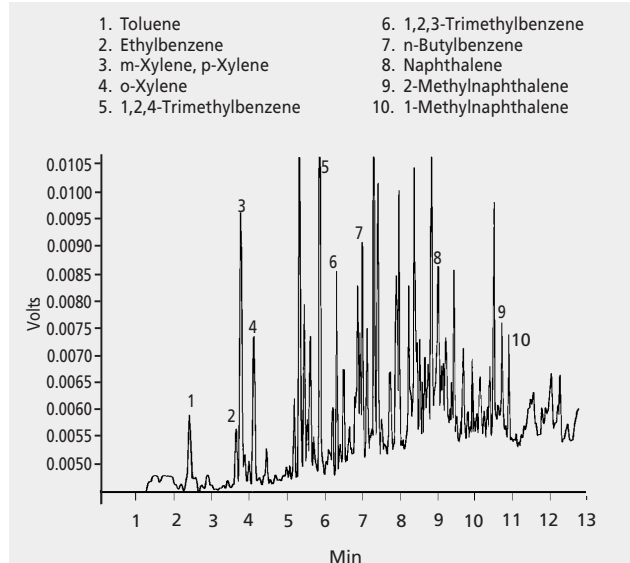


Figure courtesy of José Almirall, Crime Laboratory Bureau, Metro-Dade Police Department, Miami, FL, USA, and Kenneth Furton and Juan Bruna, Department of Chemistry, Florida International University, Miami.

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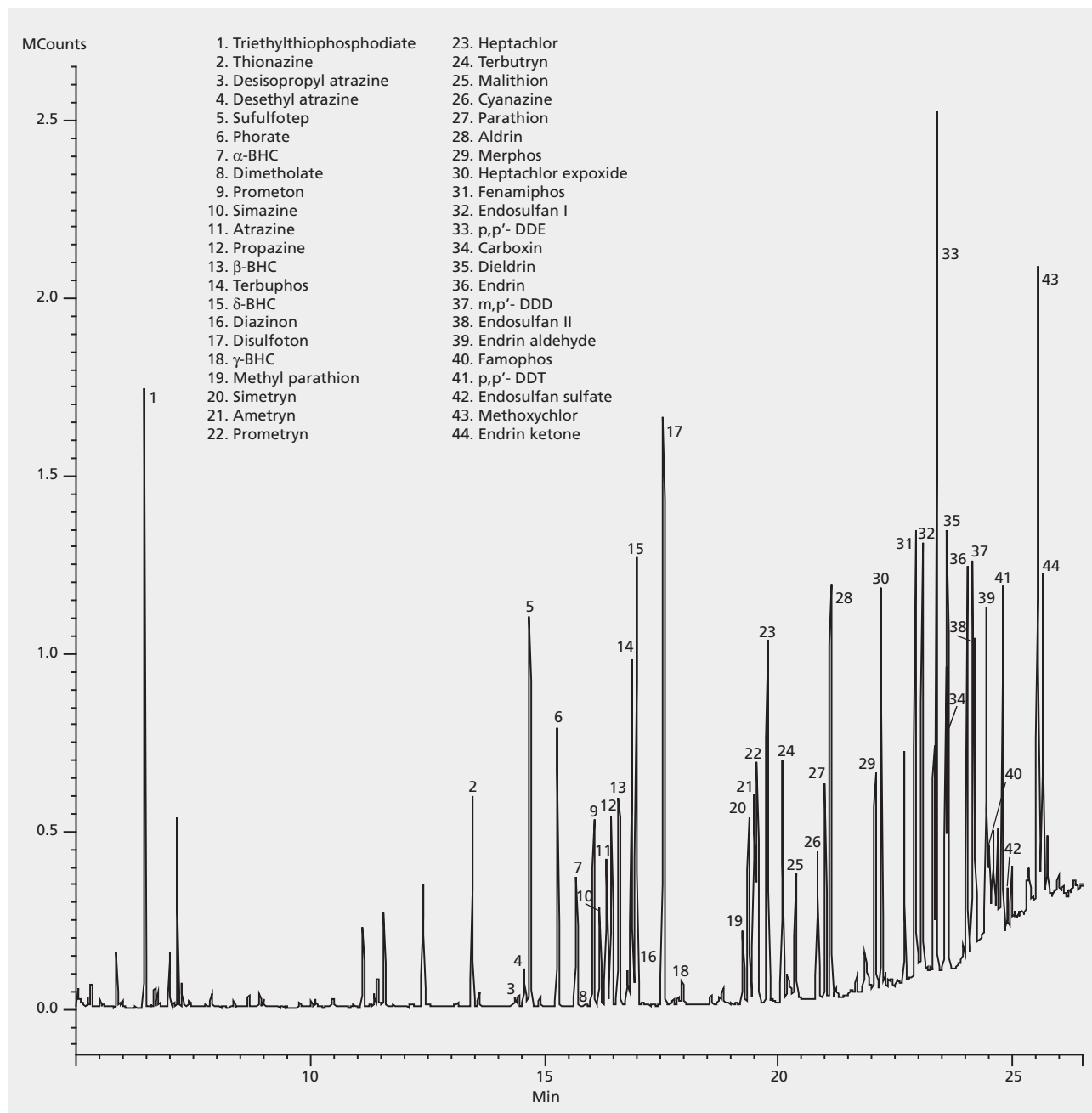
SPME Applications

Hydrocarbons and Pesticides

GC Analysis of Multiple Pesticides on the SLB®-5ms after SPME using 60 µm Carbowax®

▶ application for SPME, application for GC

sample/matrix Pesticides at 10 ppb in 0.1M phosphate buffer, pH 7, with 25% NaCl, 9 mL in 10 mL screw cap vial
 SPME fiber 60 µm Carbowax (PEG) (57354-U)
 extraction 30 min. direct immersion with agitation using CombiPal autosampler
 desorption process 2 min. at 250°C, splitless for 0.75 min. then opened
 column SLB-5ms, 30 m x 0.25 mm ID, 0.5µm film
 oven 60°C(1 min) to 150°C @ 25°C/min to 230°C @ 5°C/min to 310°C @ 18°C/min (3 min)
 inj. temp. Splitless/split with 0.75mm ID liner and Merlin Microseal
 detector ITMS m/z=60-450 @ 0.9 µsec per scan, transfer line 310°C
 carrier gas Helium, 1mL/min constant flow
 Application No. G003775



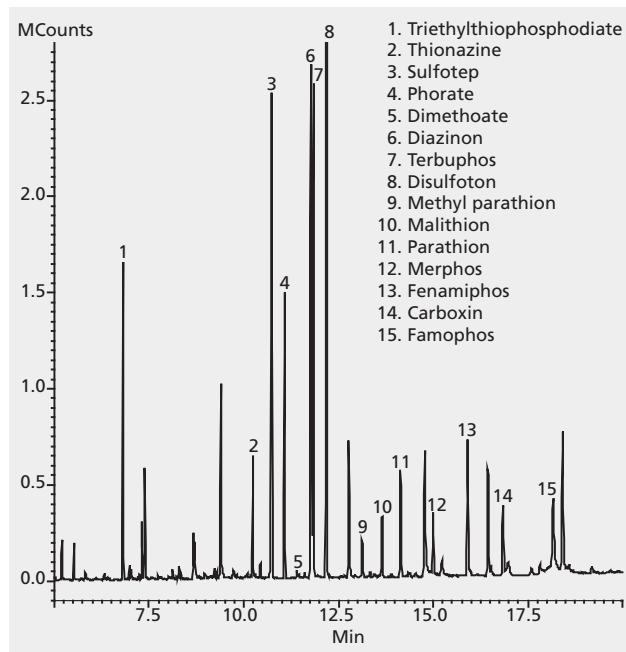
SPME Applications

Hydrocarbons and Pesticides

GC Analysis of Organophosphorous Pesticides on the SPB®-5ms after SPME using 60 µm Carbowax®

▶ application for SPME, application for GC

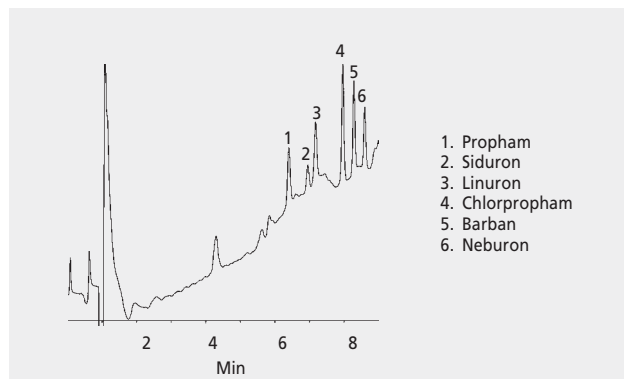
sample/matrix .. Organophosphate pesticides at 10ppb in 0.2M phosphate buffer, pH 7, with 25% NaCl, 9mL in 10 mL vial
 SPME fiber 60 µm Carbowax(PEG) (57354-U)
 extraction 30 min. direct immersion with agitation using CombiPal autosampler
 desorption process 2 min. at 250°C, splitless for 0.75 min. then opened
 column SLB-5ms 30 m x 0.25mm ID, 0.5 µm film
 oven 60°C(1 min) to 215°C @ 20°C/min to 290°C @ 6°C/min (1 min)
 inj. temp. Splitless/split with 0.75mm ID liner and Merlin Microseal
 detector ITMS m/z=50-326 @ 0.6 µsec per scan, transfer line 310°C
 carrier gas Helium, 1mL/min constant flow
 Application No. G003776



HPLC Analysis of Carbamate and Urea Pesticides on the SUPELCOSIL™ LC-8 after SPME using 60 µm PDMS/DVB

▶ application for SPME, application for HPLC

sample/matrix 3 mL water containing 8ng/mL of each analyte in 10% NaCl
 SPME fiber PDMS/DVB, 60 µm (57317)
 extraction immersion, 40 min, rapid stirring
 desorption process ... static, 5 min in acetonitrile:water (65:35); dynamic, valve open during run
 column SUPELCOSIL LC-8, 15 cm x 4.6 mm I.D., 5 µm particles (58220-U)
 mobile phase acetonitrile:water (18:82 to 65:35 in 9 min, hold 3 min)
 flow rate 2.0 mL/min
 column temp. 35 °C
 detector UV, 240 nm
 Application No. 797-0049



Herbicides, PCBs, and Phenols

GC Analysis of Nitrogen-Containing Herbicides in Water on the PTE™-5 after SPME using 85 µm Polyacrylate

▶ application for SPME, application for GC

sample/matrix 4 mL (water + 100ng/mL each analyte 1g/mL NaCl), pH 2, in 4.6 mL vial
 SPME fiber polyacrylate, 85 µm (57304)
 extraction immersion, ambient temp., 50 min (constant stirring)
 desorption process 5 min, 230 °C
 column PTE-5, 30 m x 0.25 mm I.D., 0.25 µm (24135-U)
 oven 40 °C (5 min) to 100 °C at 30 °C/min, to 275 °C at 5 °C/min
 inj. temp. splitless, 230 °C
 detector MS (Ion Trap Manifold: 250°C; scan range m/z=45-400 at 0.6 sec/scan)
 carrier gas helium, 40 cm/sec, set at 40 °C
 Application No. 795-0567

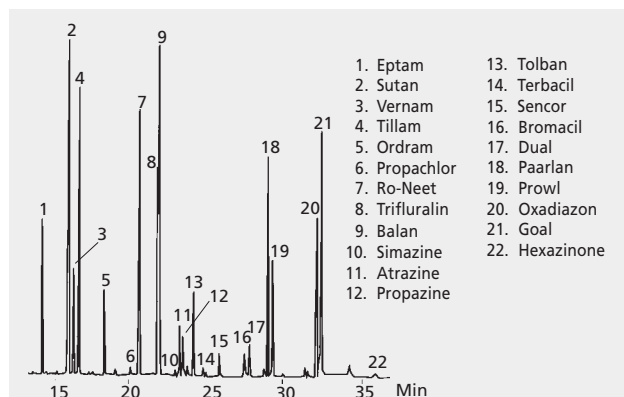


Figure provided by A. Boyd-Boland and J. Pawliszyn, University of Waterloo, Waterloo, Ontario, Canada.

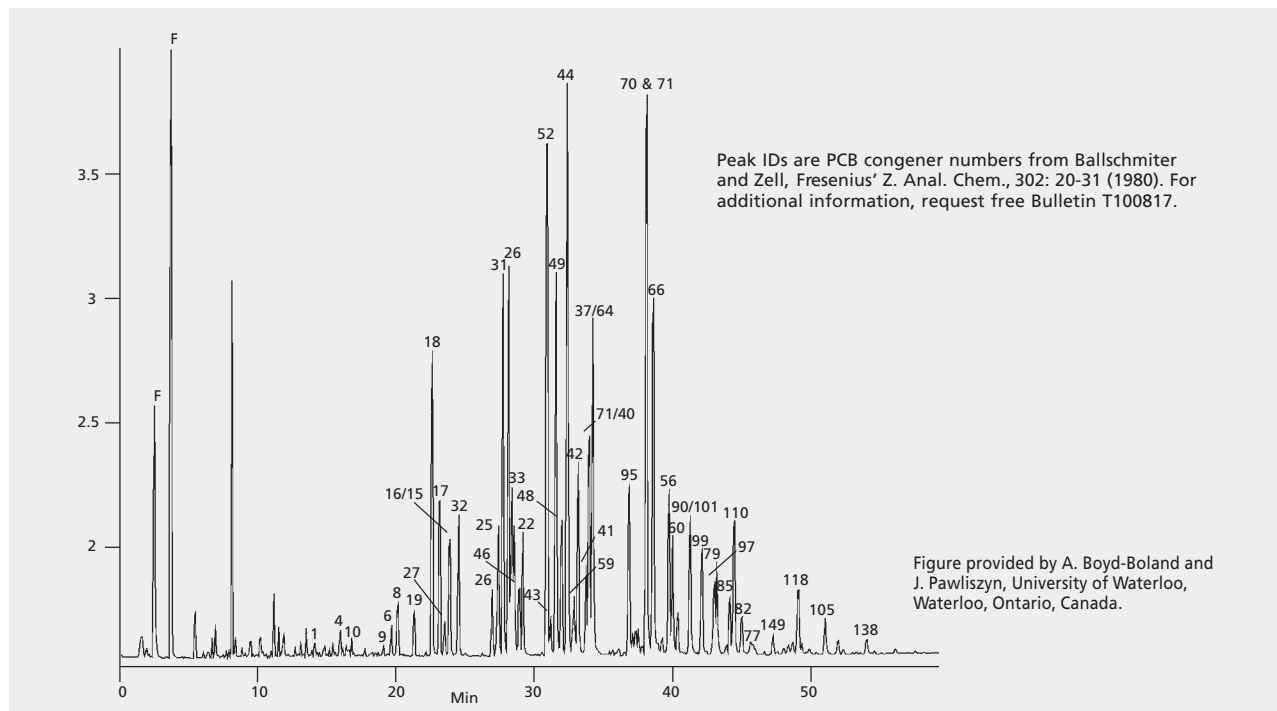
SPME Applications

Herbicides, PCBs, and Phenols

GC Analysis of PCB Congeners in Stream Sediment on the SPB®-Octyl after SPME using 100 µm PDMS

▶ application for SPME, application for GC

sample/matrix 5 g stream sediment, downstream from industrial sites
 SPME fiber PDMS, 100 µm (57300-U) (57300-U)
 extraction headspace, 90 °C/30 min
 desorption process 280 °C/2 min, splitless
 column SPB®-Octyl, 30 m × 0.25 mm I.D., 0.25 µm (24218-U) (24218-U)
 oven 50 °C/1 min at 10 °C/min to 150 °C/0 min
 Application No. 794-0695

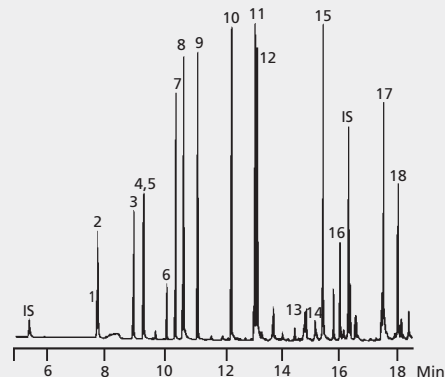


GC Analysis of Phenols in Water on the PTE™-5 after SPME using 85 µm Polyacrylate

▶ application for SPME, application for GC

sample/matrix 50 ppb phenols in water, 27% NaCl, pH 2
 SPME fiber polyacrylate, 85 µm (57304)
 extraction 20 min immersed in water with rapid stirring
 desorption process splitless, 280 °C (closed 3 min)
 column PTE-5, 30 m × 0.25 mm I.D., 0.25 µm (24135-U)
 oven 40 °C (4 min) to 260 °C at 12 °C/min
 detector MS, Scan Range m/z = 45-465 at 0.6 sec/scan
 carrier gas helium, 40 cm/sec at 40 °C
 Application No. 794-0199

- | | |
|-------------------------------|-------------------------------------|
| IS 2-Fluorophenol (int. std.) | 10. 4-Chloro-3-methylphenol |
| 1. Phenol | 11. 2,4,5-Trichlorophenol |
| 2. 2-Chlorophenol | 12. 2,4,6-Trichlorophenol |
| 3. 2-Methylphenol | 13. 2,4-Dinitrophenol |
| 4. 3-Methylphenol | 14. 4-Nitrophenol |
| 5. 4-Methylphenol | 15. 2,3,4,6-Tetrachlorophenol |
| 6. 2-Nitrophenol | 16. 2-Methyl-4,6-dinitrophenol |
| 7. 2,4-Dimethylphenol | IS 2,4,6-Tribromophenol (int. std.) |
| 8. 2,4-Dichlorophenol | 17. Pentachlorophenol |
| 9. 2,6-Dichlorophenol | 18. Dinoseb |



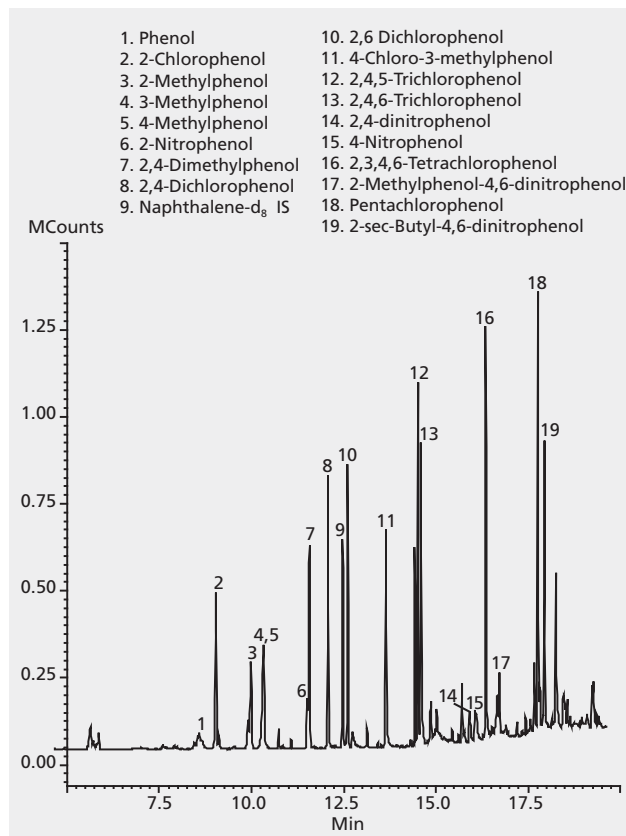
SPME Applications

Herbicides, PCBs, and Phenols

GC Analysis of Phenols in Water on the SLB®-5ms after SPME using 60 µm Carbowax®

► application for SPME, application for GC

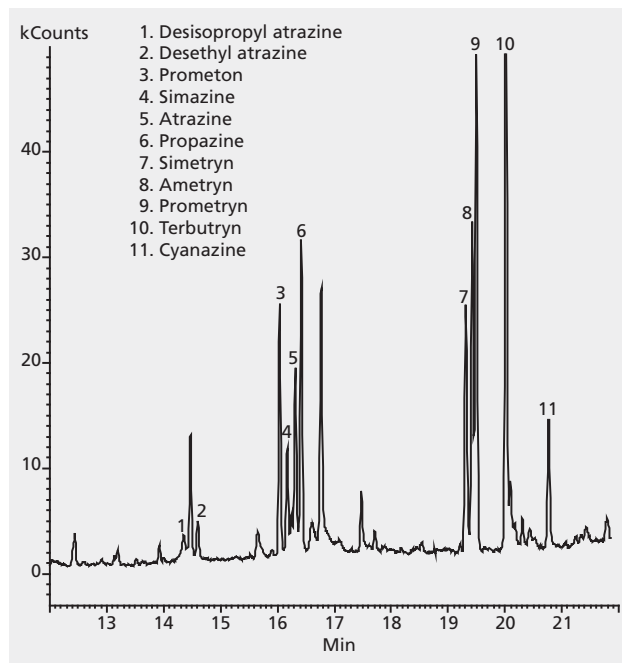
sample/matrix .. Phenols at 25 ppb in 0.1M phosphate buffer, pH 2, with 25% NaCl, 9 mL in 10 mL screw cap vial
 SPME fiber 60 µm Carbowax (PEG) (57354-U)
 extraction 30 min. direct immersion with agitation using CombiPal autosampler
 desorption process (30 min. direct immersion with agitation using CombiPal autosampler)
 column SLB-5ms, 30 m x 0.25 mm ID, 0.5µm film
 oven 50°C(2.0 min) to 160°C @ 10°C/min to 280°C @ 20°C/min
 inj. temp. Splitless/split with 0.75mm ID liner and Merlin Microseal
 detector ITMS m/z=45-275 @ 0.7 µsec per scan, transfer line 310°C
 carrier gas Helium, 1mL/min constant flow, 8.7 psi
 Application No. G003778



GC Analysis of Triazine Herbicides on the SLB®-5ms after SPME using 60 µm Carbowax®

► application for SPME, application for GC

sample/matrix .. Triazine herbicides at 2 ppb in 0.1M phosphate buffer, pH 7, with 25% NaCl, 9 mL in 10 mL screw cap vial
 SPME fiber 60 µm Carbowax (PEG) (57354-U)
 extraction 30 min. direct immersion with agitation using CombiPal program
 desorption process 2 min. at 250°C, splitless for 0.75 min. then opened
 column SLB-5ms, 30 m x 0.25 mm ID, 0.5µm film
 oven 60°C(1 min) to 150°C @ 25°C/min to 230°C @ 5°C/min (0.5 min)
 inj. temp. Splitless/split with 0.75mm ID liner and Merlin Microseal
 detector ITMS m/z=150-250 @ 0.5 µsec per scan, transfer line 310°C
 carrier gas Helium, 1mL/min constant flow
 Application No. G003777



SPME Applications

Polynuclear Aromatic Hydrocarbons

Polynuclear Aromatic Hydrocarbons

HPLC Analysis of PAHs in Water on the SUPELCOSM LC-PAH after SPME using 100 µm PDMS

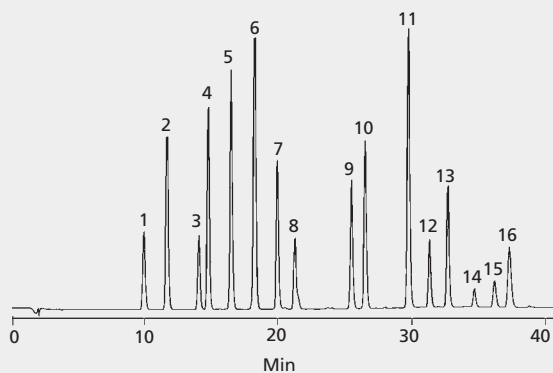
▶ application for SPME, application for HPLC

sample/matrix 5 µL PAH mix (Cat. No. 4-8743) in 5 mL water
 SPME fiber polydimethylsiloxane, 100 µm (57301)
 extraction immersion, 30 min (rapid stirring)
 desorption process static, 200 µL acetonitrile:water, 40:60, 2 min
 column SUPELCOSM LC-PAH, 15 cm x 4.6 mm I.D., 5 µm particles (58318)
 mobile phase acetonitrile:water gradient (see program)
 flow rate 0-2 min: 0.2 mL/min 2-45 min: 1.0 mL/min
 detector UV, 254 nm
 Application No. 796-0086

1. Naphthalene 1000 ng/mL
2. Acenaphthylene 2000 ng/mL
3. Acenaphthene 1000 ng/mL
4. Fluorene 200 ng/mL
5. Phenanthrene 100 ng/mL
6. Anthracene 100 ng/mL
7. Fluoranthene 200 ng/mL
8. Pyrene 100 ng/mL
9. Benzo(a)anthracene 100 ng/mL
10. Chrysene 100 ng/mL
11. Benzo(b)fluoranthene 200 ng/mL
12. Benzo(k)fluoranthene 100 ng/mL
13. Benzo(a)pyrene 100 ng/mL
14. Dibenzo(a,h)anthracene 200 ng/mL
15. Benzo(ghi)perylene 200 ng/mL
16. Indeno(1,2,3-cd)pyrene 100 ng/mL

Gradient Program Time (min)	% ACN
0	50
5	50
30	100
45	100

Flow increased at 2.0 min

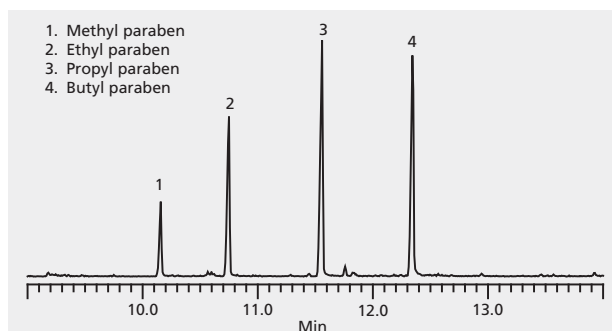


Preservatives

GC Analysis of Parabens on the SLB[®]-5ms after SPME using 50/30 µm DVB/Carboxen/PDMS

▶ application for SPME, application for GC

sample/matrix .. parabens, each at 200 ppb in 3 mL water + 25% sodium chloride in a 4 mL vial
 SPME fiber metal fiber assembly coated with 50/30 µm DVB/Carboxen/PDMS
 extraction immersion with stirring, 25 °C (15 min.)
 desorption process 260 °C, 2 min.
 column SLB-5ms, 20 m x 0.18 mm I.D., 0.36 µm (28576-U)
 oven 60 °C (2 min.), 15 °C/min. to 300 °C (5 min.)
 MSD interface 275 °C
 scan range m/z 40-450
 carrier gas helium, 0.7 mL/min. constant
 liner 0.75 mm I.D. SPME
 Application No. G004057

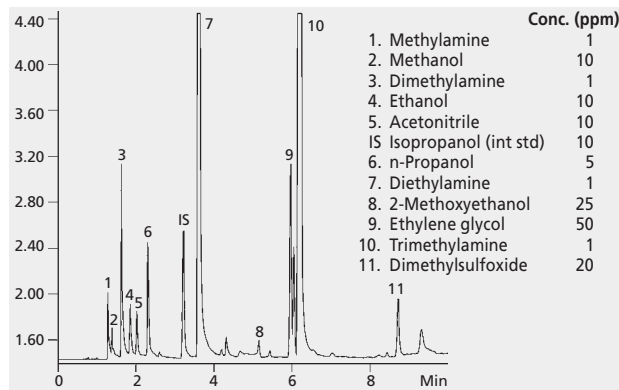


Semivolatiles, Solvents

GC Analysis of Pharmaceutical Residual Solvents on the SPB[®]-1 SULFUR after SPME using 65 µm PDMS/DVB

▶ application for SPME, application for GC

sample/matrix .. water + 25% NaCl, pH 11.0 immersion: 3.9 mL sample + 0.1 mL 50% Na₃PO₄ / 1 g NaCl headspace: 2.4 mL sample + 0.06 mL 50% Na₃PO₄ / 0.6 g NaCl
 SPME fiber polydimethylsiloxane/DVB, 65 µm (57310-U)
 extraction immersion, 15 min (rapid stirring or headspace, 15 min, 55 °C)
 desorption process 270 °C, 5 min
 column SPB-1 SULFUR, 30 m x 0.32 mm I.D., 4.0 µm (24158)
 oven 50 °C (2 min) to 180 °C at 10 °C/min
 inj. temp. splitless (3 min), 270 °C (0.75 mm I.D. liner)
 detector FID
 carrier gas helium, 50 cm/sec
 Application No. 96-0114



SPME Applications

Semivolatiles, Solvents

GC Analysis of Residual Solvents in Pharmaceutical Preparations on the SPB®-624 after SPME using 100 µm PDMS

▶ application for SPME, application for GC

SPME fiber polydimethylsiloxane, 100 µm (57300-U)
 extraction headspace or immersion sampling (15 min) 1 min desorption
 column SPB-624, 75 m × 0.53 mm I.D., 3.0 µm (25432)
 oven 40 °C (35 min) to 220 °C at 40 °C/min, hold 5 min
 inj. temp. splitless (closed 3 min), 200 °C
 detector FID, 250 °C
 carrier gas helium, 35 cm/sec
 Application No. 794-0864

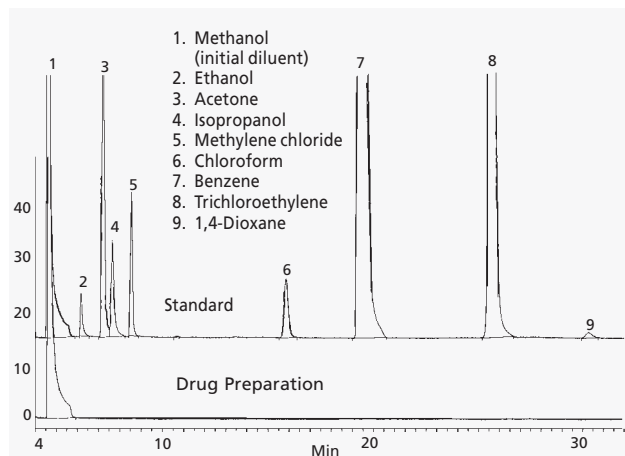
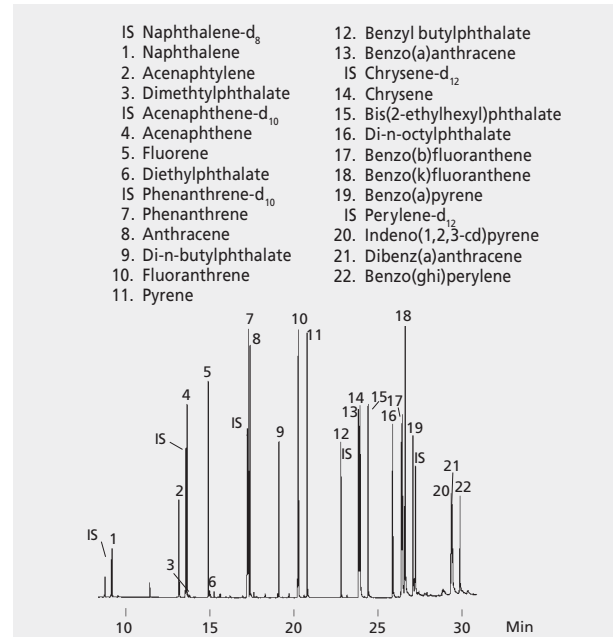


Figure courtesy of Stephen Scypinski, Ann-Marie Smith, Linda Clark Nelson, and Sandra Rosen Shaw, Hoffmann-La Roche, Nutley, NJ, USA.

GC Analysis of Semivolatiles in Water on the PTE™-5 after SPME using 7 µm PDMS

▶ application for SPME, application for GC

sample/matrix water spiked with PAHs and phthalates at 50ppb
 SPME fiber polydimethylsiloxane, 7 µm (57302)
 extraction direct immersion in water, 15 min (rapid stirring)
 column PTE-5, 30 m × 0.25 mm I.D., 0.25 µm (24135-U)
 oven 60 °C (3 min) to 320 °C at 10 °C/min
 inj. temp. split/splitless, 280 °C (closed 4 min)
 detector MS, Scan Range m/z = 45-465 at 0.6 sec/scan
 carrier gas helium, 40 cm/sec at 60 °C
 Application No. 794-0047



SPME Applications

Semivolatiles, Solvents

GC Analysis of Semivolatiles on the SLB®-5ms after SPME using 60 µm Carbowax®

▶ application for SPME, application for GC

sample/matrix .. Base neutral analytes at 50 ppb and internal standards 25 ppb in 0.1M phosphate buffer, pH 11, with 25% NaCl, 9 mL in 10 mL screw cap vial

SPME fiber 60 µm Carbowax (PEG) (57354-U)

extraction 30 min. direct immersion with agitation using CombiPal autosampler

desorption process 2 min. at 250°C, splitless for 0.75 min. then opened column

column SLB-5ms, 30 m x 0.25 mm ID, 0.5µm film

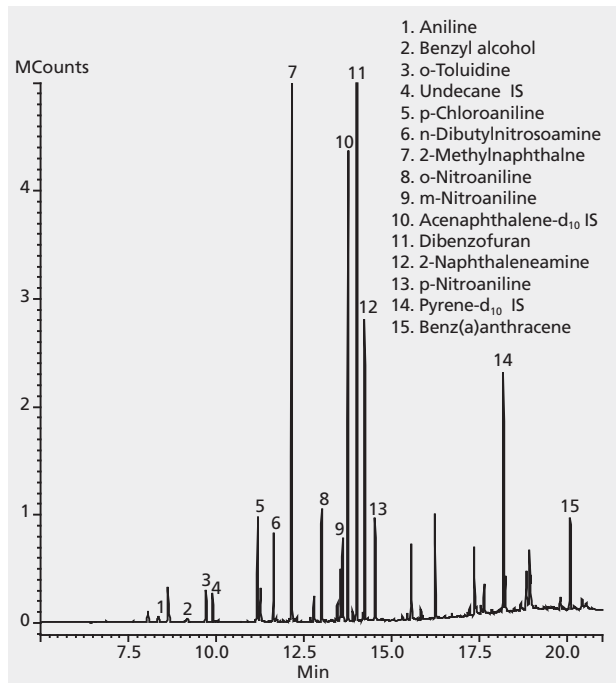
oven .. 50°C(2 min) to 130°C @ 12°C/min to 200°C @ 20°C/min to 260°C @ 15°C/min to 310°C @ 20°C/min (4 min.)

inj. temp. Splitless/split with 0.75mm ID liner and Merlin Microseal

detector ITMS m/z=50-230 @ 0.65 µsec per scan, transfer line 310°C

carrier gas Helium, 1mL/min constant flow, 8.7 psi

Application No. G003779



GC Analysis of Solvents in Water on the SPB®-1 SULFUR after SPME using 75 µm Carboxen/PDMS

▶ application for SPME, application for GC

sample/matrix solvents at 20 ppb in 4 mL water + 25% NaCl in 4 mL vial

SPME fiber carboxen/PDMS, 75 µm (57318)

extraction immersion, 10 min, rapid stirring

desorption process 270 °C, 5 min

column SPB-1 SULFUR, 30 m x 0.32 mm I.D., 4.0 µm film (24158)

oven 50°C (2 min) to 150°C at 10°C/min

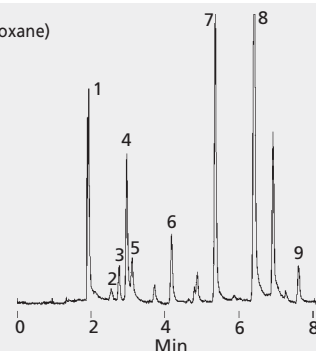
inj. temp. splitless (closed 2 min), 260°C, 0.75 mm I.D. liner

detector FID

carrier gas helium, 30 cm/sec

Application No. 96-0327

1. Methanol (solvent for dioxane)
2. Ethanol
3. Acetonitrile
4. Acetone
5. Isopropanol
6. n-Propanol
7. Ethyl acetate
8. 3-Methyl-2-butanone
9. 1,4-Dioxane



SPME Applications

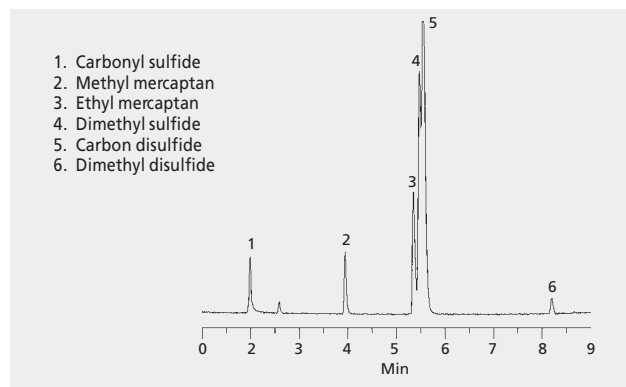
Odors, Sulfur Compounds, and Volatiles

Odors, Sulfur Compounds, and Volatiles

GC Analysis of Sulfur Gases at 1 ppm on the Supel-Q™ PLOT after SPME using 75 µm Carboxen/PDMS

► application for SPME, application for GC

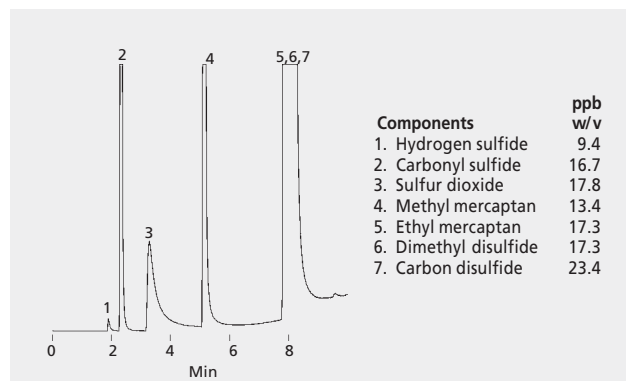
sample/matrix sulfur gases in air at 1ppm, 250 mL bulb
 SPME fiber Carboxen/PDMS, 75 µm (57318)
 extraction headspace, 5 min., ambient temp.
 desorption process 2 min., 250 °C
 column Supel-Q PLOT, 30 m x 0.32 mm I.D. (24242)
 oven 45 °C (0.75 min.) to 250 °C at 25 °C/min
 inj. temp. splitless/split (closed 2 min.), 0.75 mm I.D. liner
 detector MS quadrupole, m/z = 32 - 125 (0.6sec/scan)
 carrier gas helium, 25 cm/sec
 Application No. 96-0326



GC Analysis of Sulfur Gases on the Supel-Q™ Plot after SPME using 75 µm Carboxen/PDMS

► application for SPME, application for GC

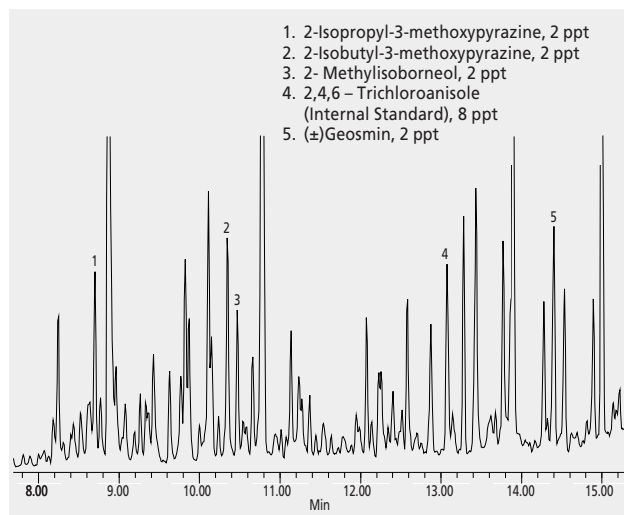
sample/matrix sulfur gases in 40 mL vial
 SPME fiber Carboxen/PDMS, 75 µm (57318)
 extraction 10 min headspace at 40 °C
 desorption process 3 min at 290 °C
 column Supel-Q PLOT, 30 m x 0.32 mm I.D. (24242)
 oven 45 °C (1 min) to 250 °C at 15 °C/min
 detector FPD
 Application No. 97-0189



GC Analysis of Trace Odors in Drinking Water on the Equity®-5 after SPME using 50/30 µm DVB/Carboxen/PDMS

► application for SPME, application for GC

sample/matrix 25 mL of water containing 25% NaCl and drinking water odors kit (47529-U)
 SPME fiber 2 cm StableFlex coated with 50/30 µm DVB/Carboxen/PDMS (57348-U)
 extraction headspace, 65 °C (30 min.)
 desorption process 3 min. at 260 °C
 column Equity-5, 30 m x 0.25 mm, 0.25 µm (28089-U)
 oven 60 °C (2 min) to 200 °C at 8 °C/min
 flow rate helium, 37 cm/sec @ 60 °C (1 mL/min constant flow)
 inj. temp. SPME fiber, splitless opened at after 1 min at 50 mL/min.
 detector MS, selected ions (SIM) 95, 112, 124, 137, 197; interface at 280 °C
 liner 0.75 mm SPME liner
 Application No. G001645



SPME Applications

Odors, Sulfur Compounds, and Volatiles

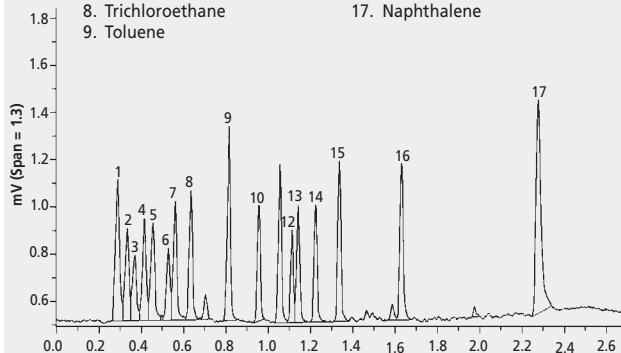
GC Analysis of Water Sample Screened for Volatiles on the Equity®-1 after SPME using 30 µm PDMS

▶ application for SPME, application for GC

sample/matrix 0.7 mL water spiked with 2-600 µg/liter each analyte, 0.25 g NaCl added
 SPME fiber 30 µm PDMS (57309)
 extraction headspace, 12 sec (no stirring), ambient temp.
 desorption process 2-3 min, 250 °C (0.75-1.0 mm I.D. inj. port liner)
 column Equity-1, 10 m x 0.20 mm I.D., 1.2 µm (available on request)
 oven 70 °C (0.2 min) to 180 °C at 50 °C/min
 detector FID, 250 °C
 Application No. 796-0685

Extraction and Analysis Completed
in Less Than 2½ Minutes

- | | |
|-----------------------------------|------------------------------------|
| 1. Methanol | 10. Tetrachloroethylene |
| 2. Acetone | 11. Chlorobenzene |
| 3. Methylene chloride | 12. Ethylbenzene |
| 4. MTBE (Methyl-tert-butyl ether) | 13. m-Xylene, p-Xylene |
| 5. cis-1,2-Dichloroethylene | 14. o-Xylene |
| 6. 1,1,1-Trichloroethane | 15. Cumene (Isopropylbenzene) |
| 7. Benzene | 16. 1,4-Dichlorobenzene-d4 (surr.) |
| 8. Trichloroethane | 17. Naphthalene |
| 9. Toluene | |

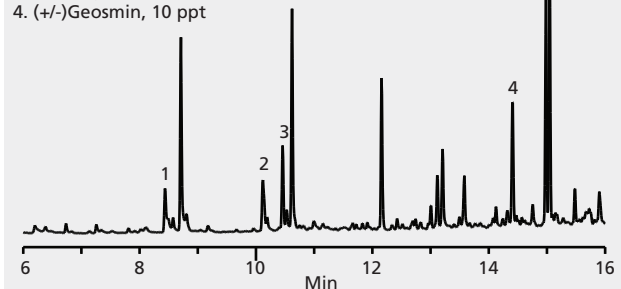


Standard Methods 6040D: GC Analysis of Geosmin and 2-MIB on the SLB®-5ms after SPME using 50/30 µm DVB/Carboxen/PDMS

▶ application for SPME, application for GC

sample/matrix 20/10 ppt odor compounds in 25 mL water + 25% NaCl
 SPME fiber 2 cm Metal coated with 50/30 µm DVB/Carboxen/PDMS (57914-U)
 extraction headspace, 65 °C (30 min.)
 desorption process 260 °C for 3 min.
 column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 µm (28471-U)
 oven 60 °C (2 min.), 8 °C/min. to 200 °C
 MSD interface 300 °C
 scan range SIM, m/z = 137, 124, 95, 112
 carrier gas helium, 1 mL/min. constant
 liner 0.75 mm I.D., SPME
 Application No. G003666

1. 2-isopropyl-3-methoxy pyrazine, 20 ppt
2. 2-isobutyl-3-methoxy pyrazine, 20 ppt
3. 2-methylisoborneol, 10 ppt
4. (+/-)Geosmin, 10 ppt



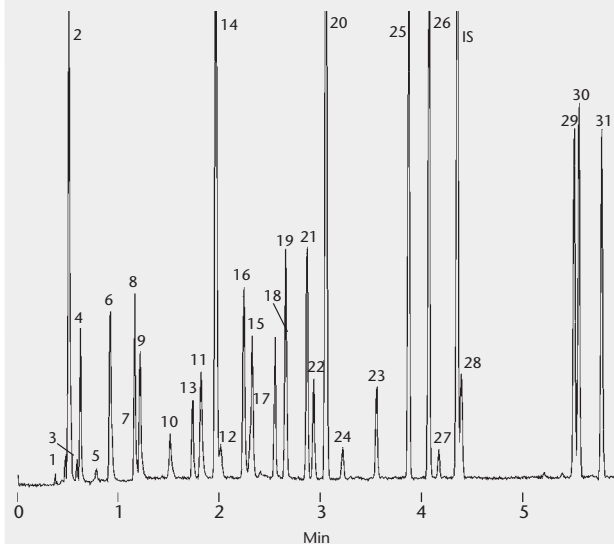
Volatiles

GC Analysis of Volatiles on the SPB®-1 after SPME using 100 µm PDMS

▶ application for SPME, application for GC

SPME fiber polydimethylsiloxane, 100 µm (57300-U)
 extraction 5 min immersed in water with rapid stirring
 column SPB-1, 10 m x 0.20 mm I.D., 1.2 µm (24134-U)
 oven 40 °C (0.75 min) to 160 °C at 20 °C/min
 inj. temp. 230 °C, splitless (closed 3 min)
 detector FID, 260 °C
 carrier gas helium, 40 cm/sec
 sample 50ppb each analyte in 1.8 mL saturated salt water
 Application No. 794-0438

- | | |
|-----------------------------|-------------------------------|
| 1. Chloromethane | 17. Bromodichloromethane |
| 2. Vinyl chloride | 18. 2-Chloroethyl vinyl ether |
| 3. Bromomethane | 19. cis-1,3-Dichloropropene |
| 4. Chloroethane | 20. Toluene |
| 5. Trichlorofluoromethane | 21. trans-1,3-Dichloropropene |
| 6. 1,1-Dichloroethylene | 22. 1,1,2-Trichloroethane |
| 7. Methylene chloride | 23. Tetrachloroethylene |
| 8. trans-1,2-Dichloroethene | 24. Dibromochloromethane |
| 9. 1,1,-Dichloroethane | 25. Chlorobenzene |
| 10. Chloroform | 26. Ethylbenzene |
| 11. 1,1,1-Trichloroethane | 27. Bromoform |
| 12. Carbon tetrachloride | IS 1,4-Dichlorobutane |
| 13. Benzene | 28. 1,1,2,2-Tetrachloroethane |
| 14. 1,2-Dichloroethane | 29. 1,3-Dichlorobenzene |
| 15. Trichloroethylene | 30. 1,4-Dichlorobenzene |
| 16. 1,2-Dichloropropane | 31. 1,2-Dichlorobenzene |



SPME Applications

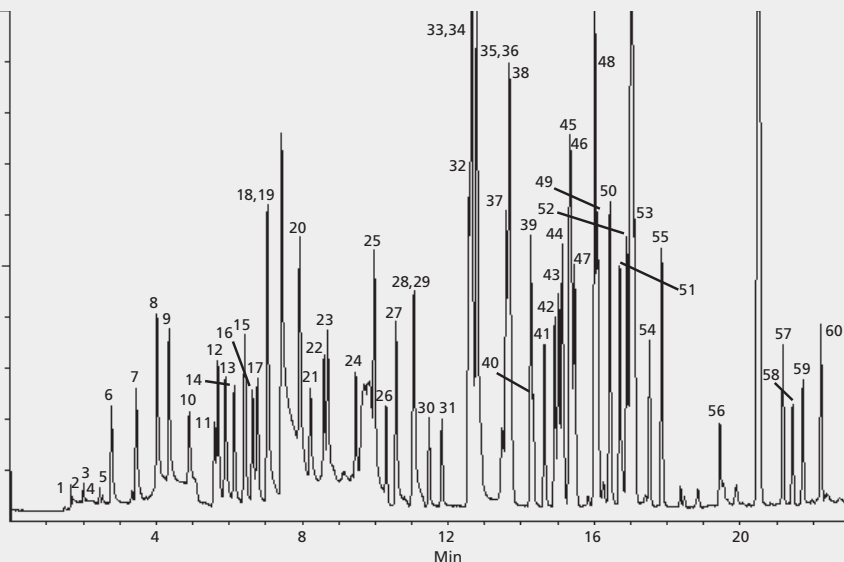
Volatiles

GC Analysis of Volatiles on the VOCOL® after SPME using 75 µm Carboxen/PDMS

▶ application for SPME, application for GC

sample/matrix 1 ppb each analyte in 3 mL water (25% NaCl added) in 4 mL vial
 SPME fiber Carboxen/PDMS, 75 µm (57318)
 extraction headspace, 40°C (20 min), with stirring
 desorption process 5 min, 310 °C
 column VOCOL®, 30 m x 0.25 mm I.D., 1.5 µm (24205-U) (24205-U)
 oven 40 °C (2 min) to 210 °C at 8 °C/min
 detector ion trap, MS, m/z = 45-260 (0.6sec/scan)
 carrier gas helium, 35 cm/sec
 injection splitless/split (closed 2 min), 0.75 mm I.D. liner
 Application No. 97-0183

- | | | | |
|-------------------------------|-------------------------------|-------------------------------|--|
| 1. Dichlorodifluoromethane | 17. Carbon tetrachloride | 32. Chlorobenzene | 47. 4-Chlorotoluene |
| 2. Chloromethane | 18. 1,2-Dichloroethane | 33. 1,1,1,2-Tetrachloroethane | 48. tert-Butylbenzene |
| 3. Vinyl chloride | 19. Benzene | 34. Ethylbenzene | 49. 1,2,4-Trimethylbenzene |
| 4. Bromomethane | 20. Fluorobenzene | 35. m-Xylene | 50. sec-Butylbenzene |
| 5. Chloroethane | 21. Trichloroethylene | 36. p-Xylene | 51. p-Isopropyltoluene |
| 6. Trichlorofluoromethane | 22. 1,2-Dichloropropane | 37. o-Xylene | 52. 1,3-Dichlorobenzene |
| 7. 1,1-Dichloroethylene | 23. Bromodichloromethane | 38. Styrene | 53. 1,4-Dichlorobenzene |
| 8. Methylene chloride | 24. Dibromomethane | 39. Isopropylbenzene | 54. n-Butylbenzene |
| 9. trans-1,2-Dichloroethylene | 25. cis-1,3-Dichloropropene | 40. Bromoform | 55. 1,2-Dichlorobenzene-d ₄ |
| 10. 1,1,-Dichloroethane | 26. Toluene | 41. 1,1,2,2-Tetrachloroethane | 56. 1,2-Dichlorobenzene |
| 11. 2,2-Dichloropropane | 27. trans-1,3-Dichloropropene | 42. 1,2,3-Trichloropropane | 57. 1,2-Dibromo-3-chloropropane |
| 12. cis-1,2-Dichloroethylene | 28. 1,1,2-Trichloroethane | 43. n-Propylbenzene | 58. 1,2,4-Trichlorobenzene |
| 13. Chloroform | 29. 1,3-Dichloropropane | 44. Bromobenzene | 59. Hexachlorobutadiene |
| 14. Bromochloromethane | 30. Tetrachloroethylene | 45. 1,3,5-Trimethylbenzene | 60. Naphthalene |
| 15. 1,1,1-Trichloroethane | 31. Chlorodibromomethane | 46. 2-Chlorotoluene | |
| 16. 1,1-Dichloropropene | | | |





GAS CHROMATOGRAPHY

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Capillary GC Columns and Guard Columns/Retention Gaps

Supelco Analytical brand products include capillary GC columns and guard columns, packed GC columns and components, GC accessories, and gas purification/management items. Fluka Analytical brand products include GC solvents and GC derivatization reagents.

Capillary GC Columns and Guard Columns/Retention Gaps



Supelco began in 1966 in a tiny garage in a small central Pennsylvania (USA) town manufacturing packed gas chromatography (GC) columns. By 1977, glass capillary GC columns were being manufactured and in 1982, production began on fused silica capillary GC columns. In 1983, the first special purpose fused silica capillary GC column was introduced. Since then, an impressive list of special purpose fused silica capillary GC columns has followed. We test every capillary column we manufacture according to strict quality assurance processes, and guarantee satisfactory performance.

How to Choose a Column

An optimized chromatographic separation begins with the column. The selection of the proper capillary column for any application should be based on four significant factors: stationary phase, column I.D., film thickness, and column length. The practical effects of these factors on the performance of the column are discussed briefly in this section, in order of importance. Note that this information is general. Specific situations may warrant exceptions to these guidelines.

Step 1 - Stationary Phase

Choosing a stationary phase is the most important step in selecting a column. A stationary phase is the film coated on the inner wall of a capillary column, and should be selected based on the application to be performed. The differences in the chemical and physical properties of injected organic compounds and their interactions with the stationary phase are the basis of the separation process. When the strength of the analyte-phase interactions differs significantly for two compounds, one is retained longer than the other. How long they are retained in the column (retention time) is a measure of these analyte-phase interactions.

Changing the chemical features of the stationary phase alters its physical properties. Two compounds that co-elute (do not separate) on a particular stationary phase might separate on another phase of a different chemistry, if the difference in the analyte-phase interactions is significant. This is the reason for providing a wide variety of capillary column phases. Each phase provides a specific combination of interactions for each chemical class of analytes.

Established Applications: Gas chromatography, first established in the 1950's, is a mature analytical technique with many established applications. Therefore, it is probable that literature, such as written methodology or journals, exists stating which stationary phases have successfully been used for a given application. Additionally, column manufacturers routinely publish phase selection charts which are conveniently arranged by industry to simplify the process of selecting the proper phase. First, find the chart that matches your industry or area of interest. Then, locate the application within that chart to identify a recommended column phase. Our phase selection charts are located in our GC Column Selection Guide, which can be viewed by entering "T407133" as a search term on the Sigma-Aldrich web site, at sigma-aldrich.com

New Applications: For new applications, there is often no existing reference to provide guidance. In these 'method development' instances, one must have some knowledge of the chemistry of the compounds to be analyzed. Phase selection is based on the general chemical principle that "likes dissolves like." A non-polar column is the recommended starting point for the analyses of non-polar compounds. Likewise, polar columns are usually recommended as the starting point for the separation of polar compounds.

Phase Polarity Based on Compound Polarity

Compound Polarity	Compound Examples	Recommended Phases
Non-Polar Compounds		
C and H atoms only, C-C bonds	alkanes	Petrocol, SPB-Octyl, Equity-1, SPB-1, SLB-5ms, Equity-5, SPB-5
Polar Compounds		
Primarily C and H atoms, also contain Br, Cl, F, N, O, P, and/or S	alcohols, amines, carboxylic acids, diols, esters, ethers, ketones, thiols	SPB-624, OVI-G43, VOCOL, SPB-20, SPB-35, Equity-1701, SPB-50, SPB-225, PAG, Omegawax, SPB-1000, Nukol, SUPELCOWAX 10
Polarizable Compounds		
C and H atoms only, C=C and/or C≡C bonds	alkenes, alkynes, aromatic hydrocarbons	SP-2330, SP-2331, SP-2380, SP-2560, SP-2340, TCEP

Step 2 - Column I.D.

Fused Silica Tubing Inner/Outer Diameters

Tubing I.D.	Tubing I.D. Range	Tubing O.D. Range
0.10 mm ^A	0.094–0.106 mm	0.349–0.369 mm
0.10 mm ^B	0.094–0.106 mm	0.290–0.310 mm
0.18 mm ^A	0.174–0.186 mm	0.349–0.369 mm
0.18 mm ^B	0.174–0.186 mm	0.330–0.350 mm
0.20 mm ^C	0.194–0.206 mm	0.349–0.370 mm
0.25 mm ^C	0.244–0.256 mm	0.349–0.370 mm
0.32 mm ^C	0.314–0.326 mm	0.425–0.450 mm
0.53 mm ^C	0.526–0.546 mm	0.640–0.680 mm
0.75 mm ^C	0.737–0.758 mm	0.875–0.925 mm

^AAnalytical columns with non-polar or intermediate polarity stationary phases

^BAnalytical columns with polar stationary phases; guard columns regardless of deactivation

^CAnalytical columns regardless of polarity; guard columns regardless of deactivation

Capillary GC Columns and Guard Columns/Retention Gaps

How to Choose a Column: *Step 2 - Column I.D.*

The current range of commercially available capillary column internal diameters enables the balancing of two factors: efficiency (number of theoretical plates) and sample capacity (amount of any one sample component that can be applied to the column without causing the desired sharp peak to overload). Optimizing one of these factors requires a sacrifice from the other. The ideal I.D. for a given application is dependent on the analytical needs. Columns with a 0.25 mm I.D. are the most popular, providing adequate plates/meter for most applications while allowing acceptable sample capacity.

High Efficiency: Observed chromatographically as narrow and well-resolved peaks. The efficiency of a capillary column, measured in plates (N) or plates per meter (N/m), increases as the I.D. of the column decreases. This is one of the basic principles behind Fast GC. If the sample to be analyzed contains many analytes, or has analytes that elute closely together, the most narrow I.D. capillary column that is practical should be selected. Note that very narrow bore columns, such as 0.10 or 0.18 mm I.D., may require specialized equipment, such as a GC with a pressure regulator that allows a higher column head pressure.

Sample Capacity: Increases as column I.D. increases. Wide bore columns can accommodate a larger mass of each analyte in a sample than narrow bore capillary columns. Exceeding the sample capacity of a column will result in skewed peaks and decreased resolution. Therefore, if the samples to be analyzed contain compounds at high concentrations, or represent a wide range of concentrations, then a wide bore column should be considered. If the proper I.D. is chosen, the column should allow the system to provide sufficient sensitivity for the minor components without being overloaded with the major components. The analyst must decide if the loss in efficiency resulting from using a wide bore column is problematic for their application. Note that the nature of the sample components and the polarity of the phase will affect sample capacity. Non-polar phases have higher capacities for non-polar analytes, and polar phases have higher capacities for polar analytes.

Effects of Column I.D.

Internal Diam. (mm)	Efficiency: Plates/Meter (N/m)	Efficiency: Total Plates (N)	Capacity: Each Analyte (ng)
0.53	1,300	39,000	1,000–2,000
0.32	2,300	69,000	400–500
0.25	2,925	87,750	50–100
0.20	3,650	109,500	<50
0.18	4,050	121,500	<50
0.10	7,300	219,000	<10

*Theoretical values for 30 m long columns, calculated @ a k = 6.00 and 85% coating efficiency

Step 3 - Film Thickness

Most 0.25 mm I.D. columns have a 0.25 or 0.50 μm film thickness. Depending on the application, the optimal film thickness may be different.

Decreasing Film Thickness: The benefits are sharper peaks (which may increase resolution) and reduced column bleed; both resulting in increased signal-to-noise. Additionally, the column's maximum operating temperature will be increased. The drawbacks are increased analyte interaction with the tubing wall, and decreased analyte capacity. Decreasing film thickness also allows analytes to elute with shorter retention times and at lower temperatures, which may be desirable or undesirable, depending on the application. Thinner film columns should be used for analytes with high (>300 °C) boiling points (such as pesticides, PCBs, FAMES, phthalate esters, and other semivolatiles compounds), or for trace analyses.

Increasing Film Thickness: The benefits are reduced analyte-tubing interaction and increased sample capacity. The drawbacks are increased peak widths (which may reduce resolution), increased column bleed, and a reduced maximum operating temperature for the column. Increasing film thickness also leads to increased analyte retention (may also increase resolution, specifically for compounds with low k') and increased elution temperature. Depending on the application, these last effects may be either desirable or undesirable. Thicker film columns are best suited for analytes with low boiling points (such as volatile organic compounds and gases). These types of analytes are retained longer on the thicker film, which may eliminate the need for subambient oven conditions. A thicker film will also increase capacity, thus making the column more compatible for higher concentration samples than a thinner film column.

Phase Ratio (β)

Effects of phase film thickness are interdependent with column I.D. The phase ratio, beta (β), expresses the ratio of the gas volume and the stationary phase volume in a column:

$$\beta = \frac{\text{column radius } (\mu\text{m})}{2 \times \text{film thickness } (\mu\text{m})}$$

In contrast to relative terms ("thick film" and "thin film"), β values establish a distinct ranking for columns. As a general rule, select columns by β values as follows:

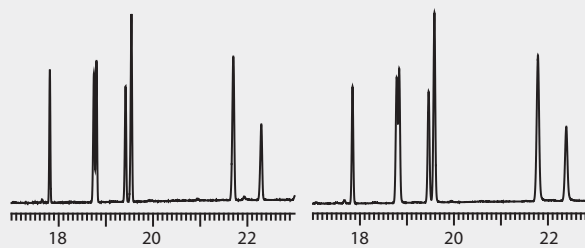
β Value	Uses
<100	Highly volatile, low molecular weight compounds
100–400	General purpose analyses Wide range of compounds
>400	High molecular weight compounds Trace analyses

β values are also useful when changing column I.D. and film thickness combinations for a particular analysis, because columns with the same phase ratio will provide very similar retention times and elution order under the same analytical conditions.

Columns With Similar β Values

SLB-5ms, 30 m \times 0.53 mm I.D.,
0.50 μm ($\beta = 265$)

SLB-5ms, 30 m \times 0.25 mm I.D.,
0.25 μm ($\beta = 250$)



Capillary GC Columns and Guard Columns/Retention Gaps

How to Choose a Column: Step 4 - Column Length

Step 4 - Column Length

Generally a 30 m column provides the best balance of resolution, analysis time, and required column head pressure. Specific applications may warrant a different column length.

Longer Columns: Provides greater resolution, but increases back pressure. It should be stressed that doubling column length will NOT double resolution (resolution only increases according to the square root of the column length). If resolution between a critical pair is less than 1, doubling column length will not bring it to baseline (resolution value of at least 1.5). Increasing column length to increase resolution should be considered as a last resort. A more effective approach to increasing resolution is to reduce column I.D.

Shorter Columns: When great resolution is not required, such as for screening purposes or for simple samples whose components are dissimilar in chemical nature. However, if column I.D. is decreased along with length, resolution can be maintained, or in some cases, actually increased.

Effects of Column Length

Column Length (m)	Inlet Pressure (psi)	Peak 1 Retention (min.)	Peak 1/2 Resolution (R)	Efficiency: Total Plates (N)
15	5.9	8.33	0.8	43,875
30	12	16.68	1.2	87,750
60	24.9	33.37	1.7	175,500

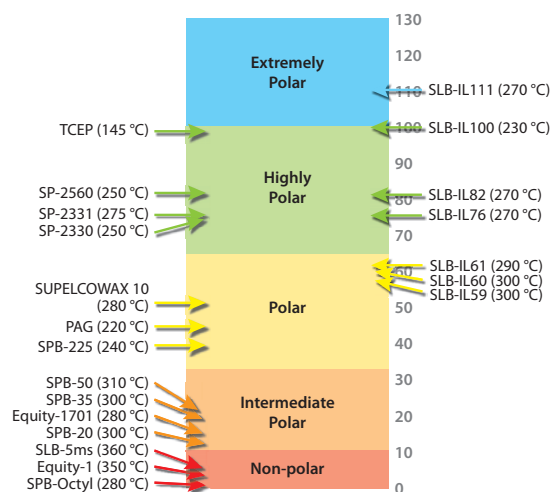
*Theoretical values for 0.25 mm I.D. columns with 85% coating efficiency, 145 °C isothermal analyses, helium at 21 cm/sec, k (peak 1) = 6.00

Columns by Phase Polarity

Choosing a stationary phase is the most important step in choosing a column, and should be selected based on the application to be performed. It is recommended to first consult our "GC Column Selection Guide" brochure (T407133 KCX) to determine if we have already identified appropriate columns. For new applications, there is often no existing reference to provide guidance. In these method development instances, one must have some knowledge of the chemistry of the compounds to be analyzed. Phase selection is based on the general chemical principle that "likes dissolves like" and relates to the specific analyte-stationary phase interactions that each group of columns can perform. Choose:

- **Non-Polar GC columns** for non-polar compounds (such as alkanes) that contain 1) only carbon and hydrogen atoms, and 2) only single bonds between carbon atoms.
- **Intermediate polar GC columns** for an alternate selectivity of non-polar and/or polar compounds.
- **Polar GC columns** for polar compounds (such as alcohols, amines, carboxylic acids, diols, esters, ethers, ketones, and thiols) that contain 1) primarily carbon and hydrogen atoms, and 2) also some bromine, chlorine, fluorine, nitrogen, oxygen, phosphorus, and/or sulfur atoms.
- **Highly polar GC columns** for polarizable compounds (such as alkenes, alkynes, and aromatic hydrocarbons) that contain 1) only carbon and hydrogen atoms, and 2) some double and/or triple bonds between carbon atoms.
- **Extremely polar GC columns** for additional selectivity of polarizable compounds.

GC Column Polarity Scale



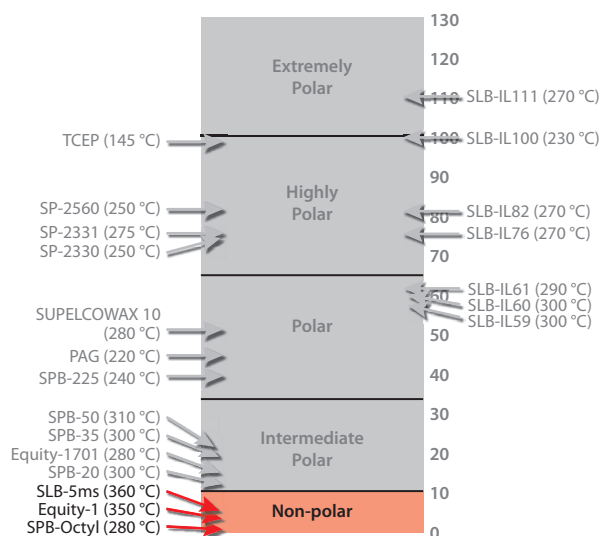
Our GC column polarity scale is a convenient tool to classify columns. The procedure we follow was proposed to us by Prof. Luigi Mondello (University of Messina, Italy). Each column is characterized with a series of five probes plus several n-alkane markers to determine the retention index for each probe. McReynolds Constants are then calculated using the retention index data of the column relative to the retention index data for the same five probes on squalane, the most non-polar GC stationary phase. The five McReynolds Constants are summed to obtain Polarity (P) values, which are then normalized to SLB-IL100 (set at P=100) to obtain Polarity Number (P.N.) values.

Once Polarity Number (P.N.) values are calculated, the relationships to each other can be shown in a visual representation. The scale is broken into five regions. The first four regions (non-polar, intermediate polar, polar, and highly polar) are generally accepted and used by several GC column manufacturers. The fifth region (extremely polar) was required with the introduction of the SLB-IL111 in 2010 (no column existed in this region prior to this). The positions and maximum temperatures of several of our capillary GC columns are shown (non-ionic liquid columns on the left and ionic liquid columns on the right). Our GC column polarity scale can be used for column selection because it allows multiple columns to be compared easily, because all P.N. values are relative to both squalane (0 on the scale) and SLB-IL100 (100 on the scale).

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity: *Non-Polar*

Non-Polar



Non-polar GC columns are made with the least selective of the GC stationary phases. They are commonly used to separate non-polar compounds (such as alkanes) that contain 1) only carbon and hydrogen atoms, and 2) only single bonds between carbon atoms. Elution order generally follows the boiling points of the analytes.

- Interactions are primarily dispersive (van der Waals forces).
- Phases with phenyl functional groups can also undergo a moderate amount of π - π interactions.
- PTA-5 columns are specially-engineered to also allow strong basic interactions.
- Phases with octyl functional groups also possess shape selectivity.

Petrocol® DH Octyl Capillary GC Column

Application: This column, for detailed analyses of petroleum products, is known within the petroleum and chemical industries for its unique selectivity. Baseline separations of benzene/1-methylcyclopentene and toluene/2,3,3-trimethylpentane that are possible with this column are not obtainable with classical poly(dimethyl siloxane) columns.

USP Code: None

Phase:

- Bonded
- Poly(50% n-octyl/50% methyl siloxane)

Temp. Limits:

- -60 °C to 220 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.50	100	125	24282	1 ea

SPB®-Octyl Capillary GC Column

Application: The low polarity of this column approaches squalane, making it substantially less polar than that of the widely used non-polar poly(dimethyl siloxane) columns. This column offers unique selectivity compared to non-polar and intermediate polarity columns, and can be used for confirmational analyses of PCB-containing samples.

USP Code: None

Phase:

- Bonded
- Poly(50% n-octyl/50% methyl siloxane)

Temp. Limits:

- ≤0.32 mm I.D.: -60 °C to 280 °C (isothermal or programmed)
- ≥0.53 mm I.D.: -60 °C to 260 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24218-U	1 ea
	0.25	60	250	24219-U	1 ea
0.53	1.00	30	63	24232	1 ea
	1.00	60	63	24233-U	1 ea
0.53	3.00	60	44	25398	1 ea

SPB®-HAP Capillary GC Column

Application: This column was developed to provide the best resolution of very volatile hazardous air pollutants. The thick film helps to focus analytes on the column, possibly eliminating the need to employ cryogenic focusing techniques.

USP Code: This column meets USP G1, G2, and G9 requirements.

Phase:

- Bonded
- Poly(dimethyl siloxane)

Temp. Limits:

- -60 °C to 300 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.32	4.00	60	20	25020-U	1 ea

Petrocol® DH 50.2 Capillary GC Column

Application: This column is designed for detailed hydrocarbon analyses of naphthas, gasolines, and similar samples, according to ASTM D5134.

USP Code: This column meets USP G1, G2, and G9 requirements.

Phase:

- Bonded
- Poly(dimethyl siloxane)

Temp. Limits:

- -60 °C to 320 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.20	0.50	50	100	24133-U	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity: *Non-Polar*

Petrocol® DH Capillary GC Column

Application: This highly reproducible column has considerable theoretical plate numbers and is designed for detailed analyses of petroleum products for PIANO, PONA, and PNA-type analytes. Includes an extensive retention index data sheet of 400+ analytes.

USP Code: This column meets USP G1, G2, and G9 requirements.

Phase:

- Bonded
- Poly(dimethyl siloxane)

Temp. Limits:

- -60 °C to 320 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.50	100	125	24160-U	1 ea

Petrocol® DH 150 Capillary GC Column

Application: The longest capillary column commercially available as a stock item. For detailed purity analyses of light hydrocarbon gases and petroleum products (oxygenates, solvents, naphthas, gasolines, etc.).

USP Code: This column meets USP G1, G2, and G9 requirements.

Phase:

- Bonded
- Poly(dimethyl siloxane)

Temp. Limits:

- -60 °C to 320 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	1.00	150	63	24155	1 ea

Petrocol® 2887 Capillary GC Column

Application: This column is designed for ASTM D2887 (simulated distillation [Sim Dis] of petroleum fractions) for samples having boiling points up to 1000 °F.

USP Code: This column meets G1, G2, and G9 requirements.

Phase:

- Bonded
- Poly(dimethyl siloxane)

Temp. Limits:

- Subambient to 350 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.53	0.50	5	265	25323	1 ea

Petrocol® EX2887 Capillary GC Column

Application: This column is designed for ASTM D2887 (simulated distillation [Sim Dis] of petroleum fractions) for samples having boiling points greater than 1000 °F.

USP Code: This column meets G1, G2, and G9 requirements.

Phase:

- Bonded
- Poly(dimethyl siloxane)

Temp. Limits:

- Subambient to 380 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.53	0.10	5	1325	25337	1 ea

SPB®-1 SULFUR Capillary GC Column

Application: A specialized version of the SPB-1, this column was developed for analyses of sulfur gases and other volatile sulfur compounds. The column displays relatively low column bleed, which makes it compatible for use with sulfur-specific detectors.

USP Code: This column meets USP G1, G2, and G9 requirements.

Phase:

- Bonded
- Poly(dimethyl siloxane)

Temp. Limits:

- -60 °C to 300 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.32	4.00	30	20	24158	1 ea

Equity®-1 Capillary GC Column

Application: This column is designed for general purpose applications where a non-polar column is required. Analytes will be separated primarily according to boiling point.

USP Code: This column meets USP G1, G2, and G9 requirements.

Phase:

- Bonded
- Poly(dimethyl siloxane)

Temp. Limits:

- ≤0.32 mm I.D., <2 μm: -60 °C to 325 °C (isothermal) or 350 °C (programmed)
- ≤0.32 mm I.D., ≥2 μm: -60 °C to 300 °C (isothermal or programmed)
- ≥0.53 mm I.D., <2 μm: -60 °C to 300 °C (isothermal) or 320 °C (programmed)
- ≥0.53 mm I.D., ≥2 μm: -60 °C to 260 °C (isothermal) or 280 °C (programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.10	15	250	28039-U	1 ea
0.20	0.33	12	152	28041-U	1 ea
	1.20	10	42	28043-U	1 ea
0.25	0.10	30	625	28044-U	1 ea
	0.25	15	250	28045-U	1 ea
	0.25	30	250	28046-U	1 ea
	0.25	60	250	28047-U	1 ea
	1.00	15	63	28048-U	1 ea
1.00	30	63	28049-U	1 ea	
	60	63	28050-U	1 ea	
	100	63	28052-U	1 ea	
0.32	0.10	30	800	28053-U	1 ea
	0.25	15	320	28054-U	1 ea
	0.25	30	320	28055-U	1 ea
	0.25	60	320	28056-U	1 ea
	1.00	30	80	28057-U	1 ea
	1.00	60	80	28058-U	1 ea
	1.00	100	80	28060-U	1 ea
	2.00	30	40	28061-U	1 ea
	5.00	30	16	28062-U	1 ea
	5.00	60	16	28063-U	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity: *Non-Polar*

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.53	0.10	15	1325	28064-U	1 ea
	0.50	15	265	28067-U	1 ea
	0.50	30	265	28068-U	1 ea
	1.00	15	133	28069-U	1 ea
	1.00	30	133	28071-U	1 ea
	1.50	15	88	28072-U	1 ea
	1.50	30	88	28073-U	1 ea
	1.50	60	88	28074-U	1 ea
	3.00	15	44	28075-U	1 ea
	3.00	30	44	28076-U	1 ea
	3.00	60	44	28077-U	1 ea
	5.00	15	27	28079-U	1 ea
	5.00	30	27	28081-U	1 ea
	5.00	60	27	28082-U	1 ea

SPB®-1 Capillary GC Column

Application: This column is often used for traditional general purpose applications, where a non-polar column is required. Analytes will be separated primarily according to boiling point.

USP Code: This column meets USP G1, G2, and G9 requirements.

Phase:

- Bonded
- Poly(dimethyl siloxane)

Temp. Limits:

- ≤0.32 mm I.D., <2 µm: -60 °C to 320 °C (isothermal or programmed)
- ≤0.32 mm I.D., ≥2 µm: -60 °C to 300 °C (isothermal or programmed)
- ≥0.53 mm I.D., <2 µm: -60 °C to 300 °C (isothermal) or 320 °C (programmed)
- ≥0.53 mm I.D., ≥2 µm: -60 °C to 260 °C (isothermal) or 280 °C (programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.20	0.20	15	250	24162	1 ea
	0.20	30	250	24163	1 ea
	0.33	12	152	24229-U	1 ea
	0.33	25	152	24230-U	1 ea
	1.20	10	42	24134-U	1 ea
0.25	0.10	30	625	24261	1 ea
	0.25	15	250	24026	1 ea
	0.25	30	250	24028	1 ea
	0.25	60	250	24030-U	1 ea
	0.25	100	250	24198	1 ea
	1.00	15	63	24027	1 ea
	1.00	30	63	24029	1 ea
	1.00	60	63	24031	1 ea
	1.00	100	63	24220-U	1 ea
	3.00	60	21	23304-U	1 ea
0.32	0.25	15	320	24099	1 ea
	0.25	30	320	24044	1 ea
	0.25	60	320	24046	1 ea
	1.00	15	80	24098-U	1 ea
	1.00	30	80	24045-U	1 ea
	1.00	60	80	24047	1 ea
	1.00	100	80	24213-U	1 ea
	2.00	30	40	24215-U	1 ea
	2.00	60	40	24216-U	1 ea
	5.00	30	16	24296	1 ea
	5.00	60	16	24297	1 ea

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.53	0.10	15	1325	25360	1 ea
	0.10	30	1325	25361	1 ea
	0.50	15	265	25314	1 ea
	0.50	30	265	25315	1 ea
	0.50	60	265	25382	1 ea
	1.00	30	133	25417	1 ea
	1.50	15	88	25302-U	1 ea
	1.50	30	88	25303	1 ea
	1.50	60	88	25388	1 ea
	3.00	15	44	25340	1 ea
	3.00	30	44	25341-U	1 ea
	3.00	60	44	25348	1 ea
	5.00	15	27	25344	1 ea
	5.00	30	27	25345-U	1 ea
	5.00	60	27	25349	1 ea
0.75	1.00	60	188	23302-U	1 ea

SLB®-5ms Capillary GC Column

Application: The 5% phenyl equivalent phase provides a boiling point elution order with a slight increase in selectivity, especially for aromatic compounds. The low bleed characteristics, inertness, and durable nature make it the column of choice for environmental analytes (such as semivolatiles, pesticides, PCBs, and herbicides) or anywhere a low bleed non-polar column is required.

USP Code: This column meets USP G27 and G36 requirements.

Phase:

- Bonded and highly crosslinked
- Silphenylene polymer virtually equivalent in polarity to poly(5% diphenyl/95% dimethyl siloxane)

Temp. Limits:

- ≤0.32 mm I.D.: -60 °C to 340 °C (isothermal) or 360 °C (programmed)
- ≥0.53 mm I.D.: -60 °C to 330 °C (isothermal) or 340 °C (programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty	
0.10	0.10	10	250	28465-U	1 ea	
	0.10	15	250	28466-U	1 ea	
0.18	0.18	20	250	28564-U	1 ea	
	0.30	12	150	28566-U	1 ea	
	0.30	30	150	28575-U	1 ea	
	0.36	20	125	28576-U	1 ea	
0.20	0.20	30	250	28513-U	1 ea	
	0.25	0.10	30	625	28467-U	1 ea
0.25	0.25	15	250	28469-U	1 ea	
	0.25	30	250	28471-U	1 ea	
	0.25	60	250	28472-U	1 ea	
	0.50	15	125	28577-U	1 ea	
	0.50	30	125	28473-U	1 ea	
	0.50	60	125	28474-U	1 ea	
	1.00	30	63	28476-U	1 ea	
0.32	0.25	15	320	28557-U	1 ea	
	0.25	30	320	28482-U	1 ea	
	0.32	30	250	28532-U	1 ea	
	0.50	15	160	28597-U	1 ea	
	0.50	30	160	28484-U	1 ea	
	1.00	30	80	28487-U	1 ea	
	0.53	0.50	30	265	28541-U	1 ea
		1.00	30	132	28559-U	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity: *Non-Polar*

MET-Biodiesel Capillary GC Column

Application: This rugged metal column was designed specifically for the determination of free and total glycerin in B100 biodiesel samples. A guard is integrated, thereby providing protection with a leak-free connection (the guard and analytical column are one continuous piece of tubing; there is no union between the guard and analytical column).

USP Code: None

Phase:

- Bonded
- Proprietary

Temp. Limits:

- -60 °C to 380 °C (isothermal) or 430 °C (programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.53	0.16	14	828	28668-U	1 ea

HT-5 (aluminum clad) Capillary GC Column

Application: This column offers the highest maximum temperature of any commercially available column. It is well suited for simulated distillation (Sim Dis) analyses of petroleum samples.

USP Code: None

Phase:

- Bonded
- Siloxane-carborane equivalent in polarity to poly(5% diphenyl/95% dimethyl siloxane)

Temp. Limits:

- 10 °C to 460 °C (isothermal) or 480 °C (programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.32	0.10	12	800	25002	1 ea
	0.10	25	800	25003	1 ea
0.53	0.10	6	1325	25004	1 ea
	0.15	12	883	25005-U	1 ea

PTA-5 Capillary GC Column

Application: This column is designed for analyses of amines and other basic analytes.

USP Code: None

Phase:

- Bonded
- Base-modified poly(5% diphenyl/95% dimethyl siloxane)

Temp. Limits:

- ≤0.32 mm I.D.: -60 °C to 320 °C (isothermal or programmed)
- ≥0.53 mm I.D., <2 μm: -60 °C to 320 °C (isothermal or programmed)
- ≥0.53 mm I.D., ≥2 μm: -60 °C to 260 °C (isothermal) or 280 °C (programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.50	30	125	24277	1 ea
	1.00	30	63	24330	1 ea
0.32	0.50	30	160	24331	1 ea
	1.00	30	80	24332	1 ea
	1.50	30	53	24333	1 ea
0.53	1.50	30	88	25438	1 ea
	3.00	30	44	25439	1 ea

SAC™-5 Capillary GC Column

Application: This column is an application specific non-polar column, designed for reproducible analyses of plant sterols, cholesterol, and other animal sterols.

USP Code: None

Phase:

- Bonded
- Poly(5% diphenyl/95% dimethyl siloxane)

Temp. Limits:

- -60 °C to 320 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24156	1 ea

Equity®-5 Capillary GC Column

Application: This popular column is designed for general purpose applications where a non-polar column is required. The low phenyl content provides thermal stability compared to 100% poly(dimethyl siloxane) columns.

USP Code: This column meets USP G27 and G36 requirements.

Phase:

- Bonded
- Poly(5% diphenyl/95% dimethyl siloxane)

Temp. Limits:

- ≤0.32 mm I.D., <2 μm: -60 °C to 325 °C (isothermal) or 350 °C (programmed)
- ≤0.32 mm I.D., ≥2 μm: -60 °C to 300 °C (isothermal or programmed)
- ≥0.53 mm I.D., <2 μm: -60 °C to 300 °C (isothermal) or 320 °C (programmed)
- ≥0.53 mm I.D., ≥2 μm: -60 °C to 260 °C (isothermal) or 280 °C (programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty	
0.10	0.10	15	250	28083-U	1 ea	
	0.20	0.20	30	250	28085-U	1 ea
		0.20	60	250	28086-U	1 ea
0.20	0.33	12	152	28087-U	1 ea	
	0.25	0.25	15	250	28088-U	1 ea
		0.25	30	250	28089-U	1 ea
0.25	0.25	60	250	28090-U	1 ea	
	0.50	30	125	28092-U	1 ea	
	1.00	15	63	28093-U	1 ea	
	1.00	30	63	28094-U	1 ea	
	1.00	60	63	28095-U	1 ea	
	0.32	0.25	15	320	28096-U	1 ea
0.32	0.25	30	320	28097-U	1 ea	
	0.25	60	320	28098-U	1 ea	
	0.32	30	250	28099-U	1 ea	
0.50	0.50	30	160	28195-U	1 ea	
	1.00	30	80	28199-U	1 ea	
	1.00	60	80	28251-U	1 ea	
0.53	0.50	15	265	28252-U	1 ea	
	0.50	30	265	28259-U	1 ea	
	0.50	60	265	28263-U	1 ea	
	1.50	30	88	28267-U	1 ea	
	3.00	30	44	28268-U	1 ea	
	5.00	15	27	28278-U	1 ea	
	5.00	30	27	28279-U	1 ea	
	5.00	60	27	28293-U	1 ea	

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity: *Non-Polar*

SPB®-5 Capillary GC Column

Application: This non-polar general purpose column provides primarily a boiling point elution order with a slight increase in selectivity, especially for aromatic compounds.

USP Code: This column meets USP G27 and G36 requirements.

Phase:

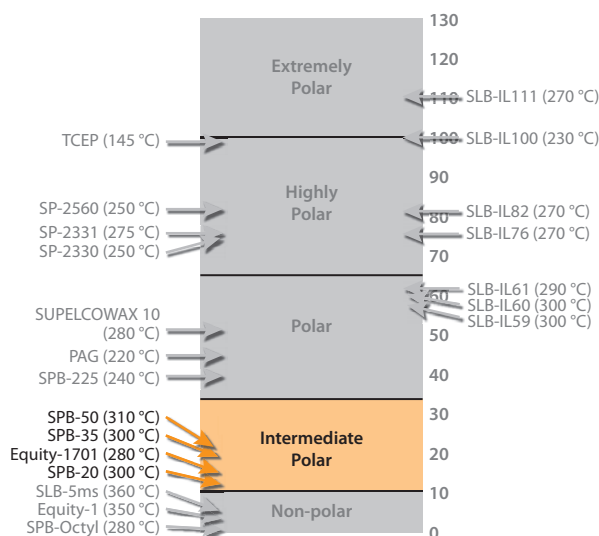
- Bonded
- Poly(5% diphenyl/95% dimethyl siloxane)

Temp. Limits:

- ≤0.32 mm I.D., <2 μm: -60 °C to 320 °C (isothermal or programmed)
- ≤0.32 mm I.D., ≥2 μm: -60 °C to 300 °C (isothermal or programmed)
- ≥0.53 mm I.D., <2 μm: -60 °C to 300 °C (isothermal) or 320 °C (programmed)
- ≥0.53 mm I.D., ≥2 μm: -60 °C to 260 °C (isothermal) or 280 °C (programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.20	0.20	15	250	24165-U	1 ea
	0.20	30	250	24166	1 ea
0.25	0.25	15	250	24032	1 ea
	0.25	30	250	24034	1 ea
	0.25	60	250	24036	1 ea
	1.00	15	63	24033	1 ea
0.32	1.00	30	63	24035	1 ea
	1.00	60	63	24037	1 ea
	0.25	15	320	24101-U	1 ea
	0.25	30	320	24048	1 ea
	0.25	60	320	24050	1 ea
	0.52	25	154	24359	1 ea
0.53	1.00	15	80	24100-U	1 ea
	1.00	30	80	24049	1 ea
	1.00	60	80	24051	1 ea
	5.00	50	16	23307-U	1 ea
	0.50	15	265	25316	1 ea
	0.50	30	265	25317	1 ea
	0.50	60	265	25383	1 ea
	1.00	30	133	25420-U	1 ea
	1.50	15	88	25304	1 ea
	1.50	30	88	25305-U	1 ea
0.53	1.50	60	88	25389	1 ea
	3.00	15	44	25342	1 ea
	3.00	30	44	25343	1 ea
	3.00	60	44	25350	1 ea
	5.00	15	27	25346	1 ea
	5.00	30	27	25347	1 ea
	5.00	60	27	25351	1 ea

Intermediate Polarity



Intermediate polar GC columns are made with phases that incorporate both non-polar and polar elements. Thus, they are commonly used to provide alternate selectivity to non-polar and polar columns. Elution order is determined by differences in the overall effects of possible interactions.

- Interactions are strongly dispersive (van der Waals forces). The greater the phenyl content of the phase, the stronger the interactions.
- Phases with phenyl functional groups can also undergo π - π , dipole-dipole, and dipole-induced dipole interactions. The greater the phenyl content, the stronger these interactions.
- Phases with cyanopropyl functional groups can also undergo strong dipole-dipole and moderate basic interactions. The greater the cyano-propyl content, the greater these interactions.

SPB®-624 Capillary GC Column

Application: This column is specially tested for separation, efficiency, and low bleed. It is designed for purge-and-trap analyses of volatile halogenated, non-halogenated, and aromatic contaminants from environmental samples.

USP Code: This column meets USP G43 requirements.

Phase:

- Bonded
- Proprietary

Temp. Limits:

- ≤0.32 mm I.D.: Subambient to 250 °C (isothermal or programmed)
- ≥0.53 mm I.D.: Subambient to 230 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.18	1.00	20	45	28662-U	1 ea
0.25	1.40	30	45	24255	1 ea
	1.40	60	45	24256	1 ea
0.32	1.80	30	44	23323-U	1 ea
	1.80	60	44	24251	1 ea
0.53	3.00	30	44	25430	1 ea
	3.00	60	44	28663-U	1 ea
	3.00	75	44	25432	1 ea
	3.00	105	44	28664-U	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity *Intermediate Polarity*

OVI-G43 Capillary GC Column

Application: This column is specially prepared and tested to meet the requirements of United States Pharmacopoeia and European Pharmacopoeia methods for determining residual solvents in pharmaceutical preparations.

USP Code: This column meets USP G43 requirements.

Phase:

- Bonded
- Poly(6% cyanopropylphenyl/94% dimethyl siloxane)

Temp. Limits:

- -20 °C to 260 °C (isothermal or programmed)

Note: To make a 5 m x 0.53 mm I.D. guard column, use P/N 25339 (fused silica tubing), P/N 23804 (butt connector body), and P/N 22591 (double-tapered ferrule).

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.53	3.00	30	44	25396	1 ea

VOCOL® Capillary GC Column

Application: This intermediate polarity column, designed for analyses of volatile organic compounds (VOCs), offers great retention and resolution of highly volatile compounds. Use this column in direct injection ports or coupled to purge and trap systems.

USP Code: None

Phase:

- Bonded
- Proprietary

Temp. Limits:

- ≤0.32 mm I.D., <2 µm: Subambient to 250 °C (isothermal or programmed)
- ≤0.32 mm I.D., ≥2 µm: Subambient to 230 °C (isothermal or programmed)
- ≥0.53 mm I.D., <2 µm: Subambient to 250 °C (isothermal or programmed)
- ≥0.53 mm I.D., ≥2 µm: Subambient to 230 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.18	1.00	20	45	28463-U	1 ea
0.20	1.20	10	42	24129-U	1 ea
0.25	1.50	30	42	24205-U	1 ea
	1.50	60	42	24154	1 ea
0.32	1.80	30	44	28464-U	1 ea
	1.80	60	44	24217-U	1 ea
	3.00	60	27	24157	1 ea
0.53	3.00	30	44	25320-U	1 ea
	3.00	60	44	25381	1 ea
	3.00	105	44	25358	1 ea
0.75	1.50	60	125	23313-U	1 ea

SPB®-20 Capillary GC Column

Application: This column has intermediate polarity due to the higher (20%) phenyl content, producing a different elution order of polar compounds for confirmational information. It is often used for analyses of aromatic analytes.

USP Code: This column meets USP G32 requirements.

Phase:

- Bonded
- Poly(20% diphenyl/80% dimethyl siloxane)

Temp. Limits:

- -25 °C to 300 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24086	1 ea
	0.25	60	250	24087-U	1 ea
	1.00	30	63	24196-U	1 ea
0.32	0.25	30	320	24088	1 ea
	1.00	60	80	24194-U	1 ea
0.53	0.50	30	265	25329-U	1 ea
	1.00	15	133	28569-U	1 ea
	1.00	30	133	25333	1 ea

Equity®-1701 Capillary GC Column

Application: Increased phase polarity, due to cyanopropylphenyl functional group substitution, offers unique selectivity compared to other phases. This column works well with systems employing ECD, NPD, and MSD detectors, and is often used for alcohols, oxygenates, pharmaceuticals, pesticides, and PCB applications.

USP Code: This column meets G46 requirements

Phase:

- Bonded
- Poly(14% cyanopropylphenyl/86% dimethyl siloxane)

Temp. Limits:

- ≤0.32 mm I.D.: Subambient to 280 °C (isothermal or programmed)
- ≥0.53 mm I.D.: Subambient to 260 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.10	15	250	28343-U	1 ea
0.25	0.25	15	250	28371-U	1 ea
	0.25	30	250	28372-U	1 ea
	0.25	60	250	28373-U	1 ea
	1.00	15	63	28374-U	1 ea
	1.00	30	63	28378-U	1 ea
	1.00	60	63	28379-U	1 ea
0.32	0.25	30	320	28382-U	1 ea
	0.25	60	320	28384-U	1 ea
	1.00	30	80	28387-U	1 ea
	1.00	60	80	28388-U	1 ea
0.53	0.50	30	265	28391-U	1 ea
	1.00	15	133	28393-U	1 ea
	1.00	30	133	28394-U	1 ea
	1.50	30	88	28396-U	1 ea

SPB®-608 Capillary GC Column

Application: This column is specially tested with low concentrations of 18 chlorinated pesticides, using an ECD detector. In addition to selectivity and efficiency, it is also tested to ensure minimum breakdown of 4,4'-DDT and endrin. This column is also suitable for use in herbicide analyses.

USP Code: None

Phase:

- Bonded
- Proprietary

Temp. Limits:

- Subambient to 300 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24103-U	1 ea
	0.25	60	250	23314-U	1 ea
0.53	0.50	15	265	25310-U	1 ea
	0.50	30	265	25312	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity *Intermediate Polarity*

Sup-Herb™ Capillary GC Column

Application: This is a specially tested intermediate polarity column for analyses of herbicides, specifically for US EPA Method 507.

USP Code: None

Phase:

- Bonded
- Proprietary

Temp. Limits:

- Subambient to 300 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.53	0.50	15	265	25322	1 ea

SPB®-35 Capillary GC Column

Application: With a phenyl content of 35%, this column offers a higher polarity option compared to columns containing a lower phenyl content. This column is useful for analyses of polar compounds because they are retained longer relative to non-polar compounds.

USP Code: This column meets USP G42 requirements.

Phase:

- Bonded
- Poly(35% diphenyl/65% dimethyl siloxane)

Temp. Limits:

- 0 °C to 300 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24092	1 ea
	0.25	60	250	28568-U	1 ea
0.32	0.25	30	320	24094	1 ea
0.53	0.50	30	265	25331	1 ea
	1.00	30	133	25335	1 ea

SPB®-50 Capillary GC Column

Application: This column has the highest phenyl content of the common phenyl-containing series of phases. The column is useful for analyses of polar analytes and provides useful confirmational information. It also offers additional selectivity for polynuclear aromatic hydrocarbon isomers over columns with lower phenyl content.

USP Code: This column meets USP G3 requirements.

Phase:

- Bonded
- Poly(50% diphenyl/50% dimethyl siloxane)

Temp. Limits:

- 30 °C to 310 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24181	1 ea
0.32	0.25	30	320	24187	1 ea
0.53	0.50	30	265	25363	1 ea

SP™-2250 Capillary GC Column

Application: The SP-2250 column is a non-bonded 50% phenyl polymer. It is highly effective for the analysis of polar compounds.

USP Code: This column meets USP G3 requirements.

Phase:

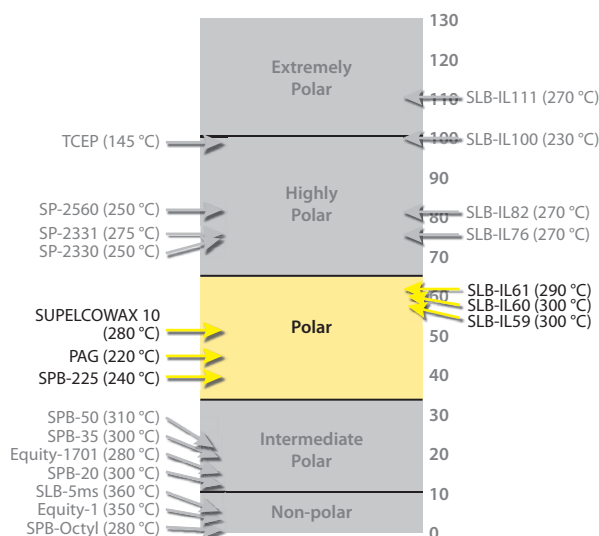
- Non-bonded
- Poly(50% phenyl/50% methyl siloxane)

Temp. Limits:

- 0 °C to 250 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.20	15	313	24009	1 ea
	0.20	30	313	24010	1 ea

Polar



Polar GC columns are made using polar stationary phases, the most common being polyethylene glycol and modified versions. These columns are commonly used to separate polar analytes (such as alcohols, amines, carboxylic acids, diols, esters, ethers, ketones, and thiols) that contain 1) primarily carbon and hydrogen atoms, and 2) also some bromine, chlorine, fluorine, nitrogen, oxygen, phosphorus, and/or sulfur atoms. Elution order is determined by differences in the overall effects of possible interactions.

- Dispersive (van der Waals forces), π - π , dipole-dipole, and dipole-induced dipole interactions are all strong with these columns.
- Moderate amounts of hydrogen bonding and basic interactions are also possible.
- SPB-1000 and Nukol columns are specially-engineered to also allow strong acidic interactions.
- Carbowax amine columns are specially-engineered to also allow strong basic interactions.

SPB®-225 Capillary GC Column

Application: Supelco offers the broadest range of cyanopropyl columns in the industry, such as this intermediate polarity column.

USP Code: This column meets USP G7 and G19 requirements.

Phase:

- Bonded
- Poly(50% cyanopropylphenyl/50% dimethyl siloxane)

Temp. Limits:

- 45 °C to 220 °C (isothermal) or 240 °C (programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.15	30	417	24334	1 ea
	0.25	15	250	23329-U	1 ea
	0.25	30	250	24335	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity *Polar*

SPB®-PUFA Capillary GC Column

Application: This column provides the necessary polarity for analyses of polyunsaturated fatty acids (PUFAs) as fatty acid methyl esters (FAME). This column is specifically tuned to provide highly reproducible analyses.

USP Code: This column meets USP G18 requirements.

Phase:

- Bonded
- Poly(alkylene glycol)

Temp. Limits:

- 50 °C to 220 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.20	30	313	24314	1 ea
0.32	0.20	30	400	24323	1 ea

PAG Capillary GC Column

Application: This column fills the polarity space between a 50% phenyl substituted column and a classical wax-type column, due to its polarity being slightly lower than a wax-type column. It is well suited for analyses of alcohols.

USP Code: This column meets USP G18 requirements.

Phase:

- Bonded
- Poly(alkylene glycol)

Temp. Limits:

- 30 °C to 220 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24223	1 ea
0.32	0.25	30	320	24226	1 ea
0.53	0.50	30	265	25423-U	1 ea

SPB®-1000 Capillary GC Column

Application: The incorporation of acid functional groups into the phase lends an acidic character to this column, useful for analyses of volatile acidic compounds. It offers great performance for analyses of glycols. It is the recommended column for ethylene glycol analysis.

USP Code: This column meets USP G25 and G35 requirements.

Phase:

- Bonded
- Acid-modified poly(ethylene glycol)

Temp. Limits:

- 60 °C to 200 °C (isothermal) or 220 °C (programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24313	1 ea
0.32	0.25	30	320	24315	1 ea
0.53	0.50	30	265	25445	1 ea

Nukol™ Capillary GC Column

Application: The incorporation of acid functional groups into the phase lends an acidic character to this column, useful for analyses of volatile acidic compounds. Difficult to analyze carboxylic acids (free fatty acids) can be analyzed with excellent peak shape and minimal adsorption.

USP Code: This column meets USP G25 and G35 requirements.

Phase:

- Bonded
- Acid-modified poly(ethylene glycol)

Temp. Limits:

- 60 °C to 200 °C (isothermal) or 220 °C (programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	15	250	24106-U	1 ea
	0.25	30	250	24107	1 ea
	0.25	60	250	24108	1 ea
0.32	0.25	15	320	24130	1 ea
	0.25	30	320	24131	1 ea
	0.25	60	320	24132	1 ea
	1.00	15	80	24206-U	1 ea
	1.00	30	80	24207	1 ea
0.53	0.50	15	265	25326	1 ea
	0.50	30	265	25327	1 ea
	0.50	60	265	25386	1 ea

Carbowax® Amine Capillary GC Column

Application: This specially prepared base-deactivated column is designed for analyses of primary, secondary, and tertiary amines, as well as other volatile basic compounds.

USP Code: None.

Phase:

- Non-bonded
- Base-modified poly(ethylene glycol)

Temp. Limits:

- 60 °C to 200 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.53	1.00	15	133	25352	1 ea
	1.00	30	133	25353	1 ea
	1.00	60	133	25354	1 ea

Omegawax® Capillary GC Column

Application: This column allows highly reproducible analyses of fatty acid methyl esters (FAMES), specifically the omega 3 and omega 6 fatty acids. It is tested to ensure reproducible FAME equivalent chain length (ECL) values and resolution of key components.

USP Code: This column meets USP G16 requirements.

Phase:

- Bonded
- Poly(ethylene glycol)

Temp. Limits:

- 50 °C to 280 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.10	15	250	23399-U	1 ea
0.25	0.25	30	250	24136	1 ea
0.32	0.25	30	320	24152	1 ea
0.53	0.50	30	265	25374	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity *Polar*

SUPELCO[®] 10 Capillary GC Column

Application: This column is based on one of the most widely used polar phases, Carbowax 20M, and is a polar column suitable for analyses of solvents, fatty acid methyl esters (FAMES), food, flavor and fragrance compounds, alcohols, and aromatics. Additionally, this column is a great choice when a polar general purpose column is required.

USP Code: This column meets USP G16 requirements.

Phase:

- Bonded
- Poly(ethylene glycol)

Temp. Limits:

- ≤0.32 mm I.D.: 35 °C to 280 °C (isothermal or programmed)
- ≥0.53 mm I.D., <2 µm: 35 °C to 280 °C (isothermal or programmed)
- ≥0.53 mm I.D., ≥2 µm: 35 °C to 250 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty	
0.10	0.10	5	250	25025-U	1 ea	
	0.10	10	250	25026-U	1 ea	
	0.10	15	250	24343	1 ea	
0.20	0.20	30	250	24169	1 ea	
	0.20	60	250	24170	1 ea	
	0.25	15	250	24077	1 ea	
0.25	0.25	30	250	24079	1 ea	
	0.25	60	250	24081	1 ea	
	0.25	100	250	23308-U	1 ea	
	0.50	30	125	24284	1 ea	
	0.50	60	125	24285-U	1 ea	
	0.32	0.25	15	320	24078	1 ea
		0.25	30	320	24080-U	1 ea
0.25		60	320	24082	1 ea	
0.50		15	160	24083	1 ea	
0.50		30	160	24084	1 ea	
0.50		60	160	24085-U	1 ea	
1.00		30	80	24211	1 ea	
0.53	0.50	60	80	24212	1 ea	
	0.50	15	265	25324	1 ea	
0.53	0.50	30	265	25325	1 ea	
	0.50	60	265	25385	1 ea	
	1.00	15	133	25300-U	1 ea	
	1.00	30	133	25301-U	1 ea	
	1.00	60	133	25391	1 ea	
	2.00	30	66	25375-U	1 ea	
	2.00	60	66	25376	1 ea	
	0.75	1.00	30	188	23327-U	1 ea

NEW PRODUCTS

SLB[®]-IL59 Capillary GC Column

Application: This polar ionic liquid column has a polarity/selectivity similar to that of polyethylene glycol (PEG) columns (usually have 'wax' in the product name), but with a higher maximum temperature (300 °C compared to 270-280 °C). This increased temperature allows faster analyses to be achieved and/or additional analytes with higher boiling points to be analyzed. This combination of a high thermal limit and an orthogonal selectivity to non-polar columns also makes it a good GCxGC column choice. Launched in 2009.

USP Code: None

Phase:

- Non-bonded
- 1,12-Di(triethylphosphonium)dodecane bis(trifluoromethylsulfonyl)imide

Temp. Limits:

- Subambient to 300 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	28880-U	1 ea
0.25	0.20	30	313	28891-U	1 ea

NEW PRODUCTS

SLB[®]-IL60 Capillary GC Column

Application: The SLB-IL60 polar ionic liquid column has a polarity/selectivity similar to that of polyethylene glycol (PEG) columns (usually have 'wax' in the product name), but different enough to provide a unique elution pattern. It also has a higher maximum temperature of 300 °C, compared to 250-280 °C for most PEG columns. These features make it an excellent alternative to existing 'wax' columns. The combination of a high thermal limit and an orthogonal selectivity to non-polar columns also makes it a good GCxGC column choice. Launched in 2012.

USP Code: None

Phase:

- Non-bonded
- 1,12-Di(triethylphosphonium)dodecane bis(trifluoromethylsulfonyl)imide

Temp. Limits:

- 35 °C to 300 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.20	30	313	29505-U	1 ea

NEW PRODUCTS

SLB[®]-IL61 Capillary GC Column

Application: This polar column, the first of our third generation ionic liquid columns, has a polarity/selectivity close to that of the SLB-IL59 due to structural similarities. This column has a polarity/selectivity similar to that of polyethylene glycol (PEG) columns (usually have 'wax' in the product name), but with a higher maximum temperature (290 °C compared to 270-280 °C). Launched in 2010.

USP Code: None

Phase:

- Non-bonded
- 1,12-Di(triethylphosphonium)dodecane bis(trifluoromethylsulfonyl)imide trifluoromethylsulfonate

Temp. Limits:

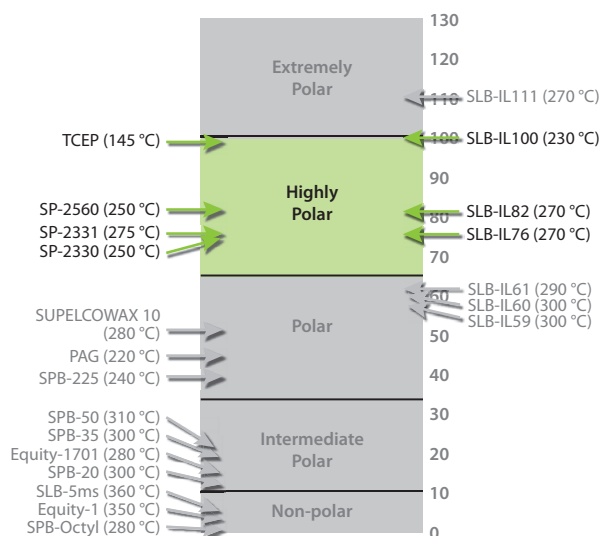
- 40 °C to 290 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	29484-U	1 ea
0.25	0.20	30	313	29486-U	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity: *Highly Polar*

Highly Polar



Highly polar GC columns are made with very selective GC stationary phases, typically containing high percentages of cyanopropyl functional groups. They are commonly used to analyze polarizable compounds (such as alkenes, alkynes, and aromatic hydrocarbons) that contain 1) only carbon and hydrogen atoms, and 2) some double and/or triple bonds between carbon atoms. Elution order is determined by differences in the overall effects of possible interactions.

- Strong dispersive (van der Waals forces), very strong dipole-dipole, very strong dipole-induced dipole, and moderate basic interactions are possible. The greater the cyanopropyl content of the phase, the greater these interactions.

SP™-2330 Capillary GC Column

Application: Supelco offers the broadest range of biscyanopropyl phases in the industry. This column is a highly specialized column that offers both polar and polarizable features due to the substitution of biscyanopropyl and phenyl groups onto the polymer backbone. It can be used for both high and low temperature separations for analytes such as geometric isomers of fatty acid methyl esters (FAMES), dioxins, and aromatic compounds.

USP Code: This column meets USP G8 requirements.

Phase:

- Non-bonded
- Poly(80% biscyanopropyl/20% cyanopropylphenyl siloxane)

Temp. Limits:

- Subambient to 250 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.20	15	313	24018	1 ea
		30	313	24019	1 ea
		60	313	24020-U	1 ea
0.32	0.20	30	400	24073	1 ea
		60	400	24074	1 ea
0.75	0.20	30	938	23328-U	1 ea

NEW PRODUCTS

SLB®-IL76 Capillary GC Column

Application: This highly polar column was the first of our second generation ionic liquid columns. It is engineered with a phase structure that allows numerous analyte solvation interactions that are not possible with other columns (non-ionic liquid columns as well as ionic liquid columns), resulting in selectivity differences even when compared to columns with similar GC column polarity scale values. Launched in 2009.

USP Code: None

Phase:

- Non-bonded
- Tri(triethylphosphoniumhexanamido)triethylamine bis(trifluoromethylsulfonyl)imide

Temp. Limits:

- Subambient to 270 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	28909-U	1 ea
0.25	0.20	30	313	28913-U	1 ea

SP™-2331 Capillary GC Column

Application: A highly polar cyanosiloxane column specially tested for analyses of dioxins, specifically tetrachlorodibenzodioxin (TCDD) isomers. Because the phase is stabilized, it has a maximum temperature slightly higher than non-bonded cyanosiloxane columns.

USP Code: None

Phase:

- Stabilized
- Proprietary

Temp. Limits:

- Subambient to 275 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.20	30	313	24257	1 ea
		60	313	24104-U	1 ea
0.32	0.20	60	400	24105-U	1 ea

SP™-2380 Capillary GC Column

Application: A highly polar cyanosiloxane column commonly used for separation of geometric (cis/trans) fatty acid methyl ester (FAME) isomers as a group. Also useful when a highly polar general purpose column with good thermal stability is required.

USP Code: This column meets USP G48 requirements.

Phase:

- Stabilized
- Poly(90% biscyanopropyl/10% cyanopropylphenyl siloxane)

Temp. Limits:

- Subambient to 275 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.20	15	313	24109	1 ea
		30	313	24110-U	1 ea
		60	313	24111	1 ea
		100	313	24317	1 ea
0.32	0.20	30	400	24116-U	1 ea
		60	400	24117	1 ea
0.53	0.20	30	663	25319	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity: *Highly Polar*

SP™-2560 Capillary GC Column

Application: This highly polar biscyanopropyl column was specifically designed for detailed separation of geometricpositional (cis/trans) isomers of fatty acid methyl esters (FAMES). It is extremely effective for FAME isomer applications.

USP Code: This column meets USP G5 requirements.

Phase:

- Non-bonded
- Poly(biscyanopropyl siloxane)

Temp. Limits:

- Subambient to 250 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.18	0.14	75	321	23348-U	1 ea
0.25	0.20	100	313	24056	1 ea
	0.20	100	313	23362-U	1 ea

Note: P/N 23362-U is wound on a 5" cage designed to fit an Agilent 6850 GC.

SP™-2340 Capillary GC Column

Application: This non-bonded column offers the highest polarity in its class. As with all general purpose biscyanopropyl columns, it is highly effective for both high and low temperature separations of geometric isomers of fatty acid methyl esters (FAMES), dioxins, carbohydrates, and aromatic compounds.

USP Code: This column meets USP G5 requirements.

Phase:

- Non-bonded
- Poly(biscyanopropyl siloxane)

Temp. Limits:

- Subambient to 250 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.20	15	313	24021	1 ea
	0.20	30	313	24022	1 ea
	0.20	60	313	24023	1 ea
0.32	0.20	30	400	24075	1 ea
	0.20	60	400	24076	1 ea

NEW PRODUCTS

SLB®-IL82 Capillary GC Column

Application: This highly polar ionic liquid column is most similar in polarity to non-ionic liquid columns that contain a polysiloxane phase with a high percentage of cyanopropyl pendent groups. It provides an alternate selectivity to these cyanopropyl siloxane columns, and is less susceptible to damage from oxygen/moisture. Launched in 2010.

USP Code: None

Phase:

- Non-bonded
- 1,12-Di(2,3-dimethylimidazolium)dodecane bis(trifluoromethylsulfonyl) imide

Temp. Limits:

- 50 °C to 270 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	29477-U	1 ea
0.25	0.25	30	313	29479-U	1 ea

TCEP Capillary GC Column

Application: The unique chemistry of the phase allows for specialized separations. It is often used for analyses of alcohols and aromatics in mineral spirits, aliphatic constituents in gasoline, impurities in individual aromatics, and oxygenates.

USP Code: None

Phase:

- Non-bonded
- 1,2,3-tris(2-cyanoethoxy)propane

Temp. Limits:

- Subambient to 145 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.44	60	142	24153	1 ea
0.32	0.51	60	157	24161	1 ea

SLB®-IL100 Capillary GC Column

Application: This highly polar column was the world's first commercially available ionic liquid GC column. It serves as the benchmark of 100 on our GC column polarity scale. Compared to a TCEP column (almost identical polarity/selectivity), the SLB-IL100 is more thermally stable, plus more resistant to damage from moisture/oxygen. Launched in 2008.

USP Code: None

Phase:

- Non-bonded
- 1,9-Di(3-vinylimidazolium)nonane bis(trifluoromethylsulfonyl)imide

Temp. Limits:

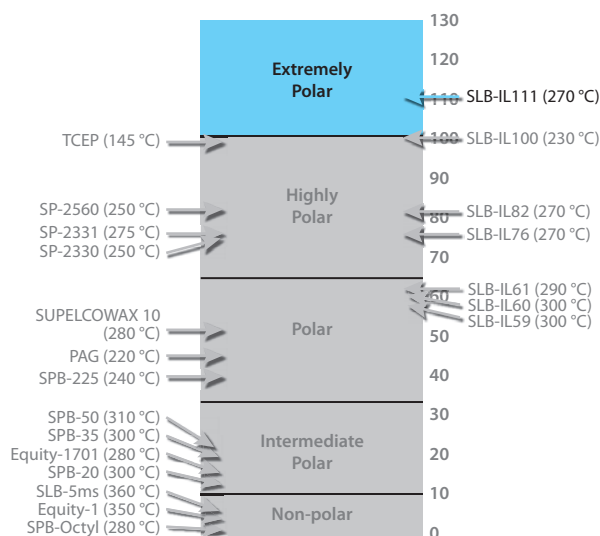
- Subambient to 230 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	28882-U	1 ea
0.18	0.14	20	313	28883-U	1 ea
0.25	0.20	30	313	28884-U	1 ea
	0.20	60	313	28886-U	1 ea
0.32	0.26	30	313	28887-U	1 ea
	0.26	60	313	28888-U	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Columns by Phase Polarity: *Extremely Polar*

Extremely Polar



Extremely polar GC columns are made with the most selective of the GC stationary phases. They are commonly used to provide alternative selectivity of polarizable compounds. Another use is in GCxGC applications due to their orthogonal selectivity to non-polar columns. Elution order is determined by differences in the overall effects of possible interactions.

- Strong dispersive (van der Waals forces), very strong dipole-dipole, very strong dipole-induced dipole, and moderate basic interactions are possible.

NEW PRODUCTS

SLB®-IL111 Capillary GC Column

Application: This extremely polar ionic liquid column was the world's first commercial column to rate over 100 on our GC column polarity scale. It has very orthogonal selectivity compared to commonly used non-polar and intermediate polar columns, providing increased selectivity for polar and polarizable analytes. Its temperature limit of 270 °C is very impressive for such an extremely polar column. The 60 m version is excellent at resolving benzene and other aromatics in gasoline. The 100 m version is suitable for detailed cis/trans FAME isomer analysis, and is a great complementary column to the SP-2560. Launched in 2010.

USP Code: None

Phase:

- Non-bonded
- 1,5-Di(2,3-dimethylimidazolium)pentane bis(trifluoromethylsulfonyl)imide

Temp. Limits:

- 50 °C to 270 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	28925-U	1 ea
0.25	0.20	30	313	28927-U	1 ea
	0.20	60	313	28928-U	1 ea
	0.20	100	313	29647-U	1 ea

Ionic Liquid Columns



In 2005, Prof. Daniel W. Armstrong (University of Texas at Arlington) showed that dicationic and polycationic ionic liquids could successfully be used as viable GC stationary phases. These consist of two or more organic cations joined by a linkage, and associated with anions, which can be either inorganic or organic. Ionic liquid phases differ physically and chemically from non-ionic liquid stationary phases.

- They are much smaller compared to big, bulky polysiloxane polymer and polyethylene glycol phases, plus there are no active hydroxyl groups. These features lead to greater stability, even in the presence of moisture and/or oxygen.
- Many modifications are possible to alter selectivity. The base structure can be dicationic or polycationic. There are numerous cation, linkage, and anion choices. Pendant groups can be added to cations and/or linkages.

Ionic liquids have the opportunity to impact current practices along several paths:

- Columns can be engineered with **identical selectivity** to non-ionic liquid columns, but with higher operating temperatures and less susceptibility to damage from moisture and/or oxygen.
- Columns can be engineered with **completely unique selectivity** to non-ionic liquid columns, producing good peak shape and resolution for compounds of varying functionality.
- Columns can be used in **multidimensional separations**, due to their engineered orthogonality and high thermal stability.

NEW PRODUCTS

SLB®-IL59 Capillary GC Column

Application: This polar ionic liquid column has a polarity/selectivity similar to that of polyethylene glycol (PEG) columns (usually have 'wax' in the product name), but with a higher maximum temperature (300 °C compared to 270-280 °C). This increased temperature allows faster analyses to be achieved and/or additional analytes with higher boiling points to be analyzed. This combination of a high thermal limit and an orthogonal selectivity to non-polar columns also makes it a good GCxGC column choice. Launched in 2009.

USP Code: None

Phase:

- Non-bonded
- 1,12-Di(triethylphosphonium)dodecane bis(trifluoromethylsulfonyl)imide

Temp. Limits:

- Subambient to 300 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	28880-U	1 ea
0.25	0.20	30	313	28891-U	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Ionic Liquid Columns

NEW PRODUCTS

SLB®-IL60 Capillary GC Column

Application: The SLB-IL60 polar ionic liquid column has a polarity/selectivity similar to that of polyethylene glycol (PEG) columns (usually have 'wax' in the product name), but different enough to provide a unique elution pattern. It also has a higher maximum temperature of 300 °C, compared to 250-280 °C for most PEG columns. These features make it an excellent alternative to existing 'wax' columns. The combination of a high thermal limit and an orthogonal selectivity to non-polar columns also makes it a good GCxGC column choice. Launched in 2012.

USP Code: None

Phase:

- Non-bonded
- 1,12-Di(triethylphosphonium)dodecane bis(trifluoromethylsulfonyl)imide

Temp. Limits:

- 35 °C to 300 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.20	30	313	29505-U	1 ea

NEW PRODUCTS

SLB®-IL61 Capillary GC Column

Application: This polar column, the first of our third generation ionic liquid columns, has a polarity/selectivity close to that of the SLB-IL59 due to structural similarities. This column has a polarity/selectivity similar to that of polyethylene glycol (PEG) columns (usually have 'wax' in the product name), but with a higher maximum temperature (290 °C compared to 270-280 °C). Launched in 2010.

USP Code: None

Phase:

- Non-bonded
- 1,12-Di(triethylphosphonium)dodecane bis(trifluoromethylsulfonyl)imide trifluoromethylsulfonate

Temp. Limits:

- 40 °C to 290 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	29484-U	1 ea
0.25	0.20	30	313	29486-U	1 ea

NEW PRODUCTS

SLB®-IL76 Capillary GC Column

Application: This highly polar column was the first of our second generation ionic liquid columns. It is engineered with a phase structure that allows numerous analyte solvation interactions that are not possible with other columns (non-ionic liquid columns as well as ionic liquid columns), resulting in selectivity differences even when compared to columns with similar GC column polarity scale values. Launched in 2009.

USP Code: None

Phase:

- Non-bonded
- Tri(triethylphosphoniumhexanamido)triethylamine bis(trifluoromethylsulfonyl)imide

Temp. Limits:

- Subambient to 270 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	28909-U	1 ea
0.25	0.20	30	313	28913-U	1 ea

NEW PRODUCTS

SLB®-IL82 Capillary GC Column

Application: This highly polar ionic liquid column is most similar in polarity to non-ionic liquid columns that contain a polysiloxane phase with a high percentage of cyanopropyl pendent groups. It provides an alternate selectivity to these cyanopropyl siloxane columns, and is less susceptible to damage from oxygen/moisture. Launched in 2010.

USP Code: None

Phase:

- Non-bonded
- 1,12-Di(2,3-dimethylimidazolium)dodecane bis(trifluoromethylsulfonyl)imide

Temp. Limits:

- 50 °C to 270 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	29477-U	1 ea
0.25	0.25	30	313	29479-U	1 ea

SLB®-IL100 Capillary GC Column

Application: This highly polar column was the world's first commercially available ionic liquid GC column. It serves as the benchmark of 100 on our GC column polarity scale. Compared to a TCEP column (almost identical polarity/selectivity), the SLB-IL100 is more thermally stable, plus more resistant to damage from moisture/oxygen. Launched in 2008.

USP Code: None

Phase:

- Non-bonded
- 1,9-Di(3-vinylimidazolium)nonane bis(trifluoromethylsulfonyl)imide

Temp. Limits:

- Subambient to 230 °C (isothermal or programmed)

I.D. (mm)	d _f (µm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	28882-U	1 ea
0.18	0.14	20	313	28883-U	1 ea
0.25	0.20	30	313	28884-U	1 ea
		60	313	28886-U	1 ea
0.32	0.26	30	313	28887-U	1 ea
		60	313	28888-U	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Ionic Liquid Columns

NEW PRODUCTS

SLB®-IL111 Capillary GC Column

Application: This extremely polar ionic liquid column was the world's first commercial column to rate over 100 on our GC column polarity scale. It has very orthogonal selectivity compared to commonly used non-polar and intermediate polar columns, providing increased selectivity for polar and polarizable analytes. Its temperature limit of 270 °C is very impressive for such an extremely polar column. The 60 m version is excellent at resolving benzene and other aromatics in gasoline. The 100 m version is suitable for detailed cis/trans FAME isomer analysis, and is a great complementary column to the SP-2560. Launched in 2010.

USP Code: None

Phase:

- Non-bonded
- 1,5-Di(2,3-dimethylimidazolium)pentane bis(trifluoromethylsulfonyl)imide

Temp. Limits:

- 50 °C to 270 °C (isothermal or programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.08	15	313	28925-U	1 ea
0.25	0.20	30	313	28927-U	1 ea
	0.20	60	313	28928-U	1 ea
	0.20	100	313	29647-U	1 ea

MS-Grade Columns

SLBms columns are designed for GC and GC-MS analysts who require low bleed, inert, durable, and consistent capillary GC columns. SLBms columns will help your laboratory achieve low detection limits, easy mass spectral identification, less instrument downtime, great resolution, short analysis times, and long column life.

SLB®-5ms Capillary GC Column

Application: The 5% phenyl equivalent phase provides a boiling point elution order with a slight increase in selectivity, especially for aromatic compounds. The low bleed characteristics, inertness, and durable nature make it the column of choice for environmental analytes (such as semivolatiles, pesticides, PCBs, and herbicides) or anywhere a low bleed non-polar column is required.

USP Code: This column meets USP G27 and G36 requirements.

Phase:

- Bonded and highly crosslinked
- Silphenylene polymer virtually equivalent in polarity to poly(5% diphenyl/95% dimethyl siloxane)

Temp. Limits:

- ≤0.32 mm I.D.: -60 °C to 340 °C (isothermal) or 360 °C (programmed)
- ≥0.53 mm I.D.: -60 °C to 330 °C (isothermal) or 340 °C (programmed)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.10	0.10	10	250	28465-U	1 ea
	0.10	15	250	28466-U	1 ea
0.18	0.18	20	250	28564-U	1 ea
	0.30	12	150	28566-U	1 ea
	0.30	30	150	28575-U	1 ea
	0.36	20	125	28576-U	1 ea
0.20	0.20	30	250	28513-U	1 ea

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.10	30	625	28467-U	1 ea
	0.25	15	250	28469-U	1 ea
	0.25	30	250	28471-U	1 ea
	0.25	60	250	28472-U	1 ea
	0.50	15	125	28577-U	1 ea
	0.50	30	125	28473-U	1 ea
	0.50	60	125	28474-U	1 ea
	1.00	30	63	28476-U	1 ea
0.32	0.25	15	320	28557-U	1 ea
	0.25	30	320	28482-U	1 ea
	0.32	30	250	28532-U	1 ea
	0.50	15	160	28597-U	1 ea
	0.50	30	160	28484-U	1 ea
	1.00	30	80	28487-U	1 ea
0.53	0.50	30	265	28541-U	1 ea
	1.00	30	132	28559-U	1 ea

Fast GC Columns

Increase Sample Throughput without Sacrificing Quality

Analytical GC chemists are continually striving to reduce analysis times, because shorter analysis times increase sample throughput, which translates to the completion of more billable samples per shift. However, any decrease in analysis time must not diminish the resolution necessary to adequately resolve peaks of interest, and identify specific elution patterns. Applying the Principles of Fast GC to any application can achieve both objectives. A wide variety of columns are offered in Fast GC dimensions.

Special Purpose Columns

- **SPB-624:** For environmental volatiles. Maximum temperature of 250 °C (isothermal or programmed).
- **VOCOL:** For environmental volatiles. Maximum temperature of 250 °C (isothermal or programmed).
- **SLB-5ms:** For environmental semivolatiles, pesticides, and PCBs. Maximum temperature of 340 °C (isothermal) or 360 °C (programmed).
- **Equity-1701:** For environmental pesticides and PCBs. Maximum temperature of 280 °C (isothermal or programmed).
- **Omegawax:** For food and beverage omega 3 and omega 6 FAMES. Maximum temperature of 280 °C (isothermal or programmed).
- **SP-2560:** For food and beverage cis/trans FAME isomers. Maximum temperature of 250 °C (isothermal or programmed).

I.D. (mm)	d _f (μm)	L (m)	Beta Value	Cat. No.	Qty
SPB®-624 Capillary GC Column					
0.18	1.00	20	45	28662-U	1 ea
VOCOL® Capillary GC Column					
0.18	1.00	20	45	28463-U	1 ea
SLB®-5ms Capillary GC Column					
0.10	0.10	10	250	28465-U	1 ea
	0.10	15	250	28466-U	1 ea
0.18	0.18	20	250	28564-U	1 ea
	0.30	12	150	28566-U	1 ea
	0.30	30	150	28575-U	1 ea
	0.36	20	125	28576-U	1 ea
Equity®-1701 Capillary GC Column					
0.10	0.10	15	250	28343-U	1 ea
Omegawax® Capillary GC Column					
0.10	0.10	15	250	23399-U	1 ea
SP™-2560 Capillary GC Column					
0.18	0.14	75	321	23348-U	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Fast GC Columns: *Ionic Liquid Columns*

Ionic Liquid Columns

- **SLB-IL59:** a polar column. Maximum temperature of 300 °C (isothermal or programmed).
- **SLB-IL61:** a polar column. Maximum temperature of 290 °C (isothermal or programmed).
- **SLB-IL76:** a highly polar column. Maximum temperature of 270 °C (isothermal or programmed).
- **SLB-IL82:** a highly polar column. Maximum temperature of 270 °C (isothermal or programmed).
- **SLB-IL100:** a highly polar column. Maximum temperature of 230 °C (isothermal or programmed).
- **SLB-IL111:** an extremely polar column. Maximum temperature of 270 °C (isothermal or programmed).

I.D. (mm)	d _f (µm)	L (m)	Beta Value	Cat. No.	Qty
SLB®-IL59 Capillary GC Column					
0.10	0.08	15	313	28880-U	1 ea
SLB®-IL61 Capillary GC Column					
0.10	0.08	15	313	29484-U	1 ea
SLB®-IL76 Capillary GC Column					
0.10	0.08	15	313	28909-U	1 ea
SLB®-IL82 Capillary GC Column					
0.10	0.08	15	313	29477-U	1 ea
SLB®-IL100 Capillary GC Column					
0.18	0.14	20	313	28883-U	1 ea
SLB®-IL111 Capillary GC Column					
0.10	0.08	15	313	28925-U	1 ea

General Purpose Columns

- **Equity-1:** For general purpose non-polar Fast GC applications. Maximum temperature of 325 °C (isothermal) or 350 °C (programmed).
- **Equity-5:** For general purpose non-polar Fast GC applications. Maximum temperature of 325 °C (isothermal) or 350 °C (programmed).
- **SUPELLOWAX 10:** For general purpose polar Fast GC applications. Maximum temperature of 280 °C (isothermal or programmed).

I.D. (mm)	d _f (µm)	L (m)	Beta Value	Cat. No.	Qty
Equity®-1 Capillary GC Column					
0.10	0.10	15	250	28039-U	1 ea
Equity®-5 Capillary GC Column					
0.10	0.10	15	250	28083-U	1 ea
SUPELLOWAX® 10 Capillary GC Column					
0.10	0.10	5	250	25025-U	1 ea
	0.10	10	250	25026-U	1 ea
	0.10	15	250	24343	1 ea

GCxGC Columns

GCxGC is one of the fastest growing areas in analytical chemistry. The level of detail it can provide cannot be equaled by any other chromatographic technique. It employs two columns in series, separated by a modulator. The role of the modulator is to collect fractions from the first column (often called the primary column, first dimension column, or 1° column) and focus them onto the second column (often called the secondary column, second dimension column, or 2° column). Primary columns tend to be 30 m x 0.25 mm I.D., whereas 1-2 m x 0.10 mm I.D. is common for secondary columns. Common detectors, including MS, can be used.

Column Selection Strategy

One key to the successful operation of GCxGC is that the two columns must have orthogonal selectivity, that is, they must utilize different retention mechanisms. The more different (more orthogonal), the better the overall performance will be. Two strategies can be used for GCxGC column selection to achieve orthogonal selectivity.

Non-Polar to Polar Strategy

Analytes are separated on a non-polar column in the first dimension, and on a polar column in the second dimension. This strategy is useful for complex samples, such as gasoline.

Polar to Non-Polar Strategy

Analytes are separated on a polar column in the first dimension, and on a non-polar column in the second dimension. This strategy is useful for complex samples, such as FAMES.

Non-Polar Primary (1°) Columns

Non-polar GC columns are made with the least selective GC stationary phases. Interactions are primarily dispersive (van der Waals forces). Phases with phenyl functional groups can also undergo a moderate amount of π - π interactions. Elution order generally follows the boiling points of the analytes. Choices are:

- **SLB-5ms:** 5% phenyl, the best choice due to high temperature limits. Maximum temperature of 340 °C (isothermal) or 360 °C (programmed).
- **Equity-5:** alternative 5% phenyl choice. Maximum temperature of 325 °C (isothermal) or 350 °C (programmed).
- **SPB-5:** alternative 5% phenyl choice. Maximum temperature of 320 °C (isothermal or programmed).
- **PTA-5:** specially-engineered 5% phenyl for basic compounds. Maximum temperature of 320 °C (isothermal or programmed).
- **SAC-5:** specially-engineered 5% phenyl for sterols. Maximum temperature of 320 °C (isothermal or programmed).
- **Equity-1:** 100% methyl, provides less selectivity than obtained with a 5% phenyl. Maximum temperature of 325 °C (isothermal) or 350 °C (programmed).
- **SPB-1:** alternative 100% methyl choice. Maximum temperature of 320 °C (isothermal or programmed).

I.D. (mm)	d _f (µm)	L (m)	Beta Value	Cat. No.	Qty
SLB®-5ms Capillary GC Column					
0.25	0.10	30	625	28467-U	1 ea
	0.25	30	250	28471-U	1 ea
	0.50	30	125	28473-U	1 ea
Equity®-5 Capillary GC Column					
0.25	0.25	30	250	28089-U	1 ea
	0.50	30	125	28092-U	1 ea
SPB®-5 Capillary GC Column					
0.25	0.25	30	250	24034	1 ea
PTA-5 Capillary GC Column					
0.25	0.50	30	125	24277	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

GCxGC Columns/Non-Polar Primary (1°) Columns

I.D. (mm)	d _f (μm)	L (m)	Beta Value	Cat. No.	Qty
SAC™-5 Capillary GC Column					
0.25	0.25	30	250	24156	1 ea
Equity®-1 Capillary GC Column					
0.25	0.10	30	625	28044-U	1 ea
	0.25	30	250	28046-U	1 ea
SPB®-1 Capillary GC Column					
0.25	0.10	30	625	24261	1 ea
	0.25	30	250	24028	1 ea

Polar Secondary (2°) Columns

Polar, highly polar, and extremely polar GC columns are made with very selective GC stationary phases. These include polyethylene glycol and ionic liquids. They are commonly used to analyze polarizable compounds (such as alkenes, alkynes, and aromatic hydrocarbons) that contain some double and/or triple bonds between carbon atoms. Dispersive (van der Waals forces), π-π, dipole-dipole, and dipole-induced dipole interactions are all strong with these columns. Moderate amounts of hydrogen bonding and basic interactions are also possible. Elution order is determined by differences in the overall effects of possible interactions. Choices are:

- **SUPELLOWAX 10:** polyethylene glycol phase, similar to the original polar phase used for GCxGC applications. Maximum temperature of 280 °C (isothermal or programmed).
- **SLB-IL59:** polar ionic liquid phase with a high temperature limit. Maximum temperature of 300 °C (isothermal or programmed).
- **SLB-IL61:** polar ionic liquid phase with improved inertness compared to the SLB-IL59. Maximum temperature of 290 °C (isothermal or programmed).
- **SLB-IL111:** extremely polar ionic liquid phase, most orthogonal phase to non-polar phases. Maximum temperature of 270 °C (isothermal or programmed).
- **SLB-IL76:** alternative ionic liquid phase. Maximum temperature of 270 °C (isothermal or programmed).
- **SLB-IL82:** alternative ionic liquid phase. Maximum temperature of 270 °C (isothermal or programmed).

I.D. (mm)	d _f (μm)	L (m)	Beta Value	Cat. No.	Qty
SUPELLOWAX® 10 Capillary GC Column					
0.10	0.10	5	250	25025-U	1 ea
	0.10	10	250	25026-U	1 ea
	0.10	15	250	24343	1 ea
SLB®-IL59 Capillary GC Column					
0.10	0.08	15	313	28880-U	1 ea
SLB®-IL61 Capillary GC Column					
0.10	0.08	15	313	29484-U	1 ea
SLB®-IL111 Capillary GC Column					
0.10	0.08	15	313	28925-U	1 ea
SLB®-IL76 Capillary GC Column					
0.10	0.08	15	313	28909-U	1 ea
SLB®-IL82 Capillary GC Column					
0.10	0.08	15	313	29477-U	1 ea

Polar Primary (1°) Columns

Polar, highly polar, and extremely polar GC columns are made with very selective GC stationary phases. These include polyethylene glycol, ionic liquids, and polysiloxane polymers with cyanopropyl functional groups. They are commonly used to analyze polarizable compounds (such as alkenes, alkynes, and aromatic hydrocarbons) that contain some double and/or triple bonds between carbon atoms. Dispersive (van der Waals forces), π-π, dipole-dipole, and dipole-induced dipole interactions are all strong with these columns. Moderate amounts of hydrogen bonding and basic interactions are also possible. Elution order is determined by differences in the overall effects of possible interactions. Choices are:

- **SUPELLOWAX 10:** polyethylene glycol phase, similar to the original polar phase used for GCxGC applications. Maximum temperature of 280 °C (isothermal or programmed).
- **SLB-IL60:** most inert polar ionic liquid phase with a high temperature limit. Maximum temperature of 300 °C (isothermal or programmed).
- **SLB-IL59:** polar ionic liquid phase with a high temperature limit. Maximum temperature of 300 °C (isothermal or programmed).
- **SLB-IL61:** polar ionic liquid phase with improved inertness compared to the SLB-IL59. Maximum temperature of 290 °C (isothermal or programmed).
- **SLB-IL111:** extremely polar ionic liquid phase, most orthogonal phase to non-polar phases. Maximum temperature of 270 °C (isothermal or programmed).
- **SP-2380:** highly polar cyanopropyl siloxane phase commonly used for FAME separations. Maximum temperature is 275 °C (isothermal or programmed).
- **SLB-IL76:** alternative ionic liquid phase. Maximum temperature of 270 °C (isothermal or programmed).
- **SLB-IL82:** alternative ionic liquid phase. Maximum temperature of 270 °C (isothermal or programmed).
- **SP-2331:** alternative highly polar cyanopropyl siloxane phase. Maximum temperature is 275 °C (isothermal or programmed).

I.D. (mm)	d _f (μm)	L (m)	Beta Value	Cat. No.	Qty
SUPELLOWAX® 10 Capillary GC Column					
0.25	0.25	30	250	24079	1 ea
	0.50	30	125	24284	1 ea
SLB®-IL60 Capillary GC Column					
0.25	0.20	30	313	29505-U	1 ea
SLB®-IL59 Capillary GC Column					
0.25	0.20	30	313	28891-U	1 ea
SLB®-IL61 Capillary GC Column					
0.25	0.20	30	313	29486-U	1 ea
SLB®-IL111 Capillary GC Column					
0.25	0.20	30	313	28927-U	1 ea
SP™-2380 Capillary GC Column					
0.25	0.20	30	313	24110-U	1 ea
SLB®-IL76 Capillary GC Column					
0.25	0.20	30	313	28913-U	1 ea
SLB®-IL82 Capillary GC Column					
0.25	0.25	30	313	29479-U	1 ea
SP™-2331 Capillary GC Column					
0.25	0.20	30	313	24257	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

GCxGC Columns: *Non-Polar Secondary (2°) Columns*

Non-Polar Secondary (2°) Columns

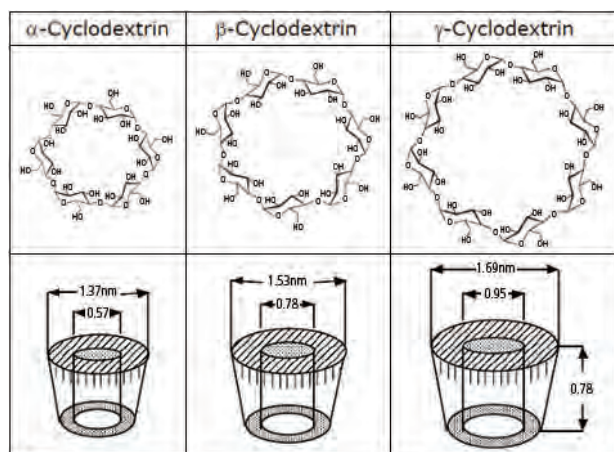
Non-polar GC columns are made with the least selective GC stationary phases. Interactions are primarily dispersive (van der Waals forces). Phases with phenyl functional groups can also undergo a moderate amount of π - π interactions. Elution order generally follows the boiling points of the analytes. Choices are:

- **SLB-5ms**: 5% phenyl, the best choice due to high temperature limits. Maximum temperature of 340 °C (isothermal) or 360 °C (programmed).
- **Equity-5**: alternative 5% phenyl choice. Maximum temperature of 325 °C (isothermal) or 350 °C (programmed).
- **Equity-1**: 100% methyl, provides less selectivity than obtained with a 5% phenyl. Maximum temperature of 325 °C (isothermal) or 350 °C (programmed).

I.D. (mm)	d _f (μm)	L (m)	Beta Value	Cat. No.	Qty
SLB®-5ms Capillary GC Column					
0.10	0.10	10	250	28465-U	1 ea
	0.10	15	250	28466-U	1 ea
Equity®-5 Capillary GC Column					
0.10	0.10	15	250	28083-U	1 ea
Equity®-1 Capillary GC Column					
0.10	0.10	15	250	28039-U	1 ea

Chiral Columns

GC columns that employ a chiral stationary phase (CSP) are suitable for enantiomer separations. We offer two cyclodextrin-based column lines, **Astec CHIRALDEX®** and **Supelco DEX**. Cyclodextrins are macromolecules composed of 6 or more D(+)-glucose residues bonded through α -glycosidic linkages. They are classified according to the number of glucose residues they contain: α -cyclodextrins contain six residues, β -cyclodextrins contain seven residues, and γ -cyclodextrins contain eight residues. All hydroxyl groups, whether at the 2, 3 or 6 position of each residue, can be selectively modified with a derivative to impart unique selectivities. Without derivatization, no enantiomeric selectivity is exhibited in GC.



Cyclodextrin molecules showing dimensions

Selectivity of cyclodextrin-based phases is a function of the derivative, the degree of derivatization, the position of the derivative on the cyclodextrin, whether the derivatized cyclodextrin is used neat or doped into a polysiloxane polymer, and if doped, at what percentage. Certain CSPs are more selective for given molecular structures. Often, more than one CSP will achieve a separation. CSPs may be chosen to optimize resolution, but

also elution order or analysis time. Cyclodextrin-based CSPs are grouped into three general categories:

- Surface Interactions, Complex Derivatives
- Surface/Inclusion Interactions, Simple Derivatives
- Inclusion Interactions

Chiral GC Column Screening Kits

Predicting the best column for a new chiral method is difficult, if not impossible. Unless a published method exists for your precise analytes, multi-column screening is still the only way. Our Column Screening Kits contain the most popular Astec CHIRALDEX® or Supelco DEX phases, along with a comprehensive method development guide. The kits are priced at a substantial savings over the cost of the columns sold separately.

- **Astec CHIRALDEX® Kit** contains G-TA, B-DM, and B-DA
- **Supelco DEX Kit I** contains α -DEX 120, β -DEX 120, and γ -DEX 120
- **Supelco DEX Kit II** contains β -DEX 325, β -DEX 225, γ -DEX 225, and β -DEX 120

Astec CHIRALDEX® GC Column Screening Kit

Description	Cat. No.	Qty
30 m kit	71030AST	1 kit

Supelco DEX™ GC Column Screening Kit

Description	Cat. No.	Qty
kit I	24340	1 kit
kit II	24328-U	1 kit

Group 1: Surface Interactions, Complex Derivatives

Sigma-Aldrich is the only supplier of complex derivatives for chiral GC. There are four members in this important group:

- Astec CHIRALDEX® TA (Trifluoroacetyl derivatives)
- Astec CHIRALDEX® PN (Propionyl derivatives)
- Astec CHIRALDEX® DP (Dipropionyl derivatives)
- Astec CHIRALDEX® BP (Butyryl derivatives)

Because the predominant mechanism of retention for phases in this group is based on surface interaction, the γ -cyclodextrin, with 8 glucose residues, has been shown to be the most useful. Compared to α - and β -cyclodextrins, the greater number of glucose residues in a γ -cyclodextrin results in the greater number of hydroxyl functional groups available for derivatization. High derivative concentration is beneficial for maximizing surface interactions.

Astec CHIRALDEX® G-TA is the first choice in this group. This phase has been shown to be the most broadly selective phase for the pharmaceutical industry, especially in the analysis of chiral intermediates and drug studies in various stages of clinical trials. Separations occur without the inclusion mechanism and are typically faster and more efficient than most other CSPs. This phase does not contain a polysiloxane polymer carrier and, therefore, there are no deleterious effects at low temperatures. The ability of this phase to separate parent drug enantiomers and their metabolites has proven quite beneficial.

A modified version of the Astec CHIRALDEX® G-TA is the **Astec CHIRALDEX® G-PN**. It functions like the Astec CHIRALDEX® G-TA but shows higher selectivity toward certain amines (amphetamine, methamphetamine). This phase is more stable to moisture than the Astec CHIRALDEX® G-TA.

The **Astec CHIRALDEX® G-DP** phase was introduced to enhance selectivity for both aliphatic and aromatic amines in addition to aliphatic and some aromatic esters. This phase is especially useful for polar racemates. This phase demonstrates better hydrolytic and thermal stability than the Astec CHIRALDEX® G-TA.

The **Astec CHIRALDEX® G-BP** phase can be used as a general purpose column but it is especially useful for amino acids.

Capillary GC Columns and Guard Columns/Retention Gaps

Chiral Columns: Group 1: Surface Interactions, Complex Derivatives

Note: The subtle differences in functional groups between the Astec CHIRALDEX® G-TA, Astec CHIRALDEX® G-PN, Astec CHIRALDEX® G-DP, and Astec CHIRALDEX® G-BP often allow for major enhancements in chiral and achiral selectivity when changing from one phase to another.

Astec CHIRALDEX® A-TA Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-trifluoroacetyl derivative of α -cyclodextrin. This phase exhibits high selectivity for oxygen-containing analytes in the form of alcohols, ketones, acids, aldehydes and lactones. It is also highly selective for halogenated compounds.

Temp. Limits:

- 10 °C to 180 °C, isothermal and programmed

phase non-bonded; 2,6-di-O-pentyl-3-trifluoroacetyl derivative of α -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	20	500	73002AST	1 ea
	0.12	30	500	73003AST	1 ea
	0.12	40	500	73004AST	1 ea
	0.12	50	500	73005AST	1 ea

Astec CHIRALDEX® B-TA Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-trifluoroacetyl derivative of β -cyclodextrin. This phase exhibits high selectivity for oxygen-containing analytes in the form of alcohols, ketones, acids, aldehydes and lactones. It is also highly selective for halogenated compounds.

Temp. Limits:

- 10 °C to 180 °C isothermal and programmed

phase non-bonded; 2,6-di-O-pentyl-3-trifluoroacetyl derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	20	500	73022AST	1 ea
	0.12	30	500	73023AST	1 ea
	0.12	40	500	73024AST	1 ea

Astec CHIRALDEX® G-TA Capillary GC Column

Astec CHIRALDEX G-TA is the first choice in the Group 1 CSPs (Surface Interactions, Complex Derivatives). This phase has been shown to be the most broadly-selective phase for the pharmaceutical industry, especially for the analysis of chiral intermediates and drug studies in various stages of clinical trials. Separations occur without the inclusion mechanism and are typically faster and more efficient than most chiral stationary phases. G-TA has also been used to separate parent drug enantiomers and their metabolites. G-TA has its highest selectivity for oxygen-containing analytes like alcohols, diols and polyols as the free alcohol and as an acyl derivative; amines as acyl derivatives; amino alcohols, halogens (Cl>Br>F), amino acids, hydroxy acids, lactones, furans and pyrans. It is also highly selective for halogenated compounds.

Temp. Limits:

- 10 °C to 180 °C isothermal and programmed

phase non-bonded; 2,6-di-O-pentyl-3-trifluoroacetyl derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	10	500	73031AST	1 ea
	0.12	20	500	73032AST	1 ea
	0.12	30	500	73033AST	1 ea
	0.12	40	500	73034AST	1 ea
	0.12	50	500	73035AST	1 ea

Astec CHIRALDEX® G-PN Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-propionyl derivative of γ -cyclodextrin. This phase exhibits high selectivity for lactones and aromatic amines. It is also suitable for epoxide separations. Additionally, the analysis of styrene oxide can be accomplished on this phase (this analyte degrades on the TA phases).

GC capillary column

fused silica

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,6-di-O-pentyl-3-propionyl derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	74033AST	1 ea

Astec CHIRALDEX® B-DP Capillary GC Column

Incorporates a phase consisting of a 2,3-di-O-propionyl-6-t-butyl silyl derivative of β -cyclodextrin. This phase exhibits good hydrolytic stability, broad chiral selectivity, and is excellent for aliphatic and aromatic amines. It is also good for many aliphatic and some aromatic esters as well as exhibiting high efficiency and resolution at low retention times for polar racemates.

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,3-di-O-propionyl-6-t-butyl silyl derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	78023AST	1 ea

Astec CHIRALDEX® G-DP Capillary GC Column

Incorporates a phase consisting of a 2,3-di-O-propionyl-6-t-butyl silyl derivative of γ -cyclodextrin. The CHIRALDEX G-DP phase was designed to enhance selectivity for both aliphatic and aromatic amines, in addition to aliphatic and some aromatic esters. This phase is especially useful for polar racemates, as it exhibits high efficiency and resolution at low retention times. G-DP demonstrates better hydrolytic and thermal stability than the CHIRALDEX G-TA.

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,3-di-O-propionyl-6-t-butyl silyl derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	78033AST	1 ea

Astec CHIRALDEX® G-BP Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-butyryl derivative of γ -cyclodextrin. This phase exhibits high selectivity for amino acids, amines, and furans.

GC capillary column

fused silica

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,6-di-O-pentyl-3-butyryl derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	75033AST	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Chiral Columns: *Group 2: Surface/Inclusion Interactions, Simple Derivatives*

Group 2: Surface/Inclusion Interactions, Simple Derivatives

There are three different derivatives in this group:

- Astec CHIRALDEX® DM and Supelco DEX 325 (Dimethyl derivatives)
- Supelco DEX 225 (Diacetyl derivatives)
- Astec CHIRALDEX® PM, Supelco DEX 110, and Supelco DEX 120 (Permethyl derivatives)

The β -cyclodextrin has shown the greatest applicability for phases with these derivatives. Astec CHIRALDEX® B-DM is the recommended column in this category. The Supelco β -DEX 325 is similar in both chemistry and use to the Astec CHIRALDEX® B-DM phase, the main difference being the concentration of the dimethyl-derivatized cyclodextrin that is doped into the polysiloxane polymer carrier.

The Supelco β -DEX 225 is a modified form of the Supelco β -DEX 325 phase, employing acetyl derivatives at the 2,3-positions instead of more traditional methyl derivatives.

This group also includes the popular permethyl derivatives, and includes Astec CHIRALDEX® B-PM, Supelco β -DEX 110, and Supelco β -DEX 120 phases. They are recommended as general purpose columns for the separation of a wide variety of compounds and are especially useful for the analysis of alcohols and diols in their underivatized form, as well as analytes with polar groups (such as tertiary amines). The main difference between these three phases is the concentration of the permethyl-derivatized cyclodextrin that is doped into the polysiloxane polymer carrier.

Astec CHIRALDEX® B-DM Capillary GC Column

Through special derivatization techniques, the concentration of the cyclodextrin in the CHIRALDEX B-DM has been substantially increased in the polysiloxane carrier. This phase is very useful for a number of free acids and bases. The B-DM is able to perform most of the separations done on a beta-permethylated phase, but with higher resolution. The selectivity of the B-DM covers applications of both the B-PM and B-PH phases, although with superior performance.

Temp. Limits:

- -10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,3-di-O-methyl-6-t-butyl silyl derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	20	500	77022AST	1 ea
	0.12	30	500	77023AST	1 ea
	0.12	40	500	77024AST	1 ea
	0.12	50	500	77025AST	1 ea

Astec CHIRALDEX® G-DM Capillary GC Column

Incorporates a phase consisting of a 2,3-di-O-methyl-6-t-butyl silyl derivative of γ -cyclodextrin. This phase exhibits broad chiral selectivity, resolving aliphatic, olefinic, and aromatic enantiomers. It combines the selectivities of the PM and PH phases.

Temp. Limits:

- -10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,3-di-O-methyl-6-t-butyl silyl derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	77033AST	1 ea

α -DEX™ 325

The chiral stationary phase in α -DEX 325 columns contains 2,3-di-O-methyl-6-O-TBDMS- α -cyclodextrin embedded in an intermediate polarity phase.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-methyl-6-O-TBDMS- α -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24303	1 ea

β -DEX™ 325

The chiral stationary phase in β -DEX 325 columns contains 2,3-di-O-methyl-6-O-TBDMS- β -cyclodextrin embedded in an intermediate polarity phase. The Supelco β -DEX 325 is similar in both chemistry and use to the CHIRALDEX B-DM phase, the main difference being the concentration of the dimethyl-derivatized cyclodextrin that is doped into the polysiloxane carrier.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-methyl-6-O-TBDMS- β -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24308	1 ea

γ -DEX™ 325

The chiral stationary phase in Supelco γ -DEX 325 columns contains 2,3-di-O-methyl-6-O-TBDMS- γ -cyclodextrin embedded in an intermediate polarity phase.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-methyl-6-O-TBDMS- γ -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24306	1 ea

α -DEX™ 225

The chiral stationary phase in α -DEX 225 columns contains 2,3-di-O-acetyl-6-O-TBDMS- α -cyclodextrin embedded in an intermediate polarity phase.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-acetyl-6-O-TBDMS- α -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24311	1 ea

β -DEX™ 225

The Supelco β -DEX 225 is a modified form of the β -DEX 325 phase, and employs acetyl derivatives at the 2,3-positions instead of more traditional methyl derivatives. The chiral stationary phase in β -DEX 225 columns contains 2,3-di-O-acetyl-6-O-TBDMS- β -cyclodextrin embedded in an intermediate polarity phase. These columns provide unique selectivity for enantiomeric separations of small molecules: alcohols, aldehydes (e.g., 2-phenylpropionaldehyde), esters (e.g. methyl malate, methyl lactate), flavor compounds and ketones.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-acetyl-6-O-TBDMS- β -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24348	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Chiral Columns: Group 2: Surface/Inclusion Interactions, Simple Derivatives

γ -DEX™ 225

The chiral stationary phase in γ -DEX 225 columns contains 2,3-di-O-acetyl-6-O-TBDMS- γ -cyclodextrin embedded in an intermediate polarity phase.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 25% 2,3-di-O-acetyl-6-O-TBDMS- γ -cyclodextrin in SPB-20 poly(20% phenyl/80% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24312	1 ea

Astec CHIRALDEX® B-PM Capillary GC Column

The main difference between CHIRALDEX B-PM and the Supelco β -DEX 110 and Supelco β -DEX 120 phases is the concentration of the permethyl-derivatized cyclodextrin that is doped into the polysiloxane carrier.

CHIRALDEX B-PM is a general-purpose column used for the separation of acids, alcohols, barbitals, diols, epoxides, esters, hydrocarbons, ketones, lactones and terpenes. Also, some underivatized alcohols and diols as well as some analytes with polar groups, i.e. tertiary amines, show excellent separation.

Temp. Limits:

- -10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,3,6-tri-O-methyl derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	76023AST	1 ea
	0.12	50	500	76025AST	1 ea

β -DEX™ 110

The chiral stationary phase in β -DEX 110 columns contains permethylated β -cyclodextrin embedded in an intermediate polarity stationary phase. They are recommended for the enantiomeric separation of a wide range of chiral compounds (ketones, esters, alkanes, alkenes, alcohols, acids, ethers, etc.).

The 10% (β -DEX 110) and 20% (β -DEX 120) β -cyclodextrin content alters the elution order while maintaining similar enantioselectivity.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 10% permethylated β -cyclodextrin in SPB-35 poly(35% diphenyl/65% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24301	1 ea
	0.25	60	250	24302	1 ea

α -DEX™ 120

Containing permethylated α -cyclodextrin embedded in an intermediate polarity stationary phase, Supelco α -DEX 120 columns provide unique selectivity for enantiomeric separations of small molecules. They are also recommended for separating positional isomers (phenols, xylenes, etc.).

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 20% permethylated α -cyclodextrin in SPB-35 poly(35% diphenyl/65% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24310	1 ea

β -DEX™ 120

The chiral stationary phase in β -DEX 120 columns contains permethylated β -cyclodextrin embedded in an intermediate polarity stationary phase. They are recommended for the enantiomeric separation of a wide range of chiral compounds (ketones, esters, alkanes, alkenes, alcohols, acids, ethers, etc.). The 10% (β -DEX 110) and 20% (β -DEX 120) β -cyclodextrin content alters the elution order while maintaining similar enantioselectivity.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 20% permethylated β -cyclodextrin in SPB-35 poly(35% phenyl/65% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24304	1 ea
	0.25	60	250	24305-U	1 ea

γ -DEX™ 120

Because the elution order of the members of a chiral pair frequently reverses (enantioreversal) on a γ -DEX column compared to the elution order on an α -DEX or β -DEX column, we recommend γ -DEX 120 columns as complements to α -DEX 120 and β -DEX 120 columns. γ -DEX is useful for enantiomeric differentiation of large analytes, i.e. α -BHC, carvone, carboxylic acids and methamphetamine.

Temp. Limits:

- 30 °C to 230 °C

phase non-bonded; 20% permethylated γ -cyclodextrin in SPB-35 poly(35% phenyl/65% dimethylsiloxane)

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.25	30	250	24307	1 ea

Group 3: Inclusion Interactions

The third group relies on inclusion interactions for retention mechanism. There are two derivatives in this group:

- Astec CHIRALDEX® DA (Dialkyl derivatives)
- Astec CHIRALDEX® PH (S-Hydroxypropyl derivatives)

The fact that there are three different size cyclodextrins (α , β , and γ) allows for separation of a wide variety of different size analytes. Astec CHIRALDEX® B-DA demonstrates the strongest size selectivity. This phase requires analytes to minimally contain two ring structures, one of which is unsaturated (aromatic). The mechanism of this phase is strongly dependent on the inclusion mechanism and is able to differentiate changes in the base structure. Because the Astec CHIRALDEX® B-DA most effectively separates multi-ring analytes, analysis temperatures are often higher than 150 °C. A key application area for this phase is fingerprinting raw materials and identifying structural differences.

Astec CHIRALDEX® B-PH shows at least some selectivity to a great variety of analytes, but is especially effective for saturated analytes with minimal functionality, saturated cyclics, and saturated bicyclics. This phase often shows a reversal of elution order (enantioreversal) compared to the Astec CHIRALDEX B-DA phase.

Capillary GC Columns and Guard Columns/Retention Gaps

Chiral Columns: Group 3: Inclusion Interactions

Astec CHIRALDEX® A-DA Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-methoxy derivative of α -cyclodextrin. This phase is good for separations of heterocyclic amines. It has different selectivity from other phases and often shows reversal in elution from the PH phases. MAOT = 200 °C isothermal, 220 °C programmed. GC capillary column

fused silica

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,6-di-O-pentyl-3-methoxy derivative of α -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	72003AST	1 ea

Astec CHIRALDEX® B-DA Capillary GC Column

CHIRALDEX B-DA requires that analytes possess a minimum of two ring structures, one of which is unsaturated (aromatic) α , β to the stereogenic center. Examples include fluoxetine, methylphenidate and chlorpheniramine. Inclusion complexation or proper fit between the analyte and cyclodextrin cavity is the dominant enantioselectivity mechanism for the DA series. There must be an includable group α or β to the stereogenic center for chiral recognition. Since CHIRALDEX DA columns most effectively separate multi-ring analytes, analysis temperatures are often higher than 150°C. Enantioselectivity has been observed at temperatures >200°C (fluoxetine acetyl derivative).

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,6-di-O-pentyl-3-methoxy derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	72023AST	1 ea

Astec CHIRALDEX® G-DA Capillary GC Column

Incorporates a phase consisting of a 2,6-di-O-pentyl-3-methoxy derivative of γ -cyclodextrin. This phase is good for separations of heterocyclic amines. It has different selectivity from other phases and often shows reversal in elution from the PH phases. MAOT = 200 °C isothermal, 220 °C programmed. GC capillary column

fused silica

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; 2,6-di-O-pentyl-3-methoxy derivative of γ -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	72033AST	1 ea

Astec CHIRALDEX® B-PH Capillary GC Column

CHIRALDEX B-PH shows at least some selectivity to a great variety of analytes, but is especially effective for saturated analytes with minimal functionality, saturated cyclics and bicyclics. The CHIRALDEX PH series of columns shows less of a necessity for inclusion complexation for chiral recognition than the DA columns. This phase often shows a reversal of elution order (enantioreversal) compared to the B-DA phase.

Temp. Limits:

- 10 °C to 200 °C isothermal, 220 °C programmed

phase non-bonded; (S)-2-hydroxy propyl methyl ether derivative of β -cyclodextrin

I.D. (mm)	d _f (μm)	Length (m)	Beta Value	Cat. No.	Qty
0.25	0.12	30	500	71023AST	1 ea

PLOT Columns

We offer a wide variety of Porous Layer Open Tubular (PLOT) GC columns, including those made with our specialty carbon adsorbents. A proprietary procedure is used to fix adsorbent particles to the inside of fused silica tubing, and ensures they will not be dislodged in normal use. PLOT GC columns are commonly used for separations of small molecules, such as permanent gases, light hydrocarbons, and volatile sulfur compounds. Choose:

- Carboxen®-1010 PLOT** for separations of hydrogen, oxygen, nitrogen, carbon monoxide, methane, carbon dioxide, and C2/C3 hydrocarbons. This is the only column that can separate all these permanent gases.
- Carboxen®-1006 PLOT** for most permanent gases and C1-C3, using above ambient initial temperatures. Also for resolving formaldehyde/water/methanol (formalin) mixtures and monitoring impurities in ethylene.
- Supel-Q PLOT** for analyses of sulfur gases, alcohols, ketones, aldehydes, and many polar compounds. Also for carbon dioxide and C1-C4 hydrocarbons at above ambient temperatures, and for gasoline and other petroleum fractions.
- Alumina sulfate PLOT** for C1-C4 hydrocarbons, specifically methane from the C2 hydrocarbons, with reduced peak tailing. Also for elution of acetylene after n-butane, and the elution of methyl acetylene after n-pentane and 1,3-butadiene.
- Alumina chloride PLOT** for C1-C4 hydrocarbons. Also for excellent separation of many common fluorocarbon compounds
- Mol Sieve 5A PLOT** for oxygen, nitrogen, carbon monoxide, and methane in less than 5 minutes. For more difficult separations, such as argon from oxygen, by using subambient temperatures (15 °C or below).

Carboxen®-1010 PLOT Capillary GC Column

Application: This column is ideal for the separation of all major components in permanent gas (helium, hydrogen, oxygen, nitrogen, carbon monoxide, methane, and carbon dioxide) and light hydrocarbons (C2-C3) in the same analysis. It is the only column commercially available that is able to separate all major components in permanent gas. This column can also separate oxygen from nitrogen at subambient temperatures.

USP Code: None

Phase:

- Carbon molecular sieve

Temp. Limits:

- Subambient to 250 °C (isothermal or programmed)

I.D. (mm)	L (m)	Cat. No.	Qty
0.32	30	24246	1 ea
0.53	30	25467	1 ea

Carboxen®-1006 PLOT Capillary GC Column

Application: This column is ideal for the separation of many permanent gas components (such as helium, hydrogen, nitrogen, carbon monoxide, methane, and carbon dioxide), and light hydrocarbons (C2-C3) in the same analysis. It is ideal for resolving formaldehyde/water/methanol (formalin) mixtures and monitoring impurities in ethylene. This column can be used with high flow rates and rapid temperature programs to ensure excellent, fast separations.

USP Code: None

Phase:

- Carbon molecular sieve

Temp. Limits:

- Subambient to 250 °C (isothermal or programmed)

I.D. (mm)	L (m)	Cat. No.	Qty
0.32	30	24241-U	1 ea
0.53	30	25461	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

PLOT Columns

Supel-Q™ PLOT Capillary GC Column

Application: This column exhibits very little bleed, even at its maximum temperature, and effectively resolves carbon dioxide and C1-C4 hydrocarbons at above ambient temperatures. It is also suitable for analyses of sulfur gases, alcohols, ketones, aldehydes, and many polar compounds. Gasoline and other petroleum fractions can be analyzed as well.

USP Code: None

Phase:

- Divinylbenzene

Temp. Limits:

- Subambient to 250 °C (isothermal or programmed)

I.D. (mm)	L (m)	Cat. No.	Qty
0.32	30	24242	1 ea
0.53	30	25462	1 ea
0.53	30	23937-U	1 ea
0.53	50	23939-U	1 ea

Note: P/N 23937-U includes an attached guard column.

Alumina Sulfate PLOT Capillary GC Column

Application: This highly dependable column has the necessary selectivity for the separation of alkanes, alkenes, and alkynes in mixtures of C1-C4 hydrocarbons. It provides elution of acetylene after n-butane and the elution of methyl acetylene after n-pentane and 1,3-butadiene. The polymer surface is deactivated to reduce peak tailing.

USP Code: None

Phase:

- Sulfate-deactivated alumina

Temp. Limits:

- Subambient to 180 °C (isothermal or programmed)

I.D. (mm)	L (m)	Cat. No.	Qty
0.32	30	28321-U	1 ea
0.32	50	28322-U	1 ea
0.53	30	28323-U	1 ea
0.53	50	28324-U	1 ea

Alumina Chloride PLOT Capillary GC Column

Application: This column allows for the separation of C1-C4 hydrocarbons. Because this column is slightly less polar than the Alumina sulfate PLOT, it provides a different elution order pattern when alkane, alkene, and alkyne mixtures of light hydrocarbons are analyzed. It also provides excellent separation of many common fluorinated compounds, such as freons.

USP Code: None

Phase:

- Chloride-deactivated alumina

Temp. Limits:

- Subambient to 180 °C (isothermal or programmed)

I.D. (mm)	L (m)	Cat. No.	Qty
0.32	30	28326-U	1 ea
0.32	50	28327-U	1 ea
0.53	30	28328-U	1 ea
0.53	50	28329-U	1 ea

Mol Sieve 5A PLOT Capillary GC Column

Application: This column can be used for the separation of many permanent gas components, such as oxygen, nitrogen, carbon monoxide, and methane, in less than five minutes. More difficult separations, such as argon from oxygen, can be achieved by using subambient temperatures. These columns possess the strongest adsorption strength of any PLOT column.

USP Code: None

Phase:

- Aluminosilicate

Temp. Limits:

- Subambient to 300 °C (isothermal or programmed)

I.D. (mm)	L (m)	Cat. No.	Qty
0.32	30	24243	1 ea
0.53	30	25463	1 ea

SCOT Columns

Supelco is the leader in Support Coated Open Tubular (SCOT) GC column technology. Our unsurpassed manufacturing technique allows us to deposit a uniform layer of liquid phase-coated support particles on the inner wall of stainless steel tubing. This technology gives us access to many phases that are inaccessible to conventional fused silica capillary column manufacturing technology. SCOT columns combine the sensitivity and excellent sample resolution of capillary GC with the extensive stationary phase library of packed GC.

All our SCOT columns have dimensions of 50 feet x 1/32 inch O.D. x 0.02 inch I.D. and include 1/16 inch O.D. connections at each end. They are banded in 3.5 inch coils, with 12 inch loose column at each end. Four columns are available as stock items. Columns with other phases may be available through our custom program.

Bentone 34/DNDP SCOT

- **Application:** Use for analyses of xylene isomers.
- **USP Code:** None
- **Phase:** Bentone 34/di-n-decyl phthalate
- **Temp. Limits:** 10 °C to 150 °C (isothermal or programmed)

TCEP SCOT

- **Application:** Use for analyses of aromatic analytes.
- **USP Code:** None
- **Phase:** 1,2,3-Tris(2-cyanoethoxy)propane
- **Temp. Limits:** 0 °C to 150 °C (isothermal or programmed)

BMEA SCOT

- **Application:** Use for analyses of olefins.
- **USP Code:** None
- **Phase:** Bis-methoxyethyladipate
- **Temp. Limits:** 25 °C to 100 °C (isothermal or programmed)

Squalane SCOT

- **Application:** Use for boiling point separations.
- **USP Code:** None
- **Phase:** Squalane
- **Temp. Limits:** 20 °C to 120 °C (isothermal or programmed)

SCOT Capillary GC Column

Phase	Cat. No.	Qty
Bentone 34/DNDP	23813-U	1 ea
TCEP	23829-U	1 ea
BMEA	23818-U	1 ea
Squalane	23819-U	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Guard Columns/Retention Gaps

Guard Columns/Retention Gaps



Over time, the inlet end of a capillary GC column can become contaminated from the accumulation of non-volatile material. The phase in the front section of the column can also be damaged from the continuous condensation and vaporization of solvent and analytes. Inevitably, active analytes will adsorb to this contaminated/damaged section (the analytes "drag" when passing through the inlet end of the column). Poor peak shape (peak tailing), loss in resolution, and reduced response may be observed. When the chromatographic system degrades to an unacceptable level, performance is restored by clipping the contaminated/damaged section off the inlet end of the column. A decrease in retention times and resolution occurs each time the column is clipped, as theoretical plates are lost. Eventually, the column will be rendered useless.

The use of a guard column/retention gap is an inexpensive technique to extend the lifetime of capillary columns. A guard column/retention gap is a short (1-5 m) piece of uncoated deactivated fused silica tubing which is placed in-line between the GC injection port and the capillary column. The guard column/retention gap is used to take the brunt of the contamination/damage from the solvent and sample. By clipping the guard column/retention gap periodically to restore performance instead of the capillary column, the capillary column remains unaltered. Therefore, chromatography (retention times and resolution) is not affected. A guard column/retention gap consists of two parts: a short length of fused silica tubing, and a connector.

Match the deactivation of the fused silica tubing with the polarity of the injection solvent. In most cases, it is also recommended to match the I.D. of the capillary column. Choose:

- **Non-polar deactivation** for injection solvents such as alkanes, carbon disulfide, and ethers.
- **Intermediate polar deactivation** for injection solvents such as acetone, methylene chloride (dichloromethane), and toluene.
- **Polar deactivation** for injection solvents such as acetonitrile, methanol, and water.

We offer two options for connecting two pieces of fused silica tubing. The **butt connector** is a small stainless steel fitting that makes a zero dead volume seal. The **GlasSeal™ connectors** offer convenience.

Fused Silica Tubing, Non-Polar Deactivated

This tubing is deactivated non-polar, for use with injection solvents such as alkanes, carbon disulfide, and ethers. It has a maximum temperature of 360 °C.

Non-Polar Fused Silica Tubing

I.D. (mm)	L (m)	Cat. No.	Qty
0.10	1	25704	3 ea
0.10	3	25720-U	1 ea
0.10	5	25740-U	1 ea
0.20	5	25741	1 ea
0.20	15	25755	1 ea
0.20	30	25768-U	1 ea
0.25	1	24025	3 ea
0.25	3	25722	1 ea
0.25	5	25742	1 ea
0.25	15	25756	1 ea
0.25	30	25769-U	1 ea
0.25	60	25783	1 ea
0.32	1	24058	3 ea
0.32	3	25723	1 ea
0.32	5	25743	1 ea
0.32	15	25757	1 ea
0.32	30	25770-U	1 ea
0.53	1	25307	3 ea
0.53	3	25724	1 ea
0.53	5	25744	1 ea
0.53	15	25758	1 ea
0.53	30	25771	1 ea

Fused Silica Tubing, Intermediate Polar Deactivated

This tubing is deactivated intermediate polar, for use with injection solvents such as acetone, methylene chloride (dichloromethane), and toluene. It has a maximum temperature of 360 °C.

Intermediate Polar Fused Silica Tubing

I.D. (mm)	L (m)	Cat. No.	Qty
0.10	5	25745-U	1 ea
0.20	1	25706	3 ea
0.20	5	25746	1 ea
0.25	1	25707	3 ea
0.25	3	25727	1 ea
0.25	5	25747	1 ea
0.25	15	25760-U	1 ea
0.25	60	25787	1 ea
0.32	1	25708	3 ea
0.32	3	25728	1 ea
0.32	5	25748-U	1 ea
0.32	15	25761	1 ea
0.32	30	25774	1 ea
0.53	1	25709	3 ea
0.53	3	25729	1 ea
0.53	5	25339	1 ea
0.53	15	25762	1 ea
0.53	30	25775-U	1 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Guard Columns/Retention Gaps: *Fused Silica Tubing, Polar Deactivated*

Fused Silica Tubing, Polar Deactivated

This tubing is deactivated polar, for use with injection solvents such as acetonitrile, methanol, and water. It has a maximum temperature of 260 °C.

Polar Fused Silica Tubing

I.D. (mm)	L (m)	Cat. No.	Qty
0.10	1	25710	3 ea
0.25	1	25712	3 ea
0.25	30	25777	1 ea
0.32	5	25752-U	1 ea
0.32	15	25765	1 ea
0.32	60	25792	1 ea
0.53	1	25714	3 ea
0.53	3	25734	1 ea
0.53	5	25753	1 ea
0.53	15	25766	1 ea
0.53	30	25779	1 ea

Fused Silica Tubing, Untreated

This tubing is untreated, for general purpose use where high inertness is not necessary. It has a maximum temperature of 360 °C.

Untreated Fused Silica Tubing

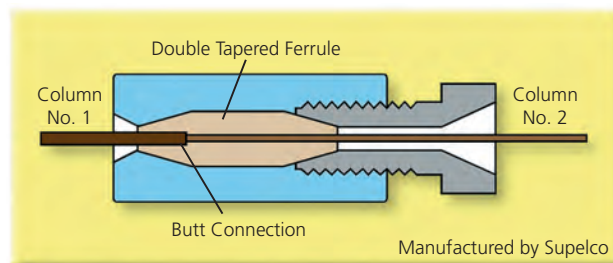
I.D. (mm)	L (m)	Cat. No.	Qty
0.10	1	25700-U	3 ea
0.10	3	25715	1 ea
0.10	5	25735	1 ea
0.25	1	24024	3 ea
0.25	3	25717	1 ea
0.25	5	25737	1 ea
0.25	15	24059	1 ea
0.25	60	24061	1 ea
0.32	1	25702	3 ea
0.32	3	25718	1 ea
0.32	5	25738	1 ea
0.32	15	24062	1 ea
0.32	30	24063	1 ea
0.32	60	24064	1 ea
0.53	1	25703	3 ea
0.53	3	25719	1 ea
0.53	5	25739	1 ea
0.53	15	25306	1 ea
0.53	60	25781	1 ea

Capillary Column Butt Connectors



This device consists of a double-tapered ferrule and a stainless steel compression body with a threaded nut. Small (2.3 cm x 0.6 cm) and light (4.4 g with ferrule), it provides a gas tight seal without a change in column efficiency or inertness. The columns to be connected can have the same or different internal and external diameters. The butt connection is made inside the special double-tapered ferrule. The ferrule is then compressed within the housing. When the column ends are butted squarely and tightly together, the butt connector will not alter the chromatographic performance of your capillary columns. There is little or no dead volume and little chance of gas flow disruption by following these steps:

- Make sure the bore of the ferrule is clean. Blow out any ferrule fragments with nitrogen. Using a magnifier, examine the column ends to be connected. Make sure each cut is clean and square. The two ends must butt squarely, without any gaps.
- With white typewriter correction fluid, place a reference mark 1/4 inch from the end of the column with the larger bore. This mark will help you to confirm visually that the end of the column is centered within the 1/2 inch ferrule.
- Place the ferrule inside the housing and loosely tighten the nut. Feed the unmarked column completely through the ferrule and out the opposite end. Cut off ~1 inch (25 mm) of the column to ensure no ferrule fragments are in the column. Draw the column back far enough to insert the marked column into the ferrule to the indicating mark. Tighten the nut about 1/8 turn past fingertight.
- Press the ends of the columns together, observing the reference mark to make certain they butt together at the center of the ferrule. Tighten the ferrule to about 1/4-1/2 turn past fingertight. Gently pull on both columns to ensure they are secure. If they are loose, additional tightening is necessary.
- Any undetected leaking connection, including this butt connection, can allow oxygen and water vapor to enter the system. Leak check the butt connector in the same manner as any capillary column connection. DO NOT USE LIQUID LEAK INDICATORS. Liquids can contaminate the capillary system. We recommend using a GOW-MAC® electronic leak detector. These thermal conductivity detectors are highly sensitive to trace amounts of hydrogen or helium, and will not contaminate the system.



Capillary Column Butt Connector

	Cat. No.	Qty
Capillary Column Butt Connector		
I.D. 0.4 mm, Supeltex M-2 ferrule included	23796	1 ea
body only (ferrules not included)	23804	1 ea

Supeltex® M-2 Double-Tapered Ferrule

- **Max. Temp.:** 350 °C
- **Composition:** DuPont VESPEL SP-1 (100% polyimide)
- **Characteristics:** High reusability.



Compatible	I.D. (mm)	Cat. No.	Qty
Supeltex® M-2 Double-Tapered Ferrule			
0.10 mm to like I. D. column	0.25	22585	2 ea
0.10-0.25 mm to like I.D. column	0.4	23797	2 ea
0.32 mm to like I. D. column	0.5	22464	2 ea

Capillary GC Columns and Guard Columns/Retention Gaps

Guard Columns/Retention Gaps: *Capillary Column Butt Connectors*

Compatible	I.D. (mm)	Cat. No.	Qty
0.53 mm to like I.D. column	0.8	22590-U	2 ea
0.10-0.25 mm I.D. to 0.53 mm I.D. column (reducing)	0.4-0.8	22465	2 ea
0.32 mm I.D. to 0.53 mm I.D. column	0.5-0.8	22596	2 ea
0.32 mm I.D. to 0.75 mm I.D. Column	0.5-1.2	22466	2 ea

Supeltex® M-2B Double-Tapered Ferrule

- **Max. Temp.:** 350 °C
- **Composition:** DuPont VESPEL SP-211 (75% polyimide, 15% graphite, 10% PTFE)
- **Characteristics:** Conforms easily to capillary column, ensuring an effective seal and less chance of breakage.



Compatible	I.D. (mm)	Cat. No.	Qty
Supeltex® M-2B Double-Tapered Ferrule			
0.10-0.25 mm to like I.D. Column	0.4	22453	2 ea
0.32 mm to like I.D. Column	0.5	22454	2 ea
0.53 mm to like I.D. Column	0.8	22591	2 ea
0.10-0.25 mm I.D. to 0.53 mm I.D. Column	0.4-0.8	22455-U	2 ea
0.32 mm I.D. to 0.53 mm I.D. Column	0.5-0.8	22586	2 ea
0.32 mm I.D. to 0.75 mm I.D. Column	0.5-1.2	22456	2 ea

Capillary Column Butt Connector Nut

Replacement nut for the Capillary Column Butt Connector.

	Cat. No.	Qty
Capillary Column Butt Connector Nut		
1/16 in. male hexagonal wrenchtight	23805	4 ea
1/16 in. male knurled fingertight	23812	2 ea

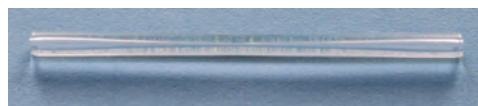
GlasSeal™ Capillary Column Connectors

GlasSeal™ connectors are inexpensive, easy-to-use, and silanized for an inert inside surface.

- Straight connectors connect two pieces of fused silica tubing of the same or different diameters without the need for tools. The leak-free connection is useful to connect a guard column or transfer line, repair a broken column, or connect two columns (same or different phases).
- "Y" connectors connect three pieces of fused silica tubing of the same or different diameters without the need for tools. The leak-free connection is useful to split a sample to two columns, or to split a column effluent to two detectors.

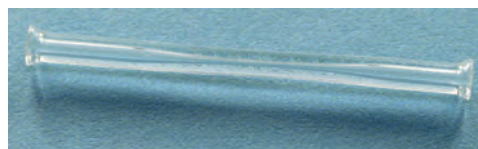
For use with 0.10 - 0.53 mm I.D. fused silica tubing.

GlasSeal™ Capillary Column Connector, Fused Silica



Cat. No.	Qty
23627	5 ea
23628	25 ea

GlasSeal™ Capillary Column Connector, Borosilicate Glass



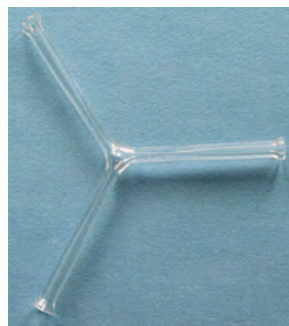
Cat. No.	Qty
20479	12 ea

"Y" GlasSeal™ Connector, Fused Silica



Cat. No.	Qty
23631	1 ea
23632	3 ea

"Y" GlasSeal™ Connector, Borosilicate Glass



Cat. No.	Qty
20480	1 ea

Polyimide Sealing Resin

A GlasSeal™ connector will form a perfect seal between two fused silica columns. To make this connection extremely durable, use a small drop of this resin. Also for use as an excellent high temperature glue. Cures at 200 °C. For use at 350 °C or lower operating temperatures. The bottle contains 5 g of resin, and includes a handy applicator cap.

Cat. No.	Qty
23817	5 g

Capillary GC Columns and Guard Columns/Retention Gaps

Cross-Reference Chart

Cross-Reference Chart

Cross capillary GC columns from other manufacturers to comparable Supelco columns.

Supelco	Agilent	Grace	Macherey-Nagel	Phenomenex	Restek	SGE	Varian
TRADITIONAL (Phases by increasing phase polarity)							
Petrocol DH Octyl	-	-	-	-	-	-	-
SPB-Octyl	-	-	-	-	-	-	CP-Sil 2 CB
SPB-HAP	-	-	-	-	-	-	-
Petrocol DH 50.2	DB-Petro, HP-PONA	-	-	-	-	BP1 PONA	-
Petrocol DH	DB-Petro	AT-Petro	-	-	Rtx-1PONA	BP1 PONA	CP-Sil PONA CB
Petrocol DH 150	-	-	-	-	-	-	-
Petrocol 2887, Petrocol EX2887	DB-2887	AT-2887	-	-	Rtx-2887	-	CP-SimDist
SPB-1 SULFUR	-	AT-Sulfur	-	-	-	-	CP-Sil 5 CB for Sulfur
Equity-1, SPB-1	DB-1, HP-1	AT-1	Optima-1	ZB-1	Rtx-1	BP1	CP-Sil 5 CB
SLB-5ms	DB-5ms, HP-5ms	AT-5ms	Optima-5 MS	ZB-5ms	Rtx-5Sil MS	BPX5	VF-5ms
MET-Biodiesel	-	-	-	-	MXT-BiodieselTG	-	Select Biodiesel for Triglycerides
HT-5 (aluminum clad)	DB-5ht	-	-	ZB-5ht	-	HT-5	VF-5ht
PTA-5	-	AT-Amine	-	-	Rtx-5 Amine	-	CP-Sil 8 CB for Amines
SAC-5	-	-	-	-	-	-	-
Equity-5, SPB-5	DB-5, HP-5	AT-5	Optima-5	ZB-5	Rtx-5	BP5	CP-Sil 8 CB
SPB-624	DB-624, DB-VRX	AT-624	Optima-624	ZB-624	Rtx-624	BP624	CP-Select 624 CB
OVI-G43	HP-Fast Residual Solvent	-	-	-	Rtx-G43	-	-
VOCOL	DB-502.2, HP-VOC	AT-502.2	-	-	Rtx-502.2, Rtx-Volatiles	-	-
SPB-20	-	AT-20	-	-	Rtx-20	-	-
Equity-1701	DB-1701	AT-1701	Optima-1701	ZB-1701	Rtx-1701	BP10	CP-Sil 19 CB
SPB-608	DB-608	AT-Pesticide	-	-	-	-	-
Sup-Herb	-	-	-	-	-	-	-
SPB-35	DB-35, HP-35	AT-35	-	ZB-35	Rtx-35	-	-
SPB-50	DB-17, HP-50	AT-50	Optima-17	ZB-50	-	-	CP-Sil 24 CB
SPB-225	DB-225	AT-225	Optima-225	-	Rtx-225	BP225	CP-Sil 43 CB
SPB-PUFA	-	-	-	-	-	-	-
PAG	-	-	-	-	-	-	-
SPB-1000, Nukol	DB-FFAP, HP-FFAP	AT-1000, AT-AquaWax-DA	Optima-FFAP	ZB-FFAP	Stabilwax-DA	BP21	CP-FFAP CB
Carbowax Amine	CAM	AT-CAM	-	-	Stabilwax-DB	-	CP-Wax 51 for Amines
Omegawax	-	AT-FAME	-	-	FAMEWAX	-	-
SUPELCOWAX 10	DB-WAX	AT-WAX, AT-AquaWax	Optima-WAX	ZB-WAX	Rtx-WAX, Stabilwax	BP20	CP-Wax 52 CB
SLB-IL59	-	-	-	-	-	-	-
SLB-IL61	-	-	-	-	-	-	-
SP-2330	HP-88	-	-	-	Rtx-2330	-	-
SLB-IL76	-	-	-	-	-	-	-
SP-2331	DB-Dioxin	-	-	-	Rtx-Dioxin2	-	CP-Sil 88 for Dioxins
SP-2380	-	AT-Silar 90	-	-	-	-	-
SP-2560	-	-	-	-	Rt-2560	-	CP-Sil 88 for FAME
SP-2340	-	AT-Silar 100	-	-	-	-	CP-Sil 88
SLB-IL82	-	-	-	-	-	-	-
TCEP	-	-	-	-	Rt-TCEP	-	CP-TCEP
SLB-IL100	-	-	-	-	-	-	-
SLB-IL111	-	-	-	-	-	-	-
CHIRAL Phases							
Astec CHIRALDEX	-	-	-	-	-	-	-
α-DEX	-	-	FS-LIPODEX	-	-	-	-
β-DEX	CycloSil-B	-	FS-LIPODEX, FS-HYDRODEX	-	Rt-bDEX	CYDEX-B	-
γ-DEX	-	-	FS-LIPODEX	-	Rt-gDEX	-	-
PLOT Columns							
Carboxen-1010 PLOT	-	-	-	-	-	-	CP-CarboPLOT P7
Carboxen-1006 PLOT	GS-Carbon PLOT	Carbograph VOC	-	-	-	-	CP-CarboBOND
Supel-Q PLOT	HP-PLOT Q	AT-Q	-	-	Rt-QPLOT	-	CP-PoraPLOT Q

Capillary GC Columns and Guard Columns/Retention Gaps

Cross-Reference Chart

Supelco	Agilent	Grace	Macherey-Nagel	Phenomenex	Restek	SGE	Varian
Alumina sulfate PLOT	HP-PLOT Al ₂ O ₃ "S"	-	-	-	-	-	CP-Al ₂ O ₃ PLOT Na ₂ SO ₄
Alumina chloride PLOT	HP-PLOT Al ₂ O ₃ "KCl"	-	-	-	-	-	CP-Al ₂ O ₃ PLOT KCl
Mol Sieve 5A PLOT	HP-PLOT Molesieve	AT-Mole Sieve	-	-	Rt-Msieve 5A	-	CP-Molsieve 5A
SCOT Columns							
SCOT Columns	-	-	-	-	-	-	-

Packed GC Columns and Components



Supelco has manufactured packed GC columns and components (empty columns, ready-to-use packings, high-purity stationary phases, and stable supports) since 1966. Our unsurpassed knowledge of packed GC, and our unrivaled product offering, is why Supelco Analytical is the world's leading supplier of packed GC columns and components.

Packed Columns

We offer a wide selection of packed GC columns with popular packings. These columns are configured to fit many commonly used instruments and are ready-to-install.

- Use **glass** columns for applications where high inertness is required, such as for the analysis of active analytes. All glass columns undergo a proprietary high temperature silanization to ensure inertness.
- More economical **metal** columns should be used for less demanding applications where the inertness of glass is not required.
- For low temperature applications, **PTFE** columns offer the flexibility of metal with inertness approaching that of glass.

TightSpec columns conform to within +/-6 mm of their stated lengths. Other columns conform to within 1.5% of instrument manufacturers' length specifications.

Custom Capabilities: The products listed here are only those that are stock items. We have the ability to manufacture many, many more products. If you do not see the item you need, please contact Technical Service at 800-359-3041 (US and Canada), 814-359-3041, or techservice@sial.com

For Agilent® GCs

These columns fit Agilent 5890 and 6890.

Glass Packed GC Column (fits Agilent, Configuration "A")

Use a glass column for applications where high inertness is required, such as for the analysis of active analytes. All glass columns undergo a proprietary high temperature silanization to ensure inertness. This column fits Agilent 5890 and 6890 (configuration A, on-column injection, all detectors except TCD).
glass column

Phase	Support	L x O.D. x I.D.	Cat. No.	Pkg
4% Carbowax 20M + 0.8% KOH	60/80 Carbopack B	6.0 ft (1.8 m) x 1/4 in. x 2.0 mm	26030-U	1 ea
4% Carbowax 20M + 0.8% KOH	60/80 Carbopack C	6.6 ft (2.0 m) x 1/4 in. x 2.0 mm (TightSpec)	26021	1 ea
4% Carbowax 20M	80/120 Carbopack B DA	6.0 ft (1.8 m) x 1/4 in. x 2.0 mm	25936	1 ea
4% Carbowax 20M	80/120 Carbopack B DA	6.6 ft (2.0 m) x 1/4 in. x 2.0 mm (TightSpec)	23110-U	1 ea
5% Carbowax 20M	60/80 Carbopack B	6.0 ft (1.8 m) x 1/4 in. x 2.0 mm	26048	1 ea
5% Carbowax 20M	60/80 Carbopack B	6.6 ft (2.0 m) x 1/4 in. x 2.0 mm (TightSpec)	26039	1 ea
5% Carbowax 20M	80/100 Chromosorb W HP	6.0 ft (1.8 m) x 1/4 in. x 2.0 mm	13090-U	1 ea
5% Carbowax 20M	80/120 Carbopack B AW	6.0 ft (1.8 m) x 1/4 in. x 2.0 mm	25953	1 ea

Packed GC Columns and Components

Packed Columns: For Agilent® GCs

Glass Packed GC Column (fits Agilent, Configuration "A") (continued)

Phase	Support	L × O.D. × I.D.	Cat. No.	Pkg
5% Carbowax 20M	80/120 Carbowax B AW	6.6 ft (2.0 m) × ¼ in. × 2.0 mm (TightSpec)	25945	1 ea
5% Carbowax 20M	100/120 Chromosorb W HP	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13091-U	1 ea
10% Carbowax 20M	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13088-U	1 ea
10% Carbowax 20M	100/120 Chromosorb W HP	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13089-U	1 ea
20% Carbowax 20M	100/120 Chromosorb W AW	6.6 ft (2.0 m) × ¼ in. × 4.0 mm (Preconditioned)	12474-U	1 ea
10% FFAP + 1% H ₃ PO ₄	100/120 Chromosorb W AW	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13081-U	1 ea
3% OV-1	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13083-U	1 ea
10% OV-1	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13086-U	1 ea
3% OV-17	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13085-U	1 ea
10% OV-17	100/120 Chromosorb W HP	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13084-U	1 ea
3% OV-101	100/120 Chromosorb W HP	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13087-U	1 ea
1.95% OV-210 + 1.5% OV-17	100/120 Chromosorb W HP	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13079-U	1 ea
0.1% SP-1000	80/100 Carbowax C	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	26012	1 ea
0.1% SP-1000	80/100 Carbowax C	6.6 ft (2.0 m) × ¼ in. × 2.0 mm (TightSpec)	26003	1 ea
1% SP-1000	60/80 Carbowax B	6.6 ft (2.0 m) × ¼ in. × 2.0 mm (TightSpec)	23093	1 ea
1% SP-1000	60/80 Carbowax B	7.9 ft (2.4 m) × ¼ in. × 2.0 mm (TightSpec)	23084	1 ea
1.5% SP-2250 + 1.95% SP-2401	100/120 SUPELCOPORT	6.0 ft (1.8 m) × ¼ in. × 4.0 mm	25965	1 ea
1.5% SP-2250 + 1.95% SP-2401	100/120 SUPELCOPORT	6.6 ft (2.0 m) × ¼ in. × 4.0 mm (TightSpec)	23077	1 ea
0.8% THEED	80/100 Carbowax C	3.3 ft (1.0 m) × ¼ in. × 2.0 mm (TightSpec)	26057	1 ea
none	80/100 Chromosorb 102	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13082-U	1 ea
none	80/100 Porapak P	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13092-U	1 ea
none	80/100 Porapak Q	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13093-U	1 ea
none	80/100 Porapak QS	6.0 ft (1.8 m) × ¼ in. × 2.0 mm	13094-U	1 ea
none	100/120 Porapak S	6.6 ft (2.0 m) × ¼ in. × 4.0 mm (Preconditioned)	12481-U	1 ea

Metal Packed GC Column (fits Agilent, Configuration "A")

An economical metal column should be used for less demanding applications where the inertness of glass is not required. This column fits Agilent 5890 and 6890 (configuration A, on-column injection, all detectors except TCD).

Phase	Support	L × O.D. × I.D.	Column	Cat. No.	Pkg
0.2% Carbowax 1500	80/100 Carbowax C	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	12506-U	1 ea
5% Carbowax 20M	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	13128-U	1 ea
10% Carbowax 20M	80/100 SUPELCOPORT	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	12787-U	1 ea
10% Carbowax 20M	80/100 Chromosorb W AW	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	12785-U	1 ea
10% Carbowax 20M	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	13126-U	1 ea
10% Carbowax 20M	100/120 Chromosorb W HP	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	13127-U	1 ea
25% DC-200 (350 cstk)	80/100 Chromosorb P AW	15.0 ft (4.6 m) × ⅛ in. × 2.1 mm	stainless steel	13039-U	1 ea
35% DC-200 (350 cstk)	80/100 Chromosorb P AW	5.0 ft (1.5 m) × ⅛ in. × 2.1 mm	stainless steel	13044-U	1 ea
35% DC-200 (350 cstk)	80/100 Chromosorb P AW	10.0 ft (3.0 m) × ⅛ in. × 2.1 mm	stainless steel	13064-U	1 ea
35% DC-200 (350 cstk)	80/100 Chromosorb P AW	30.0 ft (9.1 m) × ⅛ in. × 2.1 mm	stainless steel	13072-U	1 ea
35% DC-200 (500 cstk)	80/100 Chromosorb P AW	3.0 ft (0.91 m) × ⅛ in. × 2.1 mm	stainless steel	13019-U	1 ea
5% OV-1	100/120 Chromosorb W HP	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	13107-U	1 ea
10% OV-1	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	13106-U	1 ea
5% OV-17	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	13114-U	1 ea
10% OV-17	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	13109-U	1 ea
3% OV-101	100/120 Chromosorb W HP	1.8 ft (0.55 m) × ¼ in. × 5.3 mm	stainless steel	13095-U	1 ea
10% OV-101	60/80 Chromosorb W HP	2.6 ft (0.79 m) × ⅛ in. × 2.1 mm	stainless steel	13031-U	1 ea
10% OV-101	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	13115-U	1 ea
10% OV-101	100/120 Chromosorb W HP	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	13116-U	1 ea
20% OV-101	80/100 Chromosorb W HP	4.0 ft (1.2 m) × ⅛ in. × 2.1 mm	stainless steel	13035-U	1 ea
5% SE-30	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	13124-U	1 ea
10% SE-30	80/100 Chromosorb W HP	6.0 ft (1.8 m) × ⅛ in. × 2.1 mm	stainless steel	13122-U	1 ea
20% Sebaconitrile	80/100 Chromosorb P AW	2.0 ft (0.61 m) × ⅛ in. × 2.1 mm	stainless steel	13014-U	1 ea
20% Sebaconitrile	80/100 Chromosorb P AW	2.0 ft (0.61 m) × ⅛ in. × 2.1 mm	stainless steel	13059-U	1 ea
20% Sebaconitrile	80/100 Chromosorb P AW	30.0 ft (9.1 m) × ⅛ in. × 2.1 mm	stainless steel	13043-U	1 ea

Packed GC Columns and Components

Packed Columns: For Agilent® GCs

Phase	Support	L × O.D. × I.D.	Column	Cat. No.	Pkg
20% Sebaconitrile + 2% H ₃ PO ₄	80/100 Chromosorb P AW	30.0 ft (9.1 m) × 1/8 in. × 2.1 mm	stainless steel	13066-U	1 ea
10% Silar 5 CP	80/100 Chromosorb W HP	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13121-U	1 ea
0.1% SP-1000	80/100 Carbo-pack C	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12500-U	1 ea
1% SP-1000	60/80 Carbo-pack B	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12487	1 ea
1% SP-1000	60/80 Carbo-pack B	8.0 ft (2.4 m) × 1/8 in. × 2.1 mm	stainless steel	12548-U	1 ea
10% SP-1000	80/100 SUPELCOPORT	20.0 ft (6.1 m) × 1/8 in. × 2.1 mm	stainless steel	12794-U	1 ea
3% SP-1500	80/120 Carbo-pack B	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	12594	1 ea
10% SP-2100	80/100 SUPELCOPORT	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12801-U	1 ea
10% SP-2100	100/120 SUPELCOPORT	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	12803-U	1 ea
20% SP-2100 + 0.1% Carbowax 1500	100/120 SUPELCOPORT	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	12804-U	1 ea
25% SP-2100	80/100 Chromosorb P AW	5.7 ft (1.7 m) × 1/16 in. × 0.75 mm	stainless steel	12995-U	1 ea
10% SP-2330	100/120 Chromosorb W AW	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13776	1 ea
20% TCEP	80/100 Chromosorb P AW	1.8 ft (0.55 m) × 1/16 in. × 0.75 mm	stainless steel	12873	1 ea
20% TCEP	80/100 Chromosorb P AW	15.0 ft (4.6 m) × 1/8 in. × 2.1 mm	stainless steel	13034-U	1 ea
10% UCW-98	80/100 Chromosorb P AW	1.7 ft (0.52 m) × 1/8 in. × 2.1 mm	stainless steel	13041-U	1 ea
12% UCW-98	80/100 Chromosorb P AW	2.0 ft (0.61 m) × 1/8 in. × 2.1 mm	stainless steel	13049-U	1 ea
none	40/60 Carboxen-1000	5.0 ft (1.5 m) × 1/8 in. × 2.1 mm	stainless steel	12382	1 ea
none	60/80 Carboxen-1000	15.0 ft (4.6 m) × 1/8 in. × 2.1 mm	stainless steel	12392-U	1 ea
none	80/100 Carboxen-1004	6.6 ft (2.0 m) × 1/16 in. × 0.75 mm	stainless steel	12846	1 ea
none	60/80 Chromosorb P AW	3.0 ft (0.91 m) × 1/8 in. × 2.1 mm	stainless steel	13068-U	1 ea
none	80/100 Hayesep A	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13105-U	1 ea
none	80/100 Hayesep D	6.6 ft (2.0 m) × 1/16 in. × 0.75 mm	stainless steel	12921-U	1 ea
none	80/100 Hayesep N	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13144-U	1 ea
none	80/100 Hayesep N	8.0 ft (2.4 m) × 1/8 in. × 2.1 mm	stainless steel	13067-U	1 ea
none	80/100 Hayesep N	20.0 ft (6.1 m) × 1/8 in. × 2.1 mm	stainless steel	13021-U	1 ea
none	80/100 Hayesep Q	1.7 ft (0.52 m) × 1/8 in. × 2.1 mm (Both ends packed full)	stainless steel	14066-U	1 ea
none	80/100 Hayesep Q	3.0 ft (0.91 m) × 1/8 in. × 2.1 mm	nickel	13018-U	1 ea
none	80/100 Hayesep Q	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13803-U	1 ea
none	80/100 Hayesep Q	6.6 ft (2.0 m) × 1/16 in. × 0.75 mm	stainless steel	12879	1 ea
none	80/100 Hayesep Q	9.0 ft (2.7 m) × 1/8 in. × 2.1 mm	stainless steel	13073-U	1 ea
none	80/100 Hayesep Q	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	13038-U	1 ea
none	45/60 Molecular Sieve 5A	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13130-U	1 ea
none	45/60 Molecular Sieve 5A	9.0 ft (2.7 m) × 1/8 in. × 2.1 mm	stainless steel	13074-U	1 ea
none	60/80 Molecular Sieve 5A	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13133-U	1 ea
none	60/80 Molecular Sieve 5A	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	13832	1 ea
none	80/100 Molecular Sieve 5A	6.6 ft (2.0 m) × 1/16 in. × 0.75 mm	stainless steel	12963-U	1 ea
none	100/120 Molecular Sieve 5A	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12484-U	1 ea
none	45/60 Molecular Sieve 13X	2.0 ft (0.61 m) × 1/8 in. × 2.1 mm	stainless steel	13069-U	1 ea
none	45/60 Molecular Sieve 13X	3.0 ft (0.91 m) × 1/8 in. × 2.1 mm	stainless steel	13047-U	1 ea
none	45/60 Molecular Sieve 13X	4.0 ft (1.2 m) × 1/8 in. × 2.1 mm	stainless steel	13061-U	1 ea
none	45/60 Molecular Sieve 13X	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13134-U	1 ea
none	45/60 Molecular Sieve 13X	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	13036-U	1 ea
none	60/80 Molecular Sieve 13X	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13136-U	1 ea
none	80/100 Porapak N	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13063-U	1 ea
none	80/100 Porapak N	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13141-U	1 ea
none	80/100 Porapak N	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	13052-U	1 ea
none	80/100 Porapak P	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13146-U	1 ea
none	50/80 Porapak Q	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13232-U	1 ea
none	50/80 Porapak Q	8.0 ft (2.4 m) × 1/8 in. × 2.1 mm	stainless steel	13247-U	1 ea
none	80/100 Porapak Q	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12792-U	1 ea
none	80/100 Porapak Q	9.0 ft (2.7 m) × 1/8 in. × 2.1 mm	stainless steel	13016-U	1 ea
none	80/100 Porapak QS	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13789	1 ea
none	80/100 Porapak R	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13156-U	1 ea
none	80/100 Porapak S	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13161-U	1 ea
none	80/100 Porapak T	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13163-U	1 ea
none	60/80 Tenax TA	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12554	1 ea

Packed GC Columns and Components

Packed Columns: For Agilent® GCs

Glass Packed GC Column (fits Agilent, Configuration "C")

Use a glass column for applications where high inertness is required, such as for the analysis of active analytes. All glass columns undergo a proprietary high temperature silanization to ensure inertness. This column fits Agilent 5890 and 6890 (configuration C, not-on-column injection, all detectors except TCD).

Phase	Support	L × O.D. × I.D.	Cat. No.	Pkg
10% Carbowax 20M	100/120 SUPELCOPORT	6.6 ft (2.0 m) × 1/4 in. × 2.0 mm (Preconditioned)	12478-U	1 ea
none	50/80 Porapak Q	6.6 ft (2.0 m) × 1/4 in. × 2.0 mm (Preconditioned)	12483-U	1 ea

Metal Packed GC Column (fits Agilent, Configuration "C")

An economical metal column should be used for less demanding applications where the inertness of glass is not required. This column fits Agilent 5890 and 6890 (configuration C, not-on-column injection, all detectors except TCD).

Phase	Support	L × O.D. × I.D.	Column	Cat. No.	Pkg
none	80/100 HayeSep Q	3.0 ft (0.91 m) × 1/8 in. × 2.1 mm	stainless steel	14068-U	1 ea
none	80/100 HayeSep Q	3.0 ft (0.91 m) × 1/8 in. × 2.1 mm	nickel	14069-U	1 ea
none	60/80 Molecular Sieve 5A	8.0 ft (2.4 m) × 1/8 in. × 2.1 mm	stainless steel	14067-U	1 ea
none	80/100 Porapak Q	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel (Preconditioned)	14065-U	1 ea

For PerkinElmer® GCs

These columns fit PerkinElmer 8000, 9000, AutoSystem, XL, and Clarus 500 (Not On-Column Injection).

Glass Packed GC Column (fits PerkinElmer®)

Use a glass column for applications where high inertness is required, such as for the analysis of active analytes. All glass columns undergo a proprietary high temperature silanization to ensure inertness. This column fits PerkinElmer 8000, 9000, AutoSystem, XL, and Clarus 500 (Not On-Column Injection).

Phase	Support	L × O.D. × I.D.	Cat. No.	Pkg
4% Carbowax 20M + 0.8% KOH	60/80 Carbowax B	6.0 ft (1.8 m) × 1/4 in. × 2.0 mm	26033-U	1 ea
4% Carbowax 20M + 0.8% KOH	60/80 Carbowax B	6.6 ft (2.0 m) × 1/4 in. × 2.0 mm (TightSpec)	26024	1 ea
4% Carbowax 20M	80/120 Carbowax B DA	6.6 ft (2.0 m) × 1/4 in. × 2.0 mm (TightSpec)	25931-U	1 ea
5% Carbowax 20M	60/80 Carbowax B	6.0 ft (1.8 m) × 1/4 in. × 2.0 mm	26051	1 ea
5% Carbowax 20M	80/120 Carbowax B AW	6.6 ft (2.0 m) × 1/4 in. × 2.0 mm (TightSpec)	25947	1 ea

Metal Packed GC Column (fits PerkinElmer®)

An economical metal column should be used for less demanding applications where the inertness of glass is not required. This column fits PerkinElmer 8000, 9000, AutoSystem, XL, and Clarus 500 (Not On-Column Injection).

Phase	Support	L × O.D. × I.D.	Column	Cat. No.	Pkg
0.2% Carbowax 1500	80/100 Carbowax C	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13738-U	1 ea
10% Carbowax 20M	80/100 SUPELCOPORT	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13748-U	1 ea
10% Carbowax 20M	80/100 Chromosorb W AW	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13746-U	1 ea
0.1% SP-1000	80/120 Carbowax C	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13736-U	1 ea
1% SP-1000	60/80 Carbowax B	8.0 ft (2.4 m) × 1/8 in. × 2.1 mm	stainless steel	13730-U	1 ea
3% SP-1500	80/120 Carbowax B	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	13734-U	1 ea
10% SP-2100	100/120 SUPELCOPORT	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13769	1 ea
10% SP-2330	100/120 Chromosorb W AW	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13778	1 ea
none	60/80 Carboxen-1000	15.0 ft (4.6 m) × 1/8 in. × 2.1 mm	stainless steel	13744-U	1 ea
none	80/100 Porapak Q	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13785	1 ea

Packed GC Columns and Components

Packed Columns: For Varian® GCs

For Varian® GCs

These columns fit Varian 3000, 4000, 6000, and Vista (FID, inj A to det A).

Glass Packed GC Column (fits Varian®)

Use a glass column for applications where high inertness is required, such as for the analysis of active analytes. All glass columns undergo a proprietary high temperature silanization to ensure inertness. This column fits Varian 3000, 4000, 6000, and Vista (FID, inj A to det A).

Phase	Support	L × O.D. × I.D.	Cat. No.	Pkg
4% Carbowax 20M	80/120 Carbopack B DA	6.0 ft (1.8 m) × 1/8 in. × 2.0 mm	25942	1 ea
3% SP-2100	100/120 SUPELCOPORT	6.0 ft (1.8 m) × 1/4 in. × 2.0 mm	23858	1 ea

Metal Packed GC Column (fits Varian®)

An economical metal column should be used for less demanding applications where the inertness of glass is not required. This column fits Varian 3000, 4000, 6000, and Vista (FID, inj A to det A).

Phase	Support	L × O.D. × I.D.	Column	Cat. No.	Pkg
10% Carbowax 20M	80/100 SUPELCOPORT	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12768	1 ea
10% Carbowax 20M	80/100 Chromosorb W AW	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12456	1 ea
1% SP-1000	60/80 Carbopack B	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12489	1 ea
1% SP-1000	60/80 Carbopack B	8.0 ft (2.4 m) × 1/8 in. × 2.1 mm	stainless steel	12545-U	1 ea
3% SP-1500	80/120 Carbopack B	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	12596	1 ea
10% SP-2100	100/120 SUPELCOPORT	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12771	1 ea
none	40/60 Carboxen-1000	5.0 ft (1.5 m) × 1/8 in. × 2.1 mm	stainless steel	12384	1 ea
none	60/80 Carboxen-1000	15.0 ft (4.6 m) × 1/8 in. × 2.1 mm	stainless steel	12394	1 ea
none	80/100 Porapak Q	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12469	1 ea

General Configuration

These columns are general configuration, and can be carefully bent to fit most instruments.

Metal Packed GC Column (General Configuration)

An economical metal column should be used for less demanding applications where the inertness of glass is not required. This column is of a general configuration, and can be carefully bent to fit most instruments.

Phase	Support	L × O.D. × I.D.	Column	Cat. No.	Pkg
0.2% Carbowax 1500	60/80 Carbopack C	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13860-U	1 ea
0.2% Carbowax 1500	80/100 Carbopack C	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12501-U	1 ea
5% Carbowax 20M	60/80 Carbopack B	3.0 ft (0.91 m) × 1/16 in. × 1.25 mm (Preconditioned)	stainless steel	12087-U	1 ea
10% Carbowax 20M	80/100 SUPELCOPORT	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12713	1 ea
10% Carbowax 20M	80/100 Chromosorb W AW	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12212	1 ea
1.2% DC-200 (500 cstks)	80/100 Chromosorb P NAW	1.7 ft (0.52 m) × 1/8 in. × 2.1 mm	stainless steel	13978-U	1 ea
1.2% DC-200 (500 cstks)	80/100 Chromosorb P NAW	2.5 ft (0.76 m) × 1/8 in. × 2.1 mm	stainless steel	13986-U	1 ea
30% DC-200 (500 cstks)	80/100 Chromosorb P NAW	1.3 ft (0.40 m) × 1/8 in. × 2.1 mm	stainless steel	13984-U	1 ea
30% DC-200 (500 cstks)	80/100 Chromosorb P NAW	1.5 ft (0.46 m) × 1/8 in. × 2.1 mm	stainless steel	13976-U	1 ea
30% DC-200 (500 cstks)	80/100 Chromosorb P NAW	24.0 ft (7.3 m) × 1/8 in. × 2.1 mm	stainless steel	13977-U	1 ea
5% Fluorcol	60/80 Graphitized Carbon Black	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	SP alloy	12425	1 ea
5% Krytox 143AC	60/80 Carbopack B	20.0 ft (6.1 m) × 1/8 in. × 1.7 mm	copper	13271-U	1 ea
5% Krytox 143AC	60/80 Carbopack B	40.0 ft (12.2 m) × 1/8 in. × 1.7 mm	copper	13273-U	1 ea
30% Krytox 143AC	60/80 Chromosorb P NAW	20.0 ft (6.1 m) × 1/8 in. × 1.7 mm	copper	13274-U	1 ea
30% Krytox 143AC	60/80 Chromosorb P NAW	40.0 ft (12.2 m) × 1/8 in. × 1.7 mm	copper	13277-U	1 ea
3% OV-17	80/100 SUPELCOPORT	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12210	1 ea
3% Petrocol B	80/100 SUPELCOPORT	1.7 ft (0.52 m) × 1/8 in. × 2.1 mm	stainless steel	12449	1 ea
10% Petrocol C	80/100 SUPELCOPORT	1.7 ft (0.52 m) × 1/8 in. × 2.1 mm	stainless steel	12455	1 ea
0.1% SP-1000	80/100 Carbopack C	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12495-U	1 ea
1% SP-1000	60/80 Carbopack B	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12485-U	1 ea
1% SP-1000	60/80 Carbopack B	8.0 ft (2.4 m) × 1/8 in. × 2.1 mm	stainless steel	12543-U	1 ea
10% SP-1000	80/100 SUPELCOPORT	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	12537-U	1 ea
10% SP-1000	80/100 SUPELCOPORT	20.0 ft (6.1 m) × 1/8 in. × 2.1 mm	stainless steel	12719	1 ea
3% SP-1500	80/120 Carbopack B	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	12592	1 ea
23% SP-1700	80/100 Chromosorb P AW	30.0 ft (9.1 m) × 1/8 in. × 2.1 mm	stainless steel	12809-U	1 ea
10% SP-2100	80/100 SUPELCOPORT	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12429	1 ea
10% SP-2100	80/100 SUPELCOPORT	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	13766-U	1 ea

Packed GC Columns and Components

Packed Columns: *General Configuration*

Metal Packed GC Column (General Configuration) (continued)

Phase	Support	L × O.D. × I.D.	Column	Cat. No.	Pkg
10% SP-2100	100/120 SUPELCOPORT	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	12717	1 ea
20% SP-2100 + 1% Carbowax 1500	100/120 SUPELCOPORT	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	12718-U	10 ft
none	40/60 Carboxen-1000	2.0 ft (0.61 m) × 1/8 in. × 2.1 mm	stainless steel	12370-U	1 ea
none	40/60 Carboxen-1000	5.0 ft (1.5 m) × 1/8 in. × 2.1 mm	stainless steel	12380	1 ea
none	60/80 Carboxen-1000	15.0 ft (4.6 m) × 1/8 in. × 2.1 mm	stainless steel	12390-U	1 ea
none	80/100 Carboxen-1004	6.6 ft (2.0 m) × 1/16 in. × 0.75 mm	stainless steel	12854	1 ea
none	80/100 Chromosorb 102	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13794	1 ea
none	80/100 HaySep D	6.6 ft (2.0 m) × 1/16 in. × 0.75 mm	stainless steel	12917	1 ea
none	80/100 HaySep Q	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13801	1 ea
none	80/100 HaySep Q	6.6 ft (2.0 m) × 1/16 in. × 0.75 mm	stainless steel	12875	1 ea
none	80/100 HaySep R	3.0 ft (0.91 m) × 1/16 in. × 1.25 mm (Preconditioned)	stainless steel	12085-U	1 ea
none	80/100 HaySep R	6.0 ft (1.8 m) × 1/16 in. × 1.25 mm (Preconditioned)	stainless steel	12086-U	1 ea
none	60/80 Molecular Sieve 5A	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13823	1 ea
none	60/80 Molecular Sieve 5A	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	13830-U	1 ea
none	80/100 Molecular Sieve 5A	4.9 ft (1.5 m) × 1/16 in. × 1.25 mm	stainless steel	13166-U	1 ea
none	80/100 Molecular Sieve 5A	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13837	1 ea
none	80/100 Molecular Sieve 5A	6.6 ft (2.0 m) × 1/16 in. × 0.75 mm	stainless steel	12959-U	1 ea
none	45/60 Molecular Sieve 13X	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	13981-U	1 ea
none	80/100 Porapak Q	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13037-U	1 ea
none	80/100 Porapak Q	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	12437	1 ea
none	80/100 Porapak Q	10.0 ft (3.0 m) × 1/8 in. × 2.1 mm	stainless steel	13979-U	1 ea
none	80/100 Porapak QS	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	stainless steel	13787	1 ea

PTFE Packed GC Column (General Configuration)

For low temperature applications, a PTFE column offers the flexibility of metal with inertness approaching that of glass. This column is of a general configuration, and can be carefully bent to fit most instruments.

Phase	Support	L × O.D. × I.D.	Cat. No.	Pkg
12% Polyphenyl ether + 0.5% H ₃ PO ₄	40/60 Chromosorb T	36.0 ft (11.0 m) × 1/8 in. × 2.1 mm	11500	1 ea
none	Chromosil 310	8.0 ft (2.4 m) × 1/8 in. × 2.1 mm (Ends empty; middle 6 ft packed)	11501-U	1 ea
none	Chromosil 330	8.0 ft (2.4 m) × 1/8 in. × 2.1 mm (Ends empty; middle 6 ft packed)	11496	1 ea
none	80/100 Porapak QS	6.0 ft (1.8 m) × 1/8 in. × 2.1 mm	13071-U	1 ea
none	Supelpak S	2.5 ft (0.76 m) × 1/8 in. × 2.1 mm (Ends empty; middle 1.5 ft packed)	12255-U	1 ea

Column Sets

These column sets are specifically designed for specific column switching applications. Column manufacturing procedures have been optimized resulting in column sets that provide highly reproducible analyses.

Packed GC Column Set

Description	Suitability	Cat. No.	Qty
Packed GC Column Set	GPA 2177 (3-column set) Supelco 13984-U Supelco 13977-U	Supelco 13986-U	1 set
Packed GC Column Set	GPA 2261 (3-column set) Supelco 13976-U Supelco 13977-U	Supelco 13978-U	1 set
Packed GC Column Set	GPA 2261 (3-column set, pretested) Supelco 13976-U Supelco 13977-U	Supelco 13978-U	1 set
Packed GC Column Set	GPA 2261 (5-column set) Supelco 13976-U Supelco 13977-U Supelco 13978-U	Supelco 13981-U Supelco 13979-U	1 set

Packed GC Columns and Components

PureCol Sleeves for Packed GC Columns

PureCol Sleeves for Packed GC Columns

When nonvolatiles accumulate in the column inlet, you must replace several inches of packing - or the entire column. A silanized glass PureCol sleeve, inserted in the column inlet, solves this problem simply and inexpensively. When column performance begins to deteriorate, you can quickly and conveniently replace the sleeve - often without removing the column from the instrument. Replacement time is comparable to replacing a septum. Replace the PureCol sleeve when you change the septum, or when you analyze a new type of sample. PureCol sleeves are available in two sizes. The larger size fits any 4 mm I.D. glass column that has 7 cm of straight, unpacked inlet. The smaller size fits any 2 mm I.D. glass columns with 7 cm of straight, unpacked inlet (end must be chamfered). Use PureCol sleeves with a 2 in. (5 cm) 21-gauge or finer needle.

PureCol Sleeve



Description	Cat. No.	Qty
PureCol Sleeve, for 4 mm I.D. columns	20540-U	10 ea
	20543	50 ea
PureCol Sleeve, for 2 mm I.D. columns (chamfered inlet only)	20534	10 ea
	20536	50 ea

Inlet Liners for Packed GC (Not On-Column)

These deactivated (silanized) glass liners prevent reaction between active sample components and the metal surfaces inside the injection port.

Inlet Liner, for Packed GC (unpacked)

Deactivated (silanized) glass inlet liner for packed injection ports.

- Fits Agilent (5890, 6890, and 7890)

L × O.D. × I.D. 91.5 mm × 3.0 mm × 1.8 mm



Cat. No.	Qty
20508	5 ea
20511	25 ea

Inlet Liner, for Packed GC (wool packed)

Deactivated (silanized) glass inlet liner for packed injection ports.

- Fits PerkinElmer (AutoSystem)

L × O.D. × I.D. 112 mm × 6.0 mm × 3.0 mm



Cat. No.	Qty
2631705	5 ea
2631725	25 ea

Inlet Liner, for Packed GC (unpacked)

Deactivated (silanized) glass inlet liner for packed injection ports.

- Fits PerkinElmer (AutoSystem)

L × O.D. × I.D. 112 mm × 6.0 mm × 3.0 mm



Cat. No.	Qty
2631605	5 ea
2631625	25 ea

Empty Columns

To make your own column, first choose an empty column that fits your system. Both glass and stainless steel columns are offered.

Custom Capabilities: The products listed here are only those that are stock items. We have the ability to manufacture many, many more products. If you do not see the item you need, please contact Technical Service at 800-359-3041 (US and Canada), 814-359-3041, or techservice@sial.com

Empty Glass Columns

All empty glass columns are made in our in-house glass shop, thereby controlling quality at a high level. Over 500 column configurations are currently on hand. All glass columns also undergo a proprietary high temperature silanization to ensure inertness. Fittings are not included.

TightSpec columns conform to within +/-6 mm of their stated lengths. Other columns conform to within 1.5% of instrument manufacturers' length specifications.

Empty Glass GC Column, for Agilent® 5700 (Configuration "5")

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 8.72 in. (221 mm)
- Y (length of detector arm) = 5.18 in. (132 mm)
- S (span, injector to detector) = 6.0 in. (152 mm)

This column fits Agilent 5700 (configuration 5, on-column injection).

L × O.D. × I.D.	Cat. No.	Qty
6.0 ft (1.8 m) × ¼ in. × 4.0 mm	21637	1 ea

Packed GC Columns and Components

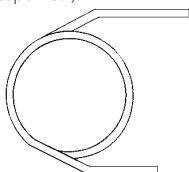
Empty Columns: *Empty Glass Columns*

Empty Glass GC Column, for Agilent® 5890 and 6890 (Configuration "A")

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 11.02 in. (280 mm)
- Y (length of detector arm) = 9.05 in. (230 mm)
- S (span, injector to detector) = 9.0 in. (229 mm)

This column fits Agilent 5890 and 6890 (configuration A, on-column injection, all detectors except TCD).



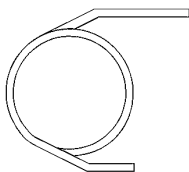
L × O.D. × I.D.	Cat. No.	Qty
2.0 ft (0.61 m) × ¼ in. × 2.0 mm	21638	1 ea
3.0 ft (0.91 m) × ¼ in. × 2.0 mm	21838	1 ea
3.3 ft (1.0 m) × ¼ in. × 2.0 mm (TightSpec)	21203-U	1 ea
4.0 ft (1.2 m) × ¼ in. × 4.0 mm	21839	1 ea
4.0 ft (1.2 m) × ¼ in. × 2.0 mm	21776	1 ea
6.0 ft (1.8 m) × ¼ in. × 4.0 mm	21681	1 ea
6.0 ft (1.8 m) × ¼ in. × 2.0 mm	21641	1 ea
6.6 ft (2.0 m) × ¼ in. × 4.0 mm (TightSpec)	21815	1 ea
6.6 ft (2.0 m) × ¼ in. × 2.0 mm (TightSpec)	21814	1 ea
7.9 ft (2.4 m) × ¼ in. × 2.0 mm (TightSpec)	21816	1 ea
10.0 ft (3.0 m) × ¼ in. × 2.0 mm	21683	1 ea
12.0 ft (3.6 m) × ¼ in. × 2.0 mm	13077-U	1 ea

Empty Glass GC Column, for Agilent® 5890 and 6890 (Configuration "B")

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 11.02 in. (280 mm)
- Y (length of detector arm) = 7.09 in. (180 mm)
- S (span, injector to detector) = 9.0 in. (229 mm)

This column fits Agilent 5890 and 6890 (configuration B, on-column injection, TCD only).



L × O.D. × I.D.	Cat. No.	Qty
6.0 ft (1.8 m) × ¼ in. × 4.0 mm	20500-U	1 ea
6.0 ft (1.8 m) × ¼ in. × 2.0 mm	20613	1 ea
10.0 ft (3.0 m) × ¼ in. × 2.0 mm	21642	1 ea

Empty Glass GC Column, for Carlo Erba 2100

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 11.85 in. (301 mm)
- Y (length of detector arm) = 10.67 in. (271 mm)
- S (span, injector to detector) = 2.82 in. (72 mm)

This column fits Carlo Erba 2100.

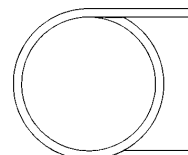
L × O.D. × I.D.	Cat. No.	Qty
6.0 ft (1.8 m) × 6.0 mm × 2.0 mm	20583-U	1 ea

Empty Glass GC Column, for PerkinElmer® 115, 300, 900, 2000, and Sigma (Not On-Column)

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 8.62 in. (219 mm)
- Y (length of detector arm) = 8.62 in. (219 mm)
- S (span, injector to detector) = 8.75 in. (222 mm)

This column fits PerkinElmer 115, 300, 900, 2000, and Sigma (not on-column injection).



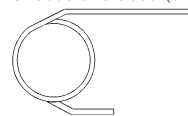
L × O.D. × I.D.	Cat. No.	Qty
4.0 ft (1.2 m) × ¼ in. × 2.0 mm	21842	1 ea
6.0 ft (1.8 m) × ¼ in. × 4.0 mm	21654	1 ea
6.0 ft (1.8 m) × ¼ in. × 2.0 mm	20487	1 ea

Empty Glass GC Column, for PerkinElmer® 8000 and 9000 (On-Column)

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 12.0 in. (305 mm)
- Y (length of detector arm) = 6.81 in. (173 mm)
- S (span, injector to detector) = 6.5 in. (165 mm)

This column fits PerkinElmer 8000 and 9000 (on-column injection).



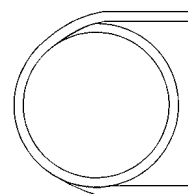
L × O.D. × I.D.	Cat. No.	Qty
3.0 ft (0.91 m) × ¼ in. × 2.0 mm	21739	1 ea

Empty Glass GC Column, for PerkinElmer® 8000, 9000, AutoSystem, XL, and Clarus 500 (Not On-Column)

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 6.81 in. (173 mm)
- Y (length of detector arm) = 6.81 in. (173 mm)
- S (span, injector to detector) = 6.5 in. (165 mm)

This column fits PerkinElmer 8000, 9000, AutoSystem, XL, and Clarus 500 (not on-column injection).



L × O.D. × I.D.	Cat. No.	Qty
6.0 ft (1.8 m) × ¼ in. × 4.0 mm (TightSpec)	21806	1 ea
6.0 ft (1.8 m) × ¼ in. × 2.0 mm	21804	1 ea
6.6 ft (2.0 m) × ¼ in. × 2.0 mm (TightSpec)	21179-U	1 ea

Packed GC Columns and Components

Empty Columns: *Empty Glass Columns***Empty Glass GC Column, for Pye 104, 106, and 204 (On-Column)**

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 11.0 in. (279 mm)
- Y (length of detector arm) = 5.38 in. (137 mm)
- S (span, injector to detector) = 7.0 in. (178 mm)

This column fits Pye 104, 106, and 204 (on-column injection).

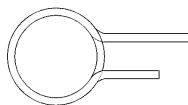
L × O.D. × I.D.	Cat. No.	Qty
6.0 ft (1.8 m) × ¼ in. × 4.0 mm	21792	1 ea

Empty Glass GC Column, for Shimadzu™ 7A, 9A, 12A, 14A, 14B, 15A, 16A, and 2014 (On-Column)

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 13.0 in. (330 mm)
- Y (length of detector arm) = 11.0 in. (279 mm)
- S (span, injector to detector) = 1.57 in. (40 mm)

This column fits Shimadzu 7A, 9A, 12A, 14A, 14B, 15A, 16A, and 2014 (on-column injection).



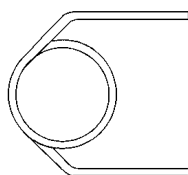
L × O.D. × I.D.	Cat. No.	Qty
3.3 ft (1.0 m) × 5.0 mm × 2.6 mm (TightSpec)	21190-U	1 ea
6.0 ft (1.8 m) × 5.0 mm × 3.0 mm (TightSpec)	21192-U	1 ea
6.0 ft (1.8 m) × 5.0 mm × 3.0 mm	21538	1 ea
6.0 ft (1.8 m) × 5.0 mm × 2.6 mm (TightSpec)	21191-U	1 ea
6.0 ft (1.8 m) × 5.0 mm × 2.6 mm	21879-U	1 ea
8.2 ft (2.5 m) × 5.0 mm × 2.6 mm	21880-U	1 ea

Empty Glass GC Column, for Shimadzu™ 8A and 8A1F

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 9.0 in. (229 mm)
- Y (length of detector arm) = 9.0 in. (229 mm)
- S (span, injector to detector) = 6.0 in. (152 mm)

This column fits Shimadzu 8A and 8A1F.



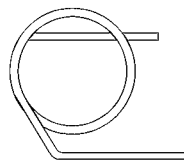
L × O.D. × I.D.	Cat. No.	Qty
4.9 ft (1.5 m) × 5.0 mm × 3.0 mm	21632	1 ea
6.6 ft (2.0 m) × 5.0 mm × 3.0 mm	21633	1 ea

Empty Glass GC Column, for Shimadzu™ Mini-GC (On-Column)

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 7.48 in. (190 mm)
- Y (length of detector arm) = 5.59 in. (142 mm)
- S (span, injector to detector) = 4.72 in. (120 mm)

This column fits Shimadzu mini-GC (on-column injection).



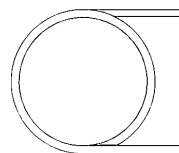
L × O.D. × I.D.	Cat. No.	Qty
6.0 ft (1.8 m) × 5.0 mm × 3.0 mm	20609	1 ea

Empty Glass GC Column, for Tracor 540, 560, 565, 570, and 585 (Not On-Column)

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 8.0 in. (203 mm)
- Y (length of detector arm) = 8.0 in. (203 mm)
- S (span, injector to detector) = 6.0 in. (152 mm)

This column fits Tracor 540, 560, 565, 570, and 585 (not on-column injection).



L × O.D. × I.D.	Cat. No.	Qty
6.0 ft (1.8 m) × ¼ in. × 2.0 mm	21588	1 ea

Empty Glass GC Column, for Varian® 3000, 4000, 6000, and Vista™ (FID, Inj. A to Det. A, On-Column)

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 9.31 in. (236 mm)
- Y (length of detector arm) = 8.0 in. (203 mm)
- S (span, injector to detector) = 5.5 in. (140 mm)

This column fits Varian 3000, 4000, 6000, and Vista (FID, injector A to detector A, on-column injection).



L × O.D. × I.D.	Cat. No.	Qty
3.3 ft (1.0 m) × ¼ in. × 2.0 mm (TightSpec)	21207	1 ea
6.0 ft (1.8 m) × ¼ in. × 4.0 mm	21722	1 ea
6.0 ft (1.8 m) × ¼ in. × 2.0 mm	21721	1 ea
6.6 ft (2.0 m) × ¼ in. × 4.0 mm (TightSpec)	21194-U	1 ea
6.6 ft (2.0 m) × ¼ in. × 2.0 mm (TightSpec)	21181-U	1 ea
6.6 ft (2.0 m) × ¼ in. × 2.0 mm (TightSpec)	21829	1 ea
6.6 ft (2.0 m) × ¼ in. × 2.0 mm	21853-U	1 ea
8.6 ft (2.6 m) × ¼ in. × 2.0 mm	21765	1 ea

Packed GC Columns and Components

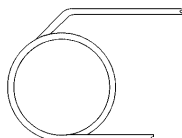
Empty Columns: *Empty Glass Columns*

Empty Glass GC Column, for Varian® 3300 and 3400 (FID, Inj. B to Det. B, On-Column)

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 9.31 in. (236 mm)
- Y (length of detector arm) = 8.0 in. (203 mm)
- S (span, injector to detector) = 6.82 in. (173 mm)

This column fits Varian 3300 and 3400 (FID, injector B to detector B, on-column injection).



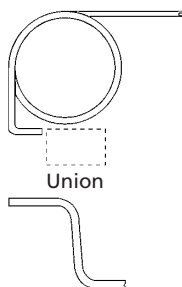
L x O.D. x I.D.	Cat. No.	Qty
6.0 ft (1.8 m) x 1/4 in. x 2.0 mm	20841	1 ea

Empty Glass GC Column, for Varian®, Universal for 3000, 4000, 6000, and Vista™ (On-Column)

Silane treated empty glass column. Fittings are not included.

- X (length of injector arm) = 9.25 in. (235 mm)
- Y (length of detector arm) = 2.0 in. (51 mm)
- S (span, injector to detector) = n/a

This column fits Varian 3000, 4000, 6000, and Vista (on-column injection). The three piece construction (injector arm + coil, union, and detector arm) allows its use in any injector to detector position (A to A, B to B, A to B, and B to A).



L x O.D. x I.D.	Cat. No.	Qty
6.0 ft (1.8 m) x 1/8 in. x 4.0 mm	20847	1 ea
6.0 ft (1.8 m) x 1/4 in. x 2.0 mm	20845	1 ea
6.6 ft (2.0 m) x 1/4 in. x 2.0 mm	21882-U	1 ea

Empty Stainless Steel Columns

For less demanding applications where the inertness of glass is not required, choose more economical stainless steel. Columns can be carefully bent to fit most instruments.

Empty Stainless Steel GC Column

L x O.D. x I.D.	Cat. No.	Qty
6.0 ft (1.8 m) x 1/8 in. x 2.1 mm	13096-U	1 ea
8.0 ft (2.4 m) x 1/8 in. x 2.1 mm	13097-U	1 ea
10.0 ft (3.0 m) x 1/8 in. x 2.1 mm	13098-U	1 ea
12.0 ft (3.6 m) x 1/8 in. x 2.1 mm	13099-U	1 ea
20.0 ft (6.1 m) x 1/8 in. x 2.1 mm	13100-U	1 ea

Packings

We offer small quantities of many ready-to-use packings for those wanting to pack their own columns. Both coated and uncoated packings are available.

Custom Capabilities: The products listed here are only those that are stock items. We have the ability to manufacture many, many more products. If you do not see the item you need, please contact Technical Service at 800-359-3041 (US and Canada), 814-359-3041, or techservice@sial.com

Coated Packings

Coated packings consist of a liquid (gum) stationary phase pre-coated on a solid support. All coated packings are prepared in our in-house manufacturing facility.

Coated GC Packing

Phase	Support	Cat. No.	Qty
0.2% Carbowax 1500	60/80 Carbowax C	11826	15 g
0.2% Carbowax 1500	80/100 Carbowax C	11827	15 g
0.3% Carbowax 20M + 0.1% H ₃ PO ₄	60/80 Carbowax C	11825-U	15 g
4% Carbowax 20M + 0.8% KOH	60/80 Carbowax B	11887	15 g
4% Carbowax 20M	80/120 Carbowax B DA	11889	15 g
5% Carbowax 20M	40/60 Chromosorb T	11993	50 g
5% Carbowax 20M	60/80 Carbowax B	11766	15 g
5% Carbowax 20M	80/120 Carbowax B AW	11812-U	15 g
6.6% Carbowax 20M	80/120 Carbowax B AW	11814	15 g
2.5% Oronite NIW	60/80 Carbowax B	11800-U	15 g
1.5% OV-225 + 1% H ₃ PO ₄	60/80 Carbowax B	1505-U	10 g
0.1% SP-1000	80/100 Carbowax C	11820	15 g
1% SP-1000	60/80 Carbowax B	11815	15 g
3% SP-1500	80/120 Carbowax B	11813-U	15 g
1% SP-1510	60/80 Carbowax B	11809	15 g
0.8% THEED	80/100 Carbowax C	11880-U	15 g

Uncoated Packings

Uncoated packings consist of an adsorbent-type support that does not require a liquid (gum) stationary phase to be coated on it to perform chromatography. We use some of the most commonly used carbon, molecular sieve, and porous polymer adsorbents:

- **Carboxen® Adsorbents:** Carbon molecular sieve materials with through-pore structures, which provides excellent thermodynamic and kinetic properties.
- **Carbosieve® Adsorbents:** Carbon molecular sieve materials with closed-pore structure, which provides very strong retention of small molecules.
- **Molecular Sieve Adsorbents:** Synthetically produced zeolites (naturally occurring aluminosilicate minerals), characterized by pores and internal cavities of extremely uniform dimensions.
- **Tenax Adsorbents:** Widely used porous polymers with unique structures, that provide alternate and desirable adsorption/desorption characteristics compared to other porous polymers.
- **HayeSep Adsorbents:** Second generation porous polymer materials that exhibit minimal shrinkage and monomer bleed.
- **Porapak Adsorbents:** These are first generation porous polymer materials.
- **Chromosorb Adsorbents:** These polyaromatic cross-linked porous polymers have uniform rigid structures. We do not offer Chromosorb adsorbents for sale in bulk. These materials are only available in columns.

Packed GC Columns and Components

Packings: *Uncoated Packings*

Many of these materials are also used as adsorbents in air collection media.

	Cat. No.	Qty
Carboxen® Adsorbent		
matrix Carboxen® 563, 20-45 mesh	10263	10 g
matrix Carboxen® 564, 20-45 mesh	10264	10 g
matrix Carboxen® 564, 20-45 mesh	11324-U	144 x 290 mg
matrix Carboxen® 569, 20-45 mesh	10269	10 g
matrix Carboxen® 569, 20-45 mesh	11048-U	500 g
matrix Carboxen® 572, 20-45 mesh	11072-U	10 g
matrix Carboxen® 1000, 40-60 mesh	10477-U	50 g
matrix Carboxen® 1000, 60-80 mesh	10478-U	10 g
matrix Carboxen® 1003, 40-60 mesh	10471	10 g
matrix Carboxen® 1016, 60-80 mesh	11021-U	10 g
Carbosieve® Adsorbent		
matrix Carbosieve® G, 45-60 mesh	10197	5 g
matrix Carbosieve® G, 60-80 mesh	10198	5 g
matrix Carbosieve® G, 80-100 mesh	10199	5 g
matrix Carbosieve® S-II, 60-80 mesh	10189	10 g
matrix Carbosieve® S-II, 80-100 mesh	10190-U	10 g
matrix Carbosieve® S-III, 60-80 mesh	10184	10 g
Molecular Sieve Adsorbent		
matrix Molecular Sieve 5A, 30-40 mesh	20300	50 g
matrix Molecular Sieve 5A, 45-60 mesh	20301	50 g
matrix Molecular Sieve 5A, 60-80 mesh	20302	50 g
matrix Molecular Sieve 13X, 45-60 mesh	20304	50 g
matrix Molecular Sieve 13X, 60-80 mesh	20305	50 g
matrix Molecular Sieve 13X, 100-120 mesh	20307	50 g
Tenax® Porous Polymer Adsorbent		
matrix Tenax TA, 60-80 mesh	11982	10 g
matrix Tenax TA (refined), 60-80 mesh	12168-U	100 g
matrix Tenax TA, 80-100 mesh	21009-U	10 g
matrix Tenax GR, 20-35 mesh	11049-U	500 g
HayeSep® Porous Polymer Adsorbent		
matrix HayeSep A, 60-80 mesh	10282	75 cc
matrix HayeSep A, 80-100 mesh	10283	75 cc
matrix HayeSep A, 100-120 mesh	10284	75 cc
matrix HayeSep B, 80-100 mesh	10286	75 cc
matrix HayeSep C, 60-80 mesh	10288	75 cc
matrix HayeSep C, 80-100 mesh	10289	75 cc
matrix HayeSep C, 100-120 mesh	10290	75 cc
matrix HayeSep D, 60-80 mesh	10291	75 cc
matrix HayeSep D, 80-100 mesh	10292	75 cc
matrix HayeSep D, 100-120 mesh	10293	75 cc
matrix HayeSep DB, 80-100 mesh	10280-U	75 cc
matrix HayeSep DB, 100-120 mesh	10281-U	75 cc
matrix HayeSep N, 60-80 mesh	10294	75 cc
matrix HayeSep N, 80-100 mesh	10295	75 cc
matrix HayeSep N, 100-120 mesh	10296	75 cc
matrix HayeSep P, 60-80 mesh	10297	75 cc
matrix HayeSep P, 80-100 mesh	10298	75 cc
matrix HayeSep Q, 60-80 mesh	10300-U	75 cc
matrix HayeSep Q, 80-100 mesh	10301-U	75 cc
matrix HayeSep Q, 100-120 mesh	10302-U	75 cc
matrix HayeSep R, 60-80 mesh	10303	75 cc
matrix HayeSep R, 80-100 mesh	10304	75 cc
matrix HayeSep R, 100-120 mesh	10305-U	75 cc
matrix HayeSep S, 60-80 mesh	10306	75 cc
matrix HayeSep S, 80-100 mesh	10307	75 cc

	Cat. No.	Qty
matrix HayeSep T, 60-80 mesh	10309	75 cc
matrix HayeSep T, 80-100 mesh	10310	75 cc
matrix HayeSep T, 100-120 mesh	10311	75 cc
Porapak™ Porous Polymer Adsorbent		
matrix Porapak N, 50-80 mesh	20324	75 cc
matrix Porapak N, 80-100 mesh	20325	75 cc
matrix Porapak N, 100-120 mesh	20326	75 cc
matrix Porapak P, 50-80 mesh	20327	75 cc
matrix Porapak P, 80-100 mesh	20328	75 cc
matrix Porapak P, 100-120 mesh	20329	75 cc
matrix Porapak PS, 50-80 mesh	20345	75 cc
matrix Porapak PS, 80-100 mesh	20346	75 cc
matrix Porapak Q, 50-80 mesh	20330-U	75 cc
matrix Porapak Q, 80-100 mesh	20331	75 cc
matrix Porapak Q, 100-120 mesh	20332	75 cc
matrix Porapak QS, 50-80 mesh	20342	75 cc
matrix Porapak QS, 80-100 mesh	20343	75 cc
matrix Porapak QS, 100-120 mesh	20344	75 cc
matrix Porapak R, 50-80 mesh	20333	75 cc
matrix Porapak R, 80-100 mesh	20334	75 cc
matrix Porapak R, 100-120 mesh	20335	75 cc
matrix Porapak S, 80-100 mesh	20337	75 cc
matrix Porapak S, 100-120 mesh	20338	75 cc
matrix Porapak T, 50-80 mesh	20339	75 cc
matrix Porapak T, 80-100 mesh	20340	75 cc

Stationary Phases

A GC stationary phase is the chemical entity that provides chromatography to occur. Prior to use, a stationary phase must first be coated then dried onto a support, before being used to fill a column. All of the stationary phases we offer are synthesized specifically for GC use, resulting in those that are typically purer, of narrow molecular weight range, and without trace catalysts or impurities.

Custom Capabilities: The products listed here are only those that are stock items. We have the ability to manufacture many, many more products. If you do not see the item you need, please contact Technical Service at 800-359-3041 (US and Canada), 814-359-3041, or techservice@sial.com

GC Stationary Phase

Phase	Cat. No.	Qty
Apiezon L	21006	25 g
Bentone 34	21013-U	50 g
bis(2-Ethoxyethyl)adipate	21146	50 g
Carbowax 1540	21028	50 g
Carbowax 20M	21032	50 g
Carbowax 20M/terephthalic acid	11033-U	50 g
DC-200 (12,500 cstks)	21095	50 g
DC-200	85377-250ML	250 mL
DC-550	21096	50 g
DC-550	85378-50ML	50 mL
DC-710	85427-100ML	100 mL
DC QF-1 (FS 1265)	21098-U	50 g
Di-n-decyl phthalate	21042-U	25 g
Diethylene glycol succinate (DEGS)	11045	25 g
Dinonyl phthalate	80151-25ML	25 mL
Dinonyl phthalate	21052-U	50 g
Ethylene glycol adipate (EGA)	11060	25 g
Free fatty acid phase (FFAP)	21063-U	10 g
OV-1	85380-5G	5 g
OV-1	21104	10 g
OV-17	21105	25 g

Packed GC Columns and Components

Stationary Phases

GC Stationary Phase (continued)

Phase	Cat. No.	Qty
OV-25	21234	10 g
OV-25	85382-10G	10 g
OV-101	21228	20 g
OV-210	21240-U	25 g
OV-225	21241	5 g
OV-275	21278-U	5 g
β,β-Oxydipropionitrile	21086	50 g
Polyethyleneimine	21195-U	50 g
PS 347.5	85392-50ML	50 mL
SE-30	21099-U	10 g
SE-54	21106	50 g
SF-96	21101-U	50 g
SP-1200	21263	10 g
SP-2100	21284-U	10 g
SP-2330	21287-U	5 g
SP-2340	21288	5 g
Squalane	21109	50 g
Synperonic PE/F68	81112-50G	50 g
Synperonic PE/L64	81114-10ML	10 mL
1,2,3-tris(2-Cyanoethoxy)propane (TCEP)	21217	50 g
Triton X-100	21123	50 g
UCW 98	21272-U	50 g

Supports

A GC support is the solid or porous particle that a liquid (gum) stationary phase is coated onto then dried, making a GC packing which can then be used to fill a GC column. We use three types of supports:

- **Carbon:** Our Carbo-pack™ specialty carbon materials make excellent GC supports. Because these materials are synthesized in-house, their physical and chemical characteristics can be controlled more tightly than with natural materials. Carbo-pack™ materials are also widely used as adsorbents in air sampling media.
- **Diatomite:** Sedimentary rock composed of the siliceous skeletal remains of pre-historic single-celled aquatic plants. These naturally-occurring materials must first be mined from deposits then processed for use as GC supports. Versions include NAW (non-acid washed), AW (acid washed), and AW-DMCS (acid washed then silanized). Our SUPELCOPORT supports are similar to Chromosorb W AW-DMCS materials, although more inert. We do not offer diatomite supports for sale in bulk. These materials are only available in columns.
- **Fluorocarbon:** A high molecular weight fluorocarbon resin particle is both inert and has a fairly high surface area. It is useful for lower temperature applications when a highly inert surface is required. We do not offer fluorocarbon supports for sale in bulk. These materials are only available in columns.

Custom Capabilities: The products listed here are only those that are stock items. We have the ability to manufacture many, many more products. If you do not see the item you need, please contact Technical Service at 800-359-3041 (US and Canada), 814-359-3041, or techservice@sial.com

	Cat. No.	Qty
Carbotrap®/Carbo-pack™ Adsorbent		
matrix Carbo-pack B, 60-80 mesh	20273	10 g
matrix Carbo-pack™ C, 60-80 mesh	10257	10 g
matrix Carbo-pack™ C, 80-100 mesh	10258	10 g

GC Column Test Mixes



Test mixes are an inexpensive aid to obtaining high quality chromatograms. They are useful when analyzed:

- After you install a column in your system, to make sure you haven't also installed some surprises (such as ferrule or column fragments in the column, or small leaks). Poor peak shape may be an indication of dead volume from an improper nut/ferrule combination, or an incorrect insertion distance of the column inlet into the injection port.
- During method development, to assist in setting proper linear velocity, split ratio, injection volume, etc.
- Routinely as part of a preventative maintenance regiment. This allows trends in the chromatography to be observed, providing an early warning to keep little problems from growing into big problems.
- For troubleshooting purposes, to help identify root causes, and to verify when the system is back in working order.

GC Column Test Mixes

Methane Standard and Accessories

Methane Standard and Accessories

Methane is the ideal compound to measure linear velocity and dead time for many GC columns because it is unretained. Use 50 µL injections of this dilute methane standard for more accurate flow measurements than will smaller quantities of more concentrated methane.

Description	Cat. No.	Qty
Methane in helium, 100 ppm, analytical standard	307200	14 L
Miniature Regulator with Gauge	513010	1 ea
Syringe Adaptor	609010	1 ea
Hamilton® GASTIGHT® Syringe, 1700 series, volume 250 µL, needle size 22s ga (side-port)	20705	1 ea

General Test Mixes

These test mixes can be used following installation or on a routine schedule to indicate column efficiency, leaks, dead volume, and column inertness.

The **Programmed Test Mix** is based on the comprehensive mix developed by Grob (Grob, et al., *J. Chromatogr.* 156, 1978, p. 1). It can be used to measure a column's affinity for many analyte types:

- The normal alkanes (decane and undecane) measure column efficiency.
- The fatty acid methyl esters (methyl decanoate, methyl laurate, and methyl undecanoate) measure column efficiency.
- The alcohol (1-octanol) and diol (2,3-butanediol) measure the presence of hydrogen-bonding sites (exposed silanols).
- The aldehyde (nonanal) measures saturated aldehyde adsorption by means other than hydrogen-bonding.
- The amine (dicyclohexylamine) measures irreversible adsorption.
- The acid/base pair (2,6-dimethylphenol/2,6-dimethylaniline) measure acid/base surface characteristic.
- The acid/base pair (2-ethylhexanoic acid/dicyclohexylamine) measure acid/base surface characteristic.

Three **Isothermal Test Mixes** are offered. Match the polarity of the test mix with the polarity of the column. A convenient kit containing one of each mix is available.

Use a **Hydrocarbon Test Mix** to check for proper capillary GC column installation. Calculating theoretical plates is also possible.

The **Acidity Test Mix** is used to measure the acid/base affinity of your column. Simply inject this mix and compare peak heights.

Description	Concentration	Cat. No.	Qty
Programmed Test Mix	in methylene chloride (varied conc.) 2,3-Butanediol, 530 µg/mL Decane, 280 µg/mL Dicyclohexylamine, 310 µg/mL 2,6-Dimethylaniline, 320 µg/mL 2,6-Dimethylphenol, 320 µg/mL 2-Ethylhexanoic acid, 380 µg/mL	- 47304	2 mL
	Methyl decanoate, 420 µg/mL Methyl laurate, 410 µg/mL Methyl undecanoate, 420 µg/mL Nonanal, 400 µg/mL 1-Octanol, 360 µg/mL Undecane, 290 µg/mL		
Isothermal Test Mix Kit	- Nonpolar Column Test Mix (Supelco 47300-U) Intermediate Polar Column Test Mix (Supelco 47301)	- 47303	3 × 2 mL
	Polar Column Test Mix (Supelco 47302)		
Nonpolar Column Test Mix	500 µg/mL in methylene chloride Decane 2,6-Dimethylaniline 2,6-Dimethylphenol Dodecane	- 47300-U	2 mL
	1-Octanol 2-Octanone Tridecane Undecane		
Intermediate Polar Column Test Mix	500 µg/mL in methylene chloride Decane 2,6-Dimethylaniline 2,6-Dimethylphenol Dodecane 1-Octanol	- 47301	2 mL
	2-Octanone Tetradecane Tridecane Undecane		
Polar Column Test Mix	500 µg/mL each component in methylene chloride 2,6-Dimethylaniline 2,6-Dimethylphenol Eicosane Heptadecane Hexadecane	- 47302	2 mL
	Octadecane 1-Octanol 2-Octanone Pentadecane		
Hydrocarbon Test Mix	in chloroform (varied conc.) Dodecane Tridecane Tetradecane	- 48244	2 mL
	Pentadecane Hexadecane Heptadecane		

GC Column Test Mixes

General Test Mixes

Description	Concentration		Cat. No.	Qty
C7 - C30 Saturated Alkanes	1000 µg/mL each component in hexane <i>Decane</i> <i>Docosane</i> <i>Dodecane</i> <i>Eicosane</i> <i>Heneicosane</i> <i>Heptacosane</i> <i>Heptadecane</i> <i>Hexacosane</i> <i>Hexadecane</i> <i>Heptane</i> <i>Nonacosane</i> <i>Nonadecane</i>	<i>Nonane</i> <i>Octacosane</i> <i>Octadecane</i> <i>Octane</i> <i>Pentacosane</i> <i>Pentadecane</i> <i>Tetracosane</i> <i>Tetradecane</i> <i>Triacotane</i> <i>Tricosane</i> <i>Tridecane</i> <i>Undecane</i>	- 49451-U	1 mL
C7 - C40 Saturated Alkane Mixture	1000 µg/mL each component in hexane <i>Decane</i> <i>Docosane</i> <i>Dodecane</i> <i>Dotriacontane</i> <i>Eicosane</i> <i>Heneicosane</i> <i>Hentriacontane</i> <i>Heptacosane</i> <i>Heptadecane</i> <i>Heptane</i> <i>Heptatriacontane</i> <i>Hexacosane</i> <i>Hexadecane</i> <i>Hexatriacontane</i> <i>Nonacosane</i> <i>Nonadecane</i> <i>Nonane</i>	<i>Nonatriacontane</i> <i>Octacosane</i> <i>Octadecane</i> <i>Octane</i> <i>Octatriacontane</i> <i>Pentacosane</i> <i>Pentadecane</i> <i>Pentatriacontane</i> <i>Tetracontane</i> <i>Tetracosane</i> <i>Tetradecane</i> <i>Tetraatriacontane</i> <i>Triacotane</i> <i>Tricosane</i> <i>Tridecane</i> <i>Tritriacontane</i> <i>Undecane</i>	- 49452-U	1 mL
Acidity Test Mix	0.05% each component in methylene chloride <i>2,6-Dimethylaniline</i>	<i>2,6-Dimethylphenol</i>	- 48255-U	2 mL

Test Mixes for Specific Applications

These test mixes are designed to measure the ability of a column to perform a specific application. Selectivity, resolution, peak shape, and signal-to-noise ratio can be measured.

Description	Concentration		Cat. No.	Qty
Herbicides Mix 1	100 µg/mL each component in ethyl acetate <i>Atrazine</i> <i>Bromacil</i> <i>Butylate</i> <i>Cycloate</i> <i>S-Ethyl-N,N-dipropylthiocarbamate</i> <i>Hexazinone</i> <i>Isopropalin</i>	<i>Metribuzin</i> <i>Molinat</i> <i>Oxyfluorfen</i> <i>Pebulat</i> <i>Terbacil</i> <i>Trifluralin</i>	- 49136	1 mL
Herbicides Mix 2	100 µg/mL in ethyl acetate <i>Benfluralin</i> <i>Metolachlor</i> <i>Oxadiazon</i> <i>Profluralin</i> <i>Propachlor</i>	<i>Propazine</i> <i>Prowl (Pendimethaline)</i> <i>Simazine</i> <i>Vernolat</i>	- 49138-U	1 mL
ASTM® D2887/D5307 Column Resolution Test Mix	1 % (w/v) each component in octane <i>Hexadecane</i>	<i>Octadecane</i>	- 48889	6 × 1 mL
C4 - C24 Even Carbon Saturated FAMES	1000 µg/mL each component in hexane <i>Methyl arachidate</i> <i>Methyl behenate</i> <i>Methyl butyrate</i> <i>Methyl decanoate</i> <i>Methyl hexanoate</i> <i>Methyl dodecanoate</i>	<i>Methyl lignocerate</i> <i>Methyl myristate</i> <i>Methyl octanoate</i> <i>Methyl palmitate</i> <i>Methyl stearate</i>	- 49453-U	1 mL
C4 - C24 Even Carbon Saturated Fatty Acid Ethyl Esters (FAEES)	1000 µg/mL each component in hexane <i>Ethyl arachidate</i> <i>Ethyl behenate</i> <i>Ethyl butyrate</i> <i>Ethyl caprylate</i> <i>Ethyl decanoate</i> <i>Ethyl dodecanoate</i>	<i>Ethyl hexanoate</i> <i>Ethyl myristate</i> <i>Ethyl palmitate</i> <i>Ethyl stearate</i> <i>Ethyl tetracosanoate</i>	- 49454-U	1 mL
Partially hydrogenated menhaden oil	100 µg/mL in hexane <i>FAMES</i>		- 48473	1 mL

GC Column Test Mixes

Test Mixes for Specific Non-Chiral Columns

Test Mixes for Specific Non-Chiral Columns

These test mixes are designed to measure the performance of specific non-chiral GC columns. Included are some of the same mixes we use in our QA/QC laboratory.

Description	Concentration	Cat. No.	Qty
Equity® / SPB® Thin Film Test Mix I	500 µg/mL each component in cyclohexane <i>Cetyl alcohol</i> <i>Eicosane</i>	- 48273 <i>Nonadecane</i> <i>Octadecane</i>	1 mL
Equity® / SPB® Thick Film Test Mix II	500 µg/mL each component in methylene chloride <i>Decane</i> <i>2,6-Dimethylaniline</i> <i>2,6-Dimethylphenol</i> <i>Dodecane</i>	- 48275-U <i>Nonane</i> <i>1-Octanol</i> <i>2-Octanone</i> <i>Tridecane</i>	1 mL
SPB®-50 Column Test Mix	500 µg/mL each component in methylene chloride <i>Decane</i> <i>2,6-Dimethylaniline</i> <i>2,6-Dimethylphenol</i> <i>Dodecane</i> <i>1-Octanol</i>	- 48280-U <i>2-Octanone</i> <i>Pentadecane</i> <i>Tridecane</i> <i>Undecane</i>	1 mL
Carbowax® Amine Test Mix	500 µg/mL each component in methyl <i>tert</i> -butyl ether <i>Benzylamine</i> <i>Decylamine</i> <i>2,4-Dimethylaniline</i> <i>2,6-Dimethylaniline</i> <i>Eicosane</i> <i>Heptadecane</i>	- 48278 <i>Hexadecane</i> <i>Nonylamine</i> <i>Octadecane</i> <i>Octylamine</i> <i>Pentadecane</i> <i>Trihexylamine</i>	1 mL
Omegawax® Column Test Mix	50 µg/mL in hexane <i>FAMES</i>	- 48476	1 mL
FAME Column Evaluation Mix	1000 µg/mL each component in methylene chloride <i>Methyl cis-11-eicosanoate</i> <i>Methyl heneicosanoate</i> <i>Methyl laurate</i>	- 47088-U <i>Methyl linolenate</i> <i>Methyl oleate</i> <i>cis-11-Octadecenoic methyl ester</i>	1 mL
<i>cis/trans</i> FAME Column Performance Mix	2.5 mg/mL in methylene chloride <i>FAMES</i>	- 40495-U 4M0495-U	1 mL 10 × 1 mL

Test Mixes for Specific Chiral Columns

These test mixes are designed to measure the performance of specific chiral GC columns. Choose:

- P/N 90001AST for Astec CHIRALDEX® A-DA columns.
- P/N 90002AST for Astec CHIRALDEX® G-TA and G-BP columns.
- P/N 90003AST for Astec CHIRALDEX® A-TA, G-DP, G-PN, G-DM, and B-PH columns.
- P/N 90004AST for Astec CHIRALDEX® B-DA and G-DA columns.
- P/N 90005AST for Astec CHIRALDEX® B-TA and B-DP columns.
- P/N 90006AST for Astec CHIRALDEX® A-PH columns.
- P/N 90007AST for Astec CHIRALDEX® B-PM and B-DM columns.
- P/N 48013 for α -DEX 120 columns.
- P/N 48028 for β -DEX 120 columns.

Description	Concentration	Cat. No.	Qty
1-(N-TFA)-2-Methylpiperidine	5000 µg/mL in ethanol: isopropanol (95:5)	- 90002AST	1 mL
2-(N-TFA)aminoheptane	5000 µg/mL in ethanol: isopropanol (95:5)	- 90003AST	1 mL
1-(N-TFA)aminoindan	5000 µg/mL in ethanol: isopropanol (95:5)	- 90004AST	1 mL
2-(Bromomethyl)tetra-2H-pyran	5000 µg/mL in ethanol: isopropanol (95:5)	- 90005AST	1 mL
3,4-Dihydro-2-ethoxy-2H-pyran	5000 µg/mL in ethanol: isopropanol (95:5)	- 90006AST	1 mL
1-Phenyl-1-ethanol	5000 µg/mL in ethanol: isopropanol (95:5)	- 90007AST	1 mL
α -DEX™ 120 Column Test Mix	500 µg/mL each component in methylene chloride <i>Decane</i> <i>Nonane</i> <i>1,2-Propanediol</i>	- 48013 <i>Undecane</i> <i>m-Xylene</i> <i>p-Xylene</i>	1 mL
β -DEX™ 120 Column Test Mix	500 µg/mL each component in methylene chloride <i>Decane</i> <i>3,3-Dimethyl-2-butanol</i> <i>1-Hexanol</i>	- 48028 <i>(+)-3-Methyl-2-heptanone</i> <i>Nonane</i> <i>Undecane</i>	1 mL

GC Accessories

GC Accessories



The proper supplies are required to maintain your GC and keep it operating at peak performance. Supelco offers premium products, such as septa, liners, and ferrules, designed to maximize performance!

Septa and Specialized Hand Tools

A GC septum is located at the top of the injection port and serves two functions: 1) providing a leak-free seal to maintain carrier gas pressure inside the system, and 2) handling repeated puncturing by a syringe needle for sample introduction purposes without severe coring or leaking.

Routine Maintenance: To reduce the risk of leaks and contamination, injection port septa should routinely be replaced. Change the septum daily, especially if the instrument is in heavy use. Repeated use of the same septum may result in increased coring, resulting in a leak. Septum fragments in the inlet liner can also lead to ghost peaks and/or loss of response due to adsorption of analytes as they pass through.

Storage and Handling: Septa can become contaminated by volatile compounds in the room air, or by finger oils. To ensure cleanliness, it is recommended that septa be stored in their shipping container with the lid securely closed, and that clean forceps be used for handling the septa during installation.

We offer a variety of septa to serve many functions. Choose:

- **Molded Thermogreen LB-2 septa** for most applications. These *bleed-temperature-puncturability-optimized* septa (up to 350 °C injection port temperatures) are widely considered the best septa choice.
- **Thermogreen LB-2 septa** when the diameter required is not offered in the Molded Thermogreen LB-2 septa line.
- **Thermogreen LB-1 septa** for lower temperature applications.
- **SS-174 PTFE-Faced septa** when the inertness of PTFE is required.
- **GR-2 septa** as an economical option for lower temperature applications (up to 200 °C injection port temperatures).
- **Merlin Miscro seal systems** for a septum-less system. While more expensive, these long-lasting systems will pay for themselves many times over.

In addition to septa, we offer several specialized hand-tools for removing septum from injection ports.

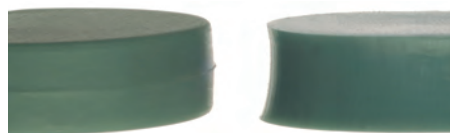
Septum Sizes for Various Chromatographs

Manufacturer	GC Model	Disc Diam. (mm)	Disc Diam. (in.)
Agilent/HP	5880A, 5890	11	7/16
	5700 series, 5880	9.5	3/8
	5880/90, 6890, OCI ports, capillary	5	3/16
Antek	all	9.5	3/8
Finnigan	9600	9.5	3/8
Finnigan/Tremetics	9000, 9500	12.5	1/2
GOW-MAC	all	9.5	3/8
HNU	portable GC	9.5	3/8
PerkinElmer	Sigma series, 900 & 990, 8000, Auto System, Clarus 500	11	7/16
Shimadzu	14, 15A, 16, 17A	plug	
Thermoquest	8000 series	17	21/32
Tracor	220, 222, 540	12.5	1/2
	550, 560	9.5	3/8
Varian	packed col. injectors	9.5	3/8
	SPI	11	7/16
	3700/Vista, capillary injectors	11/11.5	7/16/11/24
	Saturn GC/MS	11.5	11/24
	1177	9.0	11/32

Molded Thermogreen® LB-2 GC Septa

The Perfect Combination of Low Bleed, Thermal Stability, and Easy Puncturability!

Molded Thermogreen LB-2 septa are manufactured from high quality, low bleed material using the same exclusive LB-2 rubber formulation that chromatographers are accustomed to using. The difference is that molded septa, unlike traditional die-cut septa, offer easier installation and better sealing inside the injection port. This is because our liquid injection molding process ensures that every septum conforms to the same shape with crisp, clean sides. This is an improvement over a die-cutting process where septa can become cupped and/or distorted when the cutting surface becomes dull.



Left: Molded septum; Right: Die-cut septum

The useable inlet temperature range of 100-350 °C is adequate for most GC applications. **Don't be fooled by other septa that advertise a maximum temperature of 400 °C!** To make septa with high thermal limits, they must be made stiffer, resulting in septa that are harder to pierce and easier to core. Our molded Thermogreen LB-2 septa offer the perfect combination of low bleed, thermal stability, and easy puncturability.

- Rubber formulation exclusive to Supelco
- Strict tolerances (diameter, thickness, injection hole) due to constant dimension of the mold itself
- Ultra low bleed over a wide range of inlet temperatures (100 °C to 350 °C)
- No foreign substances/powders (which could contaminate the inlet) are used during manufacturing
- Fully tested for bleed and contamination
- Already conditioned, ready to use
- Ideal for use with low bleed GC-MS columns

Molded Thermogreen LB-2 septa are offered in two styles:

- **With injection hole** - reduces coring and extends life
- **Solid discs** - traditional design

GC Accessories

Septa and Specialized Hand Tools: *Molded Thermogreen® LB-2 GC Septa***Molded Thermogreen® LB-2 Septa, with injection hole**

The injection hole helps guide the syringe needle to puncture the same location every injection, resulting in two benefits:

- Minimal coring leading to long life
- Less septum fragments that contaminate the inlet liner

Their high puncture tolerance makes these septa ideal for use with autosampler injections, manual injections, and/or SPME applications.



Diam. (mm)	Cat. No.	Qty
9.5	28331-U	50 ea
9.5	28332-U	250 ea
10	28333-U	50 ea
10	28334-U	250 ea
11	28336-U	50 ea
11	28338-U	250 ea
11.5	29446-U	50 ea
11.5	29448-U	250 ea
17	29452-U	50 ea
17	29453-U	250 ea

Molded Thermogreen® LB-2 Septa, solid discs

Traditional solid discs are suitable for use with manual injections.



Diam. (mm)	Cat. No.	Qty
9.5	28670-U	50 ea
9.5	28671-U	250 ea
10	28673-U	50 ea
10	28675-U	250 ea
11	28676-U	50 ea
11	28678-U	250 ea
11.5	29449-U	50 ea
11.5	29451-U	250 ea
17	29456-U	50 ea
17	29457-U	250 ea

Thermogreen® LB-2 GC Septa

We recommend using Thermogreen LB-2 septa when the diameter required is not offered in the Molded Thermogreen LB-2 septa line.

Thermogreen® LB-2 Septa, pre-drilled

Use pre-drilled septa for SPME applications to reduce septum coring.



Diam. (mm)	Cat. No.	Qty
9.5 ($\frac{3}{8}$ in.)	23161 23162-U	25 ea 50 ea
11.0 ($\frac{7}{16}$ in.)	23167 23168	25 ea 50 ea

Thermogreen® LB-2 Septa, solid discs

An improved version over the original Thermogreen LB-1 septa.

- Extremely low bleed over a wide range of inlet temperatures (100 °C to 350 °C)
- Already conditioned, ready to use
- Easier needle penetration and high puncture tolerance (ideal for autosamplers)
- Rubber formulation exclusive to Supelco



Diam. (mm)	Cat. No.	Qty
5.0 ($\frac{3}{16}$ in.)	20638	50 ea
6.0 ($\frac{1}{4}$ in.)	20651	50 ea
6.7 ($\frac{9}{32}$ in.)	20606	10 ea
9.0 ($\frac{11}{32}$ in.)	28006-U 28021-U	5 ea 50 ea
9.5 ($\frac{3}{8}$ in.)	20652 20666 20677	50 ea 250 ea 1000 ea
10.0 ($\frac{13}{32}$ in.)	20653-U 23156 23157	50 ea 250 ea 1000 ea
11.0 ($\frac{7}{16}$ in.)	20654 23163 23164	50 ea 250 ea 1000 ea
11.5 ($\frac{11}{24}$ in.)	23154	50 ea
12.5 ($\frac{1}{2}$ in.)	20660-U 20678	50 ea 250 ea
14.0 ($\frac{9}{16}$ in.)	20662-U	50 ea
16.0 ($\frac{5}{8}$ in.)	20663	50 ea
17.0 ($\frac{21}{32}$ in.)	23159	50 ea

GC Accessories

Septa and Specialized Hand Tools: *Thermogreen® LB-2 GC Septa*

Thermogreen® LB-2 Septa, cylindrical

For use in Shimadzu GCs that require plug septa.



Diam. × L (mm)	Cat. No.	Qty
~6 × 9	20608	10 ea
	20633	50 ea

Thermogreen® LB-1 GC Septa

The original low bleed GC septa.

Thermogreen® LB-1 Septa, solid discs

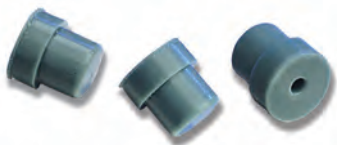
For use with 50 °C to 300 °C inlet temperatures.



Diam. (mm)	Cat. No.	Qty
9.5 ($\frac{3}{8}$ in.)	20659-U	50 ea
10.0 ($\frac{13}{32}$ in.)	20657-U	50 ea
11.0 ($\frac{7}{16}$ in.)	20658	50 ea
12.5 ($\frac{1}{2}$ in.)	20661	50 ea

Thermogreen® LB-1 Septa, cylindrical

For use in Shimadzu GCs that require plug septa, glass gas sampling bulbs, and purge & trap glassware.



Diam. × L (mm)	Cat. No.	Qty
~6 × 9	20668	100 ea

Non-Thermogreen GC Septa

In addition to our Thermogreen LB-2 septa, we also offer other popular septa.

SS-174 PTFE-Faced Septa

PTFE-faced septa are designed for applications where greater inertness is required. The off-white silicone rubber body (123 mil thick) provides plenty of support for the yellow PTFE face (2 mil thick). After the PTFE is ruptured during injection, some bleeding may occur. Because this bleed increases as more of the rubber is exposed, we recommend using a needle guide to reduce the size of the punctured area. For use with 200 °C to 300 °C inlet temperatures.

Diam. (mm)	Cat. No.	Qty
6.0 ($\frac{1}{4}$ in.)	22654	100 ea
9.5 ($\frac{3}{8}$ in.)	22656	100 ea
	22618	250 ea
10.0 ($\frac{13}{32}$ in.)	22647	100 ea
11.0 ($\frac{7}{16}$ in.)	22731	100 ea
12.5 ($\frac{1}{2}$ in.)	22657	100 ea
14.0 ($\frac{9}{16}$ in.)	22732	50 ea

GR-2 Septa

These low cost gray silicone rubber septa are designed for routine, isothermal use. For use with 50 °C to 200 °C inlet temperature.



Diam. (mm)	Cat. No.	Qty
5.0 ($\frac{3}{16}$ in.)	20712	100 ea
6.0 ($\frac{1}{4}$ in.)	20442-U	100 ea
9.5 ($\frac{3}{8}$ in.)	20405	100 ea
	20625	250 ea
	20627	1000 ea
10.0 ($\frac{13}{32}$ in.)	20441	100 ea
11.0 ($\frac{7}{16}$ in.)	20421	100 ea
12.5 ($\frac{1}{2}$ in.)	20413	100 ea

GR-2 Rubber Sheet Stock

This 290 mm x 290 mm x 3 mm thick sheet stock is useful for making septa of various diameters. Simply cut-out the desired size.

Cat. No.	Qty
20420-U	1 ea

Three Layer Disc Septa

These septa feature a soft inner layer of silicone rubber sandwiched between hard outside layers. For use with GC inlet temperatures up to 200 °C.



Diam. (mm)	Cat. No.	Qty
9.0 ($\frac{11}{32}$ in.)	20416	12 ea
10.0 ($\frac{13}{32}$ in.)	20417	12 ea
12.5 ($\frac{1}{2}$ in.)	20418	12 ea

GC Accessories

Septa and Specialized Hand Tools: *Merlin Microseal™ Systems***Merlin Microseal™ Systems**

The Merlin Microseal System is a septum-less system that provides very long life. Because there is not a septum to pierce, septum fragments will not be formed and deposited in the inlet liner. The septum contains a series of seals (wiper rib, o-rings, and a duckbill valve) that allow a needle to enter while maintaining a leak-free seal. The septum can be used only with a syringe that has a 23 gauge "blunt tipped" needle, or with an SPME fiber assembly with a 23 gauge needle. The thicker shaft is required to make the necessary contact with the septum seals.

Merlin Microseal™ System (fits Agilent)

Simply place the septum directly onto the septum cup and then add the nut (an additional adapter for the septum cup is not required for Agilent GCs). The septum incorporates a unique design with two sequential seals to provide a much longer life. Order replacement septa, or alternate versions, separately. Compatible with all Agilent autosamplers and stainless steel injection ports.

Note: Do not use with beveled tips.



Left: Septum; Right: Nut

Description	Cat. No.	Qty
1 nut and 1 Low Pressure (1-45 psi) septum	22584	1 ea
1 nut and 2 Low Pressure (1-45 psi) septa	22581-U	1 ea
1 nut and 1 General Purpose (3-100 psi) septum	24815-U	1 ea
1 nut and 2 General Purpose (3-100 psi) septa	24814-U	1 ea
1 nut	22582	1 ea

Merlin Microseal™ System (fits Varian®)

Varian GCs require an inlet adapter and an o-ring in addition to the septum and nut. The septum incorporates a unique design with two sequential seals to provide a much longer life. Order replacement septa, or alternate versions, separately. Not compatible with the Varian 8200 autosampler.

Note: Do not use with beveled tips.

Description	Cat. No.	Qty
For 1079 injector; 1 nut, 1 inlet adapter, 1 o-ring, and 1 General Purpose (3-100 psi) septum	24817-U	1 ea
For CP-1177 injector; 1 nut, 1 inlet adapter, 1 o-ring, and 1 General Purpose (3-100 psi) septum	22609-U	1 kit

Merlin Microseal™ System Replacement Septum

Three septa versions are available:

- **Low Pressure** for use with 23 gauge syringe needles, and injection port pressures between 1 and 45 psi. Do not use with syringe needles that have beveled tips.
- **General Purpose** for use with 23 gauge syringe needles, and injection port pressures between 3 and 100 psi. Do not use with syringe needles that have beveled tips.
- **SPME** for use with 23 gauge SPME fiber assemblies. Do not use with SPME fiber assemblies that have beveled tips.

Note: Do not use with beveled tips.

Description	Cat. No.	Qty
1 Low Pressure (1-45 psi) septum	22583	1 ea
1 General Purpose (3-100 psi) septum	24816-U	1 ea
1 SPME septum	24818-U	1 ea

Specialized Hand Tools

These handy tools are designed specifically for use with GC septa.

Septum Puller**▶ hook design**

The hook septum puller is great for removing soft silicone septa from injection ports, and graphite ferrules from column nuts. It has dozens of other uses around the lab.



20352	1 ea
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▶ screw design

The screw septum puller is perfect for removing harder, high temperature septa from injection ports.



20353	1 ea
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Septum Pick

The septum pick is useful for removing small pieces of septa from injection ports, and graphite ferrules from column nuts.



Z236136-1EA	1 ea
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GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools

Inlet Liners, Glass Wool, and Specialized Hand Tools

An injection port liner is used to make the connection between sample introduction and the GC column. Four primary injection techniques are used in GC; split, splitless, direct, and on-column. Inlet liners should be selected based on the injection technique being used to ensure optimal sample transfer to the column.

Split Injection: The most common injection method used. Split liners use a design that establishes turbulent flow rather than laminar flow, ensuring sample vaporization and enhancing proper mixing prior to the point where the sample is split, thereby minimizing inlet discrimination. Cups, baffles, twists, or frits are used to facilitate sample mixing. Wool may be used to improve vaporization, and/or to keep non-volatile material from entering the column. Wide bore 2 - 4 mm I.D. inlet liners are necessary for solvent expansion.

Splitless Injection: Because the sample dwell time in the liner is significantly longer in the splitless injection mode, the liner design does not need to create high turbulence. Splitless liners usually are straight 2 - 4 mm I.D. tubes with internal volume between 0.25 and 1 mL (choose a liner with an internal volume equal to or larger than the expansion volume of the solvent). Tapers (either at the bottom, or at both the top and bottom) may be incorporated to help focus analytes onto the column. Wool may be used to improve vaporization, and/or to keep non-volatile material from entering the column. NOTE: Deactivation of splitless liners is very important due to the long residence time of the sample.

Direct Injection: Often used for gas phase samples, such as with headspace, purge-and-trap, and solid phase microextraction (SPME) techniques, where the entire gas sample is transferred to the column. Because there is no solvent, large internal volumes are not necessary for solvent expansion. Narrow bore 0.5 - 1.5 mm I.D. inlet liners are used to maintain a high linear velocity through the injection port, minimizing band broadening. Also known as flash vaporization.

On-Column Injection: Liquid samples are deposited directly into the inlet of a capillary column. A specialized syringe is usually required. These liners are designed with a tapered region where the column end is seated to create a seal between the column and the liner. This taper also guides the needle into the column. The oven temperature program is then used to vaporize the sample component.

We also offer highly pure glass wool and several specialized hand tools for repacking inlet liners.

Inlet Liners for Agilent (5890, 6890, and 7890)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split Type, Cup Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2048201	1 ea
2048205	5 ea
2048225	25 ea

Inlet Liner, Split Type, Cup Design (packed with 10% OV-1 on Chromosorb W HP)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2055101	1 ea
2055105	5 ea
2055125	25 ea

Inlet Liner, Split Type, Cup Design (unpacked)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm

Cat. No.	Qty
2051001	1 ea
2051005	5 ea
2051025	25 ea

Inlet Liner, Split/Splitless Type, Single Taper FocusLiner™ Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2879901-U	1 ea
2879905-U	5 ea
2879925-U	25 ea

Inlet Liner, Split/Splitless Type, Single Taper Fast FocusLiner™ Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 2.3 mm



Cat. No.	Qty
2879501-U	1 ea
2879505-U	5 ea
2879525-U	25 ea

Inlet Liner, Split/Splitless Type, Single Taper Design (wool packed)

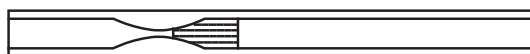
L × O.D. × I.D. 78.5 mm × 6.5 mm × 4.0 mm



Cat. No.	Qty
2047801	1 ea
2047805	5 ea
2047825	25 ea

Inlet Liner, Split/Splitless Type, Recessed Gooseneck Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2879701-U	1 ea
2879705-U	5 ea
2879725-U	25 ea

GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Inlet Liners for Agilent (5890, 6890, and 7890)***Inlet Liner, Split/Splitless Type, Straight FocusLiner™ Design (wool packed)**

L x O.D. x I.D. 78.5 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2879801-U	1 ea
2879805-U	5 ea
2879825-U	25 ea

Inlet Liner, Split/Splitless Type, Straight Fast FocusLiner™ Design (wool packed)

L x O.D. x I.D. 78.5 mm x 6.3 mm x 2.3 mm



Cat. No.	Qty
2879601-U	1 ea
2879605-U	5 ea
2879625-U	25 ea

Inlet Liner, Split/Splitless Type, Straight Design (wool packed)

L x O.D. x I.D. 78.5 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2048601	1 ea
2048605	5 ea
2048625	25 ea

Inlet Liner, Splitless Type, Single Taper Design (unpacked)

L x O.D. x I.D. 78.5 mm x 6.5 mm x 4.0 mm



Cat. No.	Qty
2046601	1 ea
2046605	5 ea
2046625	25 ea

Inlet Liner, Splitless Type, Dual-Taper Design (unpacked)

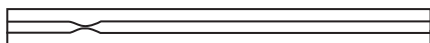
L x O.D. x I.D. 78.5 mm x 6.5 mm x 4.0 mm



Cat. No.	Qty
2048501	1 ea
2048505	5 ea
2048525	25 ea

Inlet Liner, Splitless Type, Recessed Gooseneck Design (unpacked)

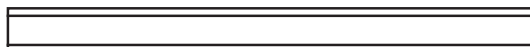
L x O.D. x I.D. 78.5 mm x 6.3 mm x 2.0 mm



Cat. No.	Qty
2879301-U	1 ea
2879305-U	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L x O.D. x I.D. 78.5 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2879401-U	1 ea
2879405-U	5 ea
2879425-U	25 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L x O.D. x I.D. 78.5 mm x 6.5 mm x 2.0 mm



Cat. No.	Qty
2051301	1 ea
2051305	5 ea
2051325	25 ea

Inlet Liner, Direct Type, Straight Design (unpacked)

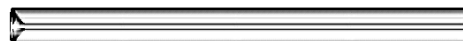
L x O.D. x I.D. 78.5 mm x 6.3 mm x 1.5 mm



Cat. No.	Qty
2051701	1 ea
2051705	5 ea
2051725	25 ea

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 78.5 mm x 6.5 mm x 0.75 mm



Cat. No.	Qty
2637501	1 ea
2637505	5 ea
2637525	25 ea

Inlet Liner, for Packed GC (unpacked)

Deactivated (silanized) glass inlet liner for packed injection ports.

• Fits Agilent (5890, 6890, and 7890)

L x O.D. x I.D. 91.5 mm x 3.0 mm x 1.8 mm



Cat. No.	Qty
20508	5 ea
20511	25 ea

GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Inlet Liners for ATAS (Optic 2)**Inlet Liners for ATAS (Optic 2)*

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split Type, Frit Design (unpacked)

L x O.D. x I.D. 80 mm x 5.0 mm x 3.0 mm



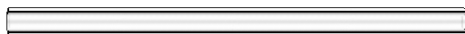
Cat. No.	Qty
2632605	5 ea
2632625	25 ea

Inlet Liners for Carlo Erba/Fisons (6000)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Splitless Type, Straight Design (unpacked)

L x O.D. x I.D. 79.5 mm x 5.5 mm x 4.0 mm



Cat. No.	Qty
2632105	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L x O.D. x I.D. 79.5 mm x 5.0 mm x 2.0 mm



Cat. No.	Qty
2632005	5 ea

Inlet Liners for Finnigan (9001GCQ)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split Type, Cup Design (wool packed)

L x O.D. x I.D. 78.5 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2048201	1 ea
2048205	5 ea
2048225	25 ea

Inlet Liner, Split Type, Cup Design (packed with 10% OV-1 on Chromosorb W HP)

L x O.D. x I.D. 78.5 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2055101	1 ea
2055105	5 ea
2055125	25 ea

Inlet Liner, Split Type, Cup Design (unpacked)

L x O.D. x I.D. 78.5 mm x 6.3 mm x 4.0 mm

Cat. No.	Qty
2051001	1 ea
2051005	5 ea
2051025	25 ea

Inlet Liner, Split/Splitless Type, Single Taper FocusLiner™ Design (wool packed)

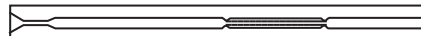
L x O.D. x I.D. 78.5 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2879901-U	1 ea
2879905-U	5 ea
2879925-U	25 ea

Inlet Liner, Split/Splitless Type, Single Taper Fast FocusLiner™ Design (wool packed)

L x O.D. x I.D. 78.5 mm x 6.3 mm x 2.3 mm



Cat. No.	Qty
2879501-U	1 ea
2879505-U	5 ea
2879525-U	25 ea

Inlet Liner, Split/Splitless Type, Single Taper Design (wool packed)

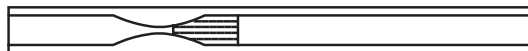
L x O.D. x I.D. 78.5 mm x 6.5 mm x 4.0 mm



Cat. No.	Qty
2047801	1 ea
2047805	5 ea
2047825	25 ea

Inlet Liner, Split/Splitless Type, Recessed Gooseneck Design (wool packed)

L x O.D. x I.D. 78.5 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2879701-U	1 ea
2879705-U	5 ea
2879725-U	25 ea

Inlet Liner, Split/Splitless Type, Straight FocusLiner™ Design (wool packed)

L x O.D. x I.D. 78.5 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2879801-U	1 ea
2879805-U	5 ea
2879825-U	25 ea

GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Inlet Liners for Finnigan (9001GCCQ)*

Inlet Liner, Split/Splitless Type, Straight Fast FocusLiner™ Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 2.3 mm



Cat. No.	Qty
2879601-U	1 ea
2879605-U	5 ea
2879625-U	25 ea

Inlet Liner, Split/Splitless Type, Straight Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2048601	1 ea
2048605	5 ea
2048625	25 ea

Inlet Liner, Splitless Type, Single Taper Design (unpacked)

L × O.D. × I.D. 78.5 mm × 6.5 mm × 4.0 mm



Cat. No.	Qty
2046601	1 ea
2046605	5 ea
2046625	25 ea

Inlet Liner, Splitless Type, Dual-Taper Design (unpacked)

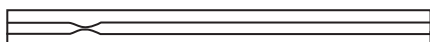
L × O.D. × I.D. 78.5 mm × 6.5 mm × 4.0 mm



Cat. No.	Qty
2048501	1 ea
2048505	5 ea
2048525	25 ea

Inlet Liner, Splitless Type, Recessed Gooseneck Design (unpacked)

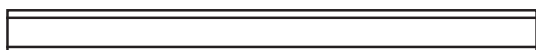
L × O.D. × I.D. 78.5 mm × 6.3 mm × 2.0 mm



Cat. No.	Qty
2879301-U	1 ea
2879305-U	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2879401-U	1 ea
2879405-U	5 ea
2879425-U	25 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 78.5 mm × 6.5 mm × 2.0 mm



Cat. No.	Qty
2051301	1 ea
2051305	5 ea
2051325	25 ea

Inlet Liner, Direct Type, Straight Design (unpacked)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 1.5 mm



Cat. No.	Qty
2051701	1 ea
2051705	5 ea
2051725	25 ea

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L × O.D. × I.D. 78.5 mm × 6.5 mm × 0.75 mm



Cat. No.	Qty
2637501	1 ea
2637505	5 ea
2637525	25 ea

Inlet Liners for PerkinElmer® (2000 and 8000)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 100 mm × 5.0 mm × 4.0 mm



Cat. No.	Qty
2630301	1 ea
2630305	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 100 mm × 5.0 mm × 2.0 mm



Cat. No.	Qty
2630401	1 ea
2630405	5 ea

GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Inlet Liners for PerkinElmer® (Clarus and AutoSystem)**Inlet Liners for PerkinElmer® (Clarus and AutoSystem)*

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split/Splitless Type, Single Taper FocusLiner™ Design (wool packed)

L × O.D. × I.D. 92 mm × 6.2 mm × 4.0 mm



Cat. No.	Qty
2879101-U	1 ea
2879105-U	5 ea

Inlet Liner, Split/Splitless Type, Straight FocusLiner™ Design (wool packed)

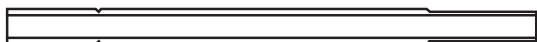
L × O.D. × I.D. 92 mm × 6.2 mm × 4.0 mm



Cat. No.	Qty
2879201-U	1 ea
2879205-U	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 92 mm × 6.2 mm × 4.0 mm



Cat. No.	Qty
2878701-U	1 ea
2878705-U	5 ea

Inlet Liners for PerkinElmer® (AutoSystem)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split/Splitless Type, Straight Design (wool packed)

L × O.D. × I.D. 92 mm × 6.35 mm × 4.0 mm



Cat. No.	Qty
2631001	1 ea
2631005	5 ea
2631025	25 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 92 mm × 6.35 mm × 4.0 mm



Cat. No.	Qty
2630901	1 ea
2630905	5 ea
2630925	25 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 92 mm × 6.35 mm × 2.0 mm



Cat. No.	Qty
2631105	5 ea

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L × O.D. × I.D. 92 mm × 6.35 mm × 0.75 mm



Cat. No.	Qty
2631205	5 ea

Inlet Liner, for Packed GC (wool packed)

Deactivated (silanized) glass inlet liner for packed injection ports.

- Fits PerkinElmer (AutoSystem)

L × O.D. × I.D. 112 mm × 6.0 mm × 3.0 mm



Cat. No.	Qty
2631705	5 ea
2631725	25 ea

Inlet Liner, for Packed GC (unpacked)

Deactivated (silanized) glass inlet liner for packed injection ports.

- Fits PerkinElmer (AutoSystem)

L × O.D. × I.D. 112 mm × 6.0 mm × 3.0 mm



Cat. No.	Qty
2631605	5 ea
2631625	25 ea

Inlet Liners for PerkinElmer® (PSS Injector)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split/Splitless Type, Straight FocusLiner™ Design (wool packed)

L × O.D. × I.D. 86.2 mm × 4.0 mm × 2.0 mm



Cat. No.	Qty
2878901-U	1 ea
2878905-U	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 86 mm × 4.0 mm × 2.0 mm



Cat. No.	Qty
2631301	1 ea
2631305	5 ea
2631325	25 ea

GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Inlet Liners for PerkinElmer® (PSS Injector)***Inlet Liner, Direct Type, Straight Design (unpacked)**

L x O.D. x I.D. 86 mm x 4.0 mm x 1.0 mm



Cat. No.	Qty
2631405	5 ea

Inlet Liner, On-Column Type, Straight Design (unpacked)

L x O.D. x I.D. 86 mm x 4.0 mm x 2.0 mm



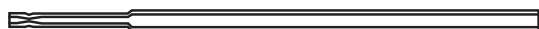
Cat. No.	Qty
2631505	5 ea

Inlet Liners for Shimadzu™ (9A and 16A)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Splitless Type, Single Taper Design (unpacked)

L x O.D. x I.D. 139 mm x 5.0 mm x 3.4 mm



Cat. No.	Qty
2878201-U	1 ea
2878205-U	5 ea

***Inlet Liners for Shimadzu™ (9A, 15A, and 16)*
*[with SPL-G9/15 Injector]***

Deactivated (silanized) glass inlet liners.

Inlet Liner, Splitless Type, Straight Design (unpacked)

L x O.D. x I.D. 127 mm x 5.0 mm x 3.4 mm



Cat. No.	Qty
2633001	1 ea
2633005	5 ea

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 127 mm x 5.0 mm x 0.75 mm



Cat. No.	Qty
2632901	1 ea
2632905	5 ea

***Inlet Liners for Shimadzu™ (14, 15A, and 16)*
*[with SPL-14 Injector]***

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split/Splitless Type, Single Taper FocusLiner™ Design (wool packed)

L x O.D. x I.D. 99 mm x 5.0 mm x 3.4 mm



Cat. No.	Qty
2877801-U	1 ea
2877805-U	5 ea

Inlet Liner, Split/Splitless Type, Straight FocusLiner™ Design (wool packed)

L x O.D. x I.D. 99 mm x 5.0 mm x 3.4 mm



Cat. No.	Qty
2878101-U	1 ea
2878105-U	5 ea

Inlet Liner, Splitless Type, Single Taper Design (unpacked)

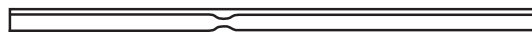
L x O.D. x I.D. 99 mm x 5.0 mm x 3.0 mm



Cat. No.	Qty
2633305	5 ea

Inlet Liner, Splitless Type, Middle Gooseneck Design (unpacked)

L x O.D. x I.D. 99 mm x 5.0 mm x 3.4 mm



Cat. No.	Qty
2877701-U	1 ea
2877705-U	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L x O.D. x I.D. 99 mm x 5.0 mm x 3.0 mm



Cat. No.	Qty
2633405	5 ea
2633425	25 ea

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 99 mm x 5.0 mm x 0.75 mm



Cat. No.	Qty
2633501	1 ea
2633505	5 ea

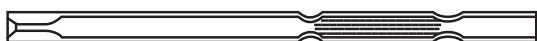
GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Inlet Liners for Shimadzu™ (17A) [with SPL-17 Injector]**Inlet Liners for Shimadzu™ (17A) [with SPL-17 Injector]*

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split/Splitless Type, Single Taper FocusLiner™ Design (wool packed)

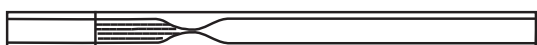
L × O.D. × I.D. 95 mm × 5.0 mm × 3.4 mm



Cat. No.	Qty
2878401-U	1 ea
2878405-U	5 ea

Inlet Liner, Split/Splitless Type, Recessed Gooseneck Design (wool packed)

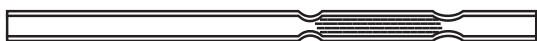
L × O.D. × I.D. 95 mm × 5.0 mm × 3.4 mm



Cat. No.	Qty
2877901-U	1 ea
2877905-U	5 ea

Inlet Liner, Split/Splitless Type, Straight FocusLiner™ Design (wool packed)

L × O.D. × I.D. 95 mm × 5.0 mm × 3.4 mm



Cat. No.	Qty
2878601-U	1 ea
2878605-U	5 ea

Inlet Liner, Split/Splitless Type, Straight Design (wool packed)

L × O.D. × I.D. 95 mm × 5.0 mm × 3.0 mm



Cat. No.	Qty
2632705	5 ea
2632725	25 ea

Inlet Liner, Splitless Type, Single Taper Design (unpacked)

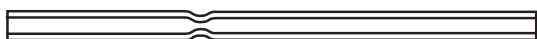
L × O.D. × I.D. 95 mm × 5.0 mm × 2.6 mm



Cat. No.	Qty
2633801	1 ea
2633805	5 ea

Inlet Liner, Splitless Type, Middle Gooseneck Design (unpacked)

L × O.D. × I.D. 95 mm × 5.0 mm × 3.4 mm



Cat. No.	Qty
2878301-U	1 ea
2878305-U	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 95 mm × 5.0 mm × 3.4 mm



Cat. No.	Qty
2633601	1 ea
2633605	5 ea
2633625	25 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 95 mm × 5.0 mm × 2.6 mm



Cat. No.	Qty
2633705	5 ea
2633725	25 ea

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L × O.D. × I.D. 95 mm × 5.0 mm × 0.75 mm



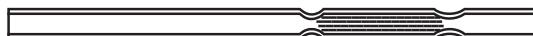
Cat. No.	Qty
2633901	1 ea
2633905	5 ea
2633925	25 ea

Inlet Liners for Shimadzu™ (GC-2010)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split/Splitless Type, Straight FocusLiner™ Design (wool packed)

L × O.D. × I.D. 95 mm × 5.0 mm × 3.4 mm



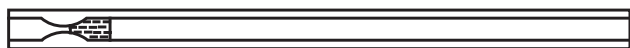
Cat. No.	Qty
2877601-U	1 ea
2877605-U	5 ea

Inlet Liners for Thermo (ThermoQuest 4000, 5000, and 6000)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split/Splitless Type, Recessed Gooseneck Design (wool packed)

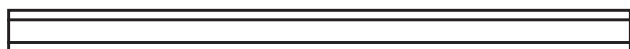
L × O.D. × I.D. 79.5 mm × 5.0 mm × 3.0 mm



Cat. No.	Qty
2876905-U	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 79.5 mm × 5.0 mm × 3.0 mm

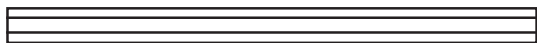


Cat. No.	Qty
2876101-U	1 ea

GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Inlet Liners for Thermo (ThermoQuest 4000, 5000, and 6000)***Inlet Liner, Splitless Type, Straight Design (unpacked)**

L x O.D. x I.D. 79.5 mm x 5.0 mm x 2.0 mm



Cat. No.	Qty
2875801-U	1 ea
2875805-U	5 ea

Inlet Liners for Thermo (ThermoQuest 8000 and TRACE)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split/Splitless Type, Single Taper FocusLiner™ Design (wool packed)

L x O.D. x I.D. 105 mm x 8.0 mm x 5.0 mm



Cat. No.	Qty
2877201-U	1 ea
2877205-U	5 ea

Inlet Liner, Split/Splitless Type, Single Taper FocusLiner™ Design (wool packed)

L x O.D. x I.D. 105 mm x 8.0 mm x 5.0 mm



Cat. No.	Qty
2877505-U	5 ea

Inlet Liner, Split/Splitless Type, Straight FocusLiner™ Design (wool packed)

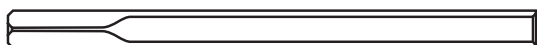
L x O.D. x I.D. 105 mm x 8.0 mm x 5.0 mm



Cat. No.	Qty
2877001-U	1 ea
2877005-U	5 ea

Inlet Liner, Splitless Type, Single Taper Design (unpacked)

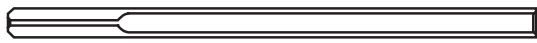
L x O.D. x I.D. 105 mm x 8.0 mm x 5.0 mm



Cat. No.	Qty
2877301-U	1 ea
2877305-U	5 ea

Inlet Liner, Splitless Type, Single Taper Design (unpacked)

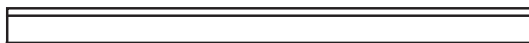
L x O.D. x I.D. 105 mm x 8.0 mm x 3.0 mm



Cat. No.	Qty
2877401-U	1 ea
2877405-U	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

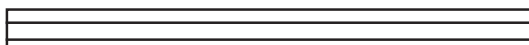
L x O.D. x I.D. 105 mm x 8.0 mm x 5.0 mm



Cat. No.	Qty
2877101-U	1 ea
2877105-U	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

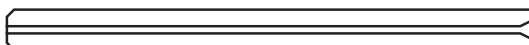
L x O.D. x I.D. 105 mm x 8.0 mm x 3.0 mm



Cat. No.	Qty
2876701-U	1 ea
2876705-U	5 ea

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 105 mm x 8.0 mm x 0.8 mm



Cat. No.	Qty
2876601-U	1 ea
2876605-U	5 ea

Inlet Liners for Thermo (PTV Injector)

Deactivated (silanized) glass inlet liners.

Inlet Liner, On-Column Type, Straight Design (unpacked)

L x O.D. x I.D. 120 mm x 2.75 mm x 2.0 mm



Cat. No.	Qty
2875901-U	1 ea
2875905-U	5 ea

Inlet Liners for Varian® (1075 and 1077 Injector)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split Type, Baffle Design (unpacked)

L x O.D. x I.D. 72 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2050105	5 ea

Inlet Liner, Split Type, Frit Design (unpacked)

L x O.D. x I.D. 72 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2050501	1 ea
2050505	5 ea
2050525	25 ea

GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Inlet Liners for Varian® (1075 and 1077 Injector)***Inlet Liner, Split/Splitless Type, Straight FocusLiner™ Design (wool packed)**

L x O.D. x I.D. 72 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2875405-U	5 ea

Inlet Liner, Split/Splitless Type, Straight Fast FocusLiner™ Design (wool packed)

L x O.D. x I.D. 72 mm x 6.3 mm x 2.3 mm



Cat. No.	Qty
2874705-U	5 ea

Inlet Liner, Split/Splitless Type, Straight Design (wool packed)

L x O.D. x I.D. 72 mm x 6.3 mm x 3.4 mm



Cat. No.	Qty
2636005	5 ea

Inlet Liner, Split/Splitless Type, Straight Design (packed with 10% OV-101 on 80/100 Chromosorb W HP)

L x O.D. x I.D. 72 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2055501	1 ea
2055505	5 ea

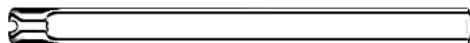
Inlet Liner, Splitless Type, Single Taper Design (unpacked)

L x O.D. x I.D. 73 mm x 6.35 mm x 4.0 mm

Cat. No.	Qty
2636801	1 ea
2636805	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L x O.D. x I.D. 72 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2636101	1 ea
2636105	5 ea
2636125	25 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L x O.D. x I.D. 72 mm x 6.3 mm x 4.0 mm



Cat. No.	Qty
2636201	1 ea
2636205	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L x O.D. x I.D. 74 mm x 6.3 mm x 2.0 mm



Cat. No.	Qty
2050201	1 ea
2050205	5 ea
2050225	25 ea

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 74 mm x 6.35 mm x 0.75 mm



Cat. No.	Qty
2635801	1 ea
2635805	5 ea
2635825	25 ea

Inlet Liners for Varian® (1078 and 1079 Injector)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split Type, Frit Design (unpacked)

L x O.D. x I.D. 54 mm x 5.0 mm x 3.4 mm



Cat. No.	Qty
2637201	1 ea
2637205	5 ea
2637225	25 ea

Inlet Liner, Split/Splitless Type, Single Taper FocusLiner™ Design (wool packed)

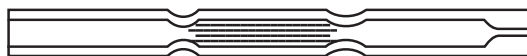
L x O.D. x I.D. 54 mm x 5.0 mm x 3.4 mm



Cat. No.	Qty
2875501-U	1 ea
2875505-U	5 ea

Inlet Liner, Split/Splitless Type, Straight FocusLiner™ Design (wool packed)

L x O.D. x I.D. 54 mm x 5.0 mm x 3.4 mm



Cat. No.	Qty
2875701-U	1 ea
2875705-U	5 ea

GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Inlet Liners for Varian® (1078 and 1079 Injector)***Inlet Liner, Split/Splitless Type, Straight Design (wool packed)**

L × O.D. × I.D. 54 mm × 5.0 mm × 2.0 mm



Cat. No.	Qty
2637701	1 ea
2637705	5 ea
2637725	25 ea

Inlet Liner, Split/Splitless Type, Straight Design (packed with 10% OV-101 on 80/100 Chromosorb W HP)

L × O.D. × I.D. 54 mm × 5.0 mm × 3.4 mm



Cat. No.	Qty
2637301	1 ea
2637305	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 54 mm × 5.0 mm × 3.4 mm



Cat. No.	Qty
2637101	1 ea
2637105	5 ea
2637125	25 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 54 mm × 5.0 mm × 2.0 mm



Cat. No.	Qty
2637401	1 ea
2637405	5 ea

Inlet Liner, Direct Type, Straight Design (unpacked)

L × O.D. × I.D. 54 mm × 5.0 mm × 0.5 mm



Cat. No.	Qty
2637601	1 ea
2637605	5 ea

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L × O.D. × I.D. 54 mm × 5.0 mm × 0.8 mm



Cat. No.	Qty
2637801	1 ea
2637805	5 ea

Inlet Liners for Varian® (1093-94 SPI Injector)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Direct Type, Straight Design (unpacked)

L × O.D. × I.D. 54 mm × 4.6 mm × 0.5 mm



Cat. No.	Qty
2636301	1 ea
2636305	5 ea
2636325	25 ea

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L × O.D. × I.D. 54 mm × 4.6 mm × 0.8 mm



Cat. No.	Qty
2636401	1 ea
2636405	5 ea
2636425	25 ea

Inlet Liners for Varian® (CP-1177 Injector)

Deactivated (silanized) glass inlet liners.

Inlet Liner, Split Type, Cup Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2048201	1 ea
2048205	5 ea
2048225	25 ea

Inlet Liner, Split Type, Cup Design (packed with 10% OV-1 on Chromosorb W HP)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2055101	1 ea
2055105	5 ea
2055125	25 ea

Inlet Liner, Split Type, Cup Design (unpacked)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm

Cat. No.	Qty
2051001	1 ea
2051005	5 ea
2051025	25 ea

GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Inlet Liners for Varian® (CP-1177 Injector)***Inlet Liner, Split/Splitless Type, Single Taper FocusLiner™ Design (wool packed)**

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2879901-U	1 ea
2879905-U	5 ea
2879925-U	25 ea

Inlet Liner, Split/Splitless Type, Single Taper Fast FocusLiner™ Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 2.3 mm



Cat. No.	Qty
2879501-U	1 ea
2879505-U	5 ea
2879525-U	25 ea

Inlet Liner, Split/Splitless Type, Single Taper Design (wool packed)

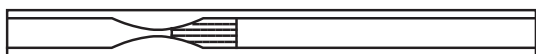
L × O.D. × I.D. 78.5 mm × 6.5 mm × 4.0 mm



Cat. No.	Qty
2047801	1 ea
2047805	5 ea
2047825	25 ea

Inlet Liner, Split/Splitless Type, Recessed Gooseneck Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2879701-U	1 ea
2879705-U	5 ea
2879725-U	25 ea

Inlet Liner, Split/Splitless Type, Straight FocusLiner™ Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2879801-U	1 ea
2879805-U	5 ea
2879825-U	25 ea

Inlet Liner, Split/Splitless Type, Straight Fast FocusLiner™ Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 2.3 mm



Cat. No.	Qty
2879601-U	1 ea
2879605-U	5 ea
2879625-U	25 ea

Inlet Liner, Split/Splitless Type, Straight Design (wool packed)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2048601	1 ea
2048605	5 ea
2048625	25 ea

Inlet Liner, Splitless Type, Single Taper Design (unpacked)

L × O.D. × I.D. 78.5 mm × 6.5 mm × 4.0 mm



Cat. No.	Qty
2046601	1 ea
2046605	5 ea
2046625	25 ea

Inlet Liner, Splitless Type, Dual-Taper Design (unpacked)

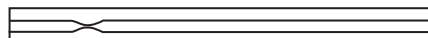
L × O.D. × I.D. 78.5 mm × 6.5 mm × 4.0 mm



Cat. No.	Qty
2048501	1 ea
2048505	5 ea
2048525	25 ea

Inlet Liner, Splitless Type, Recessed Gooseneck Design (unpacked)

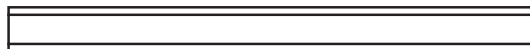
L × O.D. × I.D. 78.5 mm × 6.3 mm × 2.0 mm



Cat. No.	Qty
2879301-U	1 ea
2879305-U	5 ea

Inlet Liner, Splitless Type, Straight Design (unpacked)

L × O.D. × I.D. 78.5 mm × 6.3 mm × 4.0 mm



Cat. No.	Qty
2879401-U	1 ea
2879405-U	5 ea
2879425-U	25 ea

GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Inlet Liners for Varian® (CP-1177 Injector)***Inlet Liner, Splitless Type, Straight Design (unpacked)**

L x O.D. x I.D. 78.5 mm x 6.5 mm x 2.0 mm



Cat. No.	Qty
2051301	1 ea
2051305	5 ea
2051325	25 ea

Inlet Liner, Direct Type, Straight Design (unpacked)

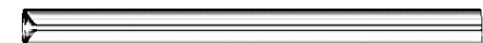
L x O.D. x I.D. 78.5 mm x 6.3 mm x 1.5 mm



Cat. No.	Qty
2051701	1 ea
2051705	5 ea
2051725	25 ea

Inlet Liner, Direct (SPME) Type, Straight Design (unpacked)

L x O.D. x I.D. 78.5 mm x 6.5 mm x 0.75 mm



Cat. No.	Qty
2637501	1 ea
2637505	5 ea
2637525	25 ea

PureCol Sleeves for Packed GC Columns

When nonvolatiles accumulate in the column inlet, you must replace several inches of packing - or the entire column. A silanized glass PureCol sleeve, inserted in the column inlet, solves this problem simply and inexpensively. When column performance begins to deteriorate, you can quickly and conveniently replace the sleeve - often without removing the column from the instrument. Replacement time is comparable to replacing a septum. Replace the PureCol sleeve when you change the septum, or when you analyze a new type of sample. PureCol sleeves are available in two sizes. The larger size fits any 4 mm I.D. glass column that has 7 cm of straight, unpacked inlet. The smaller size fits any 2 mm I.D. glass columns with 7 cm of straight, unpacked inlet (end must be chamfered). Use PureCol sleeves with a 2 in. (5 cm) 21-gauge or finer needle.

PureCol Sleeve

Description	Cat. No.	Qty
PureCol Sleeve, for 4 mm I.D. columns	20540-U	10 ea
	20543	50 ea
PureCol Sleeve, for 2 mm I.D. columns (chamfered inlet only)	20534	10 ea
	20536	50 ea

On-Column Injection

Splitter discrimination among sample components that have different boiling points causes inaccurate quantification among components. Using on-column injection with a 0.53 mm I.D. thin film capillary column yields negligible discrimination for paraffins up to C44. A syringe with a 6 in. (15.24 cm) needle is required to deposit samples properly within the sleeve.



Left to Right: Ferrule for 1/4 in. sleeve, Nut for 1/4 in. sleeve, Reducing union, Sleeve

	Cat. No.	Qty
Cool On-Column Injection Sleeve Kit		
1 injection sleeve plus 1/4 in. connecting hardware	23630	1 ea
Cool On-Column Injection Sleeve		
1 injection sleeve	20476	1 ea
Swagelok® Nut		
Swagelok®, 402-1, brass, 1/4 in. Swagelok	22000-U	20 ea
Supelco® M-2A Packed Column Ferrule, 1/4 in. Column O.D.		
I.D. 1/4 in., configured for 1/4 in. O.D. Column	22481	10 ea
Reducing Union (1/4 in. to 1/16 in.)		
1 stainless steel reducing union 1/4 in. to 1/16 in.	23633	1 ea
Capillary Column Butt Connector Nut		
1/16 in. male hexagonal wrenchtight	23805	4 ea
1/16 in. male knurled fingertight	23812	2 ea

GC Accessories

Inlet Liners, Glass Wool, and Specialized Hand Tools: *Injection Tee Kit*

Injection Tee Kit

Our injection tee allows simultaneous analyses on two wide bore columns of different polarity, a great time-saver when performing confirmatory analysis. The tee is deactivated, and the inlet is chamfered for use with autosamplers. Use in $\frac{1}{4}$ in. injection ports.

Kit includes deactivated 6 in. glass tee, two $\frac{1}{4}$ in. \times $\frac{1}{16}$ in. stainless steel reducing unions, ferrules for 0.53 mm I.D. and 0.75 mm I.D. columns, and instructions.



Left: Injection tee; Center: Ferrules for 0.53 mm I.D. columns; Right: Reducing unions

	Cat. No.	Qty
Injection Tee Kit		
6 in. (15 cm)	23664	1 ea
Injection Tee		
6 in. (15 cm)	23666	1 ea
8 in. (20 cm)	23667	1 ea
Swagelok® Nut		
Swagelok®, 402-1, brass, $\frac{1}{4}$ in. Swagelok	22000-U	20 ea
Supeltex® M-2A Packed Column Ferrule, $\frac{1}{4}$ in. Column O.D.		
I.D. $\frac{1}{4}$ in., configured for $\frac{1}{4}$ in. O.D. Column	22481	10 ea
Reducing Union ($\frac{1}{4}$ in. to $\frac{1}{16}$ in.)		
1 stainless steel reducing union $\frac{1}{4}$ in. to $\frac{1}{16}$ in.	23633	1 ea
Capillary Column Butt Connector Nut		
$\frac{1}{16}$ in. male hexagonal wrenchtight	23805	4 ea
$\frac{1}{16}$ in. male knurled fingertight	23812	2 ea

Glass Wool and Specialized Hand Tools

Wool plugs are often used in GC inlet liners to improve sample vaporization, and/or to keep non-volatile material from entering the column. They can also be used in packed GC columns, solvent desorption tubes, thermal desorption tubes, and purge traps to retain packed beds. Choose:

- **Pesticide Grade (Silanized)** for applications that involve active analytes, such as organochlorine and/or organophosphorous pesticides
- **Silanized** for general purpose use
- **Phosphoric Acid Treated** for acidic compounds such as barbiturates, free fatty acids, etc.
- **Non-Treated** for special application where the user deactivates based on their intended analytes

Our puller/inserter tool was specifically designed to assist in inserting/removing plugs to/from narrow bore tubing.

Glass Wool

Description	Cat. No.	Qty
Pesticide Grade (Silanized)	20409	10 g
	21688-U	100 g
Silanized	20411	50 g
	20410	250 g
Phosphoric Acid Treated	20383	50 g
Non-Treated	20384	50 g

Puller/Inserter Tool

Simplifies the task of inserting or removing wool or foam plugs when working with GC inlet liners, packed GC columns, solvent desorption tubes, thermal desorption tubes, and purge traps. The forked end is used to feed the plug into tubing, leaving it cleanly when the tool is removed. The hooked end will not disrupt the packing material when the plug is removed. Made of stainless steel, this tool can be used with 1 - 4 mm I.D. tubing (glass, metal, and PTFE).



22406

2 ea

Inlet Liner O-Rings and Inlet Seals for Agilent (5890, 6890, and 7890)

Two commonly replaced consumables in an Agilent capillary injection port are the inlet liner o-ring, and the inlet seal. Inlet liner o-rings develop stress cracks over time, potentially allowing split gases to enter the carrier gas stream. Inlet seals must be regularly changed to prevent sample adsorption due to accumulation of sample residue and/or septum fragments.

Inlet Liner O-Rings

These high temperature o-rings can be used with inlet temperatures up to 375 °C without sticking or fragmenting. Fit 6.3 mm O.D. (split) and 6.5 mm O.D. (splitless) capillary liners, and any $\frac{1}{4}$ in. O.D. capillary liner that uses an o-ring. Superior replacement for Viton o-rings.



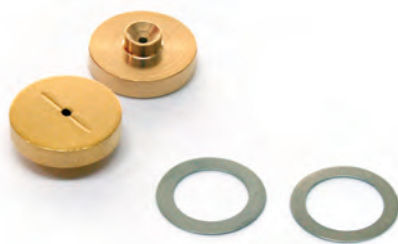
Cat. No.	Qty
21003-U	10 ea
21004-U	25 ea

GC Accessories

Inlet Liner O-Rings and Inlet Seals for Agilent (5890, 6890, and 7890): *Inlet Seals***Inlet Seals**

Supelco manufactures replacement inlet seals using a high quality stainless steel. Three versions are offered:

- **Gold-plated (straight design).** A straight design seal is suitable for applications with low split flows (<200 mL/min.). Plated with *pure gold* to insure inertness. No brighteners are used in the plating process. Each pack includes one washer for each seal.
- **Gold-Plated (cross design).** A cross design seal is suitable for applications with high split flows (>200 mL/min.). Plated with *pure gold* to insure inertness. No brighteners are used in the plating process. Each pack includes one washer for each seal.
- **Non-Plated (straight design).** A straight design seal is suitable for applications with low split flows (<200 mL/min.). More economical choice for applications that do not require high inertness. Packs of 2 and 10 include one washer for each seal. Pack of 100 includes 50 washers.



Left: Gold-plated (straight design) inlet seals; Right: Washers

Gold-Plated Inlet Seal (Straight Design)

Cat. No.	Qty
23318-U	2 ea
23319-U	10 ea

Gold-Plated Inlet Seal (Cross Design)

Cat. No.	Qty
23413-U	2 ea
23415-U	10 ea

Non-Plated Inlet Seal (Straight Design)

Cat. No.	Qty
23316-U	2 ea
23317-U	10 ea
23363-U	100 ea

Column Ferrules, Nuts, and Specialized Hand Tools

Supelco offers ferrules, nuts, and specialized hand tools for both capillary and packed column use. Supeltex® ferrules form leaktight seals without sticking to columns, and they do not require back ferrules. We recommend:

- Supeltex® M-2A, CapSeal Bullet®, or Supeltex® M-4 ferrules for fused silica capillary columns
- Supeltex® M-2A or Supeltex® M-4 ferrules for glass columns
- Supeltex® M-2A or Supeltex® M-2 ferrules for metal columns

Supeltex® M-1

- **Max. Temp.:** 250 °C
- **Composition:** Ceramic-filled PTFE
- **Characteristics:** Ideal for connections to mass spectrometers. High reusability. Isothermal use only.

Supeltex® M-2

- **Max. Temp.:** 350 °C
- **Composition:** DuPont VESPEL SP-1 (100% polyimide)
- **Characteristics:** High reusability.

Supeltex® M-2A

- **Max. Temp.:** 400 °C
- **Composition:** DuPont VESPEL SP-21 (85% polyimide/15% graphite)
- **Characteristics:** Seals at 1/4-turn past fingertight. High reusability. Won't stick to metal or glass.

Supeltex® M-2B

- **Max. Temp.:** 350 °C
- **Composition:** DuPont VESPEL SP-211 (75% polyimide/15% graphite, 10% PTFE)
- **Characteristics:** Conforms easily to capillary column, ensuring an effective seal and less chance of breakage.

Supeltex® M-4

- **Max. Temp.:** 450 °C
- **Composition:** Flexible graphite
- **Characteristics:** Seals at 1/4-turn past fingertight. Maximum sealing surface contact, reduced risk of column contamination at installation. An improved design. Supelco has refined the design of graphite ferrules so that we can offer you the finest quality ferrule available. Compare these ferrules to the graphite ferrules you are now using. Supeltex M-4 ferrules offer a clean, sharp profile with minimal flash.

CapSeal Bullet®

- **Max. Temp.:** 450 °C
- **Composition:** Graphite in an aluminum base
- **Characteristics:** Seals at 1/8-turn past fingertight. Reusable. A special end taper reduces graphite extrusion into fitting. Will not adhere to fittings. Reusable CapSeal Bullet ferrules consist of a graphite material captured in an aluminum base. This unique design keeps the ferrule from adhering to the fitting, making it easy to remove. Eliminate the headache of digging out a stuck ferrule and risking damage to your fitting.

O-Ring

- **Max. Temp.:** 200 °C
- **Composition:** Silicone
- **Characteristics:** Seals column having O.D. over or under specifications.

PTFE

- **Max. Temp.:** 250 °C
- **Composition:** PTFE
- **Characteristics:** Seals at 1/8-turn past fingertight.

Capillary GC Ferrules, Short Design

Short design ferrules are designed to fit:

- the original nuts that ship with Agilent Technologies GCs

Supeltex® M-2A Capillary Ferrule, Short Design

Column I.D.	Ferrule I.D.	Cat. No.	Qty
0.10-0.25 mm Column I.D.	I.D. 0.4 mm	24803-U	10 ea
		24807-U	50 ea
0.32 mm Column I.D.	I.D. 0.5 mm	24806-U	50 ea
0.53 mm Column I.D.	I.D. 0.8 mm	24801-U	10 ea
		24804-U	50 ea

GC Accessories

Column Ferrules, Nuts, and Specialized Hand Tools: *Capillary GC Ferrules, Short Design*

Supeltext® M-4 Capillary Ferrule, Short Design



Column I.D.	Ferrule I.D.	Cat. No.	Qty
0.10-0.25 mm Column I.D.	I.D. 0.4 mm	24811-U	10 ea
0.32 mm Column I.D.	I.D. 0.5 mm	24809-U 24813-U	10 ea 50 ea
0.53 mm Column I.D.	I.D. 0.8 mm	24808-U 24812-U	10 ea 50 ea

CapSeal Bullet® Capillary Ferrule, Short Design



Column I.D.	Ferrule I.D.	Cat. No.	Qty
0.10-0.25 mm Column I.D.	I.D. 0.4 mm	23864 23867	10 ea 50 ea
0.32 mm Column I.D.	I.D. 0.5 mm	23865 23868	10 ea 50 ea
0.53 mm Column I.D.	I.D. 0.8 mm	23866 23869	10 ea 50 ea

Capillary GC Ferrules, Long Design

Long design ferrules are designed to fit:

- MSD source nuts for Agilent Technologies GCs
- Original nuts that ship with PerkinElmer GCs
- Original nuts that ship with Varian GCs

Supeltext® M-2A Capillary Ferrule, Long Design



Column I.D.	Ferrule I.D.	Cat. No.	Qty
0.10-0.25 mm Column I.D.	I.D. 0.4 mm	24826-U 28022-U	10 ea 50 ea
0.32 mm Column I.D.	I.D. 0.5 mm	24824-U 28023-U	10 ea 50 ea
0.53 mm Column I.D.	I.D. 0.8 mm	24823-U 28024-U	10 ea 50 ea

Supeltext® M-2B Capillary Ferrule, Long Design



Column I.D.	Ferrule I.D.	Cat. No.	Qty
0.10-0.25 mm Column I.D.	I.D. 0.4 mm	22510-U	10 ea
0.32 mm Column I.D.	I.D. 0.5 mm	22511	10 ea
0.53 mm Column I.D.	I.D. 0.8 mm	22512	10 ea

Supeltext® M-4 Capillary Ferrule, Long Design



Column I.D.	Ferrule I.D.	Cat. No.	Qty
0.10-0.25 mm Column I.D.	I.D. 0.4 mm	28025-U 28028-U	10 ea 50 ea
0.32 mm Column I.D.	I.D. 0.5 mm	28026-U 28031-U	10 ea 50 ea
0.53 mm Column I.D.	I.D. 0.8 mm	28027-U 28032-U	10 ea 50 ea

CapSeal Bullet® Capillary Ferrule, Long Design



Column I.D.	Ferrule I.D.	Cat. No.	Qty
0.10-0.25 mm I.D. Column	I.D. 0.4 mm	23488 23493	12 ea 48 ea
0.32 mm I.D. Column	I.D. 0.5 mm	23489 23494-U	12 ea 48 ea
0.53 mm Column I.D.	I.D. 0.8 mm	23490 23495	2 ea 48 ea
0.50-0.75 mm I.D. Column	I.D. 1.0 mm	23491-U	12 ea

GC Accessories

Column Ferrules, Nuts, and Specialized Hand Tools: *Capillary GC Ferrules, General Purpose***Capillary GC Ferrules, General Purpose**

General purpose ferrules are designed to fit:

- Supelco Ferrule Nut Adapters for Agilent Technologies GCs
- $\frac{1}{16}$ inch compression nuts for PerkinElmer GCs

Supeltext® M-1 Capillary Ferrule, General Purpose

Column I.D.	Ferrule I.D.	Cat. No.	Qty
0.53 mm Column I.D.	I.D. 0.8 mm	22499	10 ea

Supeltext® M-2A Capillary Ferrule, General Purpose

Column I.D.	Ferrule I.D.	Cat. No.	Qty
0.10-0.25 mm Column I.D.	I.D. 0.4 mm	503258 22474	10 ea 50 ea
0.10-0.25 mm Column I.D. (2-hole)	I.D. 0.4 mm	22467	5 ea
0.32 mm Column I.D.	I.D. 0.5 mm	22461	10 ea
0.32 mm Column I.D. (2-hole)	I.D. 0.5 mm	22463	5 ea
0.53 mm Column I.D.	I.D. 0.8 mm	22489 22473	10 ea 50 ea
0.50-0.75 mm Column I.D.	I.D. 1.2 mm	22459	10 ea
Indented blank (drill to fit your column)	-	22488	10 ea

22467, 22463: 2-hole ferrules for splitting sample in the injection port onto two columns.

22488: indented blank ferrule that can be drilled to fit any capillary column O.D.

Supeltext® M-4 Capillary Ferrule, General Purpose

Column I.D.	Ferrule I.D.	Cat. No.	Qty
0.10-0.25 mm Column I.D.	I.D. 0.4 mm	22498 22480-U	10 ea 50 ea
0.32 mm Column I.D.	I.D. 0.5 mm	22462 22412	10 ea 50 ea
0.53 mm Column I.D.	I.D. 0.8 mm	20628 22479	10 ea 50 ea
0.75 mm Column I.D.	I.D. 1.0 mm	22494	10 ea
0.50-0.75 mm Column I.D.	I.D. 1.2 mm	22460	10 ea

CapSeal Bullet® Capillary Ferrule, General Purpose

Column I.D.	Ferrule I.D.	Cat. No.	Qty
0.10-0.25 mm Column I.D.	I.D. 0.4 mm	23480-U 23485	12 ea 48 ea
0.32 mm Column I.D.	I.D. 0.5 mm	23481 23486	12 ea 48 ea
0.53 mm Column I.D.	I.D. 0.8 mm	23482 23487	12 ea 48 ea

Packed GC Ferrules, $\frac{1}{4}$ in. O.D. Columns**Supeltext® M-1 Packed Column Ferrule, $\frac{1}{4}$ in. Column O.D.**

Ferrule I.D.	Cat. No.	Qty
I.D. $\frac{1}{4}$ in.	22086-U 22087-U	10 ea 100 ea

Supeltext® M-2 Packed Column Ferrule, $\frac{1}{4}$ in. Column O.D.

Ferrule I.D.	Cat. No.	Qty
I.D. $\frac{1}{4}$ in.	22320-U 22475	10 ea 50 ea

Supeltext® M-2A Packed Column Ferrule, $\frac{1}{4}$ in. Column O.D.

Ferrule I.D.	Cat. No.	Qty
I.D. $\frac{1}{4}$ in.	22481 22471	10 ea 50 ea

Supeltext® M-4 Packed Column Ferrule, $\frac{1}{4}$ in. Column O.D.

Ferrule I.D.	Cat. No.	Qty
I.D. $\frac{1}{4}$ in.	22492 22478	10 ea 50 ea

GC Accessories

Column Ferrules, Nuts, and Specialized Hand Tools: *Packed GC Ferrules, 1/4 in. O.D. Columns*

O-ring for Packed Column, 1/4 in. Column O.D.



Ferrule I.D.	Cat. No.	Qty
I.D. 1/4 in.	20407	100 ea

PTFE Packed Column Ferrule, 1/4 in. Column O.D.



Ferrule I.D.	Cat. No.	Qty
I.D. 1/4 in.	29024-U	10 ea

Packed GC Ferrules, 6 mm O.D. Columns

Supeltex® M-1 Packed Column Ferrule, 6 mm Column O.D.



Ferrule I.D.	Cat. No.	Qty
I.D. 6 mm	22089-U	10 ea

Supeltex® M-2A Packed Column Ferrule, 6 mm Column O.D.



Ferrule I.D.	Cat. No.	Qty
I.D. 6 mm	22393	10 ea
I.D. 6 mm	22196-U	100 ea

Supeltex® M-4 Packed Column Ferrule, 6 mm Column O.D.



Ferrule I.D.	Cat. No.	Qty
I.D. 6 mm	22493	10 ea

Packed GC Ferrules, 5 mm O.D. Columns

Stainless Steel Graphite Ferrules

Graphite ferrules and stainless steel spacers for use with 5 mm columns and liners in Shimadzu GCs.



23311	4 ea
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Packed GC Ferrules, 1/8 in. O.D. Columns

Supeltex® M-1 Packed Column Ferrule, 1/8 in. Column O.D.



Ferrule I.D.	Cat. No.	Qty
I.D. 1/8 in.	22496	10 ea
	22309	100 ea

Supeltex® M-2 Packed Column Ferrule, 1/8 in. Column O.D.



Ferrule I.D.	Cat. No.	Qty
ferrule I.D. 1/8 in.	22321	10 ea
	22476	50 ea

Supeltex® M-2A Packed Column Ferrule, 1/8 in. Column O.D.



Ferrule I.D.	Cat. No.	Qty
-	22483-U	10 ea
	22472	50 ea

Supeltex® M-4 Packed Column Ferrule, 1/8 in. Column O.D.



Ferrule I.D.	Cat. No.	Qty
I.D. 1/8 in.	22491	10 ea

GC Accessories

Column Ferrules, Nuts, and Specialized Hand Tools: *Packed GC Ferrules, 1/16 in. O.D. Columns**Packed GC Ferrules, 1/16 in. O.D. Columns*

Supeltex® M-1 Packed Column Ferrule, 1/16 in. Column O.D.



Ferrule I.D.	Cat. No.	Qty
I.D. 1/16 in.	22386	10 ea
I.D. 1/16 in.	23862-U	700 ea

Supeltex® M-2 Packed Column Ferrule, 1/16 in. Column O.D.



Ferrule I.D.	Cat. No.	Qty
I.D. 1/16 in.	20644-U	10 ea

Supeltex® M-2A Packed Column Ferrule, 1/16 in. Column O.D.



Ferrule I.D.	Cat. No.	Qty
I.D. 1/16 in.	22487-U	10 ea

Supeltex® M-4 Packed Column Ferrule, 1/16 in. Column O.D.



Ferrule I.D.	Cat. No.	Qty
I.D. 1/16 in.	22495-U	10 ea

Packed GC Ferrules, Reducing Design

Supeltex® M-1 Reducing Ferrule



For Use With	I.D. × O.D. (in.)	Cat. No.	Qty
1/16 in. O.D. Column in 1/8 in. fitting	1/16 × 1/8	22387	10 ea

Supeltex® M-2 Reducing Ferrule



For Use With	I.D. × O.D. (in.)	Cat. No.	Qty
1/16 in. O.D. Column in 1/4 in. fitting	1/16 × 1/4	22384	10 ea
1/8 in. O.D. Column in 1/4 in. fitting	1/8 × 1/4	22314	10 ea

Supeltex® M-2A Reducing Ferrule



For Use With	I.D. × O.D. (in.)	Cat. No.	Qty
1/16 in. O.D. Column in 1/8 in. fitting	1/16 × 1/8	22484-U	10 ea
1/16 in. O.D. Column in 1/4 in. fitting	1/16 × 1/4	22486	10 ea
1/8 in. O.D. Column in 1/4 in. fitting	1/8 × 1/4	22485-U	10 ea

Supeltex® M-4 Reducing Ferrule



For Use With	I.D. × O.D.	Cat. No.	Qty
0.32 mm I.D. Column in 1/8 in. fitting	0.5 mm × 1/8 in.	22458	2 ea
0.32mm I.D. Column in 1/4 in. fitting	0.5 mm × 1/4 in.	22457	2 ea

GC Ferrule Kits

Finding the right ferrule can be difficult. Simplify this chore with one of our ferrule starter kits. Each kit contains several types of Supeltex ferrules - you can determine which type is best for your applications. Kits include instructions for installing each ferrule.

Cat. No. 22469 is our kit for fused silica capillary columns (0.25 to 0.32 mm I. D.). It includes 4 drilled Supeltex M-2A, 4 indented blank Supeltex M-2A, 4 Supeltex M-4 ferrules, a pin vise drill kit (Cat. No. 23820-U), and instructions.

Cat. No. 22468 is our kit for wide bore fused silica capillary columns (0.53 to 0.75 mm I.D.). It includes 4 Supeltex M-1, 4 Supeltex M-2A, 4 Supeltex M-4 ferrules, a pin vise drill kit (Cat. No. 23820-U), and instructions.

Cat. No. 20648 is our kit for 1/4 in. O.D. glass packed columns. It includes 4 Supeltex M-1, 4 Supeltex M-2A, 4 Supeltex M-4 ferrules, a 6 in./15 cm × 1/4 in. practice piece of glass tubing, and instructions.

Description	Cat. No.	Qty
Fused Silica Ferrule Kit	22469	1 ea
Wide Bore Fused Silica Capillary Ferrule Kit	22468	1 ea
Packed Column Ferrule Kit	20648	1 ea

GC Accessories

Column Ferrules, Nuts, and Specialized Hand Tools: *Capillary GC Column Nuts*

Capillary GC Column Nuts

When performing capillary GC, it is critical to use the correct nut/ferrule combination. Improper nut/ferrule combinations can create dead volume (empty space that is not swept by carrier gas), resulting in poor chromatography (fronting peaks and/or band broadening).

Capillary Column Nut (fits Agilent injectors and non-MS detectors), hexagonal wrenchtight version

These stainless steel column nuts are replacements for damaged or misplaced original Agilent nuts. Use with *short* ferrules. Hexagonal shape allows tightening with a wrench to keep fingers from getting burned.



24833-U

2 ea

Supelco Ferrule Nut Adapter (fits Agilent injectors and non-MS detectors), hexagonal wrenchtight version

These stainless steel adapters enable you to use *general purpose* and other $\frac{1}{16}$ in. compression ferrules in Agilent GCs. Hexagonal shape allows tightening with a wrench to keep fingers from getting burned.



Supelco (Hexagonal) Ferrule Nut Adapter (22470-U)

22470-U

2 ea

Supelco Ferrule Nut Adapter (fits Agilent injectors and non-MS detectors), knurled fingertight version

These stainless steel adapters enable you to use *general purpose* and other $\frac{1}{16}$ in. compression ferrules in Agilent GCs. Knurled head allows tightening with fingers, eliminating the need to locate the proper wrench.



22509

2 ea

Capillary Column Nut (fits Agilent [MS detector] and PerkinElmer®), hexagonal wrenchtight version

These nickel-plated brass column nuts are replacements for damaged or misplaced original Agilent MSD or PerkinElmer nuts. Use with *long* ferrules.



28034-U

5 ea

Supelco Ferrule Nut Adapter (fits Agilent MS detectors), knurled fingertight version

These brass adapters enable you to use *long* or *general purpose* ferrules in Agilent MSDs. Made of brass to prevent damage to MSD source threads. Knurled head allows tightening with fingers, eliminating the need to locate the proper wrench.



22517

2 ea

Capillary Column Nut Kit (fits Shimadzu™)

Kit includes stainless steel nut, spring, stainless steel front ferrule, and metal back spacer. Note that 2 kits are needed per column.



23312

1 ea

Capillary Column Nut (fits Varian®)

These brass column nuts are replacements for damaged or misplaced original Varian nuts.



28033-U

1 ea

Specialized Hand Tools

These handy tools are designed specifically for use with GC ferrules.

Ferrule Remover

Spiral tapered tip for removal of capillary ferrules from nuts. Two sizes are included, for removing 0.4 mm and 0.8 mm I.D. ferrules. not available in EU



Z236128-1PAK

1 pkg

GC Accessories

Column Ferrules, Nuts, and Specialized Hand Tools: *Specialized Hand Tools***Pin Vise Drill Kit**

Drill the exact bore you need in hard or soft ferrules. Includes pin vise and 14 drill bits:

0.33 mm (0.0135 in.)
 0.40 mm (0.016 in.)
 0.56 mm (0.022 in.)
 0.63 mm (0.025 in.)
 0.72 mm (0.028 in.)
 0.77 mm (0.031 in.)
 0.83 mm (0.033 in.)
 0.91 mm (0.036 in.)
 0.97 mm (0.038 in.)
 1.02 mm (0.040 in.)
 1.06 mm (0.042 in.)
 1.17 mm (0.046 in.)
 1.40 mm (0.055 in.)
 1.61 mm (0.061 in.)

The vise handle holds all bits to keep them at your fingertips. The vise also is handy for gripping fine wire when cleaning FID jets, syringe needles, or any other small orifice.



23820-U

1 ea

Drill Bits

for use with Pin Vise Drill Kit

Description	Cat. No.	Qty
Drill Bits, diam. 0.35 mm	23811-U	6 ea
Drill Bits, diam. 0.40 mm	23810	6 ea
Drill Bits, diam. 0.51 mm	23809	6 ea

Capillary Column Installation, Maintenance, and Storage

This collection of specialized items is designed to assist the capillary GC user in several tasks.

Capillary Starter Kit

This convenient kit includes all the tools needed for installing capillary GC columns and related accessories. It contains:

6 in. (15 cm) pipe cleaners
 Tweezers
 Pocket mirror with rotating head
 $\frac{1}{4}$ in. \times $\frac{5}{16}$ in. open end wrench
 Capillary Cleaving Tool
 6 in. (15 cm) stainless steel ruler
 Small flashlight
 Pin vise drill kit
 Screw-type septum puller



23639

1 ea

Capillary Cleaving™ Tool

This handy tool makes scalpel-like cuts to polyimide-coated fused silica, leaving no jagged edges to create problems. The industrial sapphire cutting edges remains sharp indefinitely.

Description	Cat. No.	Qty
Retractable Blade Version	23814	1 ea
Replacement Blade (for P/N 23814)	23815	1 ea
Fixed Blade Version	23740-U	1 ea

Shortix™ Tubing Cutter

A rotating diamond cutting blade ensures precision cuts to polyimide-coated fused silica tubing. Even an inexperienced user can make the clean, 90° cuts required for capillary columns. Cuts 0.30 - 0.78 mm O.D. fused silica tubing. Includes a protective wood box for storage.



21386-U

1 ea

GC Accessories

Capillary Column Installation, Maintenance, and Storage

Column scribe

Inexpensive ceramic scribes for cutting fused silica tubing.

Z290254-1PAK

10 ea

Solvent Rinse Kit

Ideal for coating or washing capillary columns. Insert one end of the capillary column into the reservoir fitting and seal with a graphite ferrule. Gas pressure applied through a side arm forces the solution from the reservoir through the column.

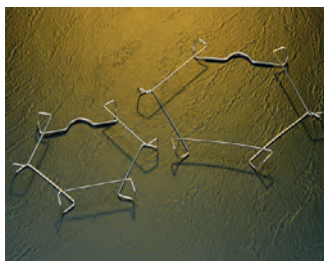


23626

1 ea

Cage for Fused Silica Column

This unique design with minimal metal-to-column contact reduces the possibility of damaging the protective coating on columns. Additionally, the design makes it easy to hang columns in most GC ovens.



Left: 23742; Right: 23743

For Use With	Cat. No.	Qty
0.25 mm I.D. column	23742	3 ea
0.32 mm or 0.53 mm I.D. column	23743	3 ea

Capillary Column Tags

Permanently label capillary columns.

- Soft enough to imprint with a ball-point pen
- Big enough for all necessary information
- Lightweight and will not damage column

writing surface L x W 1 1/8 in. x 3/4 in.
tongue L 5/16 in.



23779

100 ea

Capillary Column Connectors

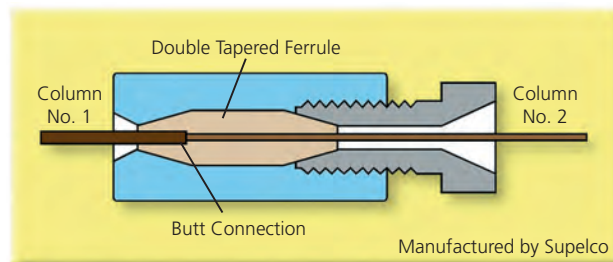
Column connectors are useful for attaching a guard column/retention gap to an analytical column, or for repairing a broken column. We offer two options for connecting two pieces of fused silica tubing. The **butt connector** is a small stainless steel fitting that makes a zero dead volume seal. The **GlasSeal™ connectors** offer convenience.

Capillary Column Butt Connectors



This device consists of a double-tapered ferrule and a stainless steel compression body with a threaded nut. Small (2.3 cm x 0.6 cm) and light (4.4 g with ferrule), it provides a gas tight seal without a change in column efficiency or inertness. The columns to be connected can have the same or different internal and external diameters. The butt connection is made inside the special double-tapered ferrule. The ferrule is then compressed within the housing. When the column ends are butted squarely and tightly together, the butt connector will not alter the chromatographic performance of your capillary columns. There is little or no dead volume and little chance of gas flow disruption by following these steps:

- Make sure the bore of the ferrule is clean. Blow out any ferrule fragments with nitrogen. Using a magnifier, examine the column ends to be connected. Make sure each cut is clean and square. The two ends must butt squarely, without any gaps.
- With white typewriter correction fluid, place a reference mark 1/4 inch from the end of the column with the larger bore. This mark will help you to confirm visually that the end of the column is centered within the 1/2 inch ferrule.
- Place the ferrule inside the housing and loosely tighten the nut. Feed the unmarked column completely through the ferrule and out the opposite end. Cut off ~1 inch (25 mm) of the column to ensure no ferrule fragments are in the column. Draw the column back far enough to insert the marked column into the ferrule to the indicating mark. Tighten the nut about 1/8 turn past fingertight.
- Press the ends of the columns together, observing the reference mark to make certain they butt together at the center of the ferrule. Tighten the ferrule to about 1/4-1/2 turn past fingertight. Gently pull on both columns to ensure they are secure. If they are loose, additional tightening is necessary.
- Any undetected leaking connection, including this butt connection, can allow oxygen and water vapor to enter the system. Leak check the butt connector in the same manner as any capillary column connection. **DO NOT USE LIQUID LEAK INDICATORS.** Liquids can contaminate the capillary system. We recommend using a GOW-MAC® electronic leak detector. These thermal conductivity detectors are highly sensitive to trace amounts of hydrogen or helium, and will not contaminate the system.



GC Accessories

Capillary Column Connectors: *Capillary Column Butt Connectors*

Capillary Column Butt Connector

	Cat. No.	Qty
Capillary Column Butt Connector		
I.D. 0.4 mm, Supeltex M-2 ferrule included	23796	1 ea
body only (ferrules not included)	23804	1 ea

Supeltex® M-2 Double-Tapered Ferrule

- Max. Temp.: 350 °C
- Composition: DuPont VESPEL SP-1 (100% polyimide)
- Characteristics: High reusability.



Compatible	I.D. (mm)	Cat. No.	Qty
Supeltex® M-2 Double-Tapered Ferrule			
0.10 mm to like I. D. column	0.25	22585	2 ea
0.10-0.25 mm to like I.D. column	0.4	23797	2 ea
0.32 mm to like I. D. column	0.5	22464	2 ea
0.53 mm to like I. D. column	0.8	22590-U	2 ea
0.10-0.25 mm I.D. to 0.53 mm I.D. column (reducing)	0.4-0.8	22465	2 ea
0.32 mm I.D. to 0.53 mm I.D. column	0.5-0.8	22596	2 ea
0.32 mm I.D. to 0.75 mm I.D. Column	0.5-1.2	22466	2 ea

Supeltex® M-2B Double-Tapered Ferrule

- Max. Temp.: 350 °C
- Composition: DuPont VESPEL SP-211 (75% polyimide, 15% graphite, 10% PTFE)
- Characteristics: Conforms easily to capillary column, ensuring an effective seal and less chance of breakage.



Compatible	I.D. (mm)	Cat. No.	Qty
Supeltex® M-2B Double-Tapered Ferrule			
0.10-0.25 mm to like I.D. Column	0.4	22453	2 ea
0.32 mm to like I. D. Column	0.5	22454	2 ea

Compatible	I.D. (mm)	Cat. No.	Qty
0.53 mm to like I. D. Column	0.8	22591	2 ea
0.10-0.25 mm I.D. to 0.53 mm I.D. Column	0.4-0.8	22455-U	2 ea
0.32 mm I.D. to 0.53 mm I.D. Column	0.5-0.8	22586	2 ea
0.32 mm I.D. to 0.75 mm I.D. Column	0.5-1.2	22456	2 ea

Capillary Column Butt Connector Nut

Replacement nut for the Capillary Column Butt Connector.

	Cat. No.	Qty
Capillary Column Butt Connector Nut		
1/16 in. male hexagonal wrenchtight	23805	4 ea
1/16 in. male knurled fingertight	23812	2 ea

GlasSeal™ Capillary Column Connectors

GlasSeal™ connectors are inexpensive, easy-to-use, and silanized for an inert inside surface.

- Straight connectors connect two pieces of fused silica tubing of the same or different diameters without the need for tools. The leak-free connection is useful to connect a guard column or transfer line, repair a broken column, or connect two columns (same or different phases).
- "Y" connectors connect three pieces of fused silica tubing of the same or different diameters without the need for tools. The leak-free connection is useful to split a sample to two columns, or to split a column effluent to two detectors.

For use with 0.10 - 0.53 mm I.D. fused silica tubing.

GlasSeal™ Capillary Column Connector, Fused Silica



Cat. No.	Qty
23627	5 ea
23628	25 ea

GlasSeal™ Capillary Column Connector, Borosilicate Glass



Cat. No.	Qty
20479	12 ea

GC Accessories

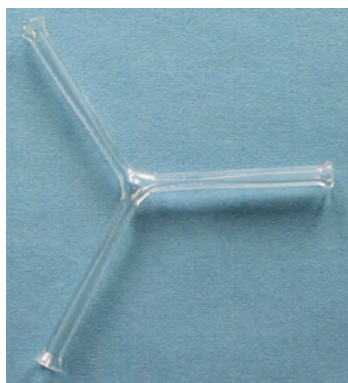
Capillary Column Connectors: *GlasSeal™ Capillary Column Connectors*

"Y" GlasSeal™ Connector, Fused Silica



Cat. No.	Qty
23631	1 ea
23632	3 ea

"Y" GlasSeal™ Connector, Borosilicate Glass



Cat. No.	Qty
20480	1 ea

Polyimide Sealing Resin

A GlasSeal™ connector will form a perfect seal between two fused silica columns. To make this connection extremely durable, use a small drop of this resin. Also for use as an excellent high temperature glue. Cures at 200 °C. For use at 350 °C or lower operating temperatures. The bottle contains 5 g of resin, and includes a handy applicator cap.

Cat. No.	Qty
23817	5 g

Packed Column Preparation, Installation, Maintenance, and Storage

This collection of specialized items is designed to assist the packed GC user in several tasks.

Sylon CT™

$C_2H_6Cl_2Si$ FW 129.06

► 5% dimethyldichlorosilane in toluene

For deactivating glassware.

Treat the glass tubing that you use for columns with Sylon-CT solution (5% dimethyldichlorosilane in toluene). It deactivates the tubing for use up to 350 °C to 400 °C, far exceeding the capabilities of other deactivating agents used at room temperature. Sylon CT™ also deactivates transfer lines and glass or glass-lined injection port liners. Instructions included.

33065-U	400 mL
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Packed Column Filling Kit

This convenient kit contains many of the items need to quickly and efficiently pack columns. Includes two puller/insertor tools (Cat. No. 22406), plastic funnel, rubber column connector, and 50 g of silanized glass wool for plugs.



22447	1 ea
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Funnel and Tubing

A small funnel and short piece of tubing simplify the process packing columns.

20390-U	1 ea
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Glass Wool

Description	Cat. No.	Qty
Pesticide Grade (Silanized)	20409	10 g
	21688-U	100 g
Silanized	20411	50 g
	20410	250 g
Phosphoric Acid Treated	20383	50 g
Non-Treated	20384	50 g

GC Accessories

Packed Column Preparation, Installation, Maintenance, and Storage

Puller/Inserter Tool

Simplifies the task of inserting or removing wool or foam plugs when working with GC inlet liners, packed GC columns, solvent desorption tubes, thermal desorption tubes, and purge traps. The forked end is used to feed the plug into tubing, leaving it cleanly when the tool is removed. The hooked end will not disrupt the packing material when the plug is removed. Made of stainless steel, this tool can be used with 1 - 4 mm I.D. tubing (glass, metal, and PTFE).



22406

2 ea

Dremel Engraver

Eliminate gaps when packing your columns. The Burgess Vibrograver is ideal for vibrating columns or marking tags.

- 110 VAC models: 9 watts, 0.08 amp, 60Hz.
- 220 VAC model: 12 watts, 0.05 amp, 50Hz; not CE compliant.



Description	Cat. No.	Qty
110 V	20402	1 ea

Stainless Steel Screening

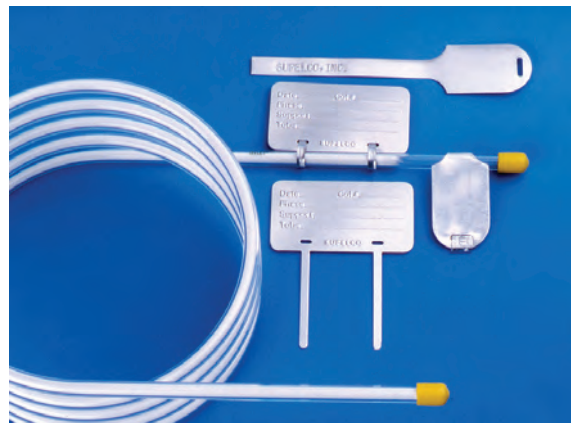
An alternative to the use of wool plugs to hold packing material inside columns. Includes a single 2 in. x 2 in. (5 cm x 5 cm) sheet of 10 µm pore size material.

22327

1 ea

Column Tag

These aluminum tags are easily marked with a Burgess Vibrograver or other scribing tool, for a permanent record of important chromatographic data.



Description	Cat. No.	Qty
engraved, two straps	20396	50 ea
plain, one strap	20401	100 ea

Rejuv-8™

► Silylating reagent

For packed columns only.

How can you improve deteriorating chromatographic results, salvage a tired column, or minimize peak tailing and sample loss when working with submicrogram samples? Simply inject 10- 50 µL of Rejuv-8 silylating agent directly onto your column. Contains no chlorosilanes.

33059-U

25 mL

Plastic Column Cap

These plastic caps will easily slip over the ends of packed GC columns to protect them during storage.



Description	Cat. No.	Qty
for use with 1/16 in. O.D. column	20436	100 ea
for use with 1/8 in. O.D. columns	20437-U	100 ea
for use with 3/16 in. O.D. column	20438-U	100 ea
for use with 1/4 in. O.D. column	20439	100 ea

GC Accessories

Flow Measurement

Flow Measurement

Those doing gas chromatography must routinely measure gas flows when setting up an instrument, developing a method, or troubleshooting. With today's modern GCs, chromatographers may rely on electronic pressure control (EPC) for setting flow rates. However, a flowmeter is still an essential tool to have when troubleshooting is necessary. Also, many older GCs still in use do not have EPC, requiring that flows be set manually using a flowmeter. Gas flowmeters generally fall into two types, volumetric (bubble) and mass, each with its advantages and limitations. Both types measure the amount of gas exiting a column or split vent in a specific time period.

Volumetric (Bubble) Measurement

If the amount of gas exiting a column or split vent is measured in units of volume, the flow rate is volumetric based. For example, measuring the volume of gas in milliliters (mL) per unit time in minutes will result in a volumetric flow rate in mL/min. The most common device for measuring a volumetric flow rate is a bubble flowmeter. These devices are used to determine flow by measuring the time required for a gas stream to move a soap bubble through a specific volume.

There are several important considerations when using a bubble flowmeter:

- The flow measurement is based on volume, and can be affected by atmospheric pressure and temperature conditions.
- If water vapor is present, it can result in an elevated flow rate measurement.
- The gas being measured can diffuse rapidly through the soap bubble resulting in an erroneously low flow rate measurement. This is especially a consideration for helium and hydrogen.

Usually, flow rates are measured at ambient temperature and pressure. If it is necessary to compare flow rates taken under different temperature and/or pressure conditions, a correction factor relative to a set standard temperature and pressure should be applied:

$$F_{ref} = F_{amb} (P_{amb}/P_{ref}) (T_{ref}/T_{amb})$$

Where:

- F_{ref} = flow corrected to reference conditions
- F_{amb} = flow measured at ambient conditions
- P_{amb} = atmospheric pressure at ambient conditions
- P_{ref} = pressure at reference conditions (1 atm commonly used)
- T_{ref} = temperature at reference conditions in Kelvin (K) (298 K commonly used)
- T_{amb} = temperature at ambient conditions in K

In the case of water vapor, a correction factor can be applied to the flow measurement to compensate:

$$\text{Corrected flow} = \text{measured flow} \times (1 - p_w/p_{amb})$$

Where:

- p_w = vapor pressure of water at ambient temperature
- p_{amb} = ambient pressure

To minimize the error introduced by diffusion of air, one can purge the flowmeter tube with several volumes of the gas being measured prior to taking the flow reading.

Mass Measurement

If the amount of gas exiting a column or split vent is measured in units of mass, the flow rate is mass based. Unlike volumetric flow rate, this measurement is not affected by atmospheric temperature or pressure changes. Also, no compensation for water vapor effect is required. The devices used for mass flow measurements in GC are usually thermal flowmeters, which are commonly referred to as mass flowmeters. The operating principle is that the gas flow transfers heat between two sensors in proportion to its mass and velocity. The resulting heat imbalance produces an electrical signal in the flow sensor, which is used to calculate mass flow in mass/unit time. This measurement is then converted to a volumetric value using constant temperature and pressure values, as well as the density of the gas. Fluctuations due to ambient temperature are

minimized by the heat. Because gases have differing thermal conductivities and densities, each mass flowmeter must be periodically calibrated for the specific gas to be measured. In contrast, a volumetric (bubble) flowmeter is non-specific (it can be used for any gas).

Digital Volumetric (Bubble) Flowmeters

A digital bubble flowmeter is one of the most useful tools in a GC lab. They are very reliable, and easy to use. The principle is that an optical sensor detects when the bubble enters and exits the calibrated tube. A microprocessor then calculates the resulting volumetric flow rate and displays it on a small screen.

NEW PRODUCTS

Optiflow Digital Bubble Flowmeters

Optiflow digital bubble flowmeters automate the bubble flowmeter "positive displacement" technique, which works independent of the type, mass, or mixture of the gas being measured. These high-precision instruments combine the simplicity and versatility of a bubble flowmeter with the speed and accuracy of a microprocessor. This provides you with a reliable means of measuring gas flow.

These versatile units can be used with all gases. Plus, they feature an easy-to-read, accurate digital display, eliminating the need for tedious bubble watching, timing, and flow rate/time conversions. The bubble is visible for your observation.

- Accurate to within $\pm 3\%$ of any reading
- Portable - includes standard 9-volt battery
- Automatic power-off for extended battery life
- Field replaceable tubes

► Model 520, flow range: 0.5-500 mL/min

Included with this product are: flowmeter, glassware (flow tube), squeeze bulb, bulb clamp, and flexible tubing.



28679-U

1 ea

GC Accessories

Flow Measurement: *Digital Volumetric (Bubble) Flowmeters*

NEW PRODUCTS

Optiflow Flowmeter Glassware Kits

This kit includes: glassware (flow tube), squeeze bulb, and flexible tubing.



28683-U

1 ea

Manual Volumetric (Bubble) Flowmeters

The most basic configuration of a bubble flowmeter is a calibrated tube, a stopwatch, and a good eye. The bubble is timed as it moves up the calibrated tube between two markings.

Manual Bubble Flowmeter (Capillary Version)

This 0.5 mL bubble flowmeter allows the true split ratio to be determined by measuring actual flow rate. The flow tube is graduated in 0.01 mL increments to allow for the low flows typical of capillary GC applications. The flow tube is held by two magnetic clamps so the unit can be attached to any metal surface for easy storage. A version that includes a sampling stand is offered for added portability.

Description	Cat. No.	Qty
magnetic clamps	23762-U	1 ea
stand included	23771	1 ea

Manual Bubble Flowmeter (Standard Version)

The most basic configuration of a bubble flowmeter is a calibrated tube, a stopwatch, and a good eye. The bubble is timed as it moves up the calibrated tube between two markings. Flow tubes are graduated as follows:

- 10 mL tube in 1 mL increments
- 25 mL tube in 5 mL increments
- 50 mL tube in 10 mL increments
- 100 mL tube in 20 mL increments

Includes glass flow tube with two magnetic clamps, a short piece of Tygon tubing and a squeeze bulb. **Stand not included.**

Description	Cat. No.	Qty
flow meter volume 10 mL	20562	1 ea
flow meter volume 25 mL	20431	1 ea
flow meter volume 50 mL	20432	1 ea
flow meter volume 100 mL	20433-U	1 ea

Manual Bubble Flowmeter (Large Version)

The most basic configuration of a bubble flowmeter is a calibrated tube, a stopwatch, and a good eye. The bubble is timed as it moves up the calibrated tube between two markings. An alternative tubing attachment port at the top of the flow tube allows the measurement of negative displacement. Flow tubes are graduated as follows:

- 500 mL tube in 50 mL increments
- 1000 mL tube in 100 mL increments

Includes the glass flow tube, 30 in. (3/4 m) of 5/16 in. Tygon tubing, a squeeze bulb, a collapsible stand, and a bottle of liquid soap solution.



20414

Description	Cat. No.	Qty
500 mL	20414	1 ea
1000 mL	20415	1 ea

Replacement 500 mL Glass Flow Tube

20427-U	1 ea
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Replacement 1000 mL Glass Flow Tube

20428-U	1 ea
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GC Accessories

Flow Measurement: *Volumetric (Bubble) Flowmeter Accessories*

Volumetric (Bubble) Flowmeter Accessories

A bubble is required for proper operation of a volumetric flowmeter. This is accomplished with a soap solution and a squeeze bulb. Both items can be replenished or replaced periodically.

SNOOP® Liquid Leak Detector

For use with volumetric (bubble) flowmeters. Also useful for checking gas delivery system plumbing for leaks. Not recommend for use upstream of capillary GC systems (an electronic leak detector is preferred).



20640-U	3.8 L
20434	8 oz

Squeeze Bulb 2mL

23166	10 ea
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Digital Mass Flowmeters

Benefits of a mass flowmeter over a volumetric (bubble) flowmeter include:

- Not affected by atmospheric temperature or pressure changes
- No need to compensate for water vapor effect
- Can be used for measurements outside the laboratory

The main drawback is the need for periodic calibration for the gas to be measured.

Aalborg Mass Flowmeter

This easy to use instrument can be used to measure gas flow rates for common GC gases (H₂, He, N₂, CO₂, air, and argon/methane mixtures). It features:

- ±1.5% accuracy
- Maximum inlet pressure: 500 psi (34.5 bar)
- Optimal operation at 20 psi (1.4 bar)
- Aluminum body for noncorrosive gases
- 1/4 in. NPT fittings
- Tilttable (more than 90°) LCD digital display
- Power options shown above must be purchased separately. Please see related tab for your required voltage.

EN 55011 Class I, Class B; and EN 50082-1

Principal of Operation

The stream of metered gas is split proportionally. A small part of the flow is shunted through a straight capillary sensor tube, the balance of the gas flows through a laminar flow conduit. Heat flux is introduced at two sections of the capillary sensor tube by means of precision wound coils. As it flows, the gas carries heat between the two coils. The resultant temperature differential is proportional to the change in resistance of the coils. Wheatstone bridges are used to monitor the instantaneous temperature of each of the coils. The closed loop control circuit detects and amplifies the temperature gradient and restores the temperature balance of the coils. The current required at any given time to maintain dynamic equilibrium is a function of the amount of heat carried by the gases. An output signal of 0-5 VDC or 4-20 mA is generated, which indicates the mass molecular-based flow rate of the metered gas. Flow rates are unaffected by temperature or pressure variations within stated limits.



Left: Flowmeter; Right: Battery kit with battery pack (back right), battery to flowmeter cable (front center), and battery AC power cord (front right)

Flow Range	Cat. No.	Qty
0-50 mL/min	503894	1 ea
0-100 mL/min	503908	1 ea
0-200 mL/min	503916	1 ea
0-500 mL/min	503924	1 ea
0-1 L/min	503932	1 ea
0-5 L/min	503940	1 ea
0-10 L/min	503959	1 ea

Aalborg Mass Flowmeter Power Supply

Description	Cat. No.	Qty
Aalborg Mass Flowmeter Power Supply, 110 V (12 VDC)	503282	1 ea
Aalborg Mass Flowmeter Power Supply, 230 V (12 VDC)	503290	1 ea

Aalborg Mass Flowmeter Battery Kit

Description	Cat. No.	Qty
Aalborg Mass Flowmeter Battery Kit, 110 V (AC)	503266	1 ea
Aalborg Mass Flowmeter Battery Kit, 230 V (AC)	503274	1 ea

GC Accessories

Instrument Upgrades and Maintenance

Instrument Upgrades and Maintenance

These products allow the user to upgrade their instrument with new components, replace worn items, and perform the necessary maintenance to keep the system in optimal condition.

Instrument Regulators/Controllers

Upgrading instrument pressure regulators and flow controllers can lead to improved system performance, and is a much less expensive option than the purchase of a new instrument. For example, an older system that employs column outlet pressure regulation can be upgraded to operate with backpressure regulation, allowing the user to:

- Conserve carrier gas
- Set linear velocity more accurately
- Use hydrogen carrier gas more safely

We offer instrument regulators/controllers made by Porter Instrument Company that are specifically designed for GC instrumentation. They are suitable for panel mounting, can be used to 160 °F, provide bubble-tight shutoff to 250 psi (helium), and have 1/8 in. brass Swagelok connections.

Porter Model 9000 Backpressure Regulator

Specifications

- Flow Capacity: 0-1000 cc/min
- Regulation Range: 0-100 psig (0-7.0 kg/cm²)
- Construction: aluminum body & bonnet, Fairprene 5029A diaphragm, Viton valve seat

Requires a low flow controller (Cat. No. 22834) with a 0-535 cc/min flow element (Cat. No. 22839).



22811-U

1 ea

Porter Low Flow Pressure Regulator

Provides precise pressure regulation at very low flows. Outlet pressure will not decrease more than 0.3 psi over the entire flow range.

Specifications

- Regulation Range: 0-100 psig (0-7.0 kg/cm²)
- Max. Operating Pressure: 250 psig (17.6 kg/cm²)
- Pressure Drop Required: >10 psi (0.7 kg/cm²)
- Control Accuracy: less than 0.3 psi decrease
- Construction: aluminum body & bonnet, stainless steel diaphragm & filter, Buna-N O-rings, Viton valve seat



22816

1 ea

Porter Model 4000 Miniature Pressure Regulator

Provides the same control and stability at lower pressures as the larger low flow pressure regulator (Cat. No. 22816), but requires much less space. The 1/8 in. (2.9 cm) O.D. body fits into the smallest of instruments. Recommended for flows of 0-500 cc/min. A 10 psi pressure change will not change the outlet pressure by more than 0.05 psi. From 2 cc/min to 250 cc/min, the outlet pressure will not change by more than 0.2 psi.

Specifications

- Flow Capacity: 0-15 liters/min (60 psig helium supply, 15 psig outlet)
- Regulation Range: 0-60 psig (0-4.2 kg/cm²)
- Max. Operating Pressure: 250 psig (17.6 kg/cm²)
- Pressure Drop Required: >10 psi (0.7 kg/cm²)
- Construction: aluminum body & bonnet, stainless steel diaphragm



22813-U

1 ea

Porter Low Flow Controller

Accurate to within 0.3%. Includes 0-110 cc/min flow element (green). Element can be changed depending on application. Order other elements [0-10 cc/min (blue) and 0-535 cc min (black)] separately.

Specifications

- Max. Operating Pressure: 250 psig
- Pressure Drop Required: >15 psi
- Construction: aluminum body & bonnet, Fairprene 5029A diaphragm, Viton valve seat, Buna-N O-ring



22834

1 ea

Optional Flow Elements

Fits Porter low flow controller (Cat. No. 22834).

Description	Cat. No.	Qty
flow rate: 0-10 cc/min (blue)	22836	1 ea
flow rate: 0-535 cc/min (black)	22839	1 ea

GC Accessories

Instrument Upgrades and Maintenance: *Injection Port Items*

Injection Port Items

Upgrading the sample introduction area (by installing a Merlin Microseal system, or a needle guide) will decrease the time and expense of changing rubber septa. Rethreading damaged threads will save money compared to the cost of replacing the entire injection port. Keep the injection port clean with specialized brushes.

Merlin Microseal™ System (fits Agilent)

Simply place the septum directly onto the septum cup and then add the nut (an additional adapter for the septum cup is not required for Agilent GCs). The septum incorporates a unique design with two sequential seals to provide a much longer life. Order replacement septa, or alternate versions, separately. Compatible with all Agilent autosamplers and stainless steel injection ports.

Note: Do not use with beveled tips.



Left: Septum; Right: Nut

Description	Cat. No.	Qty
1 nut and 1 Low Pressure (1-45 psi) septum	22584	1 ea
1 nut and 2 Low Pressure (1-45 psi) septa	22581-U	1 ea
1 nut and 1 General Purpose (3-100 psi) septum	24815-U	1 ea
1 nut and 2 General Purpose (3-100 psi) septa	24814-U	1 ea
1 nut	22582	1 ea

Merlin Microseal™ System (fits Varian®)

Varian GCs require an inlet adapter and an o-ring in addition to the septum and nut. The septum incorporates a unique design with two sequential seals to provide a much longer life. Order replacement septa, or alternate versions, separately. Not compatible with the Varian 8200 autosampler.

Note: Do not use with beveled tips.

Description	Cat. No.	Qty
For 1079 injector; 1 nut, 1 inlet adapter, 1 o-ring, and 1 General Purpose (3-100 psi) septum	24817-U	1 ea
For CP-1177 injector; 1 nut, 1 inlet adapter, 1 o-ring, and 1 General Purpose (3-100 psi) septum	22609-U	1 kit

Merlin Microseal™ System Replacement Septum

Three septa versions are available:

- **Low Pressure** for use with 23 gauge syringe needles, and injection port pressures between 1 and 45 psi. Do not use with syringe needles that have beveled tips.
- **General Purpose** for use with 23 gauge syringe needles, and injection port pressures between 3 and 100 psi. Do not use with syringe needles that have beveled tips.
- **SPME** for use with 23 gauge SPME fiber assemblies. Do not use with SPME fiber assemblies that have beveled tips.

Note: Do not use with beveled tips.

Description	Cat. No.	Qty
1 Low Pressure (1-45 psi) septum	22583	1 ea
1 General Purpose (3-100 psi) septum	24816-U	1 ea
1 SPME septum	24818-U	1 ea

Supelco Packed GC Septum Nut

The Supelco packed GC septum nut provides consistent septum tightness, resulting in better sealing and fewer bent needles. The nut contains a needle guide, ensuring that the needle consistently penetrates the septum in the same place, prolonging septum life. The guide also prevents the needle from striking the edge of the column. Each nut is supplied with easily interchanged 1/2 in. and 1 in. aluminum needle guides. The 9/16 in. stainless steel hexagonal nut head uses septa with a 9.5 mm diameter. For use with PerkinElmer (3920, 900, Sigma series), Agilent (5700), and other injection ports that accept a 1/4 in. Swagelok nut with 7/16 in. threads at 20/in.



22399

1 ea

Needle Guide

Prolongs septum and needle life. Use with septum nuts that have a 3/16 in. diameter hole in the center. For septum nuts with smaller holes, simply drill to 3/16 in. to insert guide.



20839-U

1 ea

Injection Port Rethreading Die

This die, enclosed in a knurled brass jacket, restores worn injection port threads, ensuring a good seal with the septum nut.

For Use With	Cat. No.	Qty
1/4 in. Varian nuts (7/16 in. threads at 24 threads/in.)	20854	1 ea
1/4 in. Swagelok nuts (7/16 in. threads at 20 threads/in.)	20855	1 ea
1/8 in. Swagelok nuts (7/16 in. threads at 20 threads/in.)	20856	1 ea

Injection Port Cleaning Kit (with Large Diameter Brushes)

Includes three stainless steel brushes (5 mm, 1/4 in., and 3/8 in. diameters) and one scraper for removing septa residue.

not available in EU

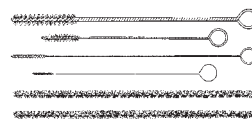
Z236144-1EA

1 ea

Injection Port Cleaning Kit (with Small Diameter Brushes)

Includes four nylon brushes (0.5, 1, 2, and 4 mm diameters) and 12" of pipe cleaner.

not available in EU



Z236160-1EA

1 ea

GC Accessories

Instrument Upgrades and Maintenance: *PID Lamps and FID Cleaning***PID Lamps and FID Cleaning**

Replacing PID lamps and cleaning FID jets on a routine schedule will help keep the GC system in peak operating condition.

PID Lamp

We offer high quality PID lamps manufactured by Andrews Glass Co.

Model 108 is the most commonly used PID lamp. The 0.781 in. (1.98 cm) base diameter is compatible with OI Model 4430, Tracor, and Baseline photoionization detectors.

Model 103C is the original PID lamp (developed by Scientific Services Co). The 1.375 in. (3.49 cm) base diameter is compatible with HNU and SRI detectors.

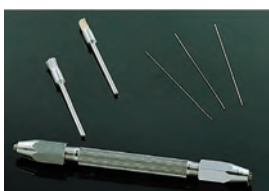


22626

Description	Cat. No.	Qty
Model 108, diam. 0.781 in., potential 10.0/10.6 eV, krypton bulb gas	22626	1 ea
Model 108-BTEX, diam. 0.781 in., potential 10.0/10.6 eV, krypton bulb gas	23129-U	1 ea
Model 103C, diam. 1.375 in., potential 10.0/10.2/10.6 eV, krypton bulb gas	22631	1 ea

FID Cleaning Kit

Includes three spiral jet reamers, a brass and a stainless steel minibrush, and a dual-ended handle the reamers and brushes. not available in EU



Z236179-1EA

1 ea

Packed GC FID Cleaning Kit

This collection of wire brushes is specially tailored to clean FIDs (and injection ports) that accept $\frac{1}{4}$ in. columns. Brass brushes prevent scratching and marring of expensive FID components and save downtime by allowing the detector to be cleaned while hot. Each kit includes two detector brushes, one injection port tube brush, a brass toothbrush (for cleaning jets and other odd surfaces), and a piece of fine emery cloth to clean electrical contacts.



Description	Cat. No.	Qty
for use with Agilent/HP instruments	22403	1 ea
for use with Varian instruments	22404	1 ea

Split Vent Traps

Most capillary GC methods split some of the sample in the injection port away from the column.

- When operating in the split injection mode, the split is always open
- When operating in the splitless injection mode, the split valve is typically opened after 0.5 - 2 minutes to drive any residual solvent vapors away from the column to minimize the solvent tail

These vapors are released through a split vent port, commonly located on the front of the instrument. Some type of engineering control needs to be used to protect users from breathing in these potentially harmful vapors. One method is to attach flexible tubing to the split vent port, and run it to a fume hood. A less cumbersome (and more aesthetic) approach is to attach a carbon scrubber directly to the split vent port.

Supelcarb® Split-Vent Trap

This is a very simple strategy to prevent sample vapors from entering the workplace environment! Our Supelcarb Split Vent Trap traps a broad range of organic compounds, and works with typical split vent flow rates of 10-100 mL/min. The Supelcarb specialty carbon adsorbent is engineered to provide twice the trapping capacity of activated charcoal. Additionally, a narrow particle size distribution and spherical shape allows tight packing and less gas channeling than the irregular shape of activated charcoal particles. We recommend replacing the trap every two weeks. This is based on data that shows that breakthrough of the Supelcarb Split Vent Trap occurs after approximately 2 weeks at 65 mL/min, a much longer time than with other traps that use activated charcoal adsorbent.



22536

Description	Cat. No.	Qty
Supelcarb® Split-Vent Trap Starter kit (1 trap and attachment fittings)	22536	1 ea
Replacement trap	2253502	2 ea
	2253505	5 ea

GC Accessories

Instrument Upgrades and Maintenance: *Manual Sampling/Switching Valves*

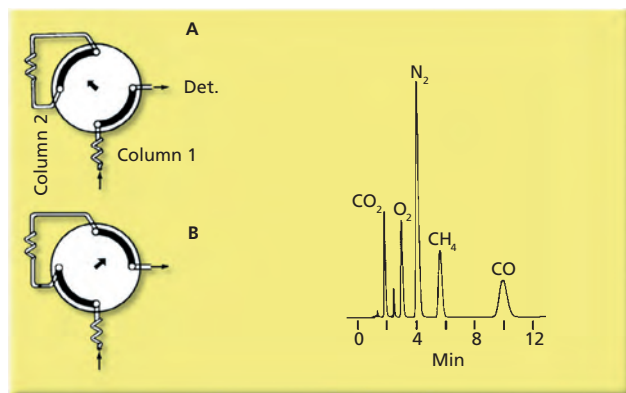
Manual Sampling/Switching Valves

Sampling valves and/or column switching valves can make a GC system much more versatile. Adding multi-port valves will enable an instrument to perform analyses that call for switching columns, reversing the elution sequence of sample components, selecting between two columns to a single detector, and the analyses of gas samples through a sample loop. These valves also eliminate pressure surges and improve sample-to-sample reproducibility of peak separations. We offer manual sampling and switching valves manufactured by Valco.

These precision valves utilize zero volume fittings that allow connections to be made directly to the valve, minimizing dead volume for on-column injections, and adapt easily to any type of tubing. Valve bodies are made of 303 grade stainless steel, and use PTFE-filled rotors. Each valve includes the complete valve, zero volume nuts, a mounting bracket, and a 3 in. handle.

4-Port Sampling and Switching Valve

Isolate a column to prevent a compound, emerging from an upstream column, from being irreversibly adsorbed. In the figure, CO₂ is separated from air in Column 1, and bypasses Column 2 when the valve is switched to position B. After the CO₂ is detected, the valve is switched back to position A and O₂, N₂, CH₄, and CO elute from Column 2 to the detector.

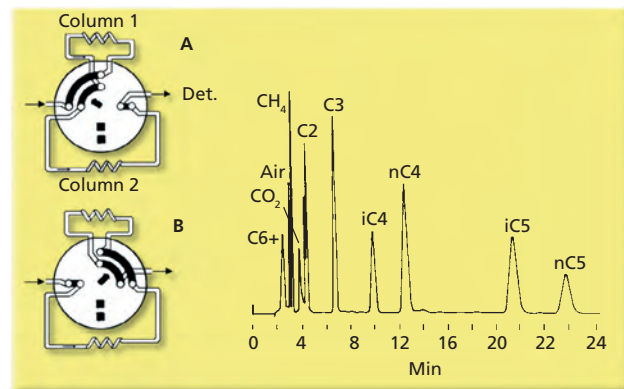


column 1: 60/80 Chromosorb 102, 6 ft × 1/8 in. SS
column 2: 60/80 Molecular Sieve 5A, 3 ft × 1/8 in. SS
oven: 50 °C, Sample: 1% mixture in H₂

Description	Cat. No.	Qty
fitting 1/8 in., maximum temperature 300 °C	22914	1 ea
fitting 1/8 in., maximum temperature 175 °C	22975	1 ea
fitting 1/16 in., maximum temperature 300 °C	22941	1 ea

6-Port Sampling and Switching Valve

Foreflushing allows you to separate low molecular weight compounds. In the example shown, C1-C5 hydrocarbons are rapidly eluted from Column 1 onto Column 2 (position A). When the valve is switched to position B, C6 and heavier compounds (which have moved slowly through Column 1) are eluted from Column 1 to the detector. C1-C5 hydrocarbons are eluted from Column 2 back onto Column 1, then to the detector.

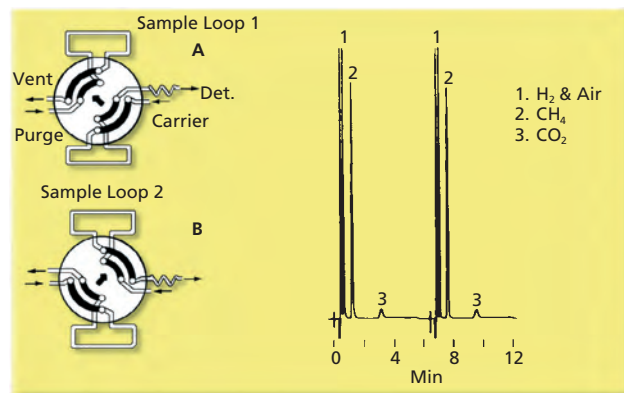


column 1: DC-200 on 60/80 Chromosorb P AW, 2.5 ft × 1/8 in. SS
column 2: DC-200 on 60/80 Chromosorb P AW, 30 ft × 1/8 in. SS
oven: 88 °C

Description	Cat. No.	Qty
fitting 1/8 in., maximum temperature 300 °C	22915	1 ea
fitting 1/8 in., maximum temperature 175 °C	22977	1 ea
fitting 1/16 in., maximum temperature 300 °C	22950	1 ea
fitting 1/16 in., maximum temperature 175 °C	22976	1 ea

8-Port Sampling and Switching Valve

Select between two columns connected to a single detector requiring auxiliary gas for the second column. The figure shows the 8-port sampling valve with two sample loops used for repetitive sample injections on one column.



column: 60/80 Chromosorb 102, 5 ft × 1/8 in. SS
oven: 40 °C, Sample: 5% mixture in H₂

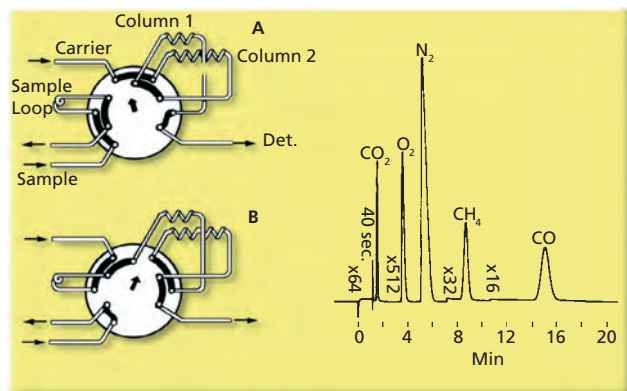
Description	Cat. No.	Qty
fitting 1/8 in., maximum temperature 300 °C	22916	1 ea

GC Accessories

Instrument Upgrades and Maintenance: *Manual Sampling/Switching Valves*

10-Port Sampling and Switching Valve

The figure illustrates the use of sequence reversal to monitor CO₂, CH₄, and CO in air. The sample is injected onto Column 1 and held 40 seconds to allow the composite peak of air, CO, and CH₄ to pass onto Column 2. The valve is switched back to position A and the column sequence is reversed to allow CO₂ to pass to the detector, followed by O₂, N₂, CH₄, and CO.



column 1: 60/80 Chromosorb 102, 5 ft × 1/8 in. SS
 column 2: 60/80 Molecular Sieve 5A, 5 ft × 1/8 in. SS
 oven: 70 °C, Sample: 1% mixture in air

Description	Cat. No.	Qty
fitting 1/8 in., maximum temperature 175 °C	22981	1 ea

Sample Loop for Gas Sampling

This 303 stainless steel sample loop does not include zero volume nuts (must purchase separately).

Description	Cat. No.	Qty
loop volume 5.0 mL, fitting 1/8 in., number of ports: 10	22651	1 ea
loop volume 5.0 mL, fitting 1/8 in., number of ports: 6	22635	1 ea
loop volume 0.5 mL, fitting 1/8 in., number of ports: 6	22633	1 ea
loop volume 0.25 mL, fitting 1/16 in., number of ports: 6	22628	1 ea

Ink Cartridges

Older Agilent/HP instruments may still employ an integrator for performing the data processing tasks. In addition to replacing the chart paper, the ink cartridge needs replaced periodically.

Agilent/HP JetPaper Print Cartridge

Fits the Agilent/HP 3396A integrator, plus QuietJet, ThinkJet, and QuietJet Plus printers. One cartridge prints ~600,000 characters in black ink.



22775

1 ea

Recorder Pens

Chart recorders were used by chromatographers long before computers were widespread in analytical labs. We offer recorder pens for some of the most common chart recorders still being used.

Recorder Pens for Houston Instruments Recorders

For use with recorder models 5110 and 5210 (1- and 2-pen versions).



Nib L (in.)	Ink	Cat. No.	Pkg
3/8 (10 mm)	red	22938	4 ea
3/8 (10 mm)	blue	22939	4 ea

Recorder Pen for Kipp & Zonen Recorders

For use with recorder models BD7, BD8, BD9, BD10, BD11, BD12, BD14, BD14D, BD30, BD31, BD40, and BD41.



Nib L (in.)	Ink	Cat. No.	Pkg
1/4 (7 mm)	black	22752-U	6 ea

Recorder Pen for Linear Instruments Recorders



Cat. No. 22774

For models: 140, 141, 143, 232, 255, 282, 285, 285-14, 291, 294, 355, 361, 385, 395, 412, 422, 432, 455, 456, 485, 486



Cat. No. 22770-U

For models: 112, 152, 160, 161, 212, 222, 252, 252A, 254, 255-14, 260, 264

Nib L (in.)	Ink	Cat. No.	Pkg
1/4 (7 mm)	black	22774	5 ea
1/4 (7 mm)	black	22770-U	5 ea

GC Accessories

Instrument Upgrades and Maintenance: *Chart Paper*

Chart Paper

To record data on paper, a chart recorder/integrator can use either ink (cartridge or pen) or thermal means. We *still* offer replacement chart paper (rolls and pads) for many makes and models of chart recorders/integrators.

Chart Paper for Many Recorders

Recorder Model	Chart Type	Mfr.'s Chart No.	Single Roll/Pad		Cat. No.	Box Qty. per Box	Price
			Cat. No.	Price			
Agilent/HP Recorders							
1080, 3380, 3388A, 5380, 5880	Z-fold blank, blue	5080-8735	22870		22885-U	10	
	Z-fold blank, black	9270-0658	22887		22888	10	
85B, 3390, 3390A, 3392A	blank, blue, 107 mm × 400' roll (82931A)	5080-8800	22337 ¹		22346	10	
	blank, black, 107 mm × 400' roll (82954A)	9270-1134	22355-U ¹		22356	10	
3394, 3395, 3396	blank roll Z-fold JetPaper, 500 sheets	5181-1219 5062-3561	22350-U		22357 22896	4 5	–
Houston Instruments Recorders							
B-5000 Series	0–10 English	EC-100	22934 ²		–	–	–
Kipp & Zonen Recorders							
BD 40/41	0–100 (230 mm × 66 ft)	XR-9	–		22802	25	–
BD 111/112	100-0 English (230 mm × 66 ft)	XR-18	23609		–	–	–
Linear Instruments Recorders							
1200, 1201, 1202, 1210, 2020, 2030	0100-0026	–	–		22349	25	–
Perkin Elmer Recorders							
056	0– 100 double scale metric	056-7300	22854		–	–	–
Sigma Series (except Sigma 15)	Z-fold blank, blue	332-1910/30/31	22870		22885-U	10	
	Z-fold blank, black	–	22887		22888	10	
LCI-100, GP100	blank	N625-1026/27	–		22856	25	–
R100	0– 100 English (274 mm × 85 ft)	C005-0610	23613		–	–	–
EX-800, FX-85 PR-100/110/	Z-fold JetPaper, 500 sheets	0944-1006	–		22896	5	–
Shimadzu Recorders							
C-R3A	black thermal (8 3/16 in. × 167 ft)	221-25412-00	–		22851	10	–
C-R5A	black thermal (208 mm × 148 ft)	223-02037-81	–		22838	10	–
C-R4A	black thermal (255 mm × 148 ft)	223-02000-12	23615		23616	25	–
C-R1A, C-R1B	black thermal (8 3/16 in. × 170 ft)	S221-13391-01	23617		–	–	–
CR501	blank (208 mm × 168 ft)	223-02037-02	–		23604	10	–
Spectra Physics Recorders							
4270, 4290	blank (9.3 in. × 165 ft)	A-2157-010	22374		22375	25	–
4400	Z-fold JetPaper, 500 sheets	4000-010	–		22896	5	–
Varian Recorders							
3000	black thermal, blank (4.33 in. × 150 ft)	03-917650-01	–		22891	12	–
4270, 4290	blank (9.3 in. × 165 ft)	00-997140-01	22374		22375	25	–
4400	Z-fold JetPaper, 500 sheets	00-997325-00	–		22896	5	–
Waters Recorders							
–	Z-fold, blue	74701	22870		22885-U	10	–
–	Z-fold blank, black	74703	22887		22888	10	–
746	Z-fold JetPaper, 500 sheets	87137	–		22896	5	–

¹ 2 rolls² 4 rolls

Gas Purification/Management

Gas Purification/Management



It is critical that a gas delivery system provides gas at the proper purity level, and at the correct pressure, based on its intended use. Supelco offers many products that enable the GC user to purify and manage their gas streams (such as helium, hydrogen, nitrogen, argon, 5% methane in argon, and air). Some of these items are Supelco brand products, such as many of the purifiers we offer (OMI, High Capacity, and Supelcarb). Others items are sourced from well-known suppliers, such as Swagelok (tubing fittings), Airgas (gas cylinder regulators), and Parker (gas generators).

We have organized products into three groups to simplify locating the required item:

- **Purifiers:** Used to achieve the required purity level by removing specific contaminants from a gas stream based on its intended use.
- **Plumbing/Regulation:** Used to transport gases from the source (gas cylinder or gas generator) to the point of use. This group includes tubing, fittings, and valves, plus products for pressure regulation and measurement, flow regulation and measurement, and leak detection.
- **Gas Generators and Air Compressors:** When possible, generating gas on-site is often a less expensive option to gas cylinders.

Purifiers

Gas is used to perform several functions associated with the GC technique. Each function has specific contaminants that must be controlled. Listed here are several of those functions, the contaminants that must be controlled, the appropriate gas choices, and recommendations for purifier selection.

Column Carrier Gas

- **Description:** The 'mobile phase' in GC, it transports analytes through the column, between the injector and detector, when the analytes are not partitioned into the stationary phase.
- **Remove:** Hydrocarbons, moisture, and oxygen. An overall gas purity of 99.9995% is desirable to optimize chromatography and column life.
- **Gas Choices:** Helium, hydrogen, nitrogen, argon, or 5% methane in argon.
- **Purifiers (Option 1):** [In series] Supelcarb HC hydrocarbon trap, molecular sieve 5A moisture trap, Supelpure-O oxygen trap, OMI (oxygen moisture indicating) polishing purifier.
- **Purifiers (Option 2, not for use with hydrogen):** [In series] Supelcarb HC hydrocarbon trap, high capacity gas purifier, OMI (oxygen moisture indicating) polishing purifier.
- **Purifiers (Option 3, for helium delivery to GC-MS):** Supelco helium purifier.

Purge Gas for Purge and Trap Operation

- **Description:** Water, and soil mixed with water, can be gas purged to drive analytes onto a trap containing adsorbent beds. This adsorbent bed trap is subsequently desorbed to transport analytes to the head of the GC column.
- **Remove:** Hydrocarbons.
- **Gas Choices:** Helium or nitrogen. Helium can be used for both the purge and desorption modes. Nitrogen can only be used for the purge mode (to reduce costs).
- **Purifier:** Supelcarb HC hydrocarbon trap.

Make-up Gas for ECD Operation

- **Description:** An ECD requires a non-inert gas for proper operation. When helium, hydrogen, or argon is used as the carrier gas, a stream of non-inert gas is plumbed into the carrier gas line between the column outlet and the detector inlet.
- **Remove:** Hydrocarbons, moisture, and oxygen. An overall gas purity of 99.9995% is desirable to optimize sensitivity and prolong detector life.
- **Gas Choices:** Nitrogen or 5% methane in argon.
- **Purifiers:** [In series] Supelcarb HC hydrocarbon trap, molecular sieve 5A moisture trap, Supelpure-O oxygen trap, OMI (oxygen moisture indicating) polishing purifier.

Fuel Gas to Support FID Combustion

- **Description:** A fuel source, along with oxygen and heat, is required to generate/maintain a flame.
- **Remove:** Hydrocarbons.
- **Gas Choices:** Hydrogen.
- **Purifier:** Supelcarb HC hydrocarbon trap.

Oxygen Source to Support FID Combustion

- **Description:** An oxygen source, along with fuel and heat, is required to generate/maintain a flame.
- **Remove:** Hydrocarbons and moisture.
- **Gas Choices:** Air.
- **Purifiers:** [In series] Supelcarb HC hydrocarbon trap, molecular sieve 5A moisture trap.

Fourier Transform Infrared Spectroscopy (FTIR) and Total Organic Carbon (TOC) Operation

- **Description:** These detection techniques operate in a nitrogen or air environment, and are sensitive to the presence of carbon dioxide.
- **Remove:** Carbon dioxide and moisture.
- **Gas Choices:** Nitrogen or air.
- **Purifiers:** [In series] Carbon dioxide trap (evolves moisture as carbon dioxide is absorbed), molecular sieve 5A moisture trap.

Pneumatic Control

- **Description:** Pressure is used to drive equipment, such as autosamplers and valves.
- **Remove:** Moisture.
- **Gas Choices:** Air.
- **Purifier:** Economy moisture trap.

Gas Purification/Management

Purifiers: OMI® (Oxygen Moisture Indicating) Polishing Purifiers

OMI® (Oxygen Moisture Indicating) Polishing Purifiers

The OMI is a polishing purifier that removes many contaminants that other upstream purifiers miss. It will simultaneously and irreversibly remove moisture, oxygen, carbon monoxide, carbon dioxide, most sulfur compounds, most halogen compounds, alcohols, and phenols to less than 10 ppb. It is recommended that an OMI be installed in carrier gas streams just upstream of every GC. It consists of two components:

- A re-useable **tube holder** that is installed into the gas delivery system. The use of polycarbonate provides see-through capability along with safety.
- A **purifier tube** containing an indicating resin (changes color from black to brown when exposed to as little as 1 ppm of moisture or oxygen). The use of glass provides see-through capability and prevents diffusion of room contaminants into the gas stream.

Spent purifier tubes are easily replaced. Simply unscrew the end assembly from the tube holder and replace it with a new purifier tube. The design prevents room air from entering the new tube during installation (protective foil covers on each end are only pierced as the end assembly is screwed back onto the tube holder to complete installation).

OMI® Tube Holder

Specifications:

- The OMI-2 tube holder is 10 in. (25.4 cm) long with a diameter of 1.5 in. (3.8 cm) and 1/8 in. fittings.
- The OMI-4 tube holder is 16 in. (40.6 cm) long with a diameter of 1.5 in. (3.8 cm) and 1/8 in. fittings.



OMI-2 tube holder

Description	Cat. No.	Qty
for use with OMI-2 purifier tubes	23921	1 ea
for use with OMI-4 purifier tubes	23926	1 ea

OMI® Purifier Tube



OMI-2 purifier tube

Description	Cat. No.	Qty
OMI-1 Purifier Tube	23900-U	1 ea
OMI-2 Purifier Tube	23906	1 ea
OMI-4 Purifier Tube	23909	1 ea

OMI® Seal Kit

Replace worn seals on OMI-2 and OMI-4 tube holders periodically to reduce the risk of leaks. Kits includes two PTFE seals and handy tool.

23917	1 ea
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Supeltex® M-1 Ferrule

Replace ferrules on OMI-1 tube holders periodically to reduce the risk of leaks.

- **Max. Temp.:** 250 °C
- **Composition:** Ceramic-filled PTFE
- **Characteristics:** Ideal for connection to mass spectrometers. High reusability. Isothermal use only.

Cat. No.	Qty
22311	10 ea

High Capacity Gas Purifiers (Remove Moisture and Oxygen)

The best purifier choice for removing moisture and oxygen from carrier gas streams is our High Capacity Gas Purifier. It consists of three parts:

- Clam-shell oven
- Replaceable heating elements
- Replaceable converter tube

A convenient starter kit contains all three items for new installations.

High Capacity Gas Purifier, Starter Kit

No other purifier removes both moisture and oxygen in such large quantities (35 liters of moisture, 14 liters of oxygen).

Protects GC columns and detectors from damage caused by moisture and oxygen in the carrier gas stream, even when present up to 100 ppm levels. The clam-shell oven heats a converter tube to 580 °C, causing moisture and oxygen to irreversibly react with the reactant material. This chemical reaction prevents contaminants from returning to the gas stream, even when the material approaches saturation, or when the oven is cooled. Carbon monoxide and carbon dioxide are also removed.

It is recommended to install 4 ft. (1.2 m) of tubing downstream of the oven to allow heat to dissipate from the gas stream. This tubing can be coiled to reduce space.

The starter kit includes a clam-shell oven, two elements (installed), and a converter tube.

Note: Not for use with hydrogen gas.

Clam-Shell Oven

- **Length:** 14 1/2 in. (36.8 cm)
- **Height:** 5 1/4 in. (13.3 cm)
- **Depth:** 6 in. (15.2 cm)
- **Operating Temp.:** 580 °C
- **Power Consumption:** 90 watt
- **Mounting:** Horizontally only (bench or wall) using integral bracket
- **Warranty:** 1 year

Converter Tube

- **Length:** 10 in. (25.4 cm)
- **Diameter:** 1/2 in. (12.7 mm)
- **Max. Inlet Pressure:** 150 psi
- **Max. Flow Rate:** 1100 mL/min.

Gas Purification/Management

Purifiers: *High Capacity Gas Purifiers (Remove Moisture and Oxygen)*

In-Line Purifiers (Remove a Single Contaminant)

These purifiers will remove a specific contaminant (hydrocarbons, moisture, oxygen, or carbon dioxide) from a gas stream. They are filled with a single adsorbent material, providing greater capacity for individual contaminants than many multi-bed purifiers. When spent, just that purifier needs replaced (and not an entire multi-bed purifier). They can be used in series with other purifiers, for various applications.

NEW PRODUCTS

Supelcarb® HC Hydrocarbon Trap

Supelcarb adsorbent has the greatest trapping ability of hydrocarbons per gram of adsorbent (twice that of activated charcoal). Simply stated, Supelcarb HC hydrocarbon traps are the best trap available for removing hydrocarbons and other organics from carrier, fuel, air, and other gas streams.

Dimensions:

- 120 cc Trap: 11 1/8 in. (28.2 cm) long x 1 3/8 in. (35 mm) diameter
- 750 cc Trap: 16 1/2 in. (41.9 cm) long x 2 5/16 in. (59 mm) diameter



Top 24565, Bottom 24449

Description	Cat. No.	Qty
volume 120 cc, fitting 1/8 in.	24448	1 ea
volume 120 cc, fitting 1/4 in.	24449	1 ea
volume 750 cc, fitting 1/4 in.	24564	1 ea
volume 750 cc, fitting 1/2 in.	24565	1 ea

Supelpure® HC Hydrocarbon Trap

Activated charcoal adsorbs hydrocarbons and other contaminants from carrier gases, air, and hydrogen. Operates efficiently for approximately six months when total hydrocarbons in the incoming gas average 10 ppm.

Dimensions:

- 120 cc Trap: 11 1/8 in. (28.2 cm) long x 1 3/8 in. (35 mm) diameter
- 750 cc Trap: 16 1/2 in. (41.9 cm) long x 2 5/16 in. (59 mm) diameter
- S-Trap: 7 1/2 in. (19 cm) long x 5 9/16 in. (14.1 cm) wide x 1/2 in. (13 mm) diameter [total bed length = 19 3/4 in. (50.2 cm); the extended bed length ensures prolonged contact between the gas and the adsorbent and provides greater working capacity]

Description	Cat. No.	Qty
volume 120 cc, fitting 1/8 in.	22445-U	1 ea
volume 120 cc, fitting 1/4 in.	22446	1 ea
volume 750 cc, fitting 1/4 in.	24518	1 ea
volume 750 cc, fitting 1/2 in.	24519	1 ea
S-trap, fitting 1/8 in.	503142	1 ea

Supelpure® HC Hydrocarbon Trap Refill

Activated charcoal.

▶ volume 474 cc		
22823-U		474 cc
▶ volume 948 cc		
22828-U		948 cc



High Capacity Gas Purifier starter kit (clam-shell oven with elements installed, and a converter tube)

Description	Cat. No.	Qty
110 V, 1/8 in.	29541-U	1 ea
110 V, 1/4 in.	29542-U	1 ea
230 V, 1/8 in.	29546-U	1 ea
230 V, 1/4 in.	29547-U	1 ea

High Capacity Gas Purifier, Replacement Converter Tube

This replacement converter tube fits 110 V or 230 V clam-shell ovens. The converter tube must be at operating temperature (580 °C) inside a clam-shell oven for proper operation. Because the material inside is not active at room temperature, converter tube ends are not capped/plugged during shipment.

- Length: 10 in. (25.4 cm)
- Diameter: 1/2 in. (12.7 mm)
- Max. Inlet Pressure: 150 psi
- Max. Flow Rate: 1100 mL/min.

Description	Cat. No.	Qty
fitting 1/8 in.	22396	1 ea
fitting 1/4 in.	22398	1 ea

High Capacity Gas Purifier, Replacement Heating Element

This replacement element can be used to replace either the top or bottom half of a clam-shell oven.

Description	Cat. No.	Qty
110 V	29553-U	1 ea
230 V	29554-U	1 ea

Gas Purification/Management

Purifiers: *In-Line Purifiers (Remove a Single Contaminant)*

Molecular Sieve 5A Moisture Trap

Molecular Sieve 5A efficiently removes moisture and heavy hydrocarbons from compressed air, electrolytically produced hydrogen, house nitrogen, or other gases with high moisture or hydrocarbon content.

Dimensions:

- 200 cc Trap: 26 $\frac{1}{4}$ in. (67 cm) long x 1 in. (2.5 cm) diameter
- 750 cc Trap: 18 in. (45.7 cm) long x 2 $\frac{3}{8}$ in. (6 cm) diameter
- S-Trap: 7 $\frac{1}{2}$ in. (19 cm) long x 5 $\frac{9}{16}$ in. (14.1 cm) wide x $\frac{1}{2}$ in. (13 mm) diameter [total bed length: 19 $\frac{3}{4}$ in. (50.2 cm); the extended bed length ensures prolonged contact between the gas and the adsorbent and provides greater working capacity]



Top: 23991; Middle: 20619; Bottom: 503118

Description	Cat. No.	Qty
volume 200 cc, fitting $\frac{1}{8}$ in.	20619	1 ea
volume 200 cc, fitting $\frac{1}{4}$ in.	20618	1 ea
volume 750 cc, fitting $\frac{1}{4}$ in.	23991	1 ea
volume 750 cc, fitting $\frac{1}{2}$ in.	23992	1 ea
S-trap, fitting $\frac{1}{8}$ in.	503118	1 ea

Molecular Sieve 5A Water Vapor Trap Refill

Molecular Sieve 5A.

▶ volume 460 cc

20298

0.22 kg

Economy Moisture Trap

The clear polycarbonate tubes contains a mixture of Molecular Sieve 13X and Molecular Sieve 4A with indicating capability. Because room air may permeate through the polycarbonate tube, this trap should not be used with carrier gas streams. It is designed for pneumatic control to drive equipment, such as autosamplers and valves.

The indicating 4A changes from blue to tan at 20% relative humidity.

Note: Not for use with carrier gas streams.

Dimensions:

- 400 cc Traps: 17 $\frac{1}{2}$ in. (44.4 cm) long x 2 in. (51 mm) diameter



Top: Economy water vapor trap (23987); Bottom: Mounting clip (23990)

Description	Cat. No.	Qty
volume 400 cc, fitting $\frac{1}{8}$ in.	23987	1 ea
volume 400 cc, fitting $\frac{1}{4}$ in.	23988	1 ea

Economy Water Vapor Trap Refill

Blend of Molecular Sieve 13X and Molecular Sieve 4A with indicating capability.

23989

475 cc

Supelpure®-O Oxygen/Moisture Trap

The oxygen-removing catalysts can reduce oxygen to less than 2 ppb when the level in the incoming gas does not exceed 10 ppm. Because the catalyst is coated on a Molecular Sieve, this trap also can remove water vapor.

Dimensions:

- 120 cc Trap: 11 $\frac{1}{8}$ in. (28.2 cm) long x 1 $\frac{3}{8}$ in. (35 mm) diameter
- 750 cc Trap: 16 $\frac{1}{2}$ in. (41.9 cm) long x 2 $\frac{5}{16}$ in. (59 mm) diameter
- S-Trap: 7 $\frac{1}{2}$ in. (19 cm) long x 5 $\frac{9}{16}$ in. (14.1 cm) wide x $\frac{1}{2}$ in. (13 mm) diameter [total bed length = 19 $\frac{3}{4}$ in. (50.2 cm); the extended bed length ensures prolonged contact between the gas and the adsorbent and provides greater working capacity]



Top: 503088; Middle: 22450-U; Bottom: 503126

Description	Cat. No.	Qty
volume 120 cc, fitting $\frac{1}{8}$ in.	22449	1 ea
volume 120 cc, fitting $\frac{1}{4}$ in.	22450-U	1 ea
volume 750 cc, fitting $\frac{1}{4}$ in.	503088	1 ea
volume 750 cc, fitting $\frac{1}{2}$ in.	503096	1 ea
S-trap, fitting $\frac{1}{8}$ in.	503126	1 ea

Oxisorb® Oxygen Scrubber

This trap will reduce oxygen and moisture to less than 1 ppm when the incoming level of oxygen is below 15 ppm and the incoming level of moisture is below 10 ppm. Use alternative traps when the levels in the incoming gas exceed these values. The kit includes a cartridge, and fittings for installation. Replacing the cartridge is simple, and can be performed quickly.

Dimensions:

- Cartridge and Fittings: 9 $\frac{1}{4}$ in. (23.5 cm) long x 2 in. (51 mm) diameter
- Cartridge Only: 4 $\frac{7}{8}$ in. (12.4 cm) long x 1 $\frac{1}{8}$ in. (29 mm) diameter



Description	Cat. No.	Qty
Kit, fitting $\frac{1}{4}$ in.	20639-U	1 ea
Replacement cartridge	20631	1 ea

Gas Purification/Management

Purifiers: *In-Line Purifiers (Remove a Single Contaminant)*

Oxiclear™ Disposable Oxygen/Moisture Trap

Reduces oxygen to less than 1 ppm when the incoming level is below 10 ppm. Also removes some moisture, and organic contaminants.

Dimensions:

- Oxiclear: 7 1/2 in. (19.0 cm) long x 1 7/8 in. (48 mm) diameter



Description	Cat. No.	Qty
fitting 1/8 in.	22992	1 ea
fitting 1/4 in.	22993	1 ea

Carbon Dioxide Trap

Sodium hydroxide nonfibrous silicate material is universally accepted for its high absorptive capacity and indicating properties for carbon dioxide.

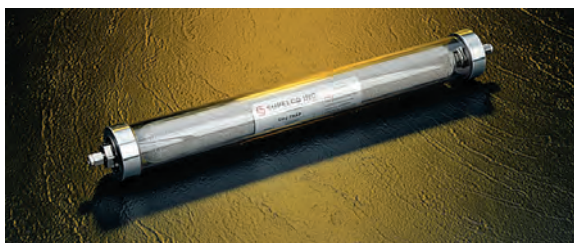
Typically, this material will absorb 20-30% of its weight in carbon dioxide before replacement of the saturated material is required. As carbon dioxide is absorbed, the greenish-brown material turns white because of the formation of sodium carbonate. The trap body is constructed of borosilicate glass, and the fittings are nickel-plated and have sintered stainless steel frits.

A moisture trap should be installed downstream from this unit to absorb the moisture that is produced.

Note: Exercise extreme caution when refilling the trap due to the caustic nature of the absorbent.

Dimensions:

- 100 cc Traps: 12 3/4 in. (32.4 cm) long x 1 3/4 in. (44 mm) diameter
- 250 cc Traps: 17 1/2 in. (44.4 cm) long x 2 in. (51 mm) diameter



Description	Cat. No.	Qty
volume 100 cc, fitting 1/8 in.	503185	1 ea
volume 100 cc, fitting 1/4 in.	503193	1 ea
volume 250 cc, fitting 1/8 in.	503207	1 ea
volume 250 cc, fitting 1/4 in.	503215	1 ea

Carbon Dioxide Trap Refill

Sodium hydroxide nonfibrous silicate material.

503223	500 cc
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Mounting Clip

This clip is designed to fit one of our in-line traps based on the volume of the trap. Simply mount two or more clips to a bench or wall using screws (not supplied), then snap the trap into the clips. One plastic clip per package.

Description	Cat. No.	Qty
for use with 100 cc traps	502936	1 ea
for use with 120 cc traps	23993	1 ea
for use with 200 cc traps	503231	1 ea
for use with 400 cc traps	23990	1 ea
for use with 750 cc traps	24983	1 ea

Specialty In-Line Purifiers for GC-MS Helium

The most sensitive GC-MS instruments require a steady stream of ultra-high purity (99.99999%) helium for optimal performance. To achieve this level, a specialty purifier is required. These purifiers contain multiple adsorbent beds for the removal of all critical contaminants. Additionally, the adsorbent materials are packed into the cartridge under helium to ensure no other gas off-gases into the system during use.

Supelco® Helium Purifier

This multiple bed trap removes hydrocarbons, moisture, oxygen, carbon monoxide, and carbon dioxide from helium gas streams. The amount of highly effective, high capacity adsorbent material in each bed is optimized so that breakthrough of each contaminant is as close to simultaneous as possible. This avoids the costly replacement observed with other broad-spectrum traps that have exhausted their capacity for one contaminant, but still have capacity for other contaminants. This trap will easily purify 99.997% purity helium to a cumulative level of 100 ppb (hydrocarbons + moisture + oxygen + carbon monoxide + carbon dioxide).

Specifications:

- Output Purity: 99.99999%
- Output Efficiency (total): <100 ppb
- Output Efficiency (hydrocarbons): <20 ppb (as methane)
- Output Efficiency (moisture): <10 ppb
- Output Efficiency (oxygen): <2 ppb
- Output Efficiency (carbon monoxide): <20 ppb
- Output Efficiency (carbon dioxide): <1ppm
- Capacity (hydrocarbons): 30 g (as methane)
- Capacity (moisture): 46 g
- Capacity (oxygen): 1200mg
- Max. Flow Rate: 8 L/min.
- Max. Pressure: 500 psi
- Max. Temp.: 100 °C

Dimensions for both purifiers

/ in. (41.91 cm) long x 2 5/16 in. (6.3 cm) diameter



Description	Cat. No.	Qty
stainless steel fittings, 1/8 in. O.D. Swagelok (nuts and ferrules included)	27600-U	1 ea
stainless steel fittings, 1/4 in. Swagelok (nuts and ferrules included)	27601-U	1 ea

Gas Purification/Management

Purifiers: *Base Plate Purifier Systems*

Base Plate Purifier Systems

With this design, the purifiers connect into a base plate in such a manner that gas supply is not interrupted during purifier change-out. Therefore, the purifier can be replaced without shutting down the entire system. Additionally, the risk of forcing a 'slug' of air into the instrument after purifier change-out is eliminated.

Super Clean (Base-Plate Design) Kit

Super Clean™ base-plate purifiers are a unique point-of use glass/metal, diffusion proof purification system to purify carrier, fuel, and other gases for the GC or GC-MS system. These purifiers remove hydrocarbons, oxygen (color indicated), and moisture (color indicated) to better than 6.0 gas (99.9999%) quality at 2 L/min., independent of the original gas quality.



Description	Cat. No.	Qty
carrier gas kit (includes SU861026 + SU861011)	28878-U	1 kit
helium carrier gas kit (includes SU861027 + SU861011)	SU861040	1 kit
GC-FID fuel gas kit (includes SU861026, 2 X SU861025, and SU861013)	SU861043	1 kit

Super Clean (Base-Plate Design) Gas Purifier

Description	Cat. No.	Qty
hydrocarbon, without indicator	SU861023	1 ea
moisture, with indicator	SU861021	1 ea
oxygen, with indicator	SU861022	1 ea
triple trap (hydrocarbon, moisture, oxygen), for carrier gas	SU861026	1 ea
triple trap (hydrocarbon, moisture, oxygen), for helium carrier gas	SU861027	1 ea
dual trap (hydrocarbon, moisture), for fuel gas	SU861025	1 ea

Super Clean (Base-Plate Design) Base Plate



Base Plates
Top: Three position; Middle: Two position; Bottom: Single position

Description	Cat. No.	Qty
single position, 1/8 in.	SU861011	1 ea
two position, 1/8 in.	SU861012	1 ea
three position, 1/8 in.	SU861013	1 ea

Super Clean (Base-Plate Design) O-ring Set

► includes 10 small and 10 large

SU861050	1 ea
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Super Clean (Base-Plate Design) Wall Mounting Bracket

SU861016	1 ea
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Gas Purification/Management

Purifiers: Click-On In-Line Purifier Systems

Click-On In-Line Purifier Systems

This design purifier incorporates special connectors that prevent room air from entering the gas line during purifier change-out. Therefore, the risk of forcing a slug of air into the instrument after purifier change-out is eliminated.

Super Clean (In-Line Design) Gas Purifier

Installation and replacement of the Click-On purifier is simple and eliminates the risk of damage to the gas line connections caused by overtightening. Simply attach the connectors to the gas line, install the purifier, and hand tighten the connectors.

Note: Does not include Click-on Connectors, these must be purchased before initial use.

Dimensions:

- Cartridge and Connectors: 11 1/2 in. long x 1 1/4 in. diameter
- Cartridge Only: 7 5/8 in. long x 1 1/4 in. diameter



Top: 28863-U; Bottom: 28867-U

Description	Cat. No.	Qty
hydrocarbon trap, stainless steel	28863-U	1 ea
moisture trap, stainless steel	28861-U	1 ea
oxygen trap, stainless steel	28862-U	1 ea
triple trap (hydrocarbon, moisture, oxygen), stainless steel	28864-U	1 ea
triple trap (hydrocarbon, moisture, oxygen), gas specific for helium, stainless steel	28865-U	1 ea
triple trap (hydrocarbon, moisture, oxygen), gas specific for helium, indicating	28867-U	1 ea
dual trap (hydrocarbon, moisture), for fuel gas, stainless steel	28866-U	1 ea

Super Clean (In-Line Design) Brass Click-On Connector



Description	Cat. No.	Qty
1/8 in.	28869-U	2 ea
1/4 in.	28868-U	2 ea

Super Clean (In-Line Design) Stainless Steel Click-On Connector



Description	Cat. No.	Qty
1/8 in.	28873-U	2 ea
1/4 in.	28872-U	2 ea

Super Clean (In-Line Design) Double Version Click-On Connector



Description	Cat. No.	Qty
1/8 in.	28874-U	1 ea

Super Clean (In-Line Design) O-ring Set

► includes 10 small and 10 large

28875-U	10 ea
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Super Clean (In-Line Design) Wall Mounting Clamp

28876-U	4 ea
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Panel Purifier Systems

Panel purifier systems offer convenience, as well as have limited space requirements. They consist of two components:

- A **panel unit** mounted to a wall near the point of use. Both 3-head and 4-head versions exist.
- Removable adsorbent **cartridges** for each head. The adsorbent material contained inside a cartridge determines what contaminant it will remove.

We no longer offer panel units. Replacement cartridges are *still* offered for those with panel units installed at their facility.

Point-of-Operation Cartridges

Cartridge Dimension: 6 1/4 in. (15.9 cm) long x 1 1/4 in. (3.2 cm) diameter

Description	Cat. No.	Qty
Hydrocarbon-Removing (GC-3)	23997	1 ea
Moisture-Removing (GC-2)	23996	1 ea
Oxygen-Removing (GC-1)	23995	1 ea
Oxygen-Removing with indicator (GC-4)	24987	1 ea

Gas Purification/Management

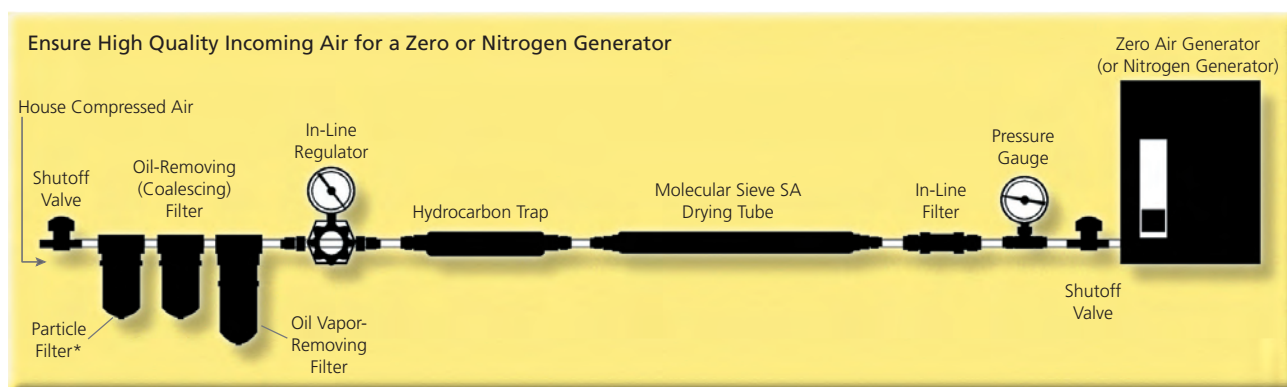
Purifiers: Norgren® Particle and Oil Filters

Norgren® Particle and Oil Filters

Airborne contaminants (dust, moisture, and organic pollutants) can be drawn into the air intake of an air compressor. The air compressor can add contaminants (oil vapors and aerosol droplets, plus sludge, rust, and other matter). These contaminants can significantly shorten the lifetimes of downstream zero air generators, nitrogen generators, and other downstream instruments, and can affect the performance of the instruments themselves. The particle-, oil-, and oil vapor-removing filters described here will eliminate these contaminants from compressed air.

Three types of filters are offered:

- **Norgren Particle Filters** remove liquids and solid particles as small as 5 microns in diameter. One of these filters should be the initial filtering device downstream from the air compressor (see figure).
- **Norgren Oil-Removing (Coalescing) Filters** remove submicron solid particles and oil aerosols, down to 0.01 micron. At 21 °C, from an inlet concentration of 8 ppm, a maximum of 0.01 ppm oil will leave the filter.
- **Norgren Oil Vapor-Removing Filters** remove oil vapors. At 21 °C, only 0.003 ppm oil will remain in air leaving the filter, when it is used properly (the oil vapor-removing filter must be protected by an oil-removing filter). We recommend incorporating this three filter system in any compressed line serving sensitive, high-performance gas chromatography or other laboratory instruments.



*Note: If your compressed air system has no additional protection, Norgren suggests using a 40 μm and a 5 μm particle filter to ensure maximum life from the filter elements in the oil filters.

Norgren® Filter

Description	Cat. No.	Qty
particle filter, 40 μm , 1/4 in. female NPT	24990-U	1 ea
particle filter, 5 μm , 1/4 in. female NPT	24992	1 ea
Oil-Removing Filter, 1/4 in. female NPT	24994	1 ea
Oil Vapor-Removing Filter, 3/8 in. female NPT	24996	1 ea

Norgren® Replacement Element

Description	Cat. No.	Qty
for use with Particle Filter 24990-U	24991	1 ea
for use with Oil-Removing Filter 24994	24995	1 ea
for use with Oil Vapor-Removing Filter 24996	24997	1 ea

Gas Purification/Management

Plumbing/Regulation

Plumbing/Regulation

As critical as it is to use the proper purifiers to remove contaminants, it is also important to use the plumbing and regulation items to insure a leak-free delivery system. Any leak, no matter how small, can compromise the quality of the gas. Additionally, the gas must be delivered to the point of use within the pressure requirements of the instrumentation. Some of the highest quality and best known companies (such as SSI, Swagelok, and Airgas) are represented by the following products.

Tubing

We offer several tubing choices. Our recommendations are:

- **Cleaned Copper** - Solvent-washed to ASTM B-280 specifications, plus in-house proprietary cleaning performed, to remove residual hydrocarbons. Use for most GC plumbing applications.
- **Premium Grade Stainless Steel** - Grade 304 tubing, specially cleaned to ensure inertness. Use for sensitive GC-MS applications.
- **Fused Silica-Lined Stainless Steel** - The strength of stainless steel with the inertness of deactivated fused silica. Use for gas transfer lines.



Cleaned Copper Tubing

Solvent-washed to ASTM B-280 specifications, plus in-house proprietary cleaning performed, to remove residual hydrocarbons. Use for most GC plumbing applications.

Length (ft)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
50	1/8 (3.18 mm)	0.065 (1.65 mm)	20488	1 ea
50	1/4 (6.35 mm)	0.190 (4.83 mm)	20489	1 ea

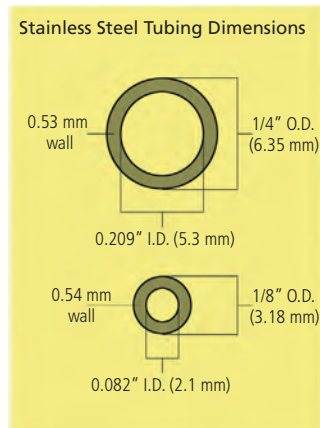
General Purpose Copper Tubing

Cleaned to ASTM B-280 specifications.

Length (ft)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
50	1/8 (3.18 mm)	0.065 (1.65 mm)	20520-U	1 ea
50	1/4 (6.35 mm)	0.190 (4.83 mm)	20522	1 ea

Premium Grade 304 Stainless Steel Tubing

Grade 304 tubing, specially cleaned to ensure inertness. Use for sensitive GC-MS applications.



Length (ft)	Tubing I.D. (in.)	Cat. No.	Pkg
tubing O.D. 1/8 in. (3.18 mm)			
50	0.085 (2.1 mm)	20526-U	1 ea
tubing O.D. 1/4 in. (6.35 mm)			
50	0.209 (5.3 mm)	20527	1 ea
tubing O.D. 1/16 in. (1.59 mm)			
100	0.010 (0.254 mm)	20552	1 ea
100	0.030 (0.762 mm)	20553	1 ea

Fused Silica-Lined Stainless Steel Tubing

The strength of stainless steel with the inertness of deactivated fused silica. Use for gas transfer lines.

Length (ft)	Tubing I.D. (in.)	Cat. No.	Pkg
tubing O.D. 1/8 in. (3.18 mm)			
6	0.085 (2.1 mm)	24965	1 ea
25	0.85 (2.1 mm)	24966	1 ea
50	0.085 (2.1 mm)	24967	1 ea
tubing O.D. 1/16 in. (1.59 mm)			
25	0.01 (0.254 mm)	24951	1 ea
50	0.01 (0.254 mm)	24952	1 ea
100	0.01 (0.254 mm)	24953	1 ea
6	0.02 (0.508 mm)	24954	1 ea
25	0.02 (0.508 mm)	24955	1 ea
50	0.02 (0.508 mm)	24956	1 ea
100	0.02 (0.508 mm)	24957	1 ea
6	0.03 (0.762 mm)	24958	1 ea
25	0.03 (0.762 mm)	24959	1 ea
100	0.03 (0.762 mm)	24961	1 ea
6	0.04 (1.016 mm)	24962	1 ea
25	0.04 (1.016 mm)	24963	1 ea
50	0.04 (1.016 mm)	24964	1 ea

SP-Alloy Tubing

Nickel Alloy, for maximum inertness.

Length (ft)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
50	1/8 (3.18 mm)	0.085 (2.1 mm)	22709-U	1 ea

Gas Purification/Management

Plumbing/Regulation: *Tubing*

PTFE Tubing

Maximum temperature of 240 °C.

Length (ft)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
25	0.085 (2.1 mm)	0.062 (1.58 mm)	20531	1 ea
25	1/4 (6.35 mm)	0.228 (5.8 mm)	20533	1 ea

PTFE (FEP) Tubing

Maximum temperature of 200 °C.

Length (ft)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
50	1/8 (3.18 mm)	0.085 (2.1 mm)	20532	1 ea

Tubing Cutters, Reamers, and Benders

Clean cuts, crisp internal openings, and smooth bends of tubing are required to ensure optimal laminar flow and to reduce the risk of leaks. These specialized tools are offered to simplify the tasks of cutting, reaming, and bending tubing.

SSI™ TC-20 Tubing Cutter

The SSI Model TC-20 electric stainless steel tube cutter assures a zero dead volume connection. Because the tubing is held securely in a clamp vise on the vertical swing arm, a square cut is produced when the swing arm is lowered against the abrasive cutting wheel, which produces a finished end. No lubricant or cutting fluid is required. The unit, which is CE marked, will cut most common tubing used in chromatography. Tubing with 1/16 in., 1/8 in., and 1/4 in. outside diameter, can be smooth-cut and dressed without distortion.

The precision ground dressing tool for the 1/16 in. O.D. tubing is included and is attached directly to the swing arm: it cannot be misplaced or lost. A dressing tool (deburring tool - Cat. No. 58804) for 1/8 in. diameter can be ordered separately.



58539-U

▶ 110 V / 220 V, 50-60 Hz (voltage selectable), CE compliant

58539-U	1 ea
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TC-20 Replacement Parts

Description	Cat. No.	Qty
Cutting Wheel for TC-20	58540-U	3 ea
Deburring Tool, configured for 1/16 in. tubing	58804	1 ea
Deburring Tool, configured for 1/8 in. tubing	58806	1 ea
Needle Insert for Dressing Tool, configured for 1/16 in.	58805	1 ea
Needle Insert for Dressing Tool, configured for 1/8 in.	58807	1 ea

Cutting Wheel for TC-10

Replacement cutting wheel for SSI Model TC-10 tubing cutter. Will not fit Model TC-20.

58803	3 ea
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Tubing Cutters



Top: 22410-U; Bottom: 20425-U

Description	Cat. No.	Qty
Heavy Duty Tubing Cutter	20425-U	1 ea
Cutting Wheel for 20425-U	20626	3 ea
Imp® tubing cutter	22410-U	1 ea
Cutting Wheel for 22410-U and 58692-U	22411	2 ea

The wheel that is included with catalog number 20425-U is for cutting soft metal (such as copper). To cut hard metal (such as stainless steel), replace the wheel with catalog number 20626.

Tubing Cutter for 1/16" Stainless Steel Tubing

Easily cut 1/16 in. stainless steel tubing, then deburr the cut end ensure a uniform flow of gas or liquid. Deburring kit includes deburring tool, tubing holder, file. Order tubing cutter and deburring kit separately. A replacement cutting blade is available as product number 22411.



58692-U

Description	Cat. No.	Qty
Manual Cutting Tool	58692-U	1 ea
Cutting Wheel for 22410-U and 58692-U	22411	2 ea
Deburring Kit	58691-U	1 ea

Gas Purification/Management

Plumbing/Regulation: *Tubing Cutters, Reamers, and Benders*

Tubing Reamer

This 5 in. hand tool does a fine job of opening and rounding tubing ends that are cut. The tip is stainless steel for durability and inertness; and the handle is wood for comfort.



20389

1 ea

Tubing Bender

The heavy duty benders easily bend aluminum, copper, or stainless steel tubing up to 180°, without kinking or splitting the tubing.

The three-in-one tool (20857) bends 1/8 in., 3/16 in., or 1/4 in. (3, 4, or 6 mm) tubing of standard wall thickness.

20422-U has a bend radius of 3/8 inch from center.

20424-U has a bend radius of 9/16 inch from center.

20857 (three-in-one tool) has a bend radius of 14.2 mm from center (pictured above).



20857 (three-in-one tool)

Description	Cat. No.	Qty
Tubing Bender, for 1/8 in. O.D. tubing	20422-U	1 ea
Tubing Bender, for 1/4 in. O.D. tubing	20424-U	1 ea
Tubing Bender, Three-Size for 1/4 in. (6 mm, 3/16 in. (4 mm) & 1/8 in. tube)	20857	1 ea

Swagelok Tubing Fittings

Swagelok tubing fittings combine superior design principles with close manufacturing tolerances and rigid quality assurance programs. They have stood the test of time, providing unparalleled performance since 1947.

Swagelok® Fittings Kit

A useful assortment of 1/8 in. and 1/4 in. brass fittings, packaged in a compartmented clear plastic storage box. Have the required parts on hand when needed, and save money (more than 30%, compared to purchasing items individually).

The Swagelok Fittings Kit

Swagelok No.	Description	Qty.
202-1	1/8 in. nut	20
402-1	1/4 in. nut	20
203-1	1/8 in. front ferrule	20
403-1	1/4 in. front ferrule	20
204-1	1/8 in. back ferrule	20
404-1	1/4 in. back ferrule	20
200-C	1/8 in. cap	6
400-C	1/4 in. cap	6
200-P	1/8 in. plug	6
400-P	1/4 in. plug	6

The Swagelok Fittings Kit

Swagelok No.	Description	Qty.
200-6	1/8 in. union	2
400-6	1/4 in. union	2
400-60-2	1/4 in. x 1/8 in. reducing union	2
200-3	1/8 in. tee	2
400-3	1/4 in. tee	2
200-R-4	Reducer 1/8 in. Swagelok x 1/4 in. tube	2
400-R-2	Reducer 1/4 in. Swagelok x 1/8 in. tube	2
MS-IG-200	1/8 in. inspection gauge	1
MS-IG-400	1/4 in. inspection gauge	1



22668-U

1 ea

Swagelok® Nut, Front and Back Ferrule Set



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/16 in.	100-S	22024	10 ea
Swagelok 1/8 in.	200-S	22014	10 ea
Swagelok 1/4 in.	400-S	22003	10 ea
stainless steel			
Swagelok 1/16 in.	100-S	22050	1 ea
Swagelok 1/8 in.	200-S	22040-U	5 ea
Swagelok 1/4 in.	400-S	22029	5 ea

Gas Purification/Management

Plumbing/Regulation: Swagelok Tubing Fittings

Swagelok® Nut



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/16 in.	102-1	22021	10 ea
Swagelok 1/8 in.	202-1	22011-U	20 ea
Swagelok 1/4 in.	402-1	22000-U	20 ea
stainless steel			
Swagelok 1/16 in.	102-1	22047	2 ea
Swagelok 1/8 in.	202-1	22037	5 ea
Swagelok 1/4 in.	402-1	22026	5 ea

Swagelok® Front Ferrule



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/16 in.	103-1	22022-U	10 ea
Swagelok 1/8 in.	203-1	22012	20 ea
Swagelok 1/4 in.	403-1	22001	20 ea
stainless steel			
Swagelok 1/16 in.	103-1	22048-U	2 ea
Swagelok 1/8 in.	203-1	22038	5 ea
Swagelok 1/4 in.	403-1	22027	5 ea

Swagelok® Back Ferrule



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/16 in.	104-1	22023	10 ea
Swagelok 1/8 in.	204-1	22013	20 ea
Swagelok 1/4 in.	404-1	22002	20 ea
stainless steel			
Swagelok 1/16 in.	104-1	22049-U	2 ea
Swagelok 1/8 in.	204-1	22039	5 ea
Swagelok 1/4 in.	404-1	22028	5 ea
Swagelok 1/2 in.	814-1	25825	5 ea

Swagelok® Union

Nut and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
1/16 in.	100-6	22025	1 ea
1/8 in.	200-6	22015	2 ea
1/4 in.	400-6	22004	2 ea
1/2 in.	810-6	25816	2 ea

Description	Swagelok No.	Cat. No.	Qty
stainless steel			
1/16 in.	100-6	22051-U	1 ea
1/8 in.	200-6	22041	1 ea
1/4 in.	400-6	22030-U	1 ea
1/2 in.	810-6	25828	1 ea

Swagelok® Bulkhead Union

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
1/16 in.	100-61	21980-U	1 ea
1/8 in.	200-61	21981-U	1 ea
1/4 in.	400-61	21982-U	1 ea
stainless steel			
1/16 in.	100-61	22665-U	1 ea
1/8 in.	200-61	22666	1 ea
1/4 in.	400-61	22667-U	1 ea

Swagelok® Reducing Union

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/16 in. (B)	200-6-1	22016	2 ea
Swagelok 1/8 in. (A)			
Swagelok 3/16 in. (A)	300-6-2	22072	2 ea
Swagelok 1/8 in. (B)			
Swagelok 1/16 in. (B)	400-6-1	22074	2 ea
Swagelok 1/4 in. (A)			
Swagelok 1/8 in. (B)	400-6-2	22005	2 ea
Swagelok 1/4 in. (A)			
Swagelok 1/8 in. (B)	810-6-2	22714	2 ea
Swagelok 1/2 in. (A)			
Swagelok 1/2 in. (B)	810-6-4	22716	2 ea
Swagelok 1/4 in. (A)			
stainless steel			
Swagelok 1/16 in. (A)	200-6-1	22042-U	1 ea
Swagelok 1/8 in. (B)			
Swagelok 1/4 in. (A)	400-6-1	22075-U	1 ea
Swagelok 1/16 in. (B)			
Swagelok 1/8 in. (B)	400-6-2	22031	1 ea
Swagelok 1/4 in. (A)			

Gas Purification/Management

Plumbing/Regulation: Swagelok Tubing Fittings

Description	Swagelok No.	Cat. No.	Qty
Swagelok 1/4 in. (B)	400-6-3	22077-U	1 ea
Swagelok 3/16 in. (A)			

Swagelok® Bored-Through Union

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
1/4 in.	400-6BT	21664	1 ea
stainless steel			
1/8 in.	200-6BT	22088	1 ea
1/4 in.	400-6BT	21518	1 ea

Swagelok® Zero-Dead Volume Union

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
1/16 in.	1 OF-6-GC	22053-U	1 ea
stainless steel			
1/16 in.	1 OF-6-GC	22052	1 ea

Swagelok® Tee

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/16 in.	100-3	22132-U	1 ea
Swagelok 1/8 in.	200-3	22020-U	1 ea
Swagelok 1/4 in.	400-3	22010-U	1 ea
Swagelok 1/2 in.	810-3	25817	1 ea
stainless steel			
Swagelok 1/16 in.	100-3	22133-U	1 ea
Swagelok 1/8 in.	200-3	22046	1 ea
Swagelok 1/4 in.	400-3	22036	1 ea
Swagelok 1/2 in.	810-3	25829	1 ea

Swagelok® Branch Tee

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
NPT 1/8 in. (B) Swagelok 1/8 in. (A)	200-3TTF	22143-U	1 ea

Swagelok® Union Cross

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/8 in.	200-4	22684	1 ea
Swagelok 1/4 in.	400-4	22686	1 ea

Swagelok® Caps

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
male 1/8 in.	-	22018-U	6 ea
male 1/4 in.	400-C	22008	6 ea
stainless steel			
male 1/4 in.	400-C	22034	2 ea

Swagelok® Plug



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/16 in.	100-P	22136-U	3 ea
Swagelok 1/8 in.	200-P	22019-U	6 ea
Swagelok 1/4 in.	400-P	22009	6 ea
Swagelok 1/2 in.	810-P	25814	3 ea
stainless steel			
Swagelok 1/16 in.	100-P	22137-U	1 ea
Swagelok 1/8 in.	200-P	22045-U	1 ea
Swagelok 1/4 in.	400-P	22035-U	2 ea

Swagelok® Reducer

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
tube 1/8 in. (B) Swagelok 1/16 in. (A)	100-R-2	22017-U	2 ea
Swagelok 1/16 in. (A) tube 1/4 in. (B)	100-R-4	22701	2 ea
tube 1/4 in. (B) Swagelok 1/8 in. (A)	200-R-4	22006	2 ea

Gas Purification/Management

Plumbing/Regulation: Swagelok Tubing Fittings

Swagelok® Reducer (continued)

Description	Swagelok No.	Cat. No.	Qty
tube 1/8 in. (B) Swagelok 1/4 in. (A)	400-R-2	21516	2 ea
Swagelok 1/4 in. (A) tube 1/2 in. (B)	400-R-8	25815	2 ea
stainless steel			
Swagelok 1/16 in. (A) tube 1/8 in. (B)	100-R-2	22043	1 ea
tube 1/4 in. (B) Swagelok 1/16 in. (A)	100-R-4	22702	1 ea
Swagelok 1/8 in. (A) tube 1/4 in. (B)	200-R-4	22032	1 ea
tube 1/8 in. (B) Swagelok 1/4 in. (A)	400-R-2	21517	1 ea
tube 1/2 in. (B) Swagelok 1/4 in. (A)	400-R-8	25827	1 ea

Swagelok® Port Connector



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/8 in.	201-PC	22688	2 ea
Swagelok 1/4 in.	401-PC	22690-U	2 ea
Swagelok 1/4 in. (B) tube 1/8 in. (A)	401-PC-2	22094-U	2 ea
stainless steel			
Swagelok 1/8 in.	201-PC	22689	2 ea
tube 1/8 in. (A) Swagelok 1/4 in. (B)	401-PC-2	22095-U	2 ea

Swagelok® Pipe Adapter



Description	Swagelok No.	Cat. No.	Qty
brass			
tube 1/4 in. (A) NPT male 1/8 in. (B)	4-TA-1-2	22100-U	2 ea

Swagelok® Connector to Male NPT

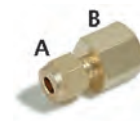
Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/8 in. (A) NPT male 1/8 in. (B)	200-1-2	22082	2 ea
Swagelok 1/4 in. (A) NPT male 1/8 in. (B)	400-1-2	22083	2 ea
NPT male 1/4 in. (B) Swagelok 1/8 in. (A)	200-1-4	22066	2 ea
Swagelok 1/4 in. (A) NPT male 1/4 in. (B)	400-1-4	21519	2 ea
NPT male 1/4 in. (B) Swagelok 1/2 in. (A)	810-1-4	25818	2 ea
stainless steel			
Swagelok 1/8 in. (A) NPT male 1/8 in. (B)	200-1-2	22084-U	1 ea
Swagelok 1/4 in. (A) NPT male 1/8 in. (B)	400-1-2	22085-U	1 ea
Swagelok 1/8 in. (A) NPT male 1/4 in. (B)	200-1-4	22067	1 ea
NPT male 1/4 in. (B) Swagelok 1/4 in. (A)	400-1-4	22700-U	1 ea
Swagelok 1/2 in. (A) NPT male 1/4 in. (B)	810-1-4	25830	1 ea

Swagelok® Connector to Female NPT

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
NPT female 1/8 in. (B) Swagelok 1/8 in. (A)	200-7-2	22703	2 ea
NPT female 1/8 in. (B) Swagelok 1/4 in. (A)	400-7-2	22705-U	2 ea
Swagelok 1/8 in. (A) NPT female 1/4 in. (B)	200-7-4	21978-U	2 ea

Gas Purification/Management

Plumbing/Regulation: Swagelok Tubing Fittings

Description	Swagelok No.	Cat. No.	Qty
NPT female 1/4 in. (B)	400-7-4	22707	2 ea
Swagelok 1/4 in. (A)			
Swagelok 1/2 in. (A)	810-7-4	25819	2 ea
NPT female 1/4 in. (B)			
stainless steel			
NPT female 1/8 in. (B)	400-7-2	22706	1 ea
Swagelok 1/4 in. (A)			
NPT female 1/4 in. (B)	200-7-4	21979-U	1 ea
Swagelok 1/8 in. (A)			
Swagelok 1/4 in. (A)	400-7-4	22708	1 ea
NPT female 1/4 in. (B)			

Swagelok® 90 Degree Male Elbow

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/8 in. (A)	200-2-2	21970-U	2 ea
NPT male 1/8 in. (B)			
NPT male 1/4 in. (B)	200-2-4	21971	2 ea
Swagelok 1/8 in. (A)			
NPT male 1/8 in. (B)	400-2-2	21972	2 ea
Swagelok 1/4 in. (A)	Pittsburgh Valve & Fitting 400-2-2		
NPT male 1/4 in. (B)	400-2-4	21973	2 ea
Swagelok 1/4 in. (A)			
stainless steel			
NPT male 1/8 in. (B)	200-2-2	21974	1 ea
Swagelok 1/8 in. (A)	Pittsburgh Valve & Fitting 200-2-2		
NPT male 1/8 in. (B)	400-2-2	21976-U	1 ea
Swagelok 1/4 in. (A)			
NPT male 1/4 in. (B)	400-2-4	21977-U	1 ea
Swagelok 1/4 in. (A)			

Swagelok® Miniature Quick Connect Body Assembly

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
fitting Swagelok 1/8 in.	QM2-B-200	22712-U	1 ea
stainless steel			
fitting Swagelok 1/8 in.	QM2-B-200	22713	1 ea

Swagelok® Miniature Quick Connect Stem Assembly

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
fitting Swagelok 1/8 in.	QM2-S-200	22710-U	1 ea
stainless steel			
fitting Swagelok 1/8 in.	QM2-S-200	22711-U	1 ea

Swagelok® PTFE Ferrules

Use PTFE ferrules instead of brass or stainless steel ferrules when attaching fittings to glass tubing, or to flexible tubing (such as PTFE or Tygon).

Description	Cat. No.	Qty
PTFE front ferrule, Swagelok for 1/4 in. tubing	22054	10 ea
PTFE back ferrule, Swagelok for 1/4 in. tubing	22055-U	10 ea
PTFE front ferrule, Swagelok for 1/8 in. tubing	22058	10 ea
PTFE back ferrule, Swagelok for 1/8 in. tubing	22059	10 ea
PTFE front ferrule, Swagelok for 1/16 in. tubing	22068	5 ea
PTFE back ferrule, Swagelok for 1/16 in. tubing	22069	5 ea

Swagelok® Tee Wrench 1/4 in.

Made specifically for 1/4 in. Swagelok union tees and crosses. This wrench allows sure, easy gripping (even in cramped areas) to hold the fitting body while an open-ended wrench is applied to tighten or loosen a nut. Made from rugged alloy steel for strength. Includes a no-slip vinyl sleeve on the handle.



21983-U 1 ea

Swagelok® Gap Inspection Gauge

Use this tool to ensure the correct tightening of 1/8 in. Swagelok tubing fittings. Simply place in the gap between the fitting nut and body. The gauge will not fit if the nut is overtightened.



21984-U 1 ea

Gas Purification/Management

Plumbing/Regulation: *Gas Line Filters (remove dust and small particles)*

Gas Line Filters (remove dust and small particles)

Needle valves may become fouled by the presence of dust or particulate matter in a gas stream. To protect any component that has a needle valve incorporated, simply install a small, inexpensive gas line filter directly upstream.

Gas Line Filter

This brass gas line filter contains a replaceable 7 µm stainless steel filter, and will remove dust and small particles that could otherwise foul downstream needle valves. Nuts and ferrules included.

stainless steel (filter)



Description	Cat. No.	Qty
for use with 1/8 in. tubing	20620	1 ea
for use with 1/4 in. tubing	20621	1 ea

Replacement 7 µm Stainless Steel Filter

Use this filter to replace worn or damaged filters in our gas line filter. Note that this filter will not fit into our "T"-type gas line filter.

Description	Cat. No.	Qty
for use with 1/8 in. gas line filter (Cat. No. 20620)	25810-U	1 ea
for use with 1/4 in. gas line filter (Cat. No. 20621)	25809	1 ea

"T"-Type Gas Line Filter

This gas line filter contains a replaceable 7 µm sintered stainless steel frit, and will remove dust and small particles that could otherwise foul downstream needle valves. Nuts and ferrules included.



Description	Cat. No.	Qty
brass, 1/4 in. male	25806	1 ea
stainless steel, 1/8 in. male	25807	1 ea
stainless steel, 1/4 in. male	25808	1 ea

Shutoff Valves

The flow of gas through a delivery system must occasionally be stopped for various reasons, such as during the changeout of spent purifiers, or during routine instrument maintenance. To prevent the infusion of room air into the delivery system, it is recommended to install a shutoff valve:

- Directly downstream of gas cylinders and/or gas generators
- Direct upstream and directly downstream of purifiers
- Directly upstream of the instrumentation

Three types of shutoff valves are offered: on/off toggle type, on/off ball type, and knob diaphragm type.

On/Off Toggle Valve

Nuts and ferrules included.



Description	Cat. No.	Qty
brass, straight arms: 1/8 in.	22699	1 ea
brass, angle arms: 1/8 in.	22123-U	1 ea
brass, straight arms: 1/4 in.	22697	1 ea
brass, angle arms: 1/4 in.	22125-U	1 ea
stainless steel, straight arms: 1/8 in.	22698	1 ea
stainless steel, angle arms: 1/8 in.	22124-U	1 ea
stainless steel, angle arms: 1/4 in.	22126-U	1 ea

On/Off Throttling Valve

Nuts and ferrules included.



Description	Cat. No.	Qty
brass, 1/8 in.	22138-U	1 ea
brass, 1/4 in.	22140-U	1 ea
stainless steel, 1/8 in.	22139-U	1 ea
stainless steel, 1/4 in.	22141-U	1 ea
stainless steel, 1/2 in.	25832	1 ea

Diaphragm Shutoff Valve

This grease-free, high integrity valve uses multiple metal diaphragms to provide a permanent seal. It will prevent diffusion of air and water vapor into the gas flow.

Specifications:

- Body: brass
- Seat: KEL-F
- Max. Pressure: 2000 psig (350 kg/cm²)
- Leak tested to 10⁻¹⁰ cc/sec (helium)
- Min. Temp.: -40 °C
- Max. Temp.: 93 °C



Left: 23897; Right: 23896

Description	Cat. No.	Qty
1/4 in. male NPT, 1/4 in. female NPT	23896	1 ea
1/4 in. male NPT	23897	1 ea

Gas Purification/Management

Plumbing/Regulation: *Shutoff Valves*

Universal Mounting Bracket

This bracket can be easily be used to mount any valve or restrictor firmly in place. Allows convenient placement of these items out of the way.



22131-U

2 ea

Gas Cylinder Pressure Regulators

Most GC systems require that the pressure is regulated between the source (gas cylinder or gas generator) and the instrument. Select a pressure regulator based on the application:

- **2-Stage Gas Cylinder Regulators:** Reduce pressure in two steps, enabling the regulator to uniformly control the output pressure despite the decreasing input pressure from the gas cylinder. An in-line regulator is typically not required downstream. Choose a 2-stage regulator when the gas cylinder is within 10 feet of the instrument. 3000 psig maximum inlet pressure.
- **1-Stage Gas Cylinder Regulators:** Reduce pressure in a single step. Some pressure change can occur downstream as the gas cylinder pressure drops. Choose a 1-stage regulator when the gas cylinder is greater than 10 feet from the instrument. Then install an in-line regulator within 10 feet of the instrument. 3000 psig maximum inlet pressure.

We offer several versions of **gas cylinder pressure regulators** to serve a wide variety of needs.



2-stage gas cylinder pressure regulator



1-stage gas cylinder pressure regulator

High Purity

- Check valve in inlet; keeps air from entering during cylinder change-out
- Bar stock nickel-plated brass body with small internal volume; purges quickly
- Smooth internal cavity; efficient gas flow
- Stainless steel diaphragm with captive PTFE seal; appropriate for most applications
- Nickel-plated zinc bonnets
- 2 1/2 in. diameter nickel-plated brass gauges; easy to read
- Needle shut-off valve at body outlet; keeps air from entering during change-out of downstream components
- 1/8 in. stainless steel male Swagelok fitting at valve outlet; ready for use with copper or stainless steel tubing

High Purity Plus

- Check valve in inlet; keeps air from entering during cylinder change-out
- Bar stock nickel-plated brass body with small internal volume; purges quickly
- Smooth internal cavity; efficient gas flow
- Stainless steel diaphragm with captive PTFE seal; appropriate for most applications
- Nickel-plated zinc bonnets
- 2 1/2 in. diameter nickel-plated brass gauges; easy to read
- Diaphragm shut-off valve at body outlet; keeps air from entering during change-out of downstream components; higher leak integrity than needle valve
- 1/8 in. stainless steel male Swagelok fitting at valve outlet; ready for use with copper or stainless steel tubing

Ultra High Purity

- Check valve in inlet; keeps air from entering during cylinder change-out
- Bar stock nickel-plated brass body with small internal volume; purges quickly
- Smooth internal cavity; efficient gas flow
- Stainless steel diaphragm with metal-to-metal seal; impervious for the most sensitive applications
- Machined brass bonnets; used for panel-mount applications
- 2 1/2 in. diameter nickel-plated brass gauges; easy to read
- Diaphragm shut-off valve at body outlet; keeps air from entering during change-out of downstream components; higher leak integrity than needle valve
- 1/8 in. stainless steel male Swagelok fitting at valve outlet; ready for use with copper or stainless steel tubing

NEW PRODUCTS

CGA-580 Gas Cylinder Pressure Regulator

For use with helium, nitrogen, or argon gas cylinders.

	Cat. No.	Qty
CGA-580 Gas Cylinder Pressure Regulator		
2-stage high purity, 0-100 psi	29557-U	1 ea
1-stage high purity, 0-100 psi	29556-U	1 ea
2-stage high purity plus, 0-100 psi	29574-U	1 ea
2-stage high purity plus, 0-150 psi	29575-U	1 ea
1-stage high purity plus, 0-100 psi	29573-U	1 ea
2-stage ultra high purity, 0-100 psi	29585-U	1 ea
1-stage ultra high purity, 0-100 psi	29584-U	1 ea

Gas Purification/Management

Plumbing/Regulation: Gas Cylinder Pressure Regulators

NEW PRODUCTS

DIN6 Gas Cylinder Pressure Regulator

For use with helium, nitrogen, or argon gas cylinders.

	Cat. No.	Qty
DIN6 Gas Cylinder Pressure Regulator		
2-stage high purity, 0-100 psi	29559-U	1 ea
1-stage high purity, 0-100 psi	29558-U	1 ea
2-stage high purity plus, 0-100 psi	29577-U	1 ea
2-stage high purity plus, 0-150 psi	29578-U	1 ea
1-stage high purity plus, 0-100 psi	29576-U	1 ea
2-stage ultra high purity, 0-100 psi	29588-U	1 ea
1-stage ultra high purity, 0-100 psi	29587-U	1 ea

NEW PRODUCTS

CGA-350 Gas Cylinder Pressure Regulator

For use with hydrogen, methane, or 5% methane in argon gas cylinders.

	Cat. No.	Qty
CGA-350 Gas Cylinder Pressure Regulator		
2-stage high purity, 0-100 psi	29561-U	1 ea
1-stage high purity, 0-100 psi	29560-U	1 ea
2-stage high purity plus, 0-100 psi	29581-U	1 ea
1-stage high purity plus, 0-100 psi	29579-U	1 ea
2-stage ultra high purity, 0-100 psi	29591-U	1 ea
1-stage ultra high purity, 0-100 psi	29589-U	1 ea

NEW PRODUCTS

DIN1 Gas Cylinder Pressure Regulator

For use with hydrogen, methane, or 5% methane in argon gas cylinders.

	Cat. No.	Qty
DIN1 Gas Cylinder Pressure Regulator		
2-stage high purity, 0-100 psi	29563-U	1 ea
1-stage high purity, 0-100 psi	29562-U	1 ea
2-stage high purity plus, 0-100 psi	29583-U	1 ea
1-stage high purity plus, 0-100 psi	29582-U	1 ea
2-stage ultra high purity, 0-100 psi	29593-U	1 ea
1-stage ultra high purity, 0-100 psi	29592-U	1 ea

NEW PRODUCTS

CGA-320 Gas Cylinder Pressure Regulator

For use with carbon dioxide gas cylinders.

	Cat. No.	Qty
CGA-320 Gas Cylinder Pressure Regulator		
2-stage high purity, 0-100 psi	29567-U	1 ea
1-stage high purity, 0-100 psi	29564-U	1 ea

NEW PRODUCTS

CGA-590 Gas Cylinder Pressure Regulator

For use with compressed air gas cylinders.

	Cat. No.	Qty
CGA-590 Gas Cylinder Pressure Regulator		
2-stage high purity, 0-100 psi	29569-U	1 ea
1-stage high purity, 0-100 psi	29568-U	1 ea

NEW PRODUCTS

DIN13 Gas Cylinder Pressure Regulator

For use with compressed air gas cylinders.

	Cat. No.	Qty
DIN13 Gas Cylinder Pressure Regulator		
2-stage high purity, 0-100 psi	29572-U	1 ea
1-stage high purity, 0-100 psi	29571-U	1 ea

In-Line Pressure Regulators and Gauges

Most GC systems require that the pressure is regulated between the source (gas cylinder or gas generator) and the instrument. Select a pressure regulator based on the application:

- **In-Line Regulators:** Reduce pressure in a single step. Choose an in-line regulator if a 1-stage gas cylinder regulator is used. Install the in-line regulator within 10 feet of the instrument. 400 psig maximum inlet pressure.

We offer several versions of **in-line pressure regulators** to serve a wide variety of needs.

General Purpose

- Bar stock nickel-plated brass body with small internal volume; purges quickly
- Smooth internal cavity; efficient gas flow
- Neoprene diaphragm; inexpensive
- 2 1/2 in. diameter nickel-plated brass gauges; easy to read
- 1/8 in. brass male Swagelok fitting at valve outlet; ready for use with copper tubing

High Purity

- Bar stock nickel-plated brass body with small internal volume; purges quickly
- Smooth internal cavity; efficient gas flow
- Stainless steel diaphragm with captive PTFE seal; appropriate for most applications
- 2 1/2 in. diameter nickel-plated brass gauges; easy to read
- 1/8 in. stainless steel male Swagelok fitting at valve outlet; ready for use with copper or stainless steel tubing

Ultra High Purity

- Bar stock nickel-plated brass body with small internal volume; purges quickly
- Smooth internal cavity; efficient gas flow
- Stainless steel diaphragm with metal-to-metal seal; impervious for the most sensitive applications
- 2 1/2 in. diameter nickel-plated brass gauges; easy to read
- 1/8 in. stainless steel male Swagelok fitting at valve outlet; ready for use with copper or stainless steel tubing

Economy

- Aluminum body; lightweight and inexpensive
- Non-releasing diaphragm; inexpensive
- Plastic gauge; lightweight and inexpensive
- 1/8 in. brass male Swagelok fitting at valve outlet; ready for use with copper tubing

Gas Purification/Management

Plumbing/Regulation: *In-Line Pressure Regulators and Gauges*

In-Line Pressure Regulator

Install an in-line pressure regulator downstream of a gas cylinder regulator to adjust pressure closer to the point of use. 400 psig maximum input pressure. $\frac{1}{8}$ in. Swagelok nuts and ferrules included.



Description	Cat. No.	Qty
General Purpose version (outlet pressure 0-50 psi, $\frac{1}{8}$ in. brass fittings)	23883	1 ea
High Purity version (outlet pressure 0-100 psi, $\frac{1}{8}$ in. stainless steel fittings)	23882	1 ea
Ultra-High Purity version (outlet pressure 0-100 psi, $\frac{1}{8}$ in. stainless steel fittings)	23884	1 ea

In-Line Pressure Regulator (economy model)

The economy in-line pressure regulator is an inexpensive version for general lab applications. Use it with gas streams for pneumatic control, and other non-chromatographic purposes. 400 psig maximum input pressure. $\frac{1}{8}$ in. brass Swagelok nuts and ferrules included.

Description	Cat. No.	Qty
Regulator body (outlet pressure 0-60 psi), gauge, and panel mount bracket	23831-U	1 ea
Regulator body only (outlet pressure 0-60 psi)	23832-U	1 ea
Gauge only	23833-U	1 ea
Panel mount bracket with nut	23834-U	1 ea

In-Line Pressure Gauge Kit

Install a pressure gauge in the gas delivery system to measure pressure at any given point. For example, install one upstream and downstream of the High Capacity Gas Purifier. When the pressure drop across the purifier exceeds 10 psi, the converter tube should be replaced. Kit contains:

- 2 in. (5 cm) diameter steel and copper alloy gauge (0-100 psi)
- NPT to Swagelok adapter
- $\frac{1}{8}$ in. tee
- 18 in. ($\frac{1}{2}$ m) of $\frac{1}{8}$ in. copper line
- assembly and installation instructions

Nuts and ferrules included.



20392

1 ea

In-Line Pressure Gauge

Install a pressure gauge in the gas delivery system to measure pressure at any given point. For example, install one upstream and downstream of the High Capacity Gas Purifier. When the pressure drop across the purifier exceeds 10 psi, the converter tube should be replaced. Contains:

- 2 in. (5 cm) diameter steel and copper alloy gauge
- NPT to Swagelok adapter
- $\frac{1}{8}$ in. tee

Nuts and ferrules included.



Description	Cat. No.	Qty
0-30 psi	20469	1 ea
0-60 psi	20470	1 ea
0-100 psi	22423	1 ea
0-30 psi, gauge only (tee not included)	20393	1 ea
0-60 psi, gauge only (tee not included)	20394	1 ea

Flow Regulation and Measurement

In addition to pressure, flow is another parameter that can be regulated and measured. Several products allow the precise control of flow to achieve the desired specifications. As important as metering is, the flow must also be accurately measured. A rotameter is commonly employed for this function. The added benefit of a rotameter is its ability to both regulate and measure flow.

Fine Metering Valve

Use for very accurate flow regulation. Install a flow measuring device downstream. Nuts and ferrules included. An optional vernier handle (Cat. No. 22122, order separately) is available for added convenience.



Description	Cat. No.	Qty
brass, straight arms: $\frac{1}{8}$ in.	22116	1 ea
brass, angle arms: $\frac{1}{8}$ in.	22114	1 ea
stainless steel, straight arms: $\frac{1}{8}$ in.	22117	1 ea
stainless steel, angle arms: $\frac{1}{8}$ in.	22115	1 ea
brass, angle arms: $\frac{1}{16}$ in.	22118	1 ea
stainless steel, straight arms: $\frac{1}{16}$ in.	22121	1 ea

Gas Purification/Management

Plumbing/Regulation: *Flow Regulation and Measurement*

Vernier Handle for Fine Metering Valve

This optional vernier handle attaches to the stem of a fine metering valve, and is more comfortable to turn than the stem itself. The thicker body also allows for more precise control than possible by turning the stem. Additionally, a scale on the handle can be used for visual detection of movement. Order choice of fine metering valve separately.



22122

1 ea

Supelco Rotameter

This rotameter is designed for the accurate regulation of gas flow, providing measurement at the same time. This versatile unit includes four interchangeable floats, each with a different working range. Simply install the float required for the application. Standard flow tables in mL/min at STP are included.

The rotameter is easy to mount. Alternatively, it can be installed on a tripod assembly (order tripod assembly separately). Available with or without needle valve.

Specifications:

- **Max. Pressure:** 200 psig (13.8 bar)
- **Max. Temp.:** 250 °F (121 °C)
- **Connections:** 1/8 in. female NPT (use connector to male NPT fittings to connect into gas delivery system)

Float Upper Flow Rates:

0-33 mL/min. Rotameter

- Glass Float: 6 mL/min.
- Sapphire Float: 8 mL/min.
- Stainless Steel Float: 17 mL/min.
- Carboly Float: 33 mL/min.

0-110 mL/min. Rotameter

- Glass Float: 19 mL/min.
- Sapphire Float: 30 mL/min.
- Stainless Steel Float: 61 mL/min.
- Carboly Float: 110 mL/min.

0-246 mL/min. Rotameter

- Glass Float: 49 mL/min.
- Sapphire Float: 73 mL/min.
- Stainless Steel Float: 137 mL/min.
- Carboly Float: 246 mL/min.

0-454 mL/min. Rotameter

- Glass Float: 92 mL/min.
- Sapphire Float: 140 mL/min.
- Stainless Steel Float: 264 mL/min.
- Carboly Float: 454 mL/min.



Description	Cat. No.	Qty
flow range: 0-33 mL/min, with needle valve	23324	1 ea
flow range: 0-110 mL/min, with needle valve	23325	1 ea
flow range: 0-244 mL/min, with needle valve	23320-U	1 ea
flow range: 0-454 mL/min, with needle valve	23326	1 ea
flow range: 0-33 mL/min, without needle valve	503843	1 ea
flow range: 0-110 mL/min, without needle valve	503851	1 ea
flow range: 0-454 mL/min, without needle valve	503886	1 ea

Modular Rotameter

The modular design of this rotameter allows the unit to be quickly converted to monitor different flow ranges. Each unit includes a rotameter body and two modules, each with two floats installed inside the flow tube (each float has a different working range). The floats are never touched. Instead, the module is simply interchanged.

Connections are 1/8 in. female NPT. Use connector to male NPT fittings to connect into gas delivery system. The rotameter can be installed on a tripod assembly (order tripod assembly separately).

Low Flow Kit (Cat. No. 22549)

Module 1

- Glass Float: 6-60 mL/min.
- Stainless Steel Float: 15-150 mL/min.

Module 2

- Sapphire Float: 11-110 mL/min.
- Carboly Float: 30-300 mL/min.

High Flow Kit (Cat. No. 22550-U)

Module 1

- Glass Float: 38-380 mL/min.
- Stainless Steel Float: 84-840 mL/min.

Module 2

- Sapphire Float: 54-540 mL/min.
- Carboly Float: 125-1250 mL/min.

Gas Purification/Management

Plumbing/Regulation: Flow Regulation and Measurement



Modular rotameter (both modules shown)

Description	Cat. No.	Qty
flow range: 6-300 mL/min	22549	1 ea
flow range: 38-1250 mL/min	22550-U	1 ea

Rotameter Tripod Assembly

Use a rotameter tripod assembly to mount a rotameter anywhere.

Description	Cat. No.	Qty
for use with Supelco rotameters (legs have leveling screws, unit has a built-in level)	23322	1 ea
for use with Modular rotameters	22548	1 ea

Swagelok® Connector to Male NPT

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
NPT male 1/8 in. (B)	200-1-2	22082	2 ea
Swagelok 1/8 in. (A)			
NPT male 1/8 in. (B)	400-1-2	22083	2 ea
Swagelok 1/4 in. (A)			
stainless steel			
NPT male 1/8 in. (B)	200-1-2	22084-U	1 ea
Swagelok 1/8 in. (A)			
NPT male 1/8 in. (B)	400-1-2	22085-U	1 ea
Swagelok 1/4 in. (A)			

Leak Detection

Leaks in a gas delivery system can lead to loss of gas (potentially a large cost over enough time), and/or the introduction of room air contaminants into the gas stream (lowering gas purity levels). A leak check of the gas delivery system should be performed after any modification or component change-out. If these occur infrequently, then a leak check should be performed at least annually. Electronic sniffers are recommended over liquids, as these liquids may be drawn into the gas stream, potentially contaminating downstream components.

GOW-MAC® Miniature Leak Detector

This highly sensitive leak detector is excellent at finding leaks quickly, without the risk of contaminating the instrument associated with liquid leak detectors. Lightweight and compact, it includes a hand-held sniffer wand that allows the location of leaks to be pinpointed. This unit operates on the same principle as a thermal conductivity detector, it responds to any gas that has a thermal conductivity value different from that of air. It is easy to use, and can be operated with little or no training:

- Turn the unit on
- Zero out background air
- Probe for leaks

This unit can be powered through an electrical cord, or by charging an on-board battery. The power cord, battery, and charger are all included.

Note: Do not use with combustible gases.

Specifications:

- **Detector:** thermal conductivity cell with thermistors
- **Pump:** diaphragm type
- **Visual Readout:** LED bar graph
- **Zero:** automatic with drift elimination
- **Audio Signal:** audible alarm with adjustable setpoint and volume
- **Battery:** rechargeable Ni-Cd
- **Battery Life:** 8 hours, can be recharged to 95% of capacity in 1 hour
- **Dimensions:** 3 1/4 in. (8 cm) wide × 1 13/16 in. (4.5 cm) high × 5 1/4 in. (13 cm) deep

Sensitivity (minimum leak rate required to produce 10% deflection of full scale):

- **Helium:** 1.0×10^{-5} cc/sec (0.012 ft³/yr)
- **Argon:** 1.0×10^{-4} cc/sec (0.110 ft³/yr)
- **CO₂:** 1.0×10^{-4} cc/sec (0.123 ft³/yr)
- **Refrigerant:** 1.0×10^{-4} cc/sec (0.123 ft³/yr)
- **H₂:He (40:60):** 1.0×10^{-5} cc/sec (0.012 ft³/yr)



Description	Cat. No.	Qty
110 V (60 Hz)	22807	1 ea
230 V (50 Hz)	22808	1 ea

Gas Purification/Management

Plumbing/Regulation: *Leak Detection*

Carrying Case for GOW-MAC® Miniature Leak Detector

Convenient case for GOW-MAC miniature leak detectors (110 V or 230 V models).

22809

1 ea

SNOOP® Liquid Leak Detector

For use with volumetric (bubble) flowmeters. Also useful for checking gas delivery system plumbing for leaks. Not recommend for use upstream of capillary GC systems (an electronic leak detector is preferred).



20640-U

3.8 L

20434

8 oz

Leak Tester Kit

This kit allows septum leaks to be detected without the risk of contaminating the system. Simply dip one end of a leak tester tube into SNOOP®, then place the other end over the septum nut or needle guide. Bubbles indicate a leak. Kit includes 10 leak tester tubes and 8 ounces of SNOOP.

22660-U

1 ea

Leak-Tec® Leak Detector

PubChem 24852215

For use on heated parts, at temperatures up to 210 °C. Simply spray onto heated fittings, joints, or other parts. The material will not bubble unless there is a leak. The pressurized delivery and short straw allow the material to be sprayed onto hard to reach parts.



20566

283 g

Gas Cylinder Accessories

This group of products are designed to make working with gas cylinders a little more user friendly and/or safe.

- Mounting the regulator on the wall instead of on the cylinder will take stress off the tubing, reducing the chance of kinking it (resulting in leaks).
- A changeover panel allows for a continuous flow of gas, even during cylinder change-out.
- Flexible pigtails (part of a wall mount, a changeover panel, or as a stand-alone item) eliminate the tendency of tubing to kink near the fitting.
- When working with hydrogen, an engineering control must be installed to prevent the release of gas if a leak develops downstream.

Cylinder valve and cap wrench

Enables easy opening of gas cylinder valves that have been fitted with a hand wheel. It is also the correct and safe tool for removing cylinder caps. product of Matheson TW-5



Z261866-1EA

1 ea

Regulator Wall Bracket

Wall-mounting a gas cylinder regulator eliminates the need to handle it during cylinder change-out, thereby reducing the chance of kinking the tubing (kinked tubing next to a fitting may result in a leak). The bracket is fabricated from grade 304 stainless steel for long life, and can be used for 2-stage or 1-stage gas cylinder regulators (order separately). An integral 30 in. flexible stainless steel pigtail allows connection to a cylinder without the risk of a leak caused from kinked tubing. The CGA connector is a hand-tight design, eliminating the need for a wrench during cylinder change-out. Choose:

- CGA 580 for helium, nitrogen, and argon
- CGA 350 for hydrogen, ethane, and 5% methane in argon
- CGA 590 for compressed air

The two station bracket has 2 pigtails that join before the regulator fitting, and allows 2 gas cylinders to feed the system, extending the time between cylinder change-out.



Description	Cat. No.	Qty
Single station, CGA 580	503665	1 ea
Single station, CGA 350	503657	1 ea
Single station, CGA 590	503673	1 ea
Two station, CGA 590	503738	1 ea

Gas Purification/Management

Plumbing/Regulation: *Gas Cylinder Accessories*

Automatic Changeover Panel

A wall-mounted automatic changeover panel allows for uninterrupted gas flow. One cylinder is always feeding the system. When it becomes empty, the unit switches to the full cylinder. The empty cylinder can be replaced so it is ready when the unit switches back. When cylinders are replaced, the tubing from the cylinder to the unit can be purged, so a slug of room air does not enter the internal regulator when the unit switches back. The pressure gauges indicate which cylinder is in use and which cylinder is empty. Flexible stainless steel pigtails allow connection to cylinders without the risk of a leak caused from kinked tubing.

Note: This unit contains a 1-stage regulator, and requires that an in-line pressure regulator is installed downstream for final pressure control.

Specifications:

- Check valve in inlets; keeps air from entering during cylinder change-out
- Stainless steel diaphragm; appropriate for most applications
- Diaphragm packless purge valves; higher leak integrity than needle valve
- Shut-off valve at unit outlet; keeps air from entering during change-out of downstream components



Description	Cat. No.	Qty
CGA 350, for use with H ₂ , Ar/CH ₄	503576	1 ea

Check valve

Max. pressure: 3,000 psig. 1/4 x 1/4 in. NPTF inlets. Attaches to the outlet side of a regulator to prevent backstreaming of liquids and gases into the regulator or cylinder.

Operating Temperature Range:

Viton: -20 °F to 400 °F

EPR: -65 °F to 300 °F

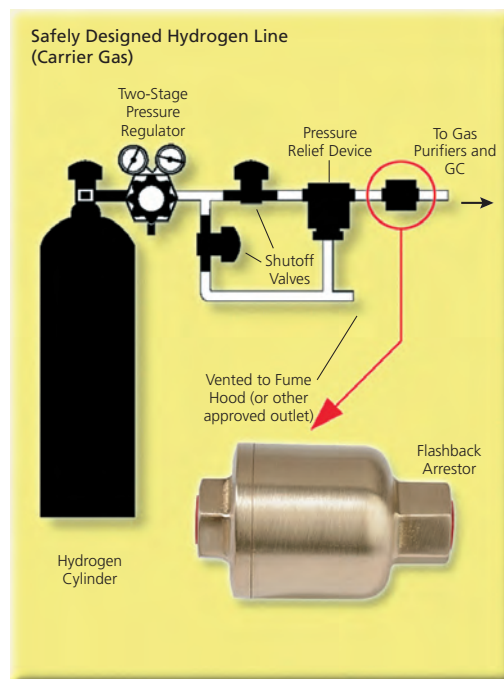
Neoprene: 80 °F to 300 °F



Description	Cat. No.	Qty
Viton® O-ring, brass valve	Z146846-1EA	1 ea
stainless steel valve, EPR O-ring	Z146854-1EA	1 ea
neoprene O-ring, stainless steel valve	Z146862-1EA	1 ea
Viton® O-ring, stainless steel valve	Z146870-1EA	1 ea

Hydrogen Flash Arrestor

Install a flash arrestor downstream of a hydrogen gas cylinder (see figure), or a hydrogen generator. In event of a flashback, the flash arrestor diverts the flame into three feet (1 m) of tubing, where the flame is extinguished and the heat is absorbed. The shock wave preceding the flashback closes and locks the arrestor's shutoff valve, eliminating the flow of gas. Inlet/outlet fittings are 1/4 in. female NPT. For use to 50 psig (3.5 kg/cm²). Meets Occupational Safety and Health Administration (OSHA) and National Fire Protection Agency (NFPA) codes. Factory Mutual approved.



23315

1 ea

Gas Purification/Management

Plumbing/Regulation: *Gas Cylinder Accessories*

Swagelok® Connector to Male NPT

Nuts and ferrules included.



Description	Swagelok No.	Cat. No.	Qty
brass			
Swagelok 1/8 in. (A)	200-1-4	22066	2 ea
NPT male 1/4 in. (B)			
NPT male 1/4 in. (B)	400-1-4	21519	2 ea
Swagelok 1/4 in. (A)			
NPT male 1/4 in. (B)	810-1-4	25818	2 ea
Swagelok 1/2 in. (A)			
stainless steel			
NPT male 1/4 in. (B)	200-1-4	22067	1 ea
Swagelok 1/8 in. (A)			
NPT male 1/4 in. (B)	400-1-4	22700-U	1 ea
Swagelok 1/4 in. (A)			
NPT male 1/4 in. (B)	810-1-4	25830	1 ea
Swagelok 1/2 in. (A)			

Flexible Stainless Steel Hose

This infinitely flexible, 30 in. (76 cm) × 1/4 in. 316 grade stainless steel hose solves many routing problems. It enables the direction of a gas line to change as needed without the risk of a leak caused from kinked tubing. Tested to 3000 psig (211 kg/cm²) with helium. End are both 1/8 in. male Swagelok fittings. Nuts and ferrules included.



22060-U

1 ea

Gas Generators and Air Compressors

Laboratory gas generators are a great alternative to gas cylinders. In addition to being a much more sensible source of gas from a cost standpoint, generators are safer, cosmetically better, take up less space, and do not require the labor needed to move bulky cylinders around the lab. Gas generators do not require switching systems or long runs of tubing to, or through, exterior walls. They just do their job - quietly, safely, and year after year. Several models of Parker gas generators, and high quality air compressors from Jun-Air, are offered.

Need a Parker generator we do not offer? We have access to the full line of Parker generators. Simply contact Technical Service at 800-359-3041 (US and Canada), 814-359-3041, or techservice@sial.com for a quotation.

Hydrogen Generators

Hydrogen has two primary uses in a GC lab; as a column carrier gas choice, and as the fuel source for FIDs. Hydrogen generators are not only more cost-effective than hydrogen cylinders, they are much safer (only a small volume of hydrogen is present at any given time, and internal controls shut the system off if a downstream leak is detected).

Parker® H2PEM Hydrogen Generator

This H2PEM hydrogen generator employs a Proton Exchange Membrane (PEM) cell to produce hydrogen on demand. An economical alternative to high pressure gas cylinders, this unit should pay for itself in a year or two.

Features/Benefits

- Eliminates need for dangerous and expensive hydrogen gas cylinders
- Compact; only requires one square foot of bench space
- Can be used anywhere that an electrical supply is available
- Just add deionized water for weeks of continuous operation
- Easy-to-read display changes color to indicate when to add water
- Only 100 mL of hydrogen is stored in the system at any time, and at low pressure
- A built-in sensing circuit shuts the generator down if a hydrogen leak is detected
- PEM technology eliminates the need for caustic liquids

Maintenance

- Add deionized water as needed
- Change the filters every six months
- Change the hydration pump every six months
- Change the desiccant cartridge when it changes color from beige to clear

Specifications

- Outlet Purity: 99.9995%
- Outlet Pressure: 10-100 psig
- Outlet Fitting: 1/8 in. compression
- Power Needs: 110-230 V (50-60 Hz)
- Shipping Weight: 40 lb (18 Kg) dry
- Dimensions (H x W x D): 17.12 in. x 13.46 in. x 17.95 in. (43.48 cm x 34.19 cm x 45.6 cm)

Marks

- CE approved
- UL listed
- CSA listed
- IEC 1010 certified
- Satisfies OSHA and NFPA requirements

Gas Purification/Management

Gas Generators and Air Compressors: *Hydrogen Generators*

Description	Cat. No.	Qty
Model H2PEM-100, 110/230 volt, output flow: 0-100 cc/min	27773-U	1 ea
Model H2PEM-165, 110/230 volt, output flow: 0-165 cc/min	27620-U	1 ea
Model H2PEM-260, 110/230 volt, output flow: 0-260 cc/min	22751	1 ea
Model H2PEM-510, 110/230 volt, output flow: 0-510 cc/min	22801	1 ea

Parker® ChromGas® Hydrogen Generator

This ChromGas hydrogen generator employs a SPE Electrolyzer cell which uses a solid polymer electrolyte to produce hydrogen on demand. An economical alternative to high pressure gas cylinders, this unit should pay for itself in a year or two.

Features/Benefits

- Eliminates need for dangerous and expensive hydrogen gas cylinders
- Compact; only requires one square foot of bench space
- Can be used anywhere that an electrical supply is available
- Just add deionized water for weeks of continuous operation
- Only 100 mL of hydrogen is stored in the system at any time, and at low pressure
- A built-in sensing circuit shuts the generator down if a hydrogen leak is detected
- If contaminated water or low level water is detected, the system activates a warning light and shuts off the generator which avoids damage to the electrolytic cell
- SPE Electrolyzer technology eliminates the need for caustic liquids

Maintenance

- Add deionized water as needed
- Change the deionizer bag every six months (or if "Change Water" indicator comes on)
- Change the desiccant cartridge when it changes color to pink

Specifications

- Water Reservoir Capacity: 4 L
- Outlet Purity: 99.99997%
- Outlet Pressure: 0-100 psig
- Outlet Fitting: 1/8 in. compression
- Power Needs: 110-230 V (50-60 Hz)
- Shipping Weight: 40 lb (18.1 Kg) dry
- Dimensions (H x W x D): 14.75 in. x 13 in. x 14 in. (37 cm x 33 cm x 36 cm)

Marks

- CE approved
- UL listed
- CSA listed
- IEC 1010 certified
- Satisfies OSHA and NFPA requirements

Description	Cat. No.	Qty
Model 9800, 110/230 volt, output flow: 0-1200 cc/min	22835	1 ea

Parker® ChromGas® Hydrogen Generator Replacement Parts

Use for routine maintenance of Parker ChromGas hydrogen generators.

- Change the deionizer bag every six months (or if "Change Water" indicator comes on)
- Change the desiccant cartridge when it changes color to pink

Description	Cat. No.	Qty
Deionizer Bags	22963	2 ea
Desiccant Cartridge	22837	1 ea

Zero Air Generators

The oxygen source for FIDs is commonly obtained by using pressurized air. In particular, zero air is recommended for FID use. This grade of air is free of methane, a compound that may cause interference with an FID (a clean flame is required for an accurate response to the analytes eluting from the column).

Parker® ChromGas® Zero Air Generator

This ChromGas zero air generator incorporates three stages:

- A 0.5 mm coalescing inlet filter removes particles, oil, and water
- A heated catalyst removes hydrocarbons
- A 0.01 mm cellulose fiber outlet filter removes residual particulate material from the product air stream

A hazard-free and economical alternative to high pressure gas cylinders, this unit should pay for itself in a year or two.

Features/Benefits

- Eliminates need for expensive gas cylinders
- Compact; requires less than one square foot of bench space
- Can be used anywhere that an electrical supply is available
- Only requires an upstream compressed air source

Maintenance

- Clean the inlet and outlet filters every six months
- Change the inlet and outlet filters every two years

Specifications

- Inlet Pressure: 2-125 psig
- Outlet Purity: <0.1 ppm hydrocarbons (as methane)
- Outlet Pressure: 125 psig
- Outlet Fitting: 1/8 in. compression
- Power Needs: 110 V (60 Hz), or 230 V (50 Hz)
- Shipping Weight (Model 1000 and 1001): 11 lb (5 Kg)
- Shipping Weight (Model 3500 and 3501): 20 lb (9.1 Kg)
- Dimensions (Model 1000 and 1001; H x W x D): 9.75 in. x 5.75 in. x 12 in. (25 cm x 14.7 cm x 30.8 cm)
- Dimensions (Model 3500 and 3501; H x W x D): 12 in. x 6.75 in. x 15 in. (29.2 cm x 17.8 cm x 39.4 cm)

Gas Purification/Management

Gas Generators and Air Compressors: *Zero Air Generators*

Parker® ChromGas® Zero Air Generator (continued)

Marks

- CE approved
- UL listed
- CSA listed
- IEC 1010 certified



Description	Cat. No.	Qty
Model 1000, 110 volt, output flow: 1000 cc/min	22824	1 ea
Model 1001, 230 volt, output flow: 1000 cc/min	22830-U	1 ea
Model 3500, 110 volt, output flow: 3500 cc/min	27625-U	1 ea
Model 3501, 230 volt, output flow: 3500 cc/min	27626-U	1 ea

Nitrogen Generators

When the application allows, switching to nitrogen may lead to cost savings. Example applications include purging samples, dry-purging air monitoring collection devices to remove moisture, or purging adsorbents during regeneration steps. Nitrogen is the most plentiful component of air, and its generation is not as complex as other gases.

domnick hunter® Nitrox Hydrocarbon-Free Nitrogen Generator

This Nitrox nitrogen generator employs pressure swing adsorption technology to produce a continuous supply of hydrocarbon-free nitrogen.

- Compressed air at 101 psig (7 bar) is delivered to a bed of carbon molecular sieve, which selectively removes hydrocarbons, moisture, oxygen, and carbon dioxide
- A heated catalyst then reduces the hydrocarbons in the nitrogen stream to less than 0.1 ppm (as methane)
- Two adsorbent beds alternate between purification and regeneration modes, ensuring a continuous supply of nitrogen

An economical alternative to high pressure gas cylinders, this unit should pay for itself in a year or two.

Features/Benefits

- Eliminates need for expensive gas cylinders
- Can be used anywhere that an electrical supply is available
- Integral oil-free air compressor eliminates need for an upstream air compressor
- Two adsorbent beds alternate between purification and regeneration modes, ensuring a continuous supply of nitrogen

Specifications

- Outlet Purity: <0.1 ppm hydrocarbons (as methane)
- Outlet Purity: <10 ppm oxygen
- Outlet Pressure: 73 psig (5 bar)
- Outlet Fitting: 1/4 in. NPT
- Power Needs: 110 V (60 Hz) or 230 V (50 Hz)
- Shipping Weight: 101 lb (46 Kg)
- Dimensions (H x W x D): 33 in. x 14 in. x 18 in. (84 cm x 36 cm x 46 cm)

Marks

- CE approved



Description	Cat. No.	Qty
Model 1001, 110 volt, output flow: 1000 cc/min	27765-U	1 ea
Model 1001, 230 volt, output flow: 1000 cc/min	28366-U	1 ea

Gas Purification/Management

Gas Generators and Air Compressors: *Air Compressors*

Air Compressors

Use a stand-alone air compressor to supply downstream zero air or nitrogen generators that do not have integral air compressors. These units can also be used to supply compressed air for pneumatic control applications. More than 30 years of experience and product development keep Jun-Air the leader in air compressor technology.

Jun-Air™ Model 2000-40MD Oilless Air Compressor

Features/Benefits

- Generate oilless, dry, clean air
- Quiet and vibrationless
- Highly efficient cooling enables compressors to run continuously
- Compressor is housed in a sound-reducing cabinet
- Incorporates an effluent filter/dryer to reduce moisture

Specifications

- Max. Pressure: 120 psig (8 bar)
- Flow Rate at 0 bar: 175 L/min.
- Flow Rate at 1 bar: 132 L/min.
- Flow Rate at 2 bar: 120 L/min.
- Flow Rate at 3 bar: 112 L/min.
- Flow Rate at 4 bar: 105 L/min.
- Flow Rate at 5 bar: 99 L/min.
- Flow Rate at 6 bar: 94 L/min.
- Flow Rate at 7 bar: 90 L/min.
- Flow Rate at 8 bar: 86 L/min.
- Noise: 53 dB at 120 psig (8 bar)
- Power Needs: 110 V (60 Hz) or 230 V (60 Hz)
- Shipping Weight: 254 lb (115 Kg)
- Dimensions (H x W x D): 31 in. x 25 in. x 22.5 in. (79 cm x 63 cm x 57 cm)

Marks

- CE approved
- UL listed
- CSA listed
- IEC 1010 certified



Description	Cat. No.	Qty
110 V, flow rate: 100 L/min (at 4 bar)	27675-U	1 ea
230 V, flow rate: 100 L/min (at 4 bar)	22825	1 ea

Jun-Air™ Model OF302-25MD2 Oilless Air Compressor

Features/Benefits

- Generate oilless, dry, clean air
- Quiet and vibrationless
- Highly efficient cooling enables compressors to run continuously
- Compressor is housed in a sound-reducing cabinet
- Incorporates an effluent filter/dryer to reduce moisture

Specifications

- Max. Pressure: 120 psig (8 bar)
- Flow Rate at 0 bar: 113 L/min.
- Flow Rate at 1 bar: 69 L/min.
- Flow Rate at 2 bar: 62 L/min.
- Flow Rate at 3 bar: 53 L/min.
- Flow Rate at 4 bar: 50 L/min.
- Flow Rate at 5 bar: 47 L/min.
- Flow Rate at 6 bar: 45 L/min.
- Flow Rate at 7 bar: 41 L/min.
- Flow Rate at 8 bar: 38 L/min.
- Noise: 48 dB at 120 psig (8 bar)
- Power Needs: 110 V (60 Hz)
- Shipping Weight: 183 lb (83 Kg)
- Dimensions (H x W x D): 33.9 in. x 17.4 in. x 26.1 in. (86.1 cm x 44 cm x 66.5 cm)

Marks

- CE approved
- UL listed
- CSA listed
- IEC 1010 certified



Description	Cat. No.	Qty
110 V, flow rate: 50 L/min (at 4 bar)	503762	1 ea

Intake Filter for Jun-Air™ Compressor

Two filters are required to perform complete maintenance on a single compressor.

Description	Cat. No.	Qty
for use with OF302-25MD2	503797	1 ea

Gas Purification/Management

Gas Generators and Air Compressors: *Air Compressors*

Jun-Air™ Model OF301-4B Oilless Air Compressor

Features/Benefits

- Generate oilless, dry, clean air
- Quiet and vibrationless
- Highly efficient cooling enables compressors to run continuously

Specifications

- Max. Pressure: 120 psig (8 bar)
- Flow Rate at 0 bar: 68 L/min.
- Flow Rate at 1 bar: 43 L/min.
- Flow Rate at 2 bar: 36 L/min.
- Flow Rate at 3 bar: 34 L/min.
- Flow Rate at 4 bar: 32 L/min.
- Flow Rate at 5 bar: 30 L/min.
- Flow Rate at 6 bar: 28 L/min.
- Flow Rate at 7 bar: 27 L/min.
- Flow Rate at 8 bar: 25 L/min.
- Noise: 61 dB at 120 psig (8 bar)
- Power Needs: 110 V (60 Hz) or 230 V (60 Hz)
- Shipping Weight: 42 lb (19 Kg)
- Dimensions (H x W x D): 13.1 in. x 11.8 in. x 15 in. (33.4 cm x 30 cm x 38.2 cm)

Marks

- UL listed
- CSA listed
- IEC 1010 certified



Description	Cat. No.	Qty
110 V, flow rate: 32 L/min (at 4 bar)	503746	1 ea
230 V, flow rate: 32 L/min (at 4 bar)	503754	1 ea

GC Solvents

GC Solvents

These solvents have been developed for residue analysis in application fields such as environmental analysis, and food & beverage control. All solvents are manufactured and bottled under oxygen-free conditions and sealed with a PTFE-lined cap to prevent product contamination and degradation.

Fluka's GC solvents are free of impurities which would show greater signals than 5 ng/l lindane, in the GC/ECD retention time range of lindane to DDT.

Fluka's GC solvents for trace analysis are controlled for high volatile halogenated hydrocarbons: with GC/ECD in the corresponding retention volume ranges (methylene chloride-pentachloroethane) no impurities are present with a signal greater than 10 µg/l in each range.

Fluka's GC solvents, Purge & Trap Grade are suitable for GC/MS analysis of volatile organics in water and oil sediment samples according to the EPA purge & trap methods 601, 624 and 8240.

General Solvents

CAS No.	Compound	Cat. No.	Qty
67-64-1	Acetone, capillary GC grade, ≥99.9%	414689-4X4L	4 × 4 L
67-64-1	Acetone, for pesticide residue analysis	34480-1L 34480-2.5L 34480-4X2.5L 34480-72X2.5L 34480-7L 34480-45L	1 L 2.5 L 4 × 2.5 L 72 × 2.5 L 7 L 45 L
75-05-8	Acetonitrile, for pesticide residue analysis	34481-50ML 34481-1L 34481-6X1L 34481-2.5L 34481-4X2.5L 34481-7L	50 mL 1 L 6 × 1 L 2.5 L 4 × 2.5 L 7 L
1634-04-4	<i>tert</i> -Butyl methyl ether, for residue analysis, ≥99.0%	20257-1L-F	1 L
67-66-3	Chloroform, contains ~1% ethanol as stabilizer, for residue analysis, ≥99.8%	25669-1L 25669-2.5L	1 L 2.5 L
60-29-7	Diethyl ether, for residue analysis	31671-1L 31671-2.5L	1 L 2.5 L
64-17-5	Ethanol, for residue analysis	02851-1L 02851-2.5L	1 L 2.5 L
141-78-6	Ethyl acetate, for pesticide residue analysis	31063-1L 31063-2.5L 31063-4X2.5L 31063-72X2.5L 31063-7L 31063-45L	1 L 2.5 L 4 × 2.5 L 72 × 2.5 L 7 L 45 L
142-82-5	Heptane, for pesticide residue analysis	34495-1L 34495-2.5L 34495-4X2.5L 34495-7L	1 L 2.5 L 4 × 2.5 L 7 L
110-54-3	Hexane, for residue analysis, ≥99.0%	52767-1L 52767-2.5L	1 L 2.5 L
110-54-3	Hexane, for pesticide residue analysis	34484-1L 34484-2.5L 34484-4X2.5L 34484-7L 34484-18L 34484-45L	1 L 2.5 L 4 × 2.5 L 7 L 18 L 45 L
-	Hexane, mixture of isomers, for pesticide residue analysis	34493-2.5L 34493-4X4L	2.5 L 4 × 4 L
67-56-1	Methanol, for pesticide residue analysis	34485-1L 34485-2.5L 34485-4X2.5L 34485-72X2.5L 34485-7L	1 L 2.5 L 4 × 2.5 L 72 × 2.5 L 7 L
67-56-1	Methanol, capillary GC grade, ≥99.9%	414719-4X4L	4 × 4 L
67-56-1	Methanol, for GC/MS analysis of volatile organics, ≥99.9%	414816-1L	1 L
109-66-0	Pentane, for residue analysis, ≥99.0%	76869-1L 76869-2.5L	1 L 2.5 L
109-66-0	Pentane, for residue analysis (of high-volatile halogenated hydrocarbons), ≥99.0%	76866-1L 76866-2.5L	1 L 2.5 L

GC Solvents

General Solvents

CAS No.	Compound	Cat. No.	Qty
109-66-0	Pentane, for pesticide residue analysis	34497-1L	1 L
		34497-2.5L	2.5 L
101316-46-5	Petroleum ether, for pesticide residue analysis, low boiling point hydrogen treated naphtha, 40-60 °C	34491-1L	1 L
		34491-6X1L	6 × 1 L
		34491-2.5L	2.5 L
		34491-4X2.5L	4 × 2.5 L
		34491-7L	7 L
		34491-45L	45 L
67-63-0	2-Propanol, for pesticide residue analysis	34486-2.5L	2.5 L
		34486-4X2.5L	4 × 2.5 L
108-88-3	Toluene, for pesticide residue analysis acc. to FDA	34494-1L	1 L
		34494-2.5L	2.5 L
		34494-4X2.5L	4 × 2.5 L
		34494-7L	7 L
		34494-45L	45 L
540-84-1	2,2,4-Trimethylpentane, for pesticide residue analysis	34499-1L	1 L
		34499-6X1L	6 × 1 L
		34499-2.5L	2.5 L

High Purity GC Solvents for Pesticide Residue Analysis

These solvents are suitable for application in residue analysis of pesticides and other low-volatile, environmentally relevant substances by means of GC/ECD or GC/PND. As polychlorinated biphenyls (PCBs) are also detected in the GC/ECD test, these solvents are suitable for analysis of this class of substances as well. Besides a general high grade of purity, the specifications are tailor-made to the special requirements in residue analysis of pesticides, metabolites, preservatives and other low-volatile, environmentally relevant substances.

CAS No.	Compound	Cat. No.	Qty
67-64-1	Acetone, for analysis of dioxins, furans and PCB, ≥99.8%	31062-2.5L	2.5 L
		31062-7L	7 L
67-64-1	Acetone, for pesticide residue analysis	34480-1L	1 L
		34480-2.5L	2.5 L
		34480-4X2.5L	4 × 2.5 L
		34480-72X2.5L	72 × 2.5 L
		34480-7L	7 L
		34480-45L	45 L
75-05-8	Acetonitrile, for pesticide residue analysis	34481-50ML	50 mL
		34481-1L	1 L
		34481-6X1L	6 × 1 L
		34481-2.5L	2.5 L
		34481-4X2.5L	4 × 2.5 L
		34481-7L	7 L
1634-04-4	<i>tert</i> -Butyl methyl ether, for pesticide residue analysis	34498-1L	1 L
		34498-2.5L	2.5 L
		34498-4X2.5L	4 × 2.5 L
67-66-3	Chloroform, contains ~1% ethanol as stabilizer, for residue analysis, ≥99.8%	25669-1L	1 L
		25669-2.5L	2.5 L
110-82-7	Cyclohexane, for pesticide residue analysis	34496-1L	1 L
		34496-2.5L	2.5 L
		34496-4X2.5L	4 × 2.5 L
		34496-72X2.5L	72 × 2.5 L
		34496-7L	7 L
		34496-18L	18 L
75-09-2	Dichloromethane, for pesticide residue analysis	34488-1L	1 L
		34488-2.5L	2.5 L
		34488-4X2.5L	4 × 2.5 L
		34488-7L	7 L
		34488-45L	45 L
60-29-7	Diethyl ether, for residue analysis	31671-1L	1 L
		31671-2.5L	2.5 L
68-12-2	<i>N,N</i> -Dimethylformamide, for pesticide residue analysis	34489-2.5L	2.5 L
141-78-6	Ethyl acetate, for pesticide residue analysis	31063-1L	1 L
		31063-2.5L	2.5 L
		31063-4X2.5L	4 × 2.5 L
		31063-72X2.5L	72 × 2.5 L
		31063-7L	7 L
		31063-45L	45 L
142-82-5	Heptane, for pesticide residue analysis	34495-1L	1 L
		34495-2.5L	2.5 L
		34495-4X2.5L	4 × 2.5 L
		34495-7L	7 L

GC Solvents

High Purity GC Solvents for Pesticide Residue Analysis

CAS No.	Compound	Cat. No.	Qty
110-54-3	Hexane, for pesticide residue analysis	34484-1L	1 L
		34484-2.5L	2.5 L
		34484-4X2.5L	4 × 2.5 L
		34484-7L	7 L
		34484-18L	18 L
-	Hexane, mixture of isomers, for pesticide residue analysis	34484-45L	45 L
		34493-2.5L	2.5 L
67-56-1	Methanol, for pesticide residue analysis	34493-4X4L	4 × 4 L
		34485-1L	1 L
109-66-0	Pentane, for pesticide residue analysis	34485-2.5L	2.5 L
		34485-4X2.5L	4 × 2.5 L
		34485-72X2.5L	72 × 2.5 L
		34485-7L	7 L
		34497-1L	1 L
101316-46-5	Petroleum ether, for pesticide residue analysis, low boiling point hydrogen treated naphtha, 40-60 °C	34497-2.5L	2.5 L
		34491-1L	1 L
67-63-0	2-Propanol, for pesticide residue analysis	34491-6X1L	6 × 1 L
		34491-2.5L	2.5 L
		34491-4X2.5L	4 × 2.5 L
		34491-7L	7 L
		34491-45L	45 L
108-88-3	Toluene, for pesticide residue analysis acc. to FDA	34486-2.5L	2.5 L
		34486-4X2.5L	4 × 2.5 L
540-84-1	2,2,4-Trimethylpentane, for pesticide residue analysis	34494-1L	1 L
		34494-2.5L	2.5 L
		34494-4X2.5L	4 × 2.5 L
		34494-7L	7 L
		34494-45L	45 L
7732-18-5	Water, for pesticide residue analysis	34499-1L	1 L
		34499-6X1L	6 × 1 L
		34499-2.5L	2.5 L

GC Solvents for Residue Analysis of Dioxins, Furans, and PCBs

These solvents are GC-MS tested and contain less than 5 pg/l (5 ppb) of the 17 relevant dibenzodioxins and dibenzofuranes.

CAS No.	Compound	Cat. No.	Qty
75-09-2	Dichloromethane, for analysis of dioxins, furans and PCB	34411-2.5L	2.5 L
		34411-7L	7 L
110-54-3	Hexane, for analysis of dioxins, furans and PCB, ≥95%	34412-2.5L	2.5 L
		34412-7L	7 L
108-88-3	Toluene, for analysis of dioxins, furans and PCB, ≥99.7%	34413-2.5L	2.5 L
		34413-7L	7 L

GC Solvents

GC Headspace Solvents

GC Headspace Solvents



Analysis of residual solvents using GC-Headspace technique is a major control procedure in pharmaceutical and food related industries. These solvents are specifically developed and optimized for sensitive GC-Headspace analysis of Organic Volatile Impurities. The purity of these solvents and handling specifications meet the requirements of the latest Ph.Eur., USP and ICH guidelines.

CAS No.	Compound	Cat. No.	Qty
100-51-6	Benzyl alcohol, GC-Headspace tested, $\geq 99.9\%$ (GC)	80708-1L	1 L
108-94-1	Cyclohexanone, GC-Headspace tested, $\geq 99.9\%$	68809-1L	1 L
127-19-5	<i>N,N</i> -Dimethylacetamide, GC-Headspace tested, $\geq 99.9\%$	44901-1L	1 L
68-12-2	<i>N,N</i> -Dimethylformamide, GC-Headspace tested, $\geq 99.9\%$	51781-1L	1 L
80-73-9	1,3-Dimethyl-2-imidazolidinone, GC-Headspace tested, $\geq 99.5\%$	67484-100ML 67484-1L	100 mL 1 L
67-68-5	Dimethyl sulfoxide, GC-Headspace tested, $\geq 99.9\%$	51779-1L 51779-2.5L	1 L 2.5 L
872-50-4	1-Methyl-2-pyrrolidinone, GC-Headspace tested, $\geq 99.9\%$	69337-1L	1 L
7732-18-5	Water, GC-Headspace tested	53463-1L	1 L

GC Purge & Trap Solvents

Suitable for GC/MS analysis of volatile organics in water and oil sediment samples according to the EPA purge & trap methods 601, 624 and 8240.

CAS No.	Compound	Cat. No.	Qty
1634-04-4	<i>tert</i> -Butyl methyl ether, for residue analysis, $\geq 99.0\%$	20257-1L-F	1 L
110-54-3	Hexane, for residue analysis, $\geq 99.0\%$	52767-1L 52767-2.5L	1 L 2.5 L
67-56-1	Methanol, for GC/MS analysis of volatile organics, $\geq 99.9\%$	414816-1L	1 L
109-66-0	Pentane, for residue analysis, $\geq 99.0\%$	76869-1L 76869-2.5L	1 L 2.5 L

GC-MS Solvents

CAS No.	Compound	Cat. No.	Qty
75-05-8	Acetonitrile, <i>TraceSELECT</i> ®, for trace analysis, $\geq 99.9\%$	01324-1L	1 L
67-56-1	Methanol, <i>TraceSELECT</i> ®, for metal speciation analysis, $\geq 99.9\%$	42105-1L	1 L
872-50-4	1-Methyl-2-pyrrolidinone, <i>TraceSELECT</i> ®, $\geq 99.0\%$ (GC), for inorganic trace analysis	43729-1L	1 L
7732-18-5	Water, <i>TraceSELECT</i> ® Ultra, ACS reagent, for ultratrace analysis	14211-1L-F	1 L

GC Derivatization Reagents

GC Derivatization Reagents

There are several reasons that derivatization may be performed prior to GC analysis; 1) to increase analyte volatility, 2) to increase response, and 3) to suppress the activity of an active functional group. Regardless of the reason, it is important that the proper derivatization-grade reagent is used. Sigma-Aldrich/Supelco offers reagents for the derivatization of a wide-range of functional groups and analyte classes.

Silylation Reagents

Silyl refers to Trimethylsilyl $\text{Si}(\text{CH}_3)_3$, or TMS. Silylation is the introduction of a silyl group into a molecule, usually in substitution for active hydrogen. Replacement of active hydrogen by a silyl group reduces polarity of the compound and decreases hydrogen bonding. The silylated derivative is thus more volatile. Also, stability is enhanced because the number of reactive sites containing active hydrogen has been reduced. Silylated compounds are less polar, detection is enhanced, and the derivatives are thermally more stable.

The greatest use of silylation has been in GC. Many hydroxy and amino compounds regarded as nonvolatile or unstable at 200-300 °C have been successfully chromatographed after silylation.

Silyl reagents are influenced by both the solvent system and the addition of a catalyst. The use of a catalyst (e.g. trimethylchlorosilane, pyridine) increases the reactivity of the silyl reagent. It is important to determine the reaction times and reaction temperatures when developing derivatization procedures. The conversion rate for the derivative must be known in order to achieve quantitative analysis of the unknown sample. The reagents generally are moisture sensitive and are sealed to prevent deactivation from moisture during storage. These silyl reagents are suitable for general use but, if used in excess, can cause difficulties with flame ionization detectors.

The trimethylsilyl group is the most popular and versatile silyl group for GC analysis. Introduction of this group enables better GC separation and the application of special detection techniques.



Related Information

Bulletin 909 contains detailed information on selecting a suitable derivatization reagent for most applications. Request a free copy of Bulletin 909 by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T196909	Derivatization Reagents

Acronyms for Silylation Reagents

Acronym	Chemical Name	CAS No.
BSA	N,O-Bis(trimethylsilyl) acetamide	10416-59-8
BSTFA	Bis(trimethylsilyl) trifluoroacetamide	25561-30-2
DMDCS	Dimethyldichlorosilane	75-78-5
HMDS	1,1,1,3,3,3-Hexamethyldisilazane	999-97-3
MTBSTFA	N-(<i>tert</i> -Butyldimethylsilyl)-N-methyltrifluoroacetamide	77377-52-7
TBDMCS	<i>t</i> -Butyldimethylchlorosilane	18162-48-6
TFA	Trifluoroacetic acid	76-05-1
TMCS	Trimethylchlorosilane	75-77-4
TMSDEA	Trimethylsilyldiethylamine (N,N-Diethyl-1,1,1-trimethylsilylamine)	996-50-9
TMSI	Trimethylsilylimidazole	18156-74-6

GC Derivatization Reagents

Silylation Reagents

CAS No.	Compound	Cat. No.	Qty
3768-58-9	Bis(dimethylamino)dimethylsilane, for GC derivatization	14755-100ML	100 mL
10416-59-8	<i>N,O</i> -Bis(trimethylsilyl)acetamide, for GC derivatization	15269-10X1ML 15269-5ML 15269-25ML	10 × 1 mL 5 mL 25 mL
35342-88-2	<i>N,O</i> -Bis(trimethylsilyl)carbamate, ≥98.0% (T)	15236-10G	10 g
920-68-3	<i>N,N</i> -Bis(trimethylsilyl)methylamine, for GC derivatization	15235-50ML	50 mL
25561-30-2	<i>N,O</i> -Bis(trimethylsilyl)trifluoroacetamide, for GC derivatization, ≥99.0%	15222-144X0.1ML-F 15222-1ML-F 15222-10X1ML-F 15222-5ML-F 15222-25ML-F	144 × 0.1 mL 1 mL 10 × 1 mL 5 mL 25 mL
25561-30-2	<i>N,O</i> -Bis(trimethylsilyl)trifluoroacetamide, ≥99%	155195-5G 155195-25G 155195-100G	5 g 25 g 100 g
25561-30-2	<i>N,O</i> -Bis(trimethylsilyl)trifluoroacetamide with trimethylchlorosilane, contains 1% TMCS, 99% (excluding TMCS)	15238-10X0.1ML 15238-10X1ML 15238-5ML 15238-25ML 15238-100ML	10 × 0.1 mL 10 × 1 mL 5 mL 25 mL 100 mL
25561-30-2	<i>N,O</i> -Bis(trimethylsilyl)trifluoroacetamide with trimethylchlorosilane, contains 10% TMCS, 98% (excluding TMCS)	15209-10X1ML 15209-5ML 15209-25ML	10 × 1 mL 5 mL 25 mL
18297-63-7	<i>N,N'</i> -Bis(trimethylsilyl)urea, purum, ≥98.0% (N)	15248-250G	250 g
2857-97-8	Bromotrimethylsilane, 97%	194409-5G 194409-25G 194409-100G	5 g 25 g 100 g
-	BSA+TMCS, for GC, with 5% trimethylchlorosilane	15256-10ML 15256-50ML	10 mL 50 mL
-	BSA+TMCS, 5:1	33018 33019-U	20 × 1 mL 25 mL
-	BSA+TMCS+TMSI, 3:2:3	33151 33030 33031-U	144 × 0.1 mL 20 × 1 mL 25 mL
25561-30-2	BSTFA, Derivatization Grade, for GC derivatization	33084	144 × 0.1 mL
25561-30-2	BSTFA, Derivatization Grade, for GC derivatization	33024	20 × 1 mL
25561-30-2	BSTFA, Derivatization Grade, for GC derivatization	33027	25 mL
-	BSTFA + TMCS, 99:1	33154-U 33148 33155-U 33149-U	144 × 0.1 mL 20 × 1 mL 25 mL 50 mL
-	BSTFA + TMCS, 99:1	33148	20 × 1 mL
54925-64-3	<i>tert</i> -Butyldimethylsilylimidazole solution, TBDMSIM in DMF	33092-U	10 × 1 mL
850418-20-1	<i>tert</i> -Butyldimethylsilyl methallylsulfinate, for GC derivatization	79262-5ML	5 mL
77377-52-7	<i>N-tert</i> -Butyldimethylsilyl- <i>N</i> -methyltrifluoroacetamide, >97%	394882-10X1ML 394882-5ML 394882-25ML 394882-100ML	10 × 1 mL 5 mL 25 mL 100 mL
77377-52-7	<i>N-tert</i> -Butyldimethylsilyl- <i>N</i> -methyltrifluoroacetamide with 1% <i>tert</i> -Butyldimethylchlorosilane, ≥95%	375934-10X1ML 375934-5ML 375934-10ML 375934-25ML	10 × 1 mL 5 mL 10 mL 25 mL
20082-71-7	Chlorodimethyl(pentafluorophenyl)silane, for GC derivatization, ≥95.0%	76750-5ML	5 mL
994-30-9	Chlorotriethylsilane, for GC derivatization	90383-50ML	50 mL
994-30-9	Chlorotriethylsilane solution, 1.0 M in THF	372943-100ML	100 mL
75-77-4	Chlorotrimethylsilane, purified by redistillation, ≥99%	386529-100ML 386529-1L	100 mL 1 L
-	Chlorotrimethylsilane	33014	100 mL
7453-26-1	1,3-Dimethyl-1,1,3,3-tetraphenyldisilazane, ≥98.0% (NT)	41663-10G	10 g
2083-91-2	<i>N,N</i> -Dimethyltrimethylsilylamine, 97%	226289-10G 226289-50G	10 g 50 g
999-97-3	Hexamethyldisilazane, for GC derivatization	52619-10ML 52619-50ML 52619-250ML 52619-1L	10 mL 50 mL 250 mL 1 L
107-46-0	Hexamethyldisiloxane, for GC derivatization	01565-1ML 01565-10X1ML	1 mL 10 × 1 mL

GC Derivatization Reagents

Silylation Reagents

CAS No.	Compound	Cat. No.	Qty
999-97-3	HMDS, Derivatization Grade, for GC derivatization	33011	
-	HMDS+TMCS, 3:1	33046	20 × 1 mL
-	HMDS+TMCS+Pyridine, 3:1:9 (Sylon™ HTP)	33038	20 × 1 mL
-	HMDS+TMCS+Pyridine, 3:1:9 (Sylon™ HTP)	33039	25 mL
7449-74-3	N-Methyl-N-trimethylsilylacetamide, for GC derivatization	69480-10ML	10 mL
53296-64-3	N-Methyl-N-trimethylsilylheptafluorobutyramide, for GC derivatization	69484-1ML 69484-5ML	1 mL 5 mL
24589-78-4	N-Methyl-N-(trimethylsilyl)trifluoroacetamide, for GC derivatization, ≥98.5%	69479-10X1ML 69479-5ML 69479-25ML	10 × 1 mL 5 mL 25 mL
24589-78-4	N-Methyl-N-(trimethylsilyl)trifluoroacetamide, synthesis grade	394866-10X1ML 394866-5ML 394866-25ML	10 × 1 mL 5 mL 25 mL
-	N-Methyl-N-trimethylsilyltrifluoroacetamide activated I, for GC, activated with ethanethiol and ammonium iodide	12245-10X1ML-F	10 × 1 mL
-	N-Methyl-N-trimethylsilyltrifluoroacetamide activated I, for GC, activated with ethanethiol and ammonium iodide	50992-5ML-F 50992-25ML-F	5 mL 25 mL
-	N-Methyl-N-trimethylsilyltrifluoroacetamide activated II, for GC, activated with trimethylsilyl-ethanethiol	44156-5ML-F 44156-100ML-F	5 mL 100 mL
-	N-Methyl-N-trimethylsilyltrifluoroacetamide activated III, for GC, activated with imidazole	12124-10X1ML-F 12124-5ML-F	10 × 1 mL 5 mL
24589-78-4	N-Methyl-N-(trimethylsilyl)trifluoroacetamide with 1% trimethylchlorosilane, for derivatization	69478-10X0.1ML-F 69478-1ML-F 69478-5ML-F	10 × 0.1 mL 1 mL 5 mL
-	Rejuv-8™, Silylating reagent	33059-U	25 mL
318974-69-5	Silylating mixture Fluka I according to Sweeley, for GC derivatization, ampule	85434-10X1ML	10 × 1 mL
318974-69-5	Silylating mixture Fluka I according to Sweeley, for GC derivatization	85431-10ML	10 mL
101660-05-3	Silylating mixture Fluka II according to Horning, for GC derivatization	85435-10X1ML	10 × 1 mL
101660-05-3	Silylating mixture Fluka II according to Horning, for GC derivatization	85432-10ML	10 mL
-	Silylation Sampler Kit	505846	1 ea
75-78-5	Sylon CT™, 5% dimethyldichlorosilane in toluene	33065-U	400 mL
3449-26-1	1,1,3,3-Tetramethyl-1,3-diphenyldisilazane, for GC derivatization	43340-10ML 43340-50ML	10 mL 50 mL
-	TMSI, Derivatization Grade	33068-U	1 kit
8077-35-8	TMSI+PYRIDINE, 1:4 (Sylon™ TP)	33159-U 33156-U	20 × 1 mL 25 mL
850418-19-8	Triethylsilyl methallylsulfinate, for GC derivatization	79264-5ML	5 mL
79271-56-0	Triethylsilyl trifluoromethanesulfonate, 99%	279471-10G 279471-50G	10 g 50 g
13154-24-0	Triisopropylsilyl chloride, 97%	241725-10G 241725-50G	10 g 50 g
80522-42-5	Triisopropylsilyl trifluoromethanesulfonate, 97%	248460-10G 248460-50G	10 g 50 g
13257-81-3	4-(Trimethylsiloxy)-3-penten-2-one, for GC derivatization, ≥97.0% (GC)	69649-1ML 69649-10X1ML	1 mL 10 × 1 mL
13435-12-6	N-(Trimethylsilyl)acetamide, for GC derivatization	91566-1G 91566-5G	1 g 5 g
18156-74-6	1-(Trimethylsilyl)imidazole, for GC derivatization	394874-10X1ML 394874-5ML 394874-25ML	10 × 1 mL 5 mL 25 mL
8077-35-8	1-(Trimethylsilyl)imidazole - Pyridine mixture, for GC derivatization	92718-10ML	10 mL
723336-86-5	Trimethylsilyl methallylsulfinate, for GC derivatization	79271-10X1ML 79271-5ML	10 × 1 mL 5 mL

Silyl Reagents for Deactivating Glassware and Chromatographic Supports

CAS No.	Compound	Cat. No.	Qty
-	Rejuv-8™, Silylating reagent	33059-U	25 mL
75-78-5	Sylon CT™, 5% dimethyldichlorosilane in toluene	33065-U	400 mL

GC Derivatization Reagents

Acylation Reagents

Acylation Reagents

Acylation, an alternative to silylation, is the conversion of compounds that contain active hydrogens (-OH, -SH and -NH) into esters, thioesters, and amides through the action of a carboxylic acid or derivative. The presence of a carbonyl group adjacent to the halogenated carbons enhances electron capture detector (ECD) response.

Acylation has many benefits:

- It improves stability of compounds by protecting unstable groups.
- It may confer volatility on substances such as carbohydrates or amino acids, which have so many polar groups that they are nonvolatile and normally decompose on heating.
- It assists in separations not possible with underivatized compounds.
- Compounds are detectable at very low levels with an ECD.

Perfluoro Acid Anhydrides – Acylation reduces the polarity of amino, hydroxyl, and thiol groups to form perfluoroacyl derivatives, which are both stable and highly volatile. Fluorinated anhydride derivatives are used primarily for ECD, but also can be used for flame ionization detection (FID). They react with alcohols, phenols, and amines to produce stable derivatives. Fluorinated anhydrides are used in derivatizing samples for drug of abuse confirmation. The anhydrides and acyl halide reagents form acid byproducts which must be removed in GC analysis to prevent destructive effects on the column. Acylations with anhydride reagents are normally performed in pyridine, tetrahydrofuran, or some other solvent capable of accepting the acid byproduct. Amine bases also may be used as catalysts/acid acceptors.

Perfluoroacylimidazoles – Perfluoroacylimidazoles offer advantages over anhydrides in preparing perfluoroacyl derivatives. The reactions are smooth and quantitative, and produce no acid byproducts that must be removed from the system before injection. The activated amide reagents yield no acid byproducts, giving only imidazole and N-methyltrifluoroacetamide, respectively. The perfluoroacylimidazoles react with hydroxyl groups, both primary and secondary amines, and quantitatively acylate into alkylamines.

General Acylation Reagents – N-methylbis(trifluoroacetamide) reacts with amines at room temperature. Hydroxyl derivatizations are slower. Heat is recommended.



Related Information

Bulletin 909 contains detailed information on selecting a suitable derivatization reagent for most applications. Request a free copy of Bulletin 909 by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T196909	<i>Derivatization Reagents</i>

Acronyms for Acylation Reagents

Acronym	Chemical Name	CAS No.
HFBA	Heptafluorobutyric anhydride	336-59-4
MBTFA	N-Methylbis (trifluoroacetamide)	685-27-8
PFPA	Pentafluoropropionic anhydride	356-42-3
TFAA	Trifluoroacetic anhydride	407-25-0
TFAI	1-(Trifluoroacetyl) imidazole	1546-79-8

CAS No.	Compound	Cat. No.	Qty
108-24-7	Acetic anhydride, for GC derivatization, ≥99.0%	91204-10X1ML-F	10 × 1 mL
108-24-7	Acetic anhydride	33085	10 × 2 mL
2466-76-4	1-Acetylimidazole, 98%	157864-25G 157864-100G	25 g 100 g
-	Acylation Sampler Kit	505862	1 ea
65-85-0	Benzoic acid, for calorimetric determination (approx. 26460 J/g)	33045-100G-R	100 g
373-57-9	Boron trifluoride-methanol solution, ~10% (~1.3 M), for synthesis	15715-50ML 15715-250ML 15715-1L	50 mL 250 mL 1 L
70-11-1	2-Bromoacetophenone, for GC derivatization, ≥99.0%	77450-10G 77450-50G	10 g 50 g
93128-04-2	4-Bromophenacyl trifluoromethanesulfonate, ≥95% (H-NMR/C-NMR)	41392-50MG-F 41392-250MG-F	50 mg 250 mg
4426-47-5	Butylboronic acid, for GC derivatization	19667-1G 19667-5G	1 g 5 g
1634-04-4	<i>tert</i> -Butyl methyl ether, puriss. p.a., ≥99.5% (GC)	20256-1L-F 20256-2.5L-F 20256-2.5L-CB-F	1 L 2.5 L 2.5 L
56-06-4	2,4-Diamino-6-hydroxypyrimidine, 96%	D19206-25G D19206-100G	25 g 100 g
2687-25-4	2,3-Diaminotoluene, 97%	272361-5G	5 g
4755-50-4	4-(Dimethylamino)benzoyl chloride, for HPLC derivatization, ≥99.0% (HPLC)	67954-1G	1 g
4637-24-5	Esterate M, for GC derivatization	33140	25 mL
141-97-9	Ethyl acetoacetate, puriss. p.a., ≥99.0% (GC)	00410-100ML 00410-1L	100 mL 1 L

GC Derivatization Reagents

Acylation Reagents

CAS No.	Compound	Cat. No.	Qty
425-75-2	Ethyl trifluoromethanesulfonate, for GC derivatization, ≥99.0%	91734-5ML	5 mL
336-59-4	Heptafluorobutyric anhydride, for GC derivatization, ≥99.0%	394912-10X1ML 394912-5ML 394912-25ML	10 × 1 mL 5 mL 25 mL
336-59-4	Heptafluorobutyric anhydride, for GC derivatization, ≥99.0%	77253-10X1ML 77253-10ML 77253-50ML	10 × 1 mL 10 mL 50 mL
32477-35-3	N-Heptafluorobutyrylimidazole, 97%	556645-1G 556645-5G	1 g 5 g
17587-22-3	6,6,7,7,8,8,8-Heptafluoro-2,2-dimethyl-3,5-octanedione, 98%	175161-5G	5 g
1522-22-1	Hexafluoroacetylacetone, 98%	238309-5G 238309-25G	5 g 25 g
-	Lab Kit , for the evaluation of FA status in blood (n-3 + n-6 PUFA)	05904-1KT	1 kit
14602-86-9	(1R)-(-)-Menthyl chloroformate, ee (GLC): 99%	245305-25G 245305-100G	25 g 100 g
7635-54-3	(1S)-(+)-Menthyl chloroformate, ee (GLC): 97%	378712-5ML 378712-25ML	5 mL 25 mL
81655-41-6	(±)-α-Methoxy-α-trifluoromethylphenylacetic acid, for GC derivatization	65371-5G	5 g
73980-71-9	N-Methyl-bis-heptafluorobutyramide, for GC/MS derivatization	78268-1ML-F	1 mL
685-27-8	N-Methyl-bis(trifluoroacetamide), for GC derivatization	M0789-10X1ML M0789-5ML	10 × 1 mL 5 mL
685-27-8	N-Methyl-bis(trifluoroacetamide), for GC derivatization	65943-5ML 65943-25ML	5 mL 25 mL
13061-96-6	Methylboronic acid, 97%	165336-1G 165336-5G	1 g 5 g
54648-79-2	o-Methyl-N,N'-diisopropylisourea, 97%	226408-5G 226408-25G	5 g 25 g
333-27-7	Methyl trifluoromethanesulfonate, for GC derivatization, 98.0%	18503-1G 18503-5G	1 g 5 g
653-37-2	2,3,4,5,6-Pentafluorobenzaldehyde, 98%	103748-2.5G 103748-10G 103748-100G	2.5 g 10 g 100 g
832-53-1	Pentafluorobenzenesulfonyl chloride, 99%	103764-1G 103764-5G 103764-25G	1 g 5 g 25 g
15989-99-8	2,3,4,5,6-Pentafluorobenzoic anhydride, for GC-MS derivatization, ≥98.0%	02379-5G	5 g
2251-50-5	2,3,4,5,6-Pentafluorobenzoyl chloride, 99%	103772-1G 103772-5G 103772-25G	1 g 5 g 25 g
356-42-3	Pentafluoropropionic anhydride, purum, ≥97.0% (GC)	77292-5ML 77292-25ML	5 mL 25 mL
71735-32-5	1-(Pentafluoropropionyl)imidazole, for GC derivatization, ≥98.5%	17281-1ML	1 mL
98-80-6	Phenylboronic acid, 95%	P20009-10G P20009-50G P20009-250G	10 g 50 g 250 g
18704-37-5	8-Quinolinesulfonyl chloride, ≥96.0% (AT)	22695-5G 22695-25G	5 g 25 g
1118-71-4	2,2,6,6-Tetramethyl-3,5-heptanedione, for GC derivatization, ≥98.0%	87851-5ML 87851-25ML	5 mL 25 mL
326-91-0	2-Thenoyltrifluoroacetone, for spectrophotometric det. of metal ions, ≥99.0%	88300-5G	5 g
76-02-8	Trichloroacetyl chloride, for GC derivatization	80521-1G 80521-5G	1 g 5 g
407-25-0	Trifluoroacetic anhydride, for GC derivatization	91719-10X1ML 91719-10ML 91719-50ML	10 × 1 mL 10 mL 50 mL
421-50-1	1,1,1-Trifluoroacetone, 97%	T62804-5G T62804-25G T62804-100G	5 g 25 g 100 g
1546-79-8	1-(Trifluoroacetyl)imidazole, for GC derivatization	394920-10X1ML 394920-5ML	10 × 1 mL 5 mL
329-15-7	4-(Trifluoromethyl)benzoyl chloride, 97%	249475-1G 249475-5G 249475-25G	1 g 5 g 25 g
367-57-7	1,1,1-Trifluoro-2,4-pentanedione, 98%	235970-10G 235970-25G	10 g 25 g

GC Derivatization Reagents

Alkylation/Esterification Reagents

Alkylation/Esterification Reagents

Alkylation involves the addition of an alkyl group (aliphatic or aliphatic-aromatic) to an active functional group. Replacement of hydrogen with an alkyl group is important because of the decreased polarity of the derivative as compared with the parent compound. This reagent is used to modify compounds containing acidic hydrogens such as carboxylic acids and phenols.

The resulting products are ethers, esters, thioethers, thioesters, n-alkyl amines, and n-alkyl amides. Alkylation of weakly acidic groups (alcohols) requires strongly basic catalysts (sodium methoxide, potassium methoxide). More acidic OH groups, as in phenols and carboxylic acids, require less basic catalysts (hydrogen chloride, boron trifluoride).

DMF-Dialkyl acetals – Dimethylformamide dialkyl acetals are used to esterify acids to their methyl esters. Hydroxyl groups are not alkylated with this reagent. Carboxylic acids, phenols, and thiols quickly react to give the corresponding alkyl derivatives. N,N-Dimethylformamide dimethyl acetals are moisture sensitive.

Diazoalkanes – Diazomethane reacts rapidly with unesterified fatty acids in the presence of a small amount of methanol, which catalyzes the reaction to form methyl esters. The yield is high and the side reactions are minimal. Diazomethane is a yellow gas which is used as an ethereal solution with some methanol present. The elimination of gaseous nitrogen drives the reaction. Diazomethane is carcinogenic, highly toxic, potentially explosive, and unstable. Diazomethane is not ideal for esterification of phenolic acids because the phenolic hydroxyl groups are also methylated at a slower rate which may lead to mixtures of partially methylated products.

Esterification and Transesterification Reagents – Esterification is the reaction of an acid with an alcohol in the presence of a catalyst to form an ester. The process involves the condensation of the carboxyl group of the acid and the hydroxyl group of the alcohol with the elimination of water. Esterification is best done in the presence of a catalyst (e.g., hydrogen chloride), which is removed with the water.

Esterification is the most popular alkylation method. Alkyl esters offer excellent stability and provide quick and quantitative samples for GC analysis.

Transesterification is the displacement of the alcohol from an ester by another alcohol. This has been widely used for making esters of higher alcohols from those of lower alcohols. Transesterification can be performed with an acidic or basic catalyst using methanol to react with fats and oils.

General Alkylation Reagents – Pentafluorobenzyl bromide is convenient for making esters and ethers and has been used in trace analysis. This reagent is a strong lachrymator and should be handled only in a hood. Hexacyclooctadecane and pentafluorobenzylbromide are reagents for preparing pentafluorobenzyl phenol derivatives for US EPA Method 604. Esterate-M is used in the preparation of methyl and other esters of long chain fatty acids by reaction with dimethylformamide dialkylacetals. Aldehydes and ketones are conveniently derivatized by forming oximes with o-alkylhydroxylamine HCl reagents. O-methylhydroxylamine HCl has been used with ketosteroids, prostaglandins, saccharides, aldoacids, and ketoacids. N-butylboronic acid reacts with 1,2- or 1,3-diols or with α - or β -hydroxy acids to form 5- or 6-member ring nonpolar boronate derivatives. They are prepared simply by adding n-butylboronic acid to a solution of the hydroxy compound in dimethylformamide.



Related Information

Bulletin 909 contains detailed information on selecting a suitable derivatization reagent for most applications. Request a free copy of Bulletin 909 by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T196909	Derivatization Reagents

Acronyms for Alkylation Reagents

Acronym	Chemical Name	CAS No.
Diazald	N-Methyl-N-nitroso-p-toluenesulfonamide	–
Diazald-N-methyl- ¹³ C	N-Methyl- ¹³ C-N-nitroso-p-toluenesulfonamide	60858-95-9
Diazald-N-methyl- ¹³ C-N-methyl-d ₃	N-Methyl- ¹³ C-d ₃ -N-nitroso-p-toluenesulfonamide	102832-11-1
DMF-DBA	N,N-Dimethylformamide di-tert-butyl acetal	36805-97-7
DMF-DEA	N,N-Dimethylformamide diethyl acetal	1188-33-6
DMF-DMA	N,N-Dimethylformamide dimethyl acetal	4637-24-5
DMF-DPA	N,N-Dimethylformamide dipropyl acetal	6006-65-1
DMP	2,2-Dimethoxypropane	77-76-9
Esterate M	2 meq DMF-DMA in 1 mL pyridine	–
MNNG	1-Methyl-3-nitro-1-nitrosoguanidine	70-25-7
NBB	n-Butylboronic acid	4426-47-5
PFBBr	Pentafluorobenzyl bromide	1765-40-8
TMAH	Trimethylphenylammonium hydroxide	–

GC Derivatization Reagents

Alkylation/Esterification Reagents

CAS No.	Compound	Cat. No.	Qty
-	BCl ₃ -2-Chloroethanol, 10 % (w/w)	33056-U	10 × 1 mL
7637-07-2	BF ₃ - Butanol solution, 10 % (w/w)	33126-U 33125-U	10 × 5 mL 100 mL
-	BF ₃ - Methanol, 10 % (w/w)	33021	400 mL
-	Boron trichloride - Methanol, 12 % (w/w)	33353	20 × 1 mL
-	Boron trichloride - Methanol, 12 % (w/w)	33089-U	20 × 2 mL
-	Boron trichloride - Methanol, 12 % (w/w)	33033	400 mL
-	Boron trifluoride-ethanol, ~10% in ethanol (~1.3 M), for GC derivatization	05576-10ML-F 05576-100ML-F	10 mL 100 mL
373-57-9	Boron trifluoride-methanol solution, 50% w/w in methanol	134821-4X25ML 134821-50ML 134821-250ML 134821-1L	4 × 25 mL 50 mL 250 mL 1 L
373-57-9	Boron trifluoride-methanol solution, ~10% (~1.3 M), for GC derivatization	15716-10ML 15716-100ML 15716-250ML 15716-1L	10 mL 100 mL 250 mL 1 L
762-48-1	Boron trifluoride propanol complex, in excess propanol, BF ₃ : 14 wt. %	156825-100G	100 g
7637-07-2	Bortrifluoride - 1-butanol solution, ~10% in 1-butanol (~1.3 M), for GC derivatization, for esterification of fatty acids for GC purposes	83253-100ML-F	100 mL
589-15-1	4-Bromobenzyl bromide, 98%	112186-25G 112186-100G	25 g 100 g
17455-13-9	18-Crown-6	33003-U	25 g
-	Derivatizing agents, Set for GC: Alcohols with hydrogen chloride, for GC derivatization	72558-1SET-F	1 set
80-11-5	Diazald®, 99%	D28000-25G D28000-100G D28000-250G D28000-4X250G D28000-500G D28000-1KG	25 g 100 g 250 g 4 × 250 g 500 g 1 kg
1133-63-7	2,3-Dihydroxy-biphenyl, for GC derivatization, ≥98.0%	17403-100MG	100 mg
77-76-9	2,2-Dimethoxypropane, for GC derivatization	33053	25 g
18503-90-7	<i>N,N</i> -Dimethylformamide dibutyl acetal, for esterification of fatty acids, ≥98.0%	40262-10ML	10 mL
36805-97-7	<i>N,N</i> -Dimethylformamide di- <i>tert</i> -butyl acetal, for GC derivatization	395005-10X1ML 395005-5ML 395005-25ML	10 × 1 mL 5 mL 25 mL
1188-33-6	<i>N,N</i> -Dimethylformamide diethyl acetal, for GC derivatization	394971-5ML 394971-25ML	5 mL 25 mL
1188-33-6	<i>N,N</i> -Dimethylformamide diethyl acetal, for esterification of fatty acids, ≥95.0% (GC)	40252-25ML-F 40252-100ML-F	25 mL 100 mL
18503-89-4	<i>N,N</i> -Dimethylformamide diisopropyl acetal, 95%	178535-25G	25 g
4637-24-5	<i>N,N</i> -Dimethylformamide dimethyl acetal, for GC derivatization	394963-10X1ML 394963-5ML 394963-25ML	10 × 1 mL 5 mL 25 mL
4909-78-8	<i>N,N</i> -Dimethylformamide dineopentyl acetal, 99%	140244-10G 140244-50G	10 g 50 g
6006-65-1	<i>N,N</i> -Dimethylformamide dipropyl acetal, 97%	178527-25G	25 g
6006-65-1	<i>N,N</i> -Dimethylformamide dipropyl acetal, for GC derivatization	394998-10X1ML 394998-5ML 394998-25ML	10 × 1 mL 5 mL 25 mL
4637-24-5	Esterate M, for GC derivatization	33140	25 mL
3332-29-4	O-Ethylhydroxylamine hydrochloride, 97%	274992-1G 274992-5G	1 g 5 g
-	FID Alkylation Sampler Kit	505854	1 ea
920-66-1	1,1,1,3,3,3-Hexafluoro-2-propanol, for GC derivatization, ≥99.8%	52517-10ML 52517-50ML	10 mL 50 mL
7647-01-0	Hydrogen chloride - 1-butanol solution, ~3 M in 1-butanol, for GC derivatization	87472-50ML-F 87472-250ML-F	50 mL 250 mL
7647-01-0	Hydrogen chloride - ethanol solution, ~1.25 M HCl, for GC derivatization	17934-50ML 17934-250ML	50 mL 250 mL
132228-87-6	Hydrogen chloride - methanol solution, ~1.25 M HCl, for GC derivatization	17935-100X1ML 17935-50ML 17935-250ML	100 × 1 mL 50 mL 250 mL
-	Hydrogen chloride - 2-propanol solution, puriss. p.a., for GC, ~1.25 M (T)	17933-250ML	250 mL

GC Derivatization Reagents

Alkylation/Esterification Reagents

CAS No.	Compound	Cat. No.	Qty
7664-93-9	Methanolic H ₂ SO ₄ , 10 % (v/v) in methanol, for GC derivatization	506516	6 × 5 mL
7647-01-0	Methanolic HCl, 0.5 M HCl in methanol (0.5N), for GC derivatization	33095	10 × 5 mL
7647-01-0	Methanolic HCl, 3 M HCl in methanol (3N), for GC derivatization	33051	10 × 3 mL
7647-01-0	Methanolic HCl, 3 N	33355	20 × 1 mL
		33051	10 × 3 mL
		33050-U	400 mL
7647-01-0	Methanolic HCl, 0.5 M HCl in methanol (0.5N), for GC derivatization	33354	20 × 1 mL
593-56-6	Methoxyamine hydrochloride	33045-U	5000 mg
593-56-6	Methoxyamine hydrochloride, 98%	226904-1G	1 g
		226904-5G	5 g
		226904-25G	25 g
		226904-100G	100 g
100-11-8	4-Nitrobenzyl bromide, 99%	N13054-25G	25 g
		N13054-100G	100 g
423-39-2	Nonafluoro-1-iodobutane, 98%	317845-25G	25 g
		317845-100G	100 g
1765-40-8	Pentafluorobenzyl bromide, analytical standard	33001	5000 mg
1765-40-8	2,3,4,5,6-Pentafluorobenzyl bromide, 99%	101052-1G	1 g
		101052-5G	5 g
		101052-25G	25 g
57981-02-9	O-(2,3,4,5,6-Pentafluorobenzyl)hydroxylamine hydrochloride, for GC derivatization	76735-250MG	250 mg
		76735-1G	1 g
354-64-3	Pentafluoroiodoethane, 97%	331015-25G	25 g
		331015-300G	300 g
828-73-9	Pentafluorophenylhydrazine, 97%	156388-10G	10 g
422-05-9	2,2,3,3,3-Pentafluoro-1-propanol, 97%	257478-5G	5 g
		257478-25G	25 g
23231-91-6	Tetrabutylammonium tetrabutylborate, 97%	477230-5G	5 g
76437-40-6	2,3,5,6-Tetrafluoro-4-(trifluoromethyl)benzyl bromide, 98%	406406-1G	1 g
1899-02-1	TMAH, 0.2 M in methanol	33358-U	10 × 1 mL
		33097-U	10 mL
115-20-8	2,2,2-Trichloroethanol, <i>ReagentPlus</i> [®] , ≥99%	T54801-100G	100 g
		T54801-500G	500 g
17950-40-2	Triethyloxonium hexafluorophosphate, contains ~10% diethyl ether as stabilizer	164682-5G	5 g
		164682-25G	25 g
368-39-8	Triethyloxonium tetrafluoroborate, ≥97.0% (T)	90520-25G	25 g
		90520-100G	100 g
75-89-8	2,2,2-Trifluoroethanol, <i>ReagentPlus</i> [®] , ≥99%	T63002-25G	25 g
		T63002-100G	100 g
		T63002-500G	500 g
823-96-1	Trimethylboroxine, 99%	323136-1G	1 g
		323136-5G	5 g
		323136-25G	25 g
420-37-1	Trimethyloxonium tetrafluoroborate, 95%	281077-1G	1 g
		281077-10G	10 g
1899-02-1	Trimethylphenylammonium hydroxide solution, ~0.5 M (CH ₃) ₃ N(OH)C ₆ H ₅ in methanol, for GC derivatization	79266-10ML	10 mL
		79266-50ML	50 mL
17287-03-5	Trimethylsulfonium hydroxide solution, ~0.25 M in methanol, for GC derivatization	92732-10X1ML	10 × 1 mL
		92732-10ML	10 mL

Product specification sheets are available for most of these reagents. Information includes properties, features and benefits, typical derivatization procedure, mechanism, toxicity, hazards, and stability. For free literature, request a copy by phone or see our Web site.

Note: All Supelco glass GC columns have been silane treated.

GC Derivatization Reagents

Derivatization Reagent Sampler Kits

Derivatization Reagent Sampler Kits

Our derivatization reagent sampler kits enable you to determine the best reagent for a specific application, without the cost of purchasing, storing, and ultimately disposing of large volumes of individual reagents. Because of our purity specifications and reaction efficiency checks, we can guarantee consistently high reactivity from every lot of each reagent. Documentation detailing the chemistry, a tested derivatization procedure, and handling and storing recommendations is available for most reagents. Each of our four kits incorporates a group of related reagents.



Description	Concentration	Cat. No.	Qty
Acylation Sampler Kit	- <i>Acetic anhydride, 3 x 2 mL</i> <i>Heptafluorobutyric anhydride, 3 x 1 mL</i>	- <i>Pentafluoropropionic anhydride, 3 x 1 mL</i> <i>Trifluoroacetic anhydride, 3 x 1 mL</i>	1 ea
FID Alkylation Sampler Kit	- <i>BF₃-Methanol, 3 x 1 mL</i> <i>Methanolic Base, 3 x 1 mL</i> <i>Methanolic HCl (0.5N), 3 x 1 mL</i>	- <i>Methanolic HCl (3N), 3 x 1 mL</i> <i>TMAH, 0.2M in Methanol, 3 x 1 mL</i>	1 ea
Silylation Sampler Kit	- <i>BSA, 3 x 1 mL</i> <i>BSTFA, 3 x 1 mL</i> <i>BSTFA + TMCS, 99:1 (Sylon BFT), 3 x 1 mL</i>	- <i>HMDS + TMCS, 3:1 (Sylon HT), 3 x 1 mL</i> <i>TMSI, 3 x 1 mL</i>	1 ea

GC Derivatization Reagents

Derivatization Reagent Sampler Kits



Related Information

Free Technical Literature

Reagent	Product Specification Sheet
Acetic Acid	T497121
• BCl ₃ Methanol	T496123
• BCl ₃ -20-Chloroethanol	T496122
• BF ₃ Butanol	T496124
• BF ₃ Methanol	T496125
BSA	T496017
BSA + TMCS, 5:1 (Sylon BT)	T496018
BSA + TMCS + TMSI, 3:2:3 (Sylon BTZ)	T496019
BSTFA	T496020
BSTFA + TMCS, 99:1 (Sylon BFT)	T496021
DMDCS	T496022
• 5% DMDCS in Toluene (Sylon CT)	T496023
HMDS	T496024
HMDS + TMCS, 3:1 (Sylon HT)	T496025
HMDS + TMCS + Pyridine, 3:1:9 (Sylon HTP)	T496026
• Methanolic Base	T497007
• Methanolic HCl	T497099
• Methanolic Sulfuric Acid	T497018
N-t-Butyldimethylsilylimidazole	T496065
Perfluoro Acid Anhydrides	T497104
PFBBr & 18 Crown 6	T497103
• Rejuv 8	T496066
TFA	T496027
TMCS	T496028
TMSI	T496029
TMSI + Pyridine, 1:4 (Sylon TP)	T496030

Bulletin 909 contains detailed information on selecting a suitable derivatization reagent for most applications. Request a free copy of publication number T196909 by phone or visit sigma-aldrich.com/literature.

Certificates of Analysis, containing lot-specific data, are available for many Supelco reagents free of charge. These certificates, as well as product specification sheets (see table above), contain information about the reagent: use, physical properties, benefits, typical procedures for derivatizing a compound, toxicity, hazards, storage and stability, and reaction mechanism. To obtain free copies, contact our Customer Service Department.

- Certificates of Analysis are not available for these reagents, only product specification sheets are available.



GC APPLICATIONS

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GC Applications

Alcohols

GC Applications

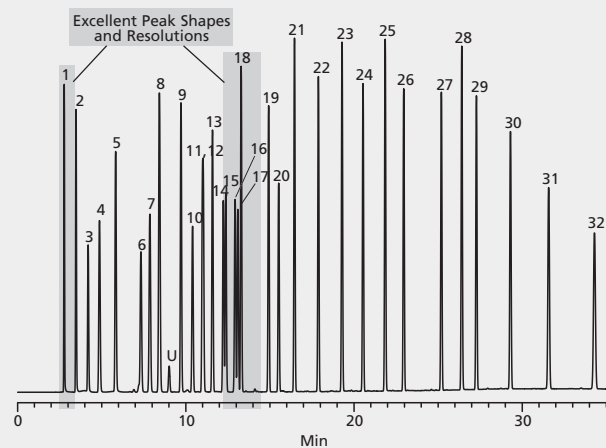
The following selected applications are provided to assist the chromatographer in the selection of the proper column and/or conditions. Additional applications can be viewed at sigma-aldrich.com/gc

Alcohols

GC Analysis of Alcohols and Hydrocarbons on the Equity®-1

column Equity-1, 30 m x 0.53 mm I.D., 3.0 µm (28076-U)
 oven 40 °C (5 min), 8 °C/min. to 225 °C (10 min.)
 inj. temp. 250 °C
 detector FID, 275 °C
 carrier gas helium, 30 cm/sec @ 40 °C
 injection 0.1 µL, split 100:1
 liner split, cup design
 sample 32 component mixed solvent sample, equal by weight
 Application No. G001709

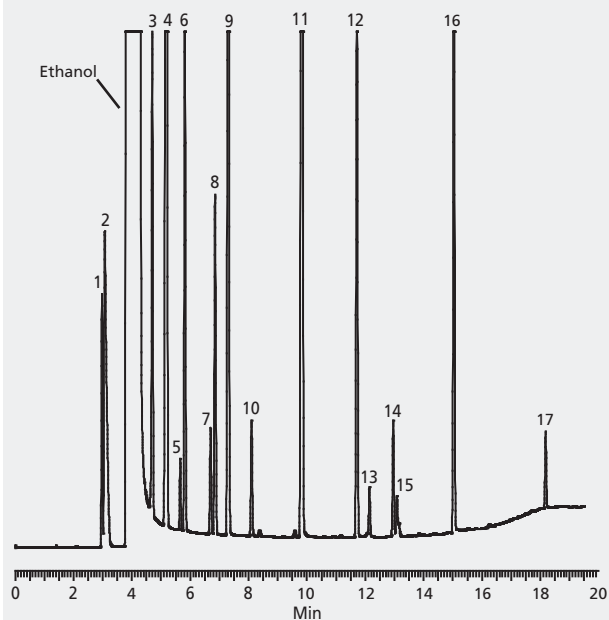
- | | |
|-------------------------|-------------------------|
| 1. Methanol | 17. 4-Methyl-2-pentanol |
| 2. Ethanol | 18. Pentanol |
| 3. Isopropanol | 19. Octane |
| 4. t-Butanol | 20. 4-Methyl-1-pentanol |
| 5. Propanol | 21. Hexanol |
| 6. 2-Butanol | 22. Nonane |
| 7. Hexane | 23. Heptanol |
| 8. Isobutanol | 24. Decane |
| U. Unknown | 25. Octanol |
| 9. Butanol | 26. Undecane |
| 10. 3-Methyl-2-butanol | 27. Dodecane |
| 11. 2-Pentanol | 28. Decanol |
| 12. 3-Pentanol | 29. Tridecane |
| 13. Heptane | 30. Tetradecane |
| 14. 3-Methyl-1-butanol | 31. Pentadecane |
| 15. 2-Methyl-1-butanol | 32. Hexadecane |
| 16. 3-Methyl-3-pentanol | |



GC Analysis of an Alcoholic Spirit on the Equity®-1

column .. Equity-1, 30 m x 0.32 mm I.D., 5.0 µm coupled to SUPELCOWAX 10, 10 m x 0.32 mm I.D., 0.25µm (28062-U)
 oven 45 °C (1 min), 10 °C/min. to 150 °C, 15 °C/min. to 240 °C (2 min.)
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas helium, 36 cm/sec @ 45 °C
 injection 1 µL, 11:1 split
 sample alcoholic spirit
 Application No. G003995

- | | | |
|------------------|---------------------|-----------------------|
| 1. Acetaldehyde | 7. 2-Butanol | 13. Furfural |
| 2. Methanol | 8. Ethyl acetate | 14. Hexanol |
| 3. Isopropanol | 9. Isobutanol | 15. Isoamyl acetate |
| 4. 3-Butanol | 10. n-Butanol | 16. Eptanol (I.S.) |
| 5. Allyl alcohol | 11. Isoamyl alcohol | 17. Diethyl succinate |
| 6. n-Propanol | 12. Ethyl lactate | |



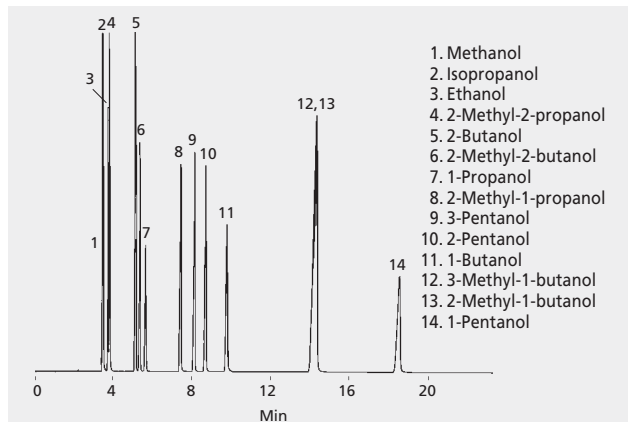
Chromatogram courtesy of Dr. Maurizio Baccarini (Dister SPA, Faenza, Italy)

GC Applications

Alcohols

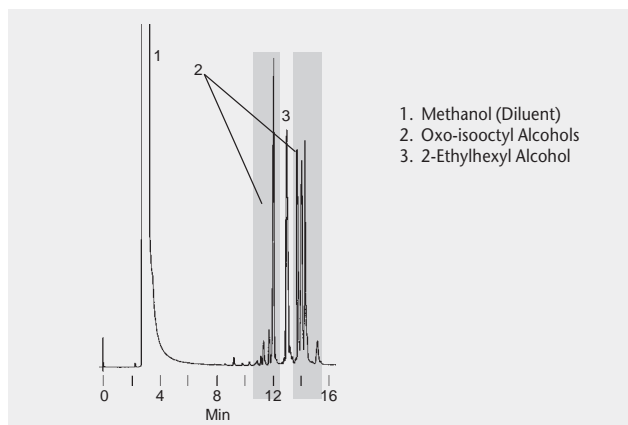
GC Analysis of Alcohols on the PAG

column PAG, 30 m x 0.25 mm I.D., 0.25 μ m (24223)
 oven 60 °C
 detector FID, 260 °C
 carrier gas helium, 20 cm/sec
 injection 1 μ L
 sample 0.5 - 17 mM alcohols in water
 Application No. 93-0052



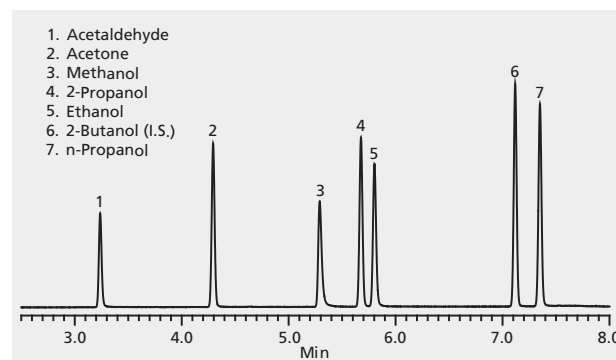
GC Analysis of Isooctyl Alcohols on the Nukol™

column Nukol, 30 m x 0.53 mm I.D., 0.50 μ m (25327)
 oven 90 °C (5 min.), 4 °C/min. to 160 °C
 inj. temp. 200 °C
 detector FID, 200 °C
 carrier gas helium, 20 cm/sec
 injection 2 μ L
 sample 2% isooctyl alcohols in methanol
 Application No. 713-0794



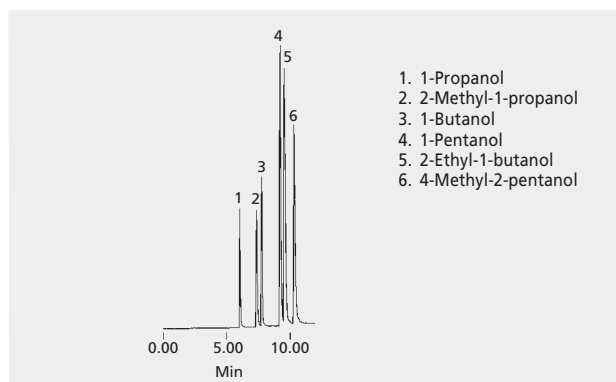
GC Analysis of Blood Alcohols on the SUPELCOWAX® 10

column SUPELCOWAX 10, 30 m x 0.25 mm I.D., 0.50 μ m (24284)
 oven 35 °C (1 min.), 10 °C/min. to 125 °C (1 min.)
 detector FID, 200 °C
 carrier gas helium, 1.0 mL/min. constant
 injection 0.5 μ L, 100:1 split
 liner 4 mm I.D. split, cup design
 sample blood alcohols, each analyte at 0.08% in water
 Application No. G004056



GC Analysis of C3-C5 Alcohols on the Supel-Q™ PLOT

column Supel-Q PLOT, 30 m x 0.53 mm I.D. (25462)
 oven 35 °C (3 min.), 16 °C/min. to 250 °C
 inj. temp. 200 °C
 detector FID, 250 °C
 carrier gas helium, 3 mL/min. @ 35 °C
 injection 0.1 μ L
 sample 5-Component C3-C5 alcohol standard
 Application No. 794-0621



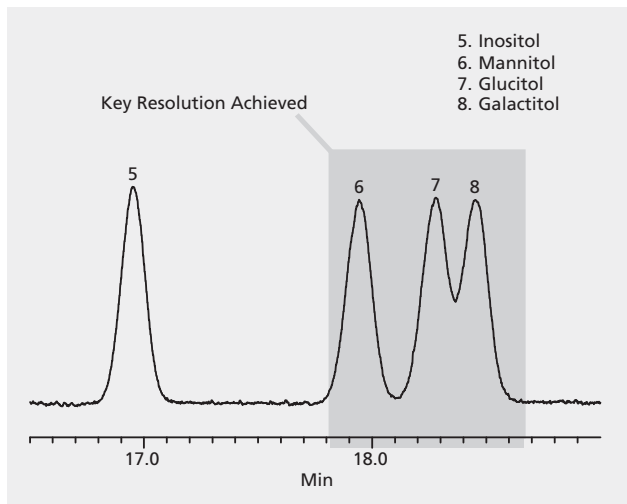
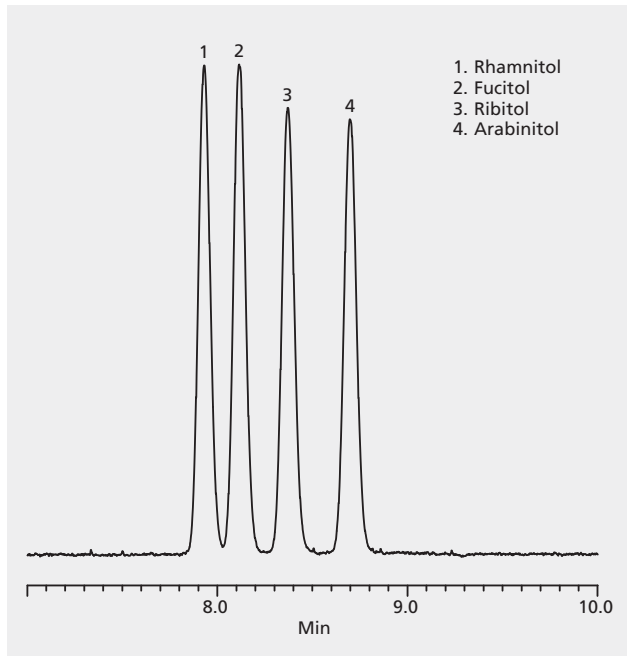
GC Applications

Alditol Acetates

Alditol Acetates

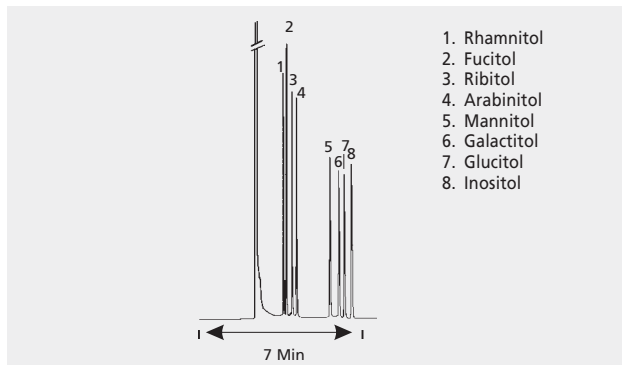
GC Analysis of Alditol Acetates on the Equity®-1701

column Equity-1701, 30 m × 0.25 mm I.D., 0.25 μm (28372-U)
 oven 220 °C
 inj. temp. 220 °C
 detector FID, 260 °C
 carrier gas helium, 20 cm/sec @ 220 °C
 injection 1 μL 25:1 split
 sample Alditol acetate mixes @ 500 ppm in methylene chloride (47880-U & 47881)
 Application No. 713-0912



GC Analysis of Alditol Acetates on the SP™-2380

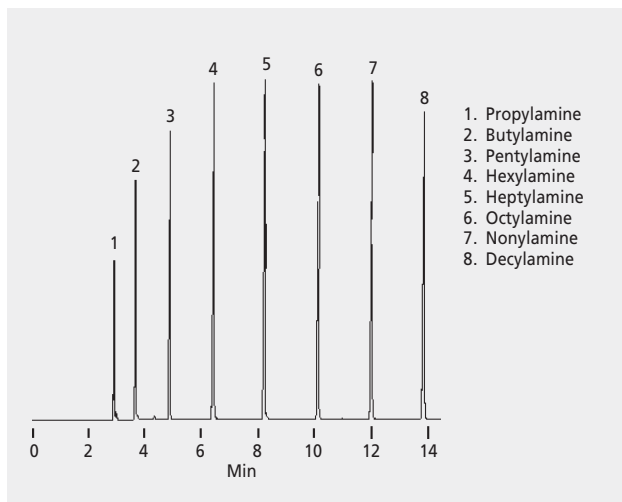
column SP-2380, 30 m × 0.25 mm I.D., 0.20 μm (24110-U)
 oven 275 °C
 detector FID
 carrier gas helium, 20 cm/sec @ 275 °C
 injection 1 μL 100:1 split
 sample alditol acetates, 6 mg/mL in chloroform
 Application No. 713-0910



Amines

GC Analysis of Primary Amines on the Carbowax® Amine

column Carbowax Amine, 30m × 0.53 mm I.D., 1.0 μm (25353)
 oven 50 °C, 8 °C/min. to 200 °C (10 min)
 inj. temp. 220 °C
 detector FID, 220 °C
 carrier gas helium, 20 cm/sec @ 170 °C
 injection 0.02 μL 100:1 split
 sample neat amines mix
 Application No. 711-0127



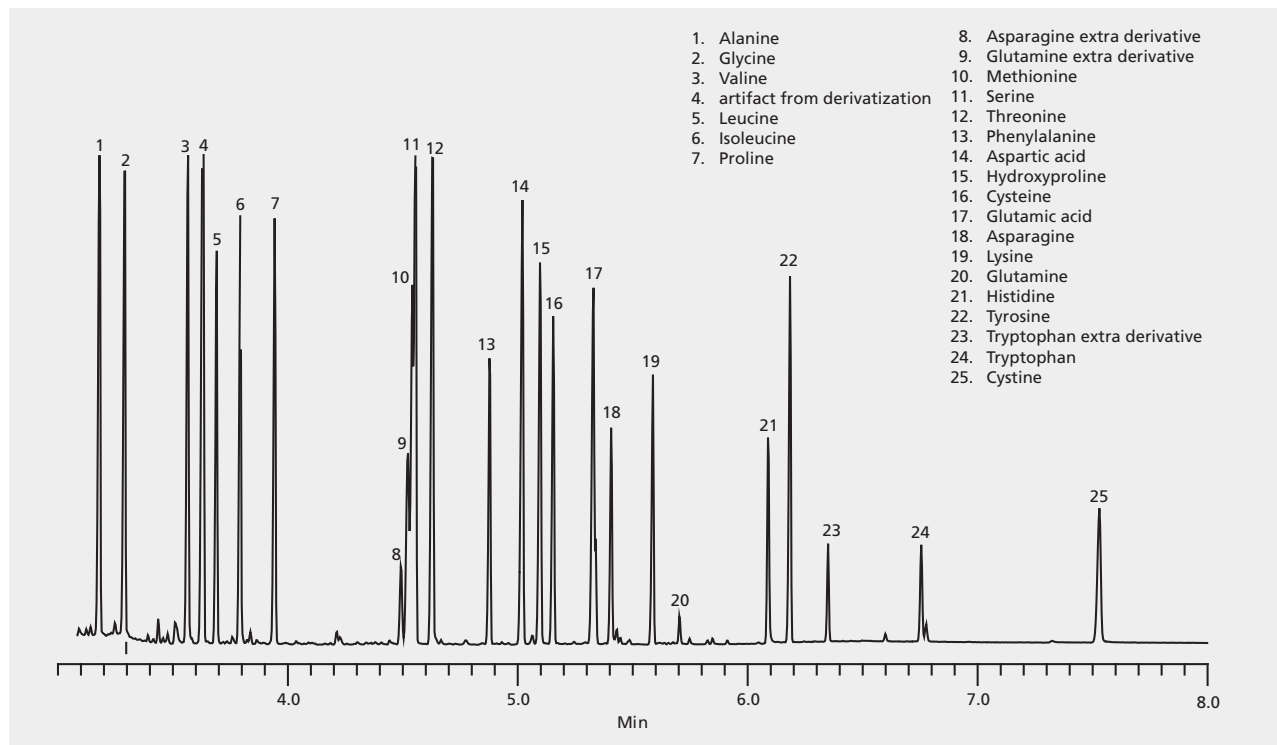
GC Applications

Amino Acids

Amino Acids

GC Analysis of Amino Acids (as TBDMS Derivatives) on the SLB®-5ms [Fast GC Analysis]

column SLB-5ms, 20 m x 0.18 mm I.D., 0.18 µm (28564-U)
 oven 100 °C (1 min.), 35 °C/min. to 290 °C (3 min.), 40 °C/min. to 360 °C
 inj. temp. 250 °C
 MSD interface 325 °C
 scan range m/z = 40-450
 carrier gas helium, 1 mL/min., constant
 injection 0.5 µL, splitless (1.0 min.)
 liner 2 mm I.D., straight
 sample TBDMS derivatives of amino acids, each approximately 23 µg/mL
 Application No. G004006



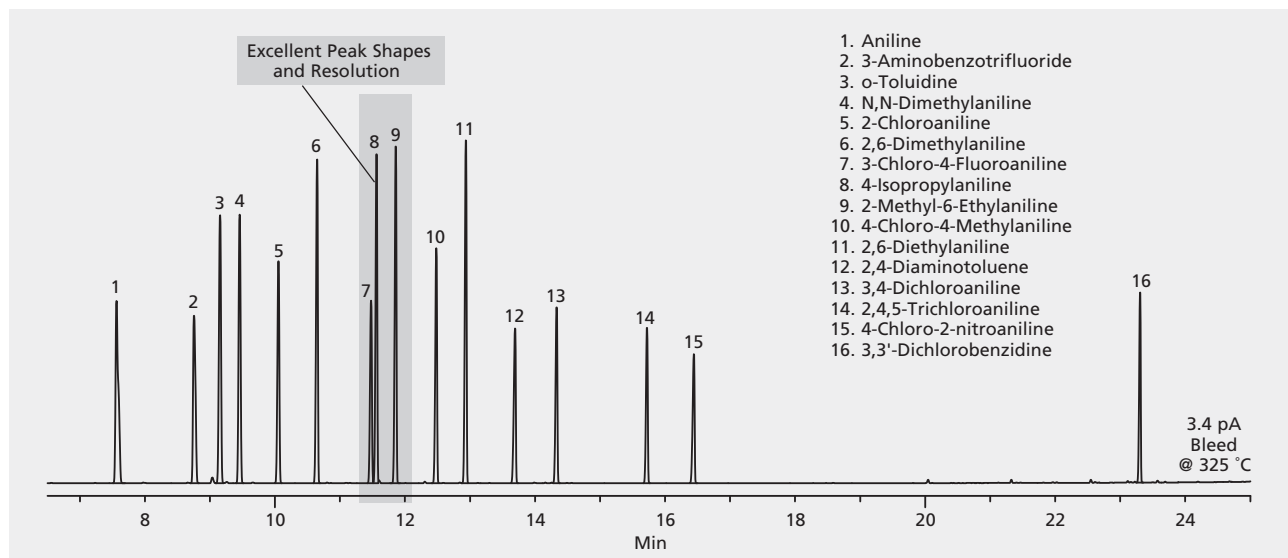
GC Applications

Anilines

Anilines

GC Analysis of Anilines on the Equity®-5

column Equity-5, 30 m x 0.25 mm I.D., 0.25 µm (28089-U)
 oven 50 °C (2 min), 10 °C/min to 200 °C, 15 °C/min to 325 °C
 inj. temp. 250 °C
 detector FID, 325 °C
 carrier gas helium, constant flow, 1.3 mL/sec
 injection 1 µL, splitless (0.5 min)
 liner 4 mm I.D., single taper
 sample 50 ng on-column of a custom anilines mix
 Application No. G001706



GC Applications

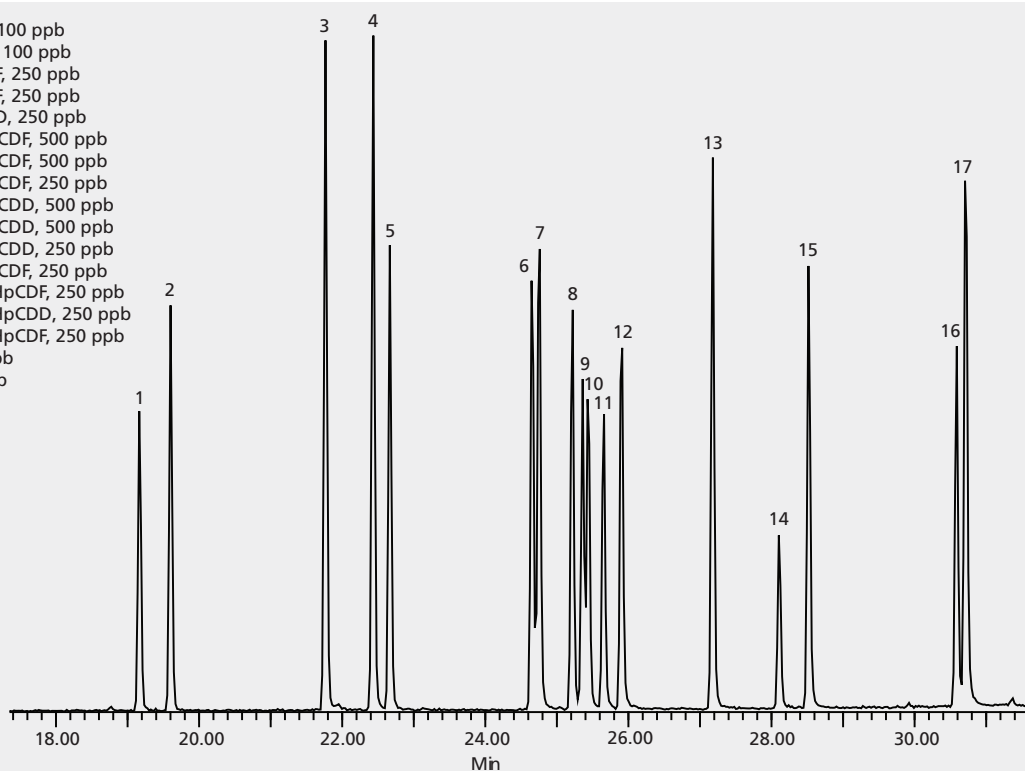
Dioxins and Furans

Dioxins and Furans

GC Analysis of Dioxin and Furan Congeners on the SLB®-5ms

column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 μ m (28471-U)
 oven 150 °C (1 min), 5 °C/min. to 325 °C (2 min.)
 inj. temp. 250 °C
 MSD interface 325 °C
 scan range SIM
 carrier gas helium, 37 cm/sec., constant
 injection 1 μ L, splitless (1 min.)
 liner 4 mm I.D., single taper
 sample dioxane/furan standard, 100-500 ppb in n-nonane
 Application No. G003529

1. 2,3,7,8-TCDF, 100 ppb
2. 2,3,7,8-TCDD, 100 ppb
3. 1,2,3,7,8-PCDF, 250 ppb
4. 2,3,4,7,8-PCDF, 250 ppb
5. 1,2,3,7,8-PCDD, 250 ppb
6. 1,2,3,4,7,8-HxCDF, 500 ppb
7. 1,2,3,6,7,8-HxCDF, 500 ppb
8. 2,3,4,6,7,8-HxCDF, 250 ppb
9. 1,2,3,4,7,8-HxCDD, 500 ppb
10. 1,2,3,6,7,8-HxCDD, 500 ppb
11. 1,2,3,7,8,9-HxCDD, 250 ppb
12. 1,2,3,7,8,9-HxCDF, 250 ppb
13. 1,2,3,4,6,7,8-HpCDF, 250 ppb
14. 1,2,3,4,6,7,8-HpCDD, 250 ppb
15. 1,2,3,4,7,8,9-HpCDF, 250 ppb
16. OCDD, 500 ppb
17. OCDF, 500 ppb

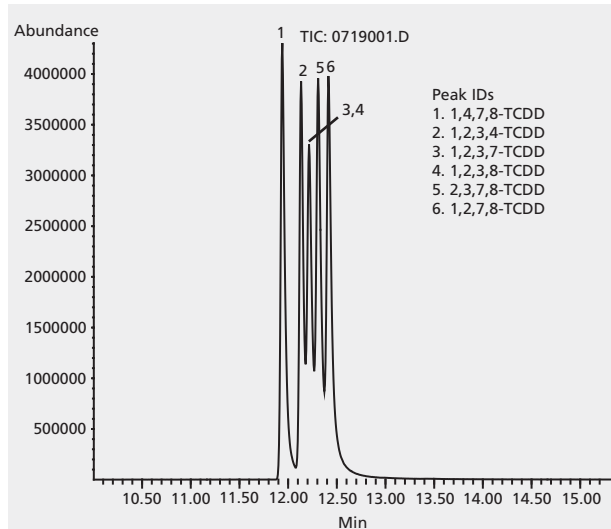


GC Applications

Dioxins and Furans

GC Analysis of TCDDs on the SLB®-5ms

column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 µm (28471-U)
 oven 170 °C (1 min.), 8 °C/min to 270 °C (10 min.)
 inj. temp. 250 °C
 MSD interface 270 °C
 scan range SIM, m/z = 320, 322, 324
 carrier gas helium, 37 cm/sec., constant
 injection 1 µL, splitless (1 min.)
 liner 4 mm I.D., single taper
 sample TCDD standard, 1500 ppb in n-dodecane
 Application No. G004055

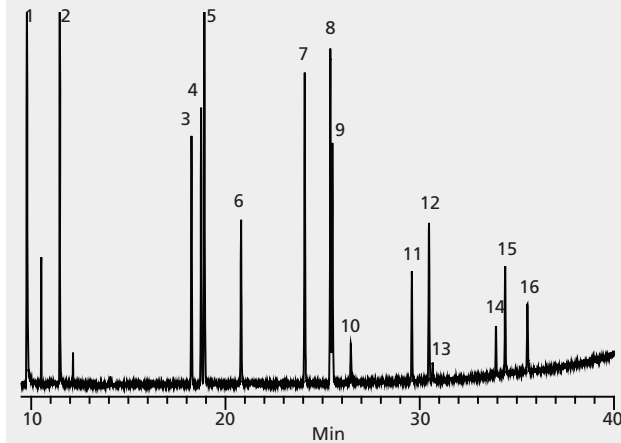


Drugs of Abuse

GC Analysis of Drugs of Abuse on the SLB®-5ms

column SLB-5ms, 30 m x 0.25 mm I.D., 0.50 µm (28473-U)
 oven .. 45 °C (2.0 min.), 30 °C/min. to 110 °C (1.0 min.), 15 °C/min. to 200 °C (1.0 min.), 4 °C/min. to 310 °C (5.0 min.)
 inj. temp. 250 °C
 MSD interface 330 °C
 scan range m/z = 40-450
 carrier gas helium, 0.7 mL/min. constant
 injection .. 0.5 µL, pulsed splitless, 30 psi. (0.20 min.), purge on (1.50 min.), purge flow (50.0 mL/min.)
 liner 2mm I.D., straight
 sample drugs of abuse standard diluted to 100 ppm in methanol
 Application No. G003677

- | | | |
|--------------------|------------------|--------------|
| 1. Methamphetamine | 7. Methadone | 13. Morphine |
| 2. Nicotine | 8. Amitriptyline | 14. Heroin |
| 3. Caffeine | 9. Cocaine | 15. Prazepam |
| 4. Diphenhydramine | 10. Desipramine | 16. Fentanyl |
| 5. Lidocaine | 11. Codeine | |
| 6. Phenobarbital | 12. Diazepam | |

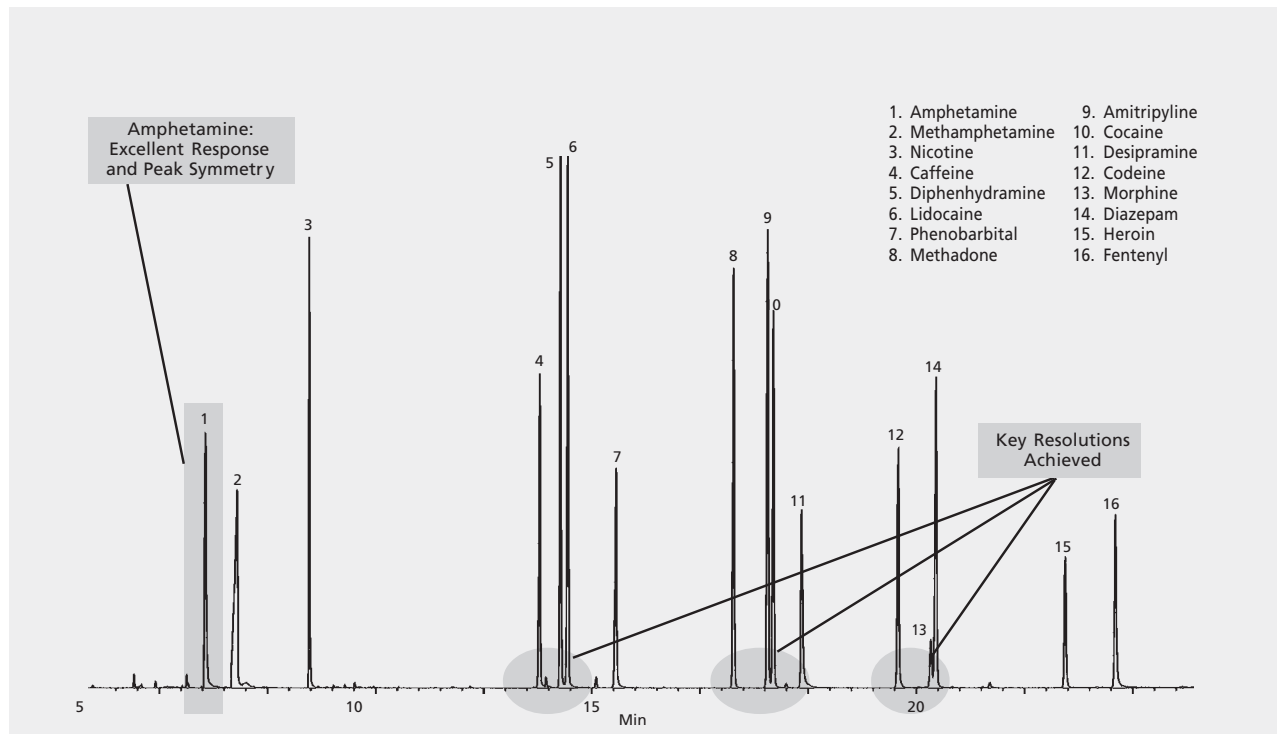


GC Applications

Drugs of Abuse

GC Analysis of Drugs of Abuse on the Equity®-5

column Equity-5, 30 m x 0.25 mm I.D., 0.25 µm (28089-U)
 oven 45 °C (2 min), 25 °C/min to 110 °C, 15 °C/min to 200 °C, 6 °C/min to 280 °C (3 min.)
 inj. temp. 250 °C
 MSD interface 325 °C
 scan range m/z = 40-450
 carrier gas helium, 40 psi for 0.2 min then 0.7 mL/min constant flow
 injection 0.3 µL pulsed splitless @ 50 mL/min (0.5 min)
 liner 2 mm I.D., splitless
 sample ~15 ng on-column of a 16-component drug standard
 Application No. G001691



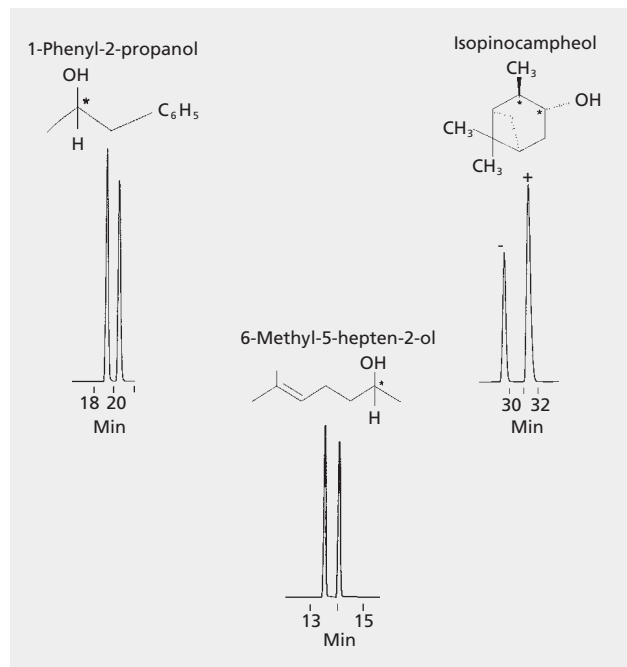
GC Applications

Enantiomers

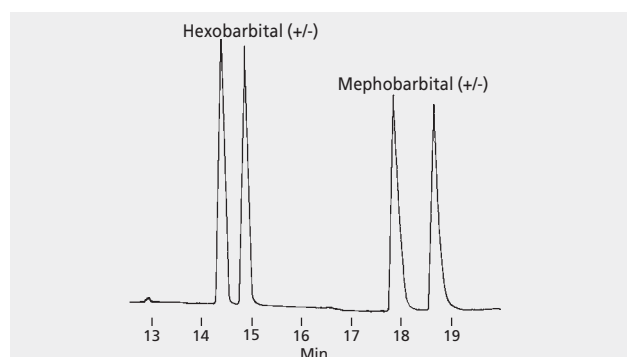
Enantiomers

GC Analysis of Alcohol Enantiomers on the β -DEX™ 325

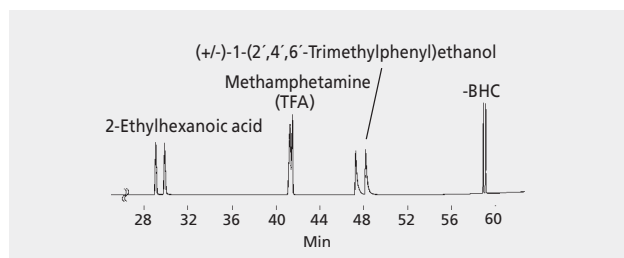
column β -DEX 325, 30 m \times 0.25 mm I.D., 0.25 μ m (24308)
 oven 110 $^{\circ}$ C, 1-phenyl-2-propanol; 100 $^{\circ}$ C, isopinocampheol; 90 $^{\circ}$ C, 6-methyl-5-hepten-2-ol
 inj. temp. 220 $^{\circ}$ C
 detector FID, 300 $^{\circ}$ C
 carrier gas helium, 20 cm/sec @ analysis temperature
 injection 1 μ L 100:1 split
 sample 1 mg/mL in methylene chloride
 Application No. 797-0020

GC Analysis of Barbiturate Enantiomers on the β -DEX™ 120

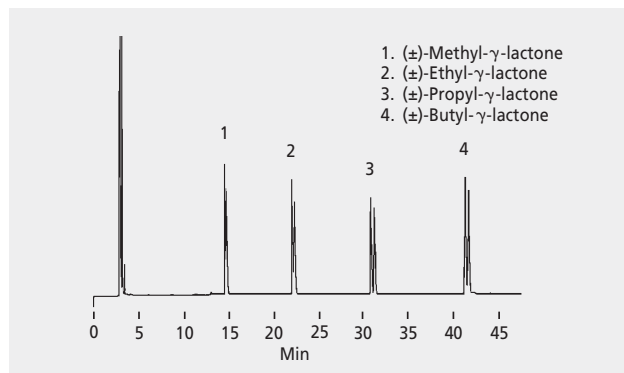
column β -DEX 120, 30 m \times 0.25 mm I.D., 0.25 μ m (24304)
 oven 210 $^{\circ}$ C
 inj. temp. 300 $^{\circ}$ C
 detector FID, 300 $^{\circ}$ C
 carrier gas helium, 20 cm/sec @ 275 $^{\circ}$ C
 injection 100:1 split
 Application No. 92-0342

GC Analysis of Enantiomers on the γ -DEX™ 120

column γ -DEX 120, 30 m \times 0.25 mm I.D., 0.25 μ m (24307)
 oven 90 $^{\circ}$ C, 1 $^{\circ}$ C/min. to 135 $^{\circ}$ C, 5 $^{\circ}$ C/min. to 240 $^{\circ}$ C
 inj. temp. 300 $^{\circ}$ C
 detector FID, 300 $^{\circ}$ C
 carrier gas helium, 20 cm/sec
 injection 1 μ L 100:1 split
 sample 500 μ g/mL in methylene chloride
 Application No. 794-0520

GC Analysis of Lactone Enantiomers on the β -DEX™ 110

column β -DEX 110, 30 m \times 0.25 mm I.D., 0.25 μ m (24301)
 oven 90 $^{\circ}$ C, 1 $^{\circ}$ C/min. to 200 $^{\circ}$ C
 inj. temp. 300 $^{\circ}$ C
 detector FID, 300 $^{\circ}$ C
 carrier gas helium, 20 cm/sec @ 90 $^{\circ}$ C
 injection 1 μ L 100:1 split
 sample 0.5 mg/mL in methylene chloride
 Application No. 712-0266

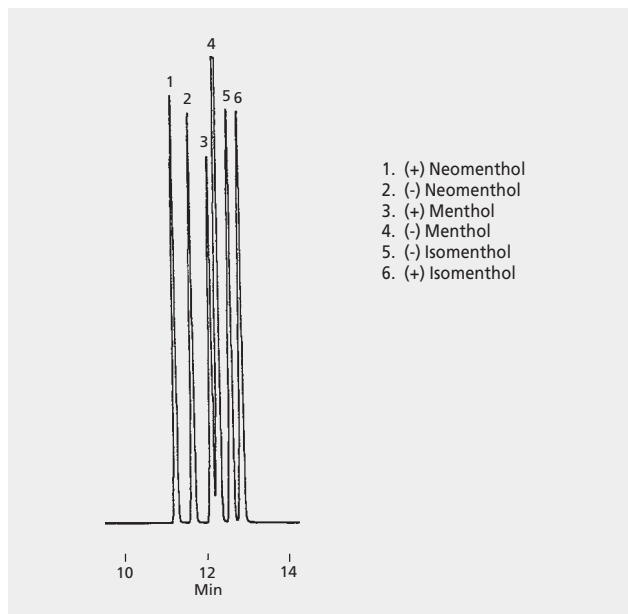


GC Applications

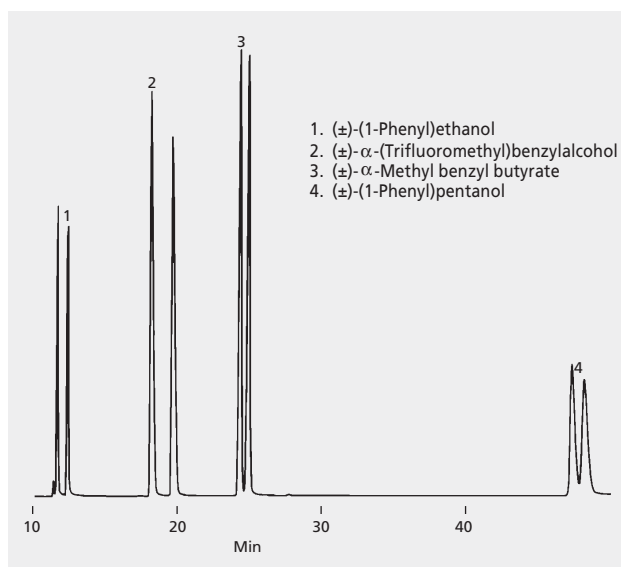
Enantiomers

GC Analysis of Menthol Enantiomers on the α -DEX™ 120

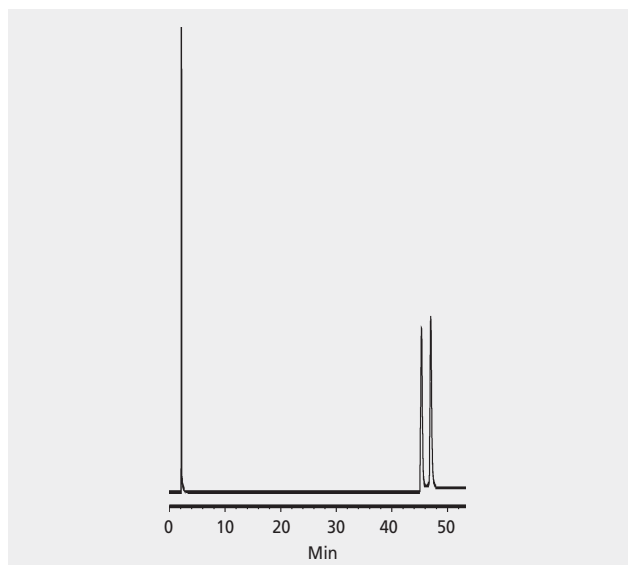
column α -DEX 120, 30 m \times 0.25 mm I.D., 0.25 μ m (24310)
 oven 110 °C
 detector FID, 300 °C
 carrier gas helium, 20 cm/sec
 injection 1 μ L, 100:1 split
 sample 0.5 mg/mL each component
 Application No. 713-0089

GC Analysis of Phenylethanol Enantiomers on the β -DEX™ 120

column β -DEX 120, 30 m \times 0.25 mm I.D., 0.25 μ m (24304)
 oven 120 °C
 inj. temp. 200 °C
 detector FID, 300 °C
 carrier gas helium, 20 cm/sec
 injection 1 μ L, 100:1 split
 sample 0.5 mg/mL each analyte in methylene chloride
 Application No. 94-0340

GC Analysis of 4-Methyloctanoic Acid Enantiomers on the γ -DEX™ 120

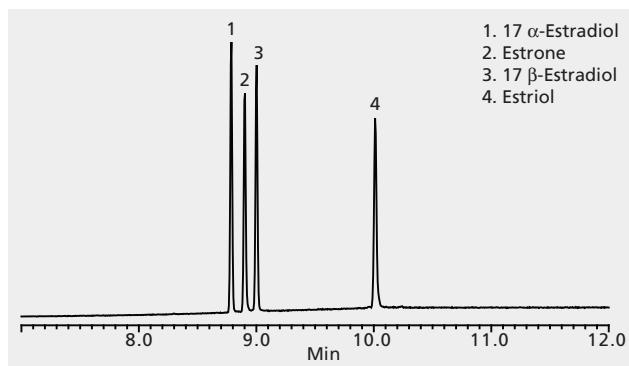
column γ -DEX 120, 30 m \times 0.25 mm I.D., 0.25 μ m (24307)
 oven 115 °C
 inj. temp. 220 °C
 detector FID, 300 °C
 carrier gas helium, 20 cm/sec
 injection 1 μ L, 100:1 split
 sample ~1 mg/mL each enantiomer in methylene chloride
 Application No. 797-0225



Estrogenic Compounds

GC Analysis of Estrogenic Compounds on the SLB®-5ms

column SLB-5ms, 30 m \times 0.25 mm I.D., 0.25 μ m (28471-U)
 oven 175 °C (0.5 min.), 15 °C/min. to 300 °C (5 min.)
 inj. temp. 250 °C
 MSD interface 330 °C
 scan range m/z = 45-525
 carrier gas helium, 1 mL/min, constant
 injection 0.5 μ L, pulsed splitless (30 psi until 0.5 min, splitter open at 1.5 min.)
 liner 2 mm I.D., straight
 sample Estrogenic compounds, as methylated derivatives, 10 ppm in ethyl acetate
 Application No. G003737



GC Applications

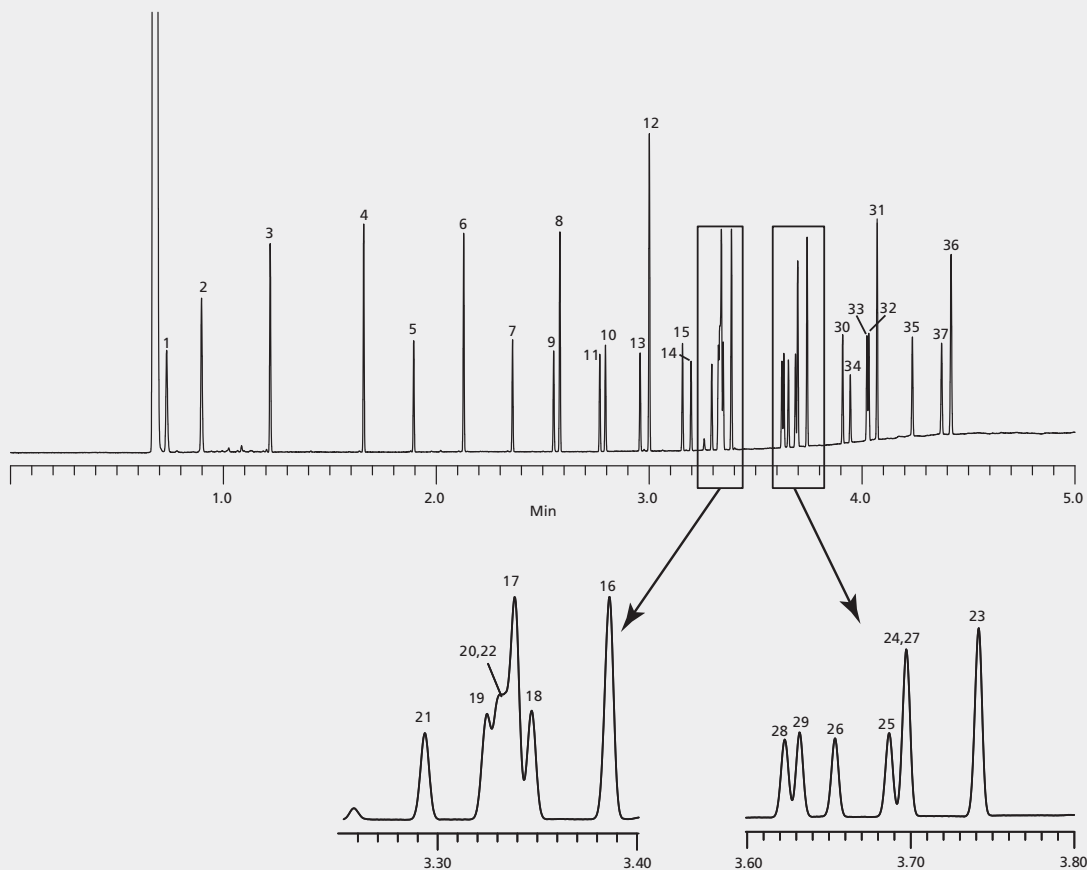
Fatty Acid Methyl Esters (FAMES)

Fatty Acid Methyl Esters (FAMES)

GC Analysis of the 37-Component FAME Mix on the Equity®-1 [Fast GC Analysis]

column Equity-1, 15 m x 0.10 mm I.D., 0.10 µm (28039-U)
 oven 100 °C, 50 °C/min. to 300 °C (1 min.)
 inj. temp. 250 °C
 detector FID, 300 °C
 carrier gas hydrogen, 50 cm/sec constant
 injection 0.2 µL, 200:1 split
 liner 4 mm I.D., split, cup design
 sample Supelco 37-Component FAME Mix (47885-U), analytes at concentrations indicated in methylene chloride
 Application No. G004278

1. Butyric Acid Methyl Ester (C4:0) at 4 wt %
2. Caproic Acid Methyl Ester (C6:0) at 4 wt %
3. Caprylic Acid Methyl Ester (C8:0) at 4 wt %
4. Capric Acid Methyl Ester (C10:0) at 4 wt %
5. Undecanoic Acid Methyl Ester (C11:0) at 2 wt %
6. Lauric Acid Methyl Ester (C12:0) at 4 wt %
7. Tridecanoic Acid Methyl Ester (C13:0) at 2 wt %
8. Myristic Acid Methyl Ester (C14:0) at 4 wt %
9. Myristoleic Acid Methyl Ester (C14:1) at 2 wt %
10. Pentadecanoic Acid Methyl Ester (C15:0) at 2 wt %
11. cis-10-Pentadecenoic Acid Methyl Ester (C15:1) at 2 wt %
12. Palmitic Acid Methyl Ester (C16:0) at 6 wt %
13. Palmitoleic Acid Methyl Ester (C16:1) at 2 wt %
14. Heptadecanoic Acid Methyl Ester (C17:0) at 2 wt %
15. cis-10-Heptadecenoic Acid Methyl Ester (C17:1) at 2 wt %
16. Stearic Acid Methyl Ester (C18:0) at 4 wt %
17. Oleic Acid Methyl Ester (C18:1n9c) at 4 wt %
18. Elaidic Acid Methyl Ester (C18:1n9t) at 2 wt %
19. Linoleic Acid Methyl Ester (C18:2n6c) at 2 wt %
20. Linolelaidic Acid Methyl Ester (C18:2n6t) at 2 wt %
21. γ-Linolenic Acid Methyl Ester (C18:3n6) at 2 wt %
22. α-Linolenic Acid Methyl Ester (C18:3n3) at 2 wt %
23. Arachidic Acid Methyl Ester (C20:0) at 4 wt %
24. cis-11-Eicosenoic Acid Methyl Ester (C20:1n9) at 2 wt %
25. cis-11,14-Eicosadienoic Acid Methyl Ester (C20:2) at 2 wt %
26. cis-8,11,14-Eicosatrienoic Acid Methyl Ester (C20:3n6) at 2 wt %
27. cis-11,14,17-Eicosatrienoic Acid Methyl Ester (C20:3n3) at 2 wt %
28. Arachidonic Acid Methyl Ester (C20:4n6) at 2 wt %
29. cis-5,8,11,14,17-Eicosapentaenoic Acid Methyl Ester (C20:5n3) at 2 wt %
30. Heneicosanoic Acid Methyl Ester (C21:0) at 2 wt %
31. Behenic Acid Methyl Ester (C22:0) at 4 wt %
32. Erucic Acid Methyl Ester (C22:1n9) at 2 wt %
33. cis-13,16-Docosadienoic Acid Methyl Ester (C22:2) at 2 wt %
34. cis-4,7,10,13,16,19-Docosahexaenoic Acid Methyl Ester (C22:6n3) at 2 wt %
35. Tricosanoic Acid Methyl Ester (C23:0) at 2 wt %
36. Lignoceric Acid Methyl Ester (C24:0) at 4 wt %
37. Nervonic Acid Methyl Ester (C24:1n9) at 2 wt %



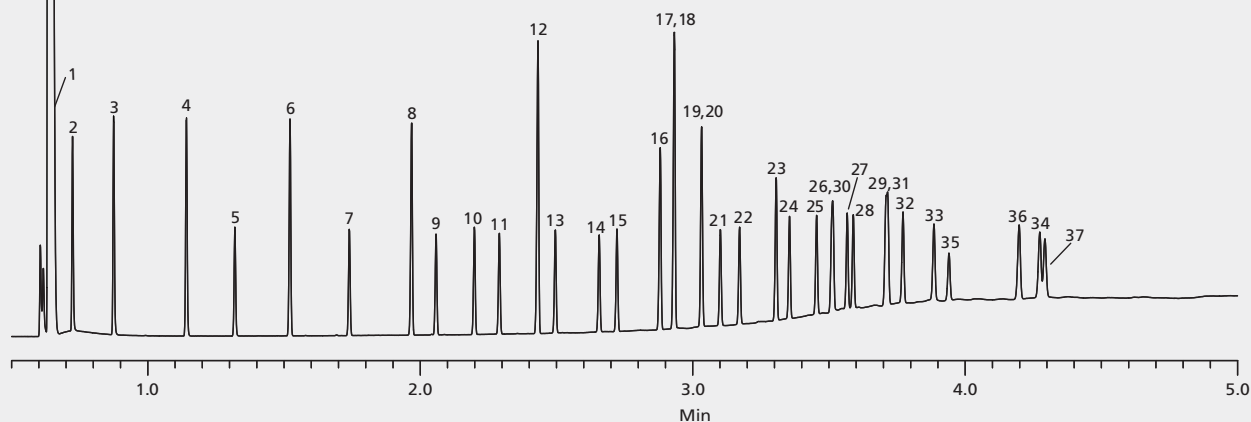
GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of the 37-Component FAME Mix on the Omegawax® 100 [Fast GC Analysis]

column Omegawax 100, 15 m x 0.10 mm I.D., 0.10 µm (23399-U)
 oven 140 °C, 40 °C/min. to 280 °C (2 min.)
 inj. temp. 250 °C
 detector FID, 260 °C
 carrier gas hydrogen, 50 cm/sec constant
 injection 0.2 µL, 200:1 split
 liner 4 mm I.D., split, cup design
 sample Supelco 37-Component FAME Mix (47885-U), analytes at concentrations indicated in methylene chloride
 Application No. G003886

- | | |
|--|---|
| 1. Butyric Acid Methyl Ester (C4:0) at 4 wt % | 20. Linolelaidic Acid Methyl Ester (C18:2n6t) at 2 wt % |
| 2. Caproic Acid Methyl Ester (C6:0) at 4 wt % | 21. γ -Linolenic Acid Methyl Ester (C18:3n6) at 2 wt % |
| 3. Caprylic Acid Methyl Ester (C8:0) at 4 wt % | 22. α -Linolenic Acid Methyl Ester (C18:3n3) at 2 wt % |
| 4. Capric Acid Methyl Ester (C10:0) at 4 wt % | 23. Arachidic Acid Methyl Ester (C20:0) at 4 wt % |
| 5. Undecanoic Acid Methyl Ester (C11:0) at 2 wt % | 24. cis-11-Eicosenoic Acid Methyl Ester (C20:1n9) at 2 wt % |
| 6. Lauric Acid Methyl Ester (C12:0) at 4 wt % | 25. cis-11,14-Eicosadienoic Acid Methyl Ester (C20:2) at 2 wt % |
| 7. Tridecanoic Acid Methyl Ester (C13:0) at 2 wt % | 26. cis-8,11,14-Eicosatrienoic Acid Methyl Ester (C20:3n6) at 2 wt % |
| 8. Myristic Acid Methyl Ester (C14:0) at 4 wt % | 27. cis-11,14,17-Eicosatrienoic Acid Methyl Ester (C20:3n3) at 2 wt % |
| 9. Myristoleic Acid Methyl Ester (C14:1) at 2 wt % | 28. Arachidonic Acid Methyl Ester (C20:4n6) at 2 wt % |
| 10. Pentadecanoic Acid Methyl Ester (C15:0) at 2 wt % | 29. cis-5,8,11,14,17-Eicosapentaenoic Acid Methyl Ester (C20:5n3) at 2 wt % |
| 11. cis-10-Pentadecenoic Acid Methyl Ester (C15:1) at 2 wt % | 30. Heneicosanoic Acid Methyl Ester (C21:0) at 2 wt % |
| 12. Palmitic Acid Methyl Ester (C16:0) at 6 wt % | 31. Behenic Acid Methyl Ester (C22:0) at 4 wt % |
| 13. Palmitoleic Acid Methyl Ester (C16:1) at 2 wt % | 32. Erucic Acid Methyl Ester (C22:1n9) at 2 wt % |
| 14. Heptadecanoic Acid Methyl Ester (C17:0) at 2 wt % | 33. cis-13,16-Docosadienoic Acid Methyl Ester (C22:2) at 2 wt % |
| 15. cis-10-Heptadecenoic Acid Methyl Ester (C17:1) at 2 wt % | 34. cis-4,7,10,13,16,19-Docosahexaenoic Acid Methyl Ester (C22:6n3) at 2 wt % |
| 16. Stearic Acid Methyl Ester (C18:0) at 4 wt % | 35. Tricosanoic Acid Methyl Ester (C23:0) at 2 wt % |
| 17. Oleic Acid Methyl Ester (C18:1n9c) at 4 wt % | 36. Lignoceric Acid Methyl Ester (C24:0) at 4 wt % |
| 18. Elaidic Acid Methyl Ester (C18:1n9t) at 2 wt % | 37. Nervonic Acid Methyl Ester (C24:1n9) at 2 wt % |
| 19. Linoleic Acid Methyl Ester (C18:2n6c) at 2 wt % | |



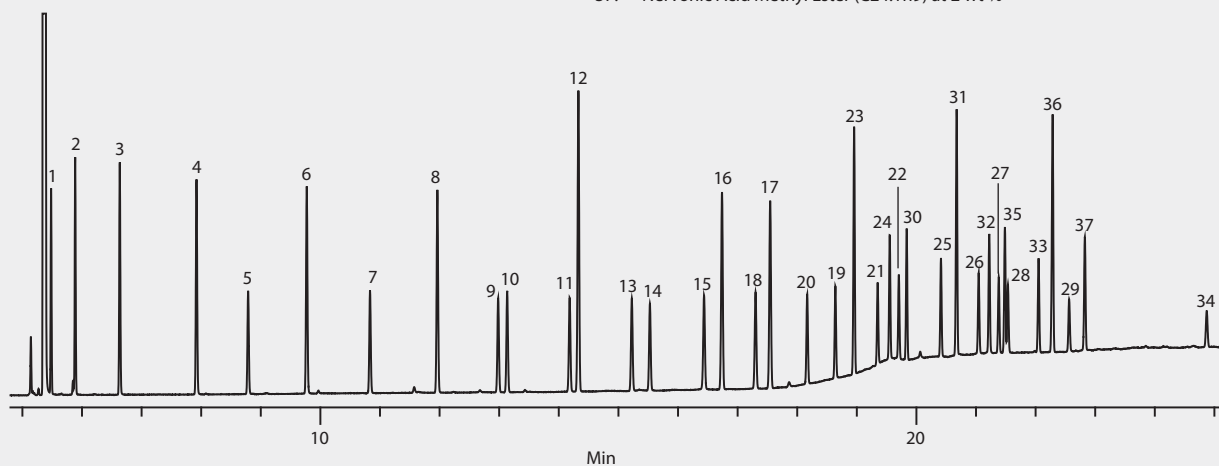
GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of the 37-Component FAME Mix on the SP™-2560

column SP-2560, 100 m x 0.25 mm I.D., 0.20 µm (24056)
 oven 140 °C (5 min.), 8 °C/min. to 180 °C, 4 °C/min. to 210 °C, 20 °C/min. to 250 °C (7 min.)
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas hydrogen, 40 cm/sec
 injection 1 µL, 100:1 split
 liner 4 mm I.D., cup design
 sample Supelco 37-Component FAME Mix (47885-U), analytes at concentrations indicated in methylene chloride
 Application No. G005366

- | | |
|--|---|
| 1. Butyric Acid Methyl Ester (C4:0) at 4 wt % | 19. Linoleic Acid Methyl Ester (C18:2n6c) at 2 wt % |
| 2. Caproic Acid Methyl Ester (C6:0) at 4 wt % | 20. Linolelaidic Acid Methyl Ester (C18:2n6t) at 2 wt % |
| 3. Caprylic Acid Methyl Ester (C8:0) at 4 wt % | 21. γ-Linolenic Acid Methyl Ester (C18:3n6) at 2 wt % |
| 4. Capric Acid Methyl Ester (C10:0) at 4 wt % | 22. α-Linolenic Acid Methyl Ester (C18:3n3) at 2 wt % |
| 5. Undecanoic Acid Methyl Ester (C11:0) at 2 wt % | 23. Arachidic Acid Methyl Ester (C20:0) at 4 wt % |
| 6. Lauric Acid Methyl Ester (C12:0) at 4 wt % | 24. cis-11-Eicosenoic Acid Methyl Ester (C20:1n9) at 2 wt % |
| 7. Tridecanoic Acid Methyl Ester (C13:0) at 2 wt % | 25. cis-11,14-Eicosadienoic Acid Methyl Ester (C20:2) at 2 wt % |
| 8. Myristic Acid Methyl Ester (C14:0) at 4 wt % | 26. cis-8,11,14-Eicosatrienoic Acid Methyl Ester (C20:3n6) at 2 wt % |
| 9. Myristoleic Acid Methyl Ester (C14:1) at 2 wt % | 27. cis-11,14,17-Eicosatrienoic Acid Methyl Ester (C20:3n3) at 2 wt % |
| 10. Pentadecanoic Acid Methyl Ester (C15:0) at 2 wt % | 28. Arachidonic Acid Methyl Ester (C20:4n6) at 2 wt % |
| 11. cis-10-Pentadecenoic Acid Methyl Ester (C15:1) at 2 wt % | 29. cis-5,8,11,14,17-Eicosapentaenoic Acid Methyl Ester (C20:5n3) at 2 wt % |
| 12. Palmitic Acid Methyl Ester (C16:0) at 6 wt % | 30. Heneicosanoic Acid Methyl Ester (C21:0) at 2 wt % |
| 13. Palmitoleic Acid Methyl Ester (C16:1) at 2 wt % | 31. Behenic Acid Methyl Ester (C22:0) at 4 wt % |
| 14. Heptadecanoic Acid Methyl Ester (C17:0) at 2 wt % | 32. Erucic Acid Methyl Ester (C22:1n9) at 2 wt % |
| 15. cis-10-Heptadecenoic Acid Methyl Ester (C17:1) at 2 wt % | 33. cis-13,16-Docosadienoic Acid Methyl Ester (C22:2) at 2 wt % |
| 16. Stearic Acid Methyl Ester (C18:0) at 4 wt % | 34. cis-4,7,10,13,16,19-Docosahexaenoic Acid Methyl Ester (C22:6n3) at 2 wt % |
| 17. Oleic Acid Methyl Ester (C18:1n9c) at 4 wt % | 35. Tricosanoic Acid Methyl Ester (C23:0) at 2 wt % |
| 18. Elaidic Acid Methyl Ester (C18:1n9t) at 2 wt % | 36. Lignoceric Acid Methyl Ester (C24:0) at 4 wt % |
| | 37. Nervonic Acid Methyl Ester (C24:1n9) at 2 wt % |



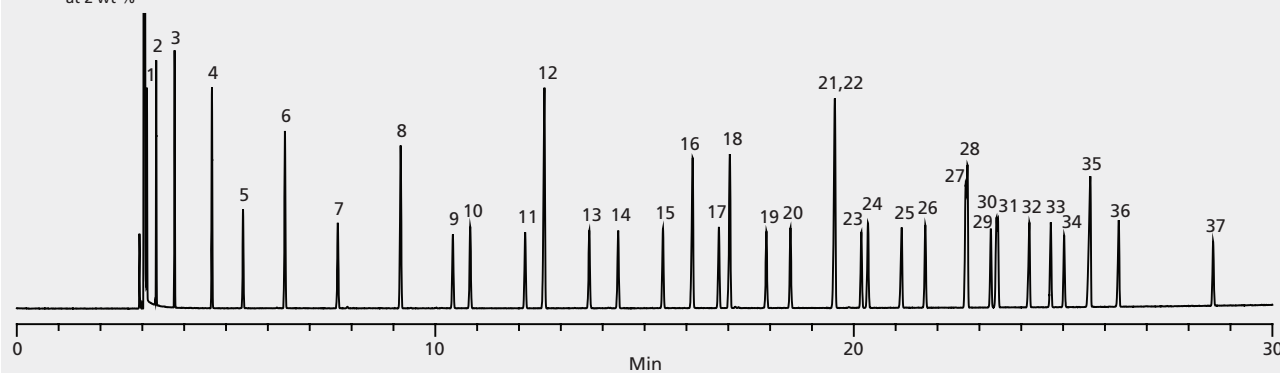
GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of the 37-Component FAME Mix on the SP™-2560 [Fast GC Analysis]

column SP-2560, 75 m x 0.18 mm I.D., 0.14 μ m (23348-U)
 oven 140 $^{\circ}$ C (5 min.), 4 $^{\circ}$ C/min. to 240 $^{\circ}$ C (2 min.)
 inj. temp. 250 $^{\circ}$ C
 detector FID, 250 $^{\circ}$ C
 carrier gas hydrogen, 40 cm/sec. @ 175 $^{\circ}$ C
 injection 1 μ L, split 100:1
 liner 4 mm I.D. split, cup design
 sample 37 component FAME mix at concentrations listed in methylene chloride (47885-U)
 Application No. G003461

- | | | |
|--|--|--|
| 1. Butyric Acid Methyl Ester (C4:0) at 4 wt % | 16. Stearic Acid Methyl Ester (C18:0) at 4 wt % | 28. Behenic Acid Methyl Ester (C22:0) at 4 wt % |
| 2. Caproic Acid Methyl Ester (C6:0) at 4 wt % | 17. Elaidic Acid Methyl Ester (C18:1n9t) at 2 wt % | 29. cis-11,14,17-Eicosatrienoic Acid Methyl Ester (C20:3n3) at 2 wt % |
| 3. Caprylic Acid Methyl Ester (C8:0) at 4 wt % | 18. Oleic Acid Methyl Ester (C18:1n9c) at 4 wt % | 30. Erucic Acid Methyl Ester (C22:1n9) at 2 wt % |
| 4. Capric Acid Methyl Ester (C10:0) at 4 wt % | 19. Linolelaidic Acid Methyl Ester (C18:2n6t) at 2 wt % | 31. Arachidonic Acid Methyl Ester (C20:4n6) at 2 wt % |
| 5. Undecanoic Acid Methyl Ester (C11:0) at 2 wt % | 20. Linoleic Acid Methyl Ester (C18:2n6c) at 2 wt % | 32. Tricosanoic Acid Methyl Ester (C23:0) at 2 wt % |
| 6. Lauric Acid Methyl Ester (C12:0) at 4 wt % | 21. Arachidic Acid Methyl Ester (C20:0) at 4 wt % | 33. cis-13,16-Docosadienoic Acid Methyl Ester (C22:2) at 2 wt % |
| 7. Tridecanoic Acid Methyl Ester (C13:0) at 2 wt % | 22. g-Linolenic Acid Methyl Ester (C18:3n6) at 2 wt % | 34. cis-5,8,11,14,17-Eicosapentaenoic Acid Methyl Ester (C20:5n3) at 2 wt % |
| 8. Myristic Acid Methyl Ester (C14:0) at 4 wt % | 23. Linolenic Acid Methyl Ester (C18:3n3) at 2 wt % | 35. Lignoceric Acid Methyl Ester (C24:0) at 4 wt % |
| 9. Myristoleic Acid Methyl Ester (C14:1) at 2 wt % | 24. cis-11-Eicosenoic Acid Methyl Ester (C20:1) at 2 wt % | 36. Nervonic Acid Methyl Ester (C24:1) at 2 wt % |
| 10. Pentadecanoic Acid Methyl Ester (C15:0) at 2 wt % | 25. Heneicosanoic Acid Methyl Ester (C21:0) at 2 wt % | 37. cis-4,7,10,13,16,19-Docosaheptaenoic Acid Methyl Ester (C22:6n3) at 2 wt % |
| 11. cis-10-Pentadecenoic Acid Methyl Ester (C15:1) at 2 wt % | 26. cis-11,14-Eicosadienoic Acid Methyl Ester (C20:2) at 2 wt % | |
| 12. Palmitic Acid Methyl Ester (C16:0) at 6 wt % | 27. cis-8,11,14-Eicosatrienoic Acid Methyl Ester (C20:3n6) at 2 wt % | |
| 13. Palmitoleic Acid Methyl Ester (C16:1) at 2 wt % | | |
| 14. Heptadecanoic Acid Methyl Ester (C17:0) at 2 wt % | | |
| 15. cis-10-Heptadecenoic Acid Methyl Ester (C17:1) at 2 wt % | | |



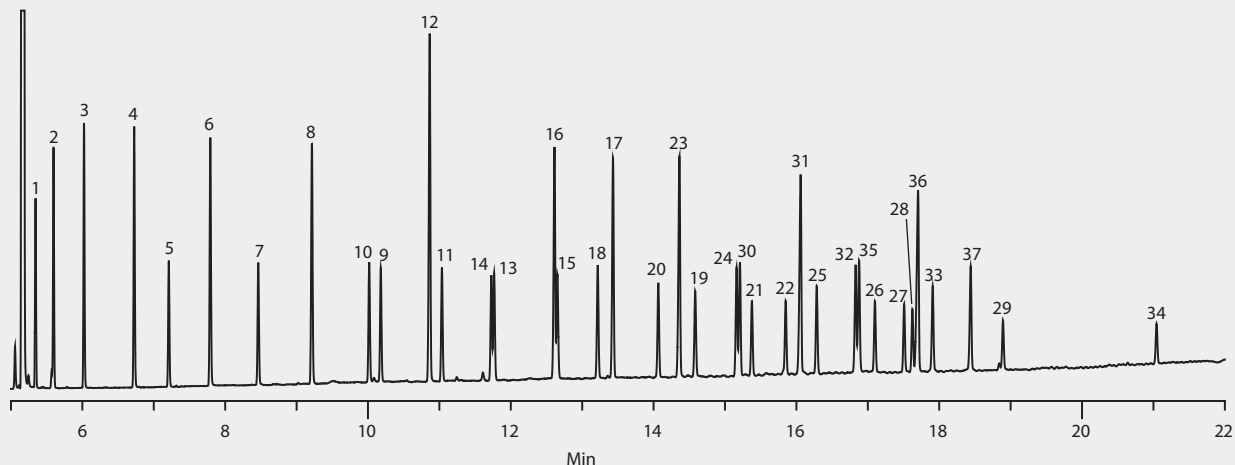
GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of the 37-Component FAME Mix on the SLB®-IL111

column SLB-IL111, 100 m x 0.25 mm I.D., 0.20 µm (29647-U)
 oven 140 °C (5 min), 8 °C/min. to 180 °C, 5 °C/min. to 260 °C
 inj. temp. 250 °C
 detector FID, 260 °C
 carrier gas hydrogen, 40 cm/sec
 injection 1 µL, 100:1 split
 liner 4 mm I.D., cup design
 sample Supelco 37-Component FAME Mix (47885-U), analytes at concentrations indicated in methylene chloride
 Application No. G005367

- | | |
|--|---|
| 1. Butyric Acid Methyl Ester (C4:0) at 4 wt % | 19. Linoleic Acid Methyl Ester (C18:2n6c) at 2 wt % |
| 2. Caproic Acid Methyl Ester (C6:0) at 4 wt % | 20. Linolelaidic Acid Methyl Ester (C18:2n6t) at 2 wt % |
| 3. Caprylic Acid Methyl Ester (C8:0) at 4 wt % | 21. γ-Linolenic Acid Methyl Ester (C18:3n6) at 2 wt % |
| 4. Capric Acid Methyl Ester (C10:0) at 4 wt % | 22. α-Linolenic Acid Methyl Ester (C18:3n3) at 2 wt % |
| 5. Undecanoic Acid Methyl Ester (C11:0) at 2 wt % | 23. Arachidic Acid Methyl Ester (C20:0) at 4 wt % |
| 6. Lauric Acid Methyl Ester (C12:0) at 4 wt % | 24. cis-11-Eicosenoic Acid Methyl Ester (C20:1n9) at 2 wt % |
| 7. Tridecanoic Acid Methyl Ester (C13:0) at 2 wt % | 25. cis-11,14-Eicosadienoic Acid Methyl Ester (C20:2) at 2 wt % |
| 8. Myristic Acid Methyl Ester (C14:0) at 4 wt % | 26. cis-8,11,14-Eicosatrienoic Acid Methyl Ester (C20:3n6) at 2 wt % |
| 9. Myristoleic Acid Methyl Ester (C14:1) at 2 wt % | 27. cis-11,14,17-Eicosatrienoic Acid Methyl Ester (C20:3n3) at 2 wt % |
| 10. Pentadecanoic Acid Methyl Ester (C15:0) at 2 wt % | 28. Arachidonic Acid Methyl Ester (C20:4n6) at 2 wt % |
| 11. cis-10-Pentadecenoic Acid Methyl Ester (C15:1) at 2 wt % | 29. cis-5,8,11,14,17-Eicosapentaenoic Acid Methyl Ester (C20:5n3) at 2 wt % |
| 12. Palmitic Acid Methyl Ester (C16:0) at 6 wt % | 30. Heneicosanoic Acid Methyl Ester (C21:0) at 2 wt % |
| 13. Palmitoleic Acid Methyl Ester (C16:1) at 2 wt % | 31. Behenic Acid Methyl Ester (C22:0) at 4 wt % |
| 14. Heptadecanoic Acid Methyl Ester (C17:0) at 2 wt % | 32. Erucic Acid Methyl Ester (C22:1n9) at 2 wt % |
| 15. cis-10-Heptadecenoic Acid Methyl Ester (C17:1) at 2 wt % | 33. cis-13,16-Docosadienoic Acid Methyl Ester (C22:2) at 2 wt % |
| 16. Stearic Acid Methyl Ester (C18:0) at 4 wt % | 34. cis-4,7,10,13,16,19-Docosahexaenoic Acid Methyl Ester (C22:6n3) at 2 wt % |
| 17. Oleic Acid Methyl Ester (C18:1n9c) at 4 wt % | 35. Tricosanoic Acid Methyl Ester (C23:0) at 2 wt % |
| 18. Elaidic Acid Methyl Ester (C18:1n9t) at 2 wt % | 36. Lignoceric Acid Methyl Ester (C24:0) at 4 wt % |
| | 37. Nervonic Acid Methyl Ester (C24:1n9) at 2 wt % |



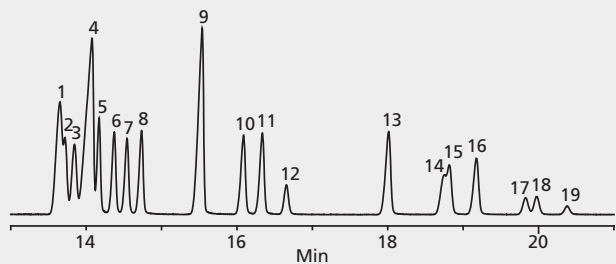
GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of C18:1, C18:2, and C18:3 cis/trans FAME Isomers on the SP™-2560

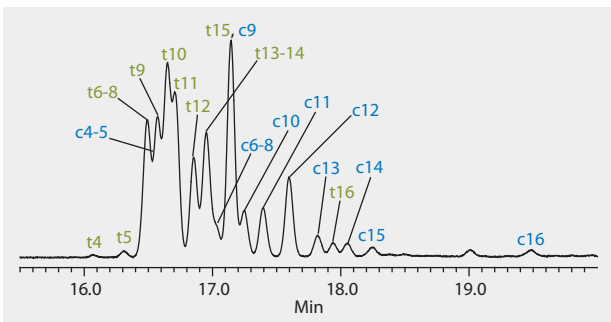
column SP-2560, 75 m x 0.18 mm I.D., 0.14 μ m (23348-U)
 oven 180 °C, isothermal
 inj. temp. 220 °C
 detector FID, 220 °C
 carrier gas hydrogen, 25 cm/sec. @ 180 °C
 injection 0.5 μ L, split 100:1
 liner 4 mm I.D. split, cup design
 sample mixture of C18:1, C18:2, and C18:3 FAMES in methylene chloride
 Application No. G003460

- | | |
|---|--|
| 1. 18:1 Δ 7t and 18:1 Δ 6t | 11. 18:2 Δ 9t, 12c |
| 2. 18:1 Δ 9t | 12. 18:2 Δ 9c, 12c |
| 3. 18:1 Δ 11t | 13. 18:3 Δ 9t, 12t, 15t |
| 4. 18:1 Δ 12t, 18:1 Δ 6c,
18:1 Δ 7c and 18:1 Δ 13t | 14. 18:3 Δ 9t, 12t, 15c |
| 5. 18:1 Δ 9c | 15. 18:3 Δ 9t, 12c, 15t |
| 6. 18:1 Δ 11c | 16. 18:3 Δ 9c, 12t, 15t and
18:3 Δ 9c, 12c, 15t |
| 7. 18:1 Δ 12c | 17. 18:3 Δ 9c, 12t, 15c |
| 8. 18:1 Δ 13c | 18. 18:3 Δ 9t, 12c, 15c |
| 9. 18:2 Δ 9t, 12t | 19. 18:3 Δ 9c, 12c, 15c |
| 10. 18:2 Δ 9c, 12t | |



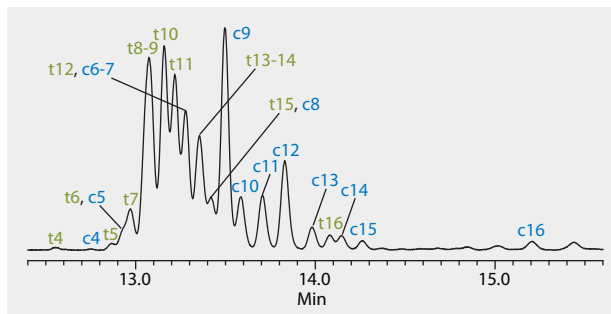
GC Analysis of C18:1 cis/trans FAME Isomers in Partially Hydrogenated Vegetable Oil (PHVO) on the SP™-2560

column SP-2560, 100 m x 0.25 mm I.D., 0.20 μ m (24056)
 oven 180 °C isothermal
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas hydrogen, 1 mL/min.
 injection 1 μ L, 100:1 split
 liner 4 mm I.D., split liner with cup (2051001)
 sample partially hydrogenated vegetable oil FAMES
 Application No. G005287



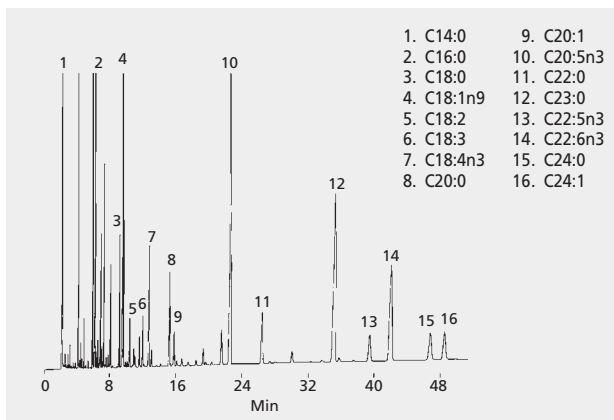
GC Analysis of C18:1 cis/trans FAME Isomers in Partially Hydrogenated Vegetable Oil (PHVO) on the SLB®-IL111

column SLB-IL111, 100 m x 0.25 mm I.D., 0.20 μ m (29647-U)
 oven 168 °C isothermal
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas hydrogen, 1 mL/min.
 injection 1 μ L, 100:1 split
 liner 4 mm I.D., split liner with cup (2051001)
 sample partially hydrogenated vegetable oil FAMES
 Application No. G005290



GC Analysis of Polyunsaturated Fatty Acid (PUFA) Methyl Esters on the PAG

column PAG, 30 m x 0.25 mm I.D., 0.25 μ m (24223)
 oven 220 °C
 inj. temp. 250 °C
 detector FID, 260 °C
 carrier gas helium, 25 cm/sec @ 220 °C
 injection 1 μ L, split 100:1
 sample Omegawax Test Mix (48476)
 Application No. 93-0049

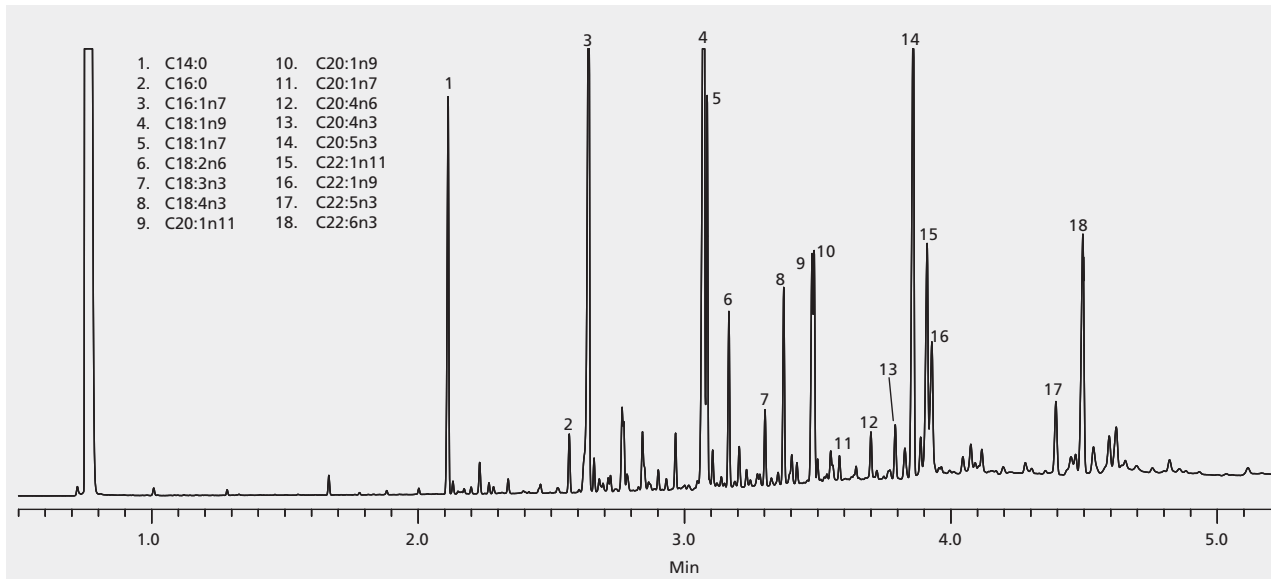


GC Applications

Fatty Acid Methyl Esters (FAMES)

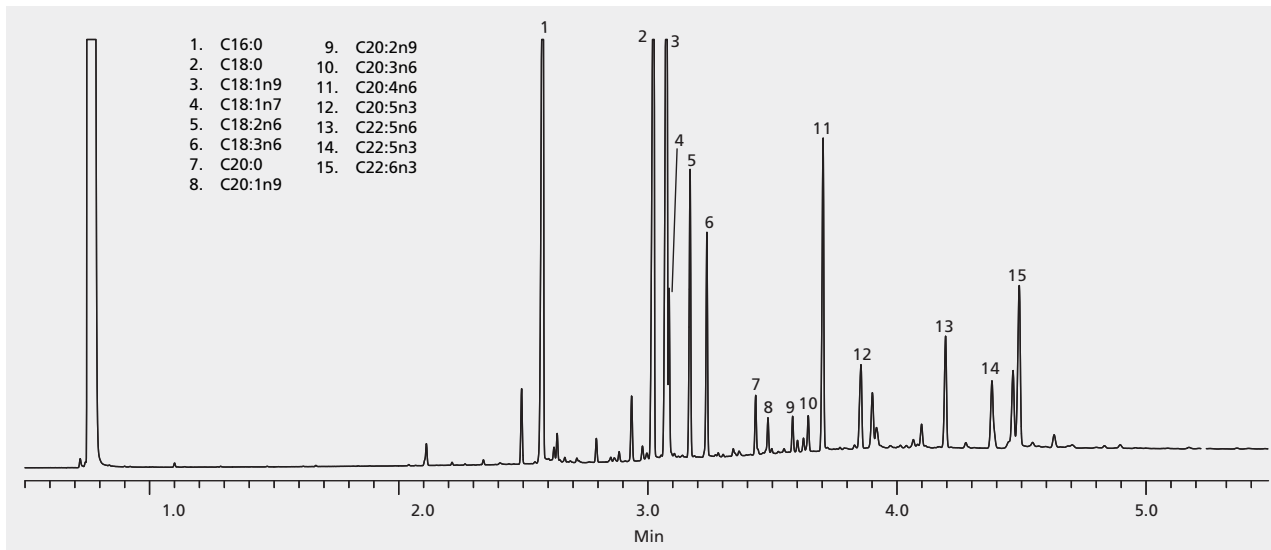
GC Analysis of Marine Source Polyunsaturated Fatty Acid (PUFA) Methyl Esters on the Omegawax® 100 [Fast GC Analysis]

column Omegawax 100, 15 m x 0.10 mm I.D., 0.10 µm (23399-U)
 oven 140 °C, 40 °C/min. to 280 °C (2 min.)
 inj. temp. 250 °C
 detector FID, 280 °C
 carrier gas hydrogen, 50 cm/sec constant
 injection 0.2 µL, 200:1 split
 liner 4 mm I.D., split, cup design
 sample PUFA No. I – Marine Source (47033), diluted to 50 mg/mL in methylene chloride
 Application No. G003890



GC Analysis of Animal Source Polyunsaturated Fatty Acid (PUFA) Methyl Esters on the Omegawax® 100 [Fast GC Analysis]

column Omegawax 100, 15 m x 0.10 mm I.D., 0.10 µm (23399-U)
 oven 140 °C, 40 °C/min. to 280 °C (2 min.)
 inj. temp. 250 °C
 detector FID, 280 °C
 carrier gas hydrogen, 50 cm/sec constant
 injection 0.2 µL, 200:1 split
 liner 4 mm I.D., split, cup design
 sample PUFA No. II – Animal Source (47015-U), diluted to 50 mg/mL in methylene chloride
 Application No. G003892

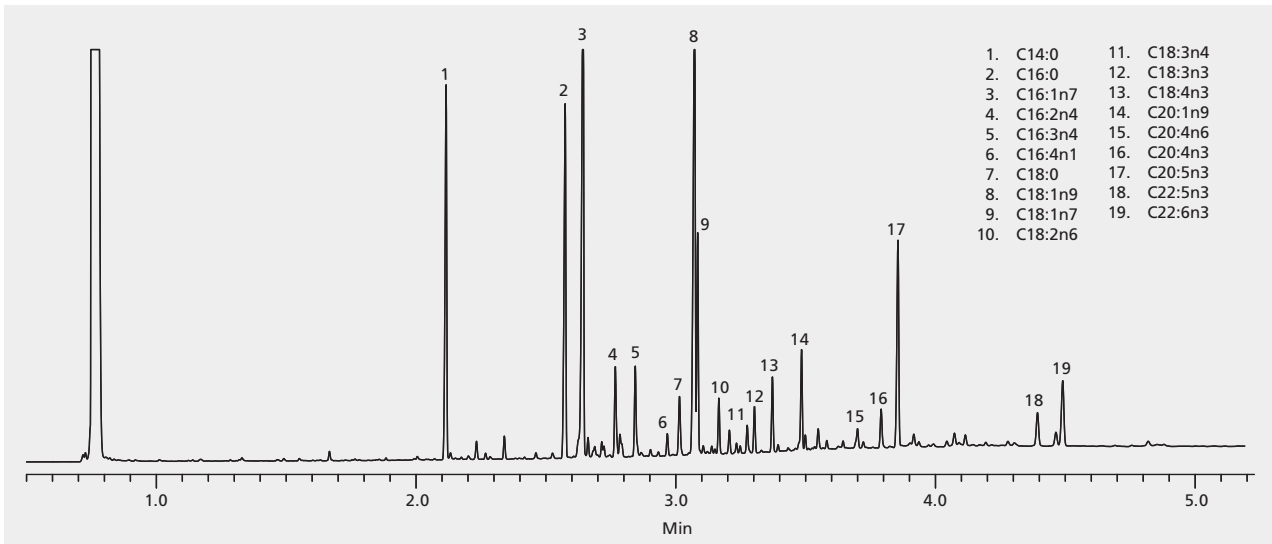


GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of Menhaden Oil Polyunsaturated Fatty Acid (PUFA) Methyl Esters on the Omegawax® 100 [Fast GC Analysis]

column Omegawax 100, 15 m x 0.10 mm I.D., 0.10 µm (23399-U)
 oven 140 °C, 40 °C/min. to 280 °C (2 min.)
 inj. temp. 250 °C
 detector FID, 280 °C
 carrier gas hydrogen, 50 cm/sec constant
 injection 0.2 µL, 200:1 split
 liner 4 mm I.D., split, cup design
 sample PUFA No. III – Menhaden Oil (47085-U), diluted to 50 mg/mL in methylene chloride
 Application No. G003891



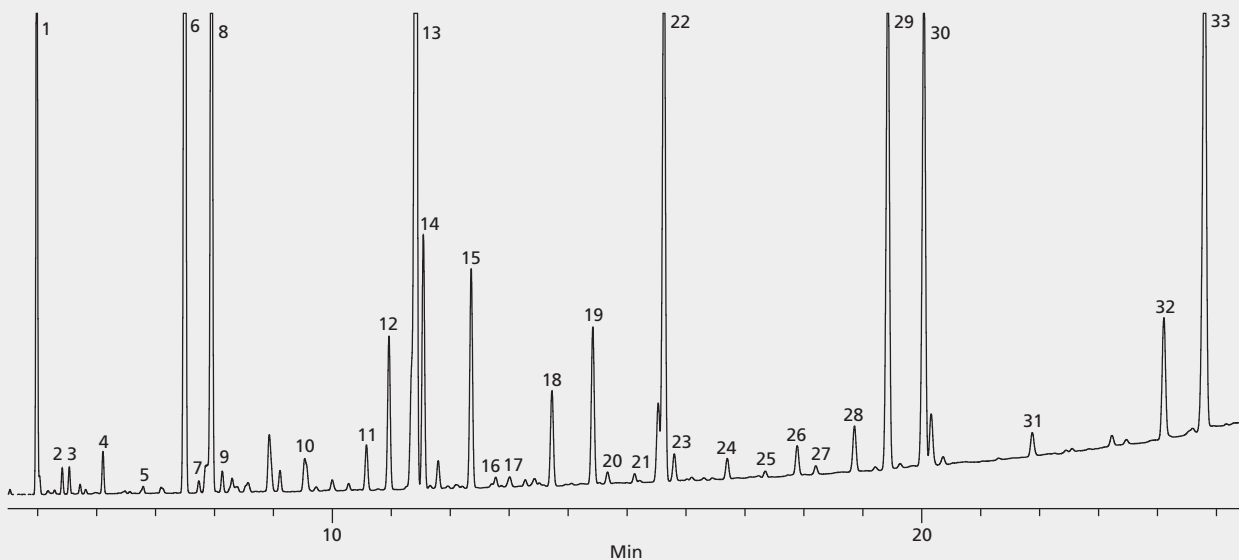
GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of Cod Liver Oil FAMES on the Omegawax® 250

column Omegawax 250, 30 m x 0.25 mm I.D., 0.25 μ m (24136)
 oven 180 $^{\circ}$ C, 3 $^{\circ}$ C/min. to 270 $^{\circ}$ C (2 min.)
 inj. temp. 280 $^{\circ}$ C
 detector FID, 280 $^{\circ}$ C
 carrier gas hydrogen, 35 cm/sec constant
 injection 0.2 μ L in the split mode (50:1)
 sample cod liver oil FAMES in hexane
 Application No. G003782

1. C14:0	10. C16:3 ω 4	19. C18:4 ω 3	28. C20:4 ω 3
2. C15:0 anteiso	11. C16:4 ω 4	20. C18:4 ω 1	29. C20:5 ω 3
3. C15:0 iso	12. C18:0	21. C20:0	30. C22:1 ω 9
4. C15:0	13. C18:1 ω 9	22. C20:1 ω 9	31. C21:5 ω 3
5. C16:0 iso	14. C18:1 ω 7	23. C20:1 ω 7	32. C22:5 ω 3
6. C16:0	15. C18:2 ω 6	24. C20:2 ω 6	33. C22:6 ω 3
7. C16:1 ω 9	16. C18:2 ω 4	25. C20:3 ω 6	
8. C16:1 ω 7	17. C18:3 ω 6	26. C20:4 ω 6	
9. C16:1 ω 5	18. C18:3 ω 3	27. C20:3 ω 3	



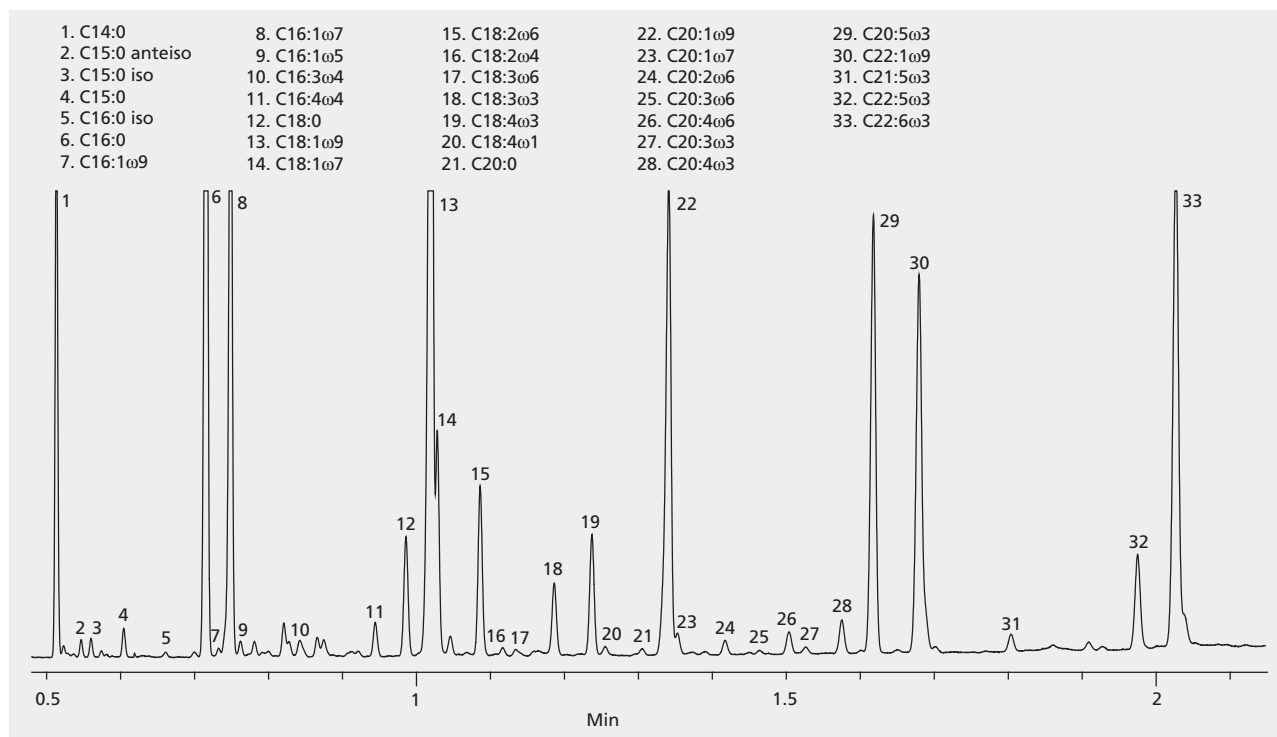
Chromatogram courtesy of Prof. Luigi Mondello (Univ. of Messina, Italy)

GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of Cod Liver Oil FAMES on the SUPELCOWAX® 10 [Fast GC Analysis]

column SUPELCOWAX 10, 10 m x 0.10 mm I.D., 0.10 μ m (25026-U)
 oven 180 $^{\circ}$ C, 40 $^{\circ}$ C/min. to 270 $^{\circ}$ C (0.5 min.)
 inj. temp. 280 $^{\circ}$ C
 detector FID, 280 $^{\circ}$ C
 carrier gas hydrogen, 100 cm/sec constant
 injection 0.2 μ L in the split mode (200:1)
 sample cod liver oil FAMES in hexane
 Application No. G003783



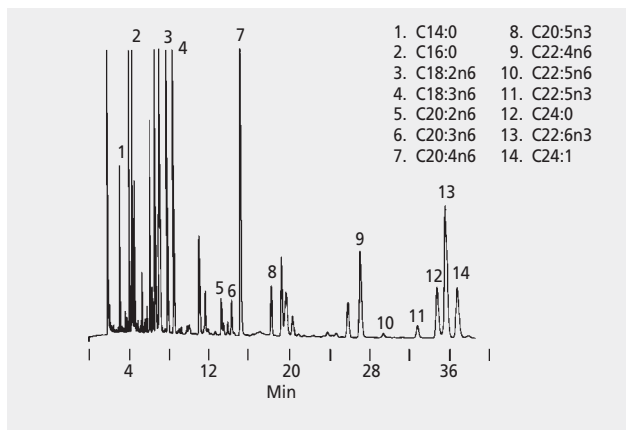
Chromatogram courtesy of Prof. Luigi Mondello (Univ. of Messina, Italy)

GC Applications

Fatty Acid Methyl Esters (FAMES)

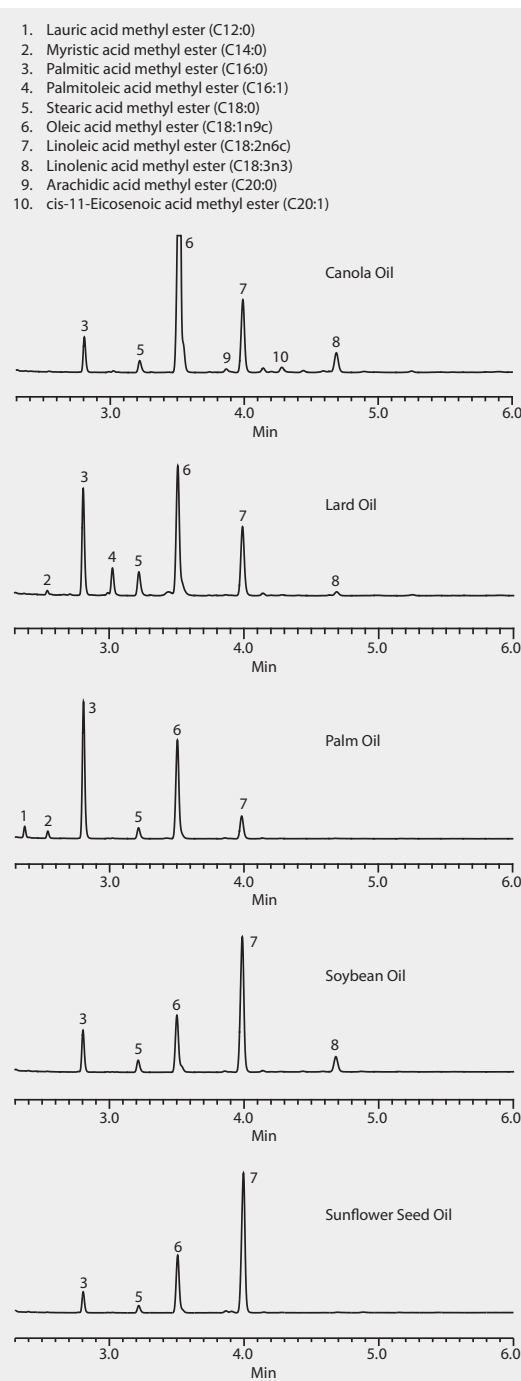
GC Analysis of Omega 6 and Other FAMES on the Omegawax® 320

column Omegawax 320, 30 m x 0.32 mm I.D., 0.25 µm (24152)
 oven 200 °C
 inj. temp. 250 °C
 detector FID, 260 °C
 carrier gas helium, 25 cm/sec @ 200 °C
 injection 1 µL, split 100:1
 sample 50 mg/mL animal source FAMES in hexane
 Application No. 80-191



GC Analysis of Edible Oil FAMES on the SLB®-IL111

column SLB-IL111, 30 m x 0.25 mm I.D., 0.20 µm (28927-U)
 oven 180 °C
 inj. temp. 250 °C
 detector FID, 260 °C
 carrier gas helium, 25 cm/sec
 injection 1 µL, 50:1 split
 liner 4 mm I.D., split type, cup design
 sample Canola (46961), Lard (47115-U), Palm (46962), Soybean (47122), and Sunflower Seed (47123) characterized reference oils, methylated using BF₃-methanol prior to analysis
 Application No. G005480

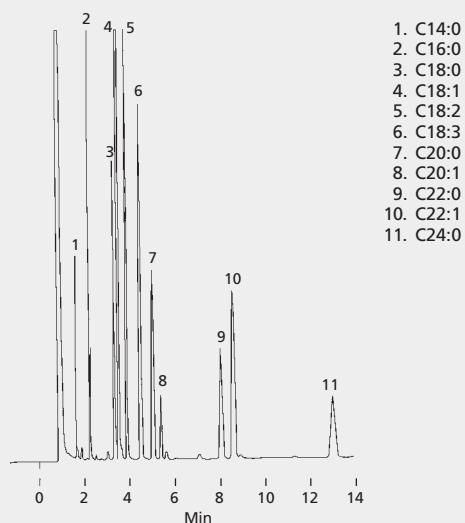


GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of Rapeseed Oil FAMES on the SUPELCOWAX® 10

column SUPELCOWAX 10, 30m x 0.53 mm I.D., 1.0 µm (25301-U)
 oven 240 °C
 inj. temp. 250 °C
 detector FID, 260 °C
 carrier gas helium, 5 mL/min (flow controlled)
 injection 0.1 µL direct
 sample Rapeseed Oil Reference mix (O7756-1AMP)
 Application No. 713-0978

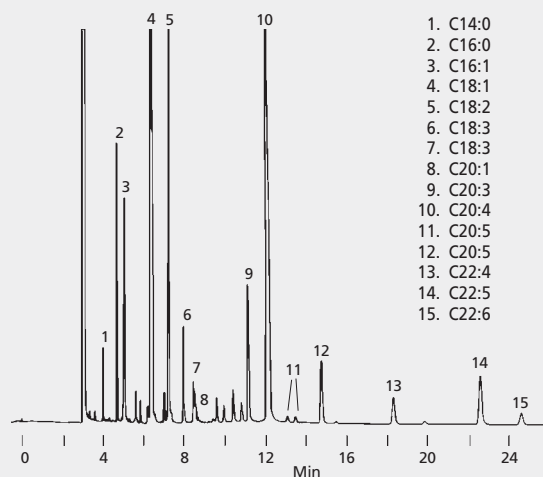


1. C14:0
2. C16:0
3. C18:0
4. C18:1
5. C18:2
6. C18:3
7. C20:0
8. C20:1
9. C22:0
10. C22:1
11. C24:0

For more information on fatty acids analyses by capillary GC, request Bulletin 855.

GC Analysis of FAMES on the SP™-2330

column SP-2330, 30m x 0.25 mm I.D., 0.20 µm (24019)
 oven 200 °C
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas helium, 20 cm/sec @ 200 °C
 injection 0.5 µL, split 100:1
 sample FAMES from a natural source dissolved in chloroform
 Application No. 713-0979



1. C14:0
2. C16:0
3. C16:1
4. C18:1
5. C18:2
6. C18:3
7. C18:3
8. C20:1
9. C20:3
10. C20:4
11. C20:5
12. C20:5
13. C22:4
14. C22:5
15. C22:6

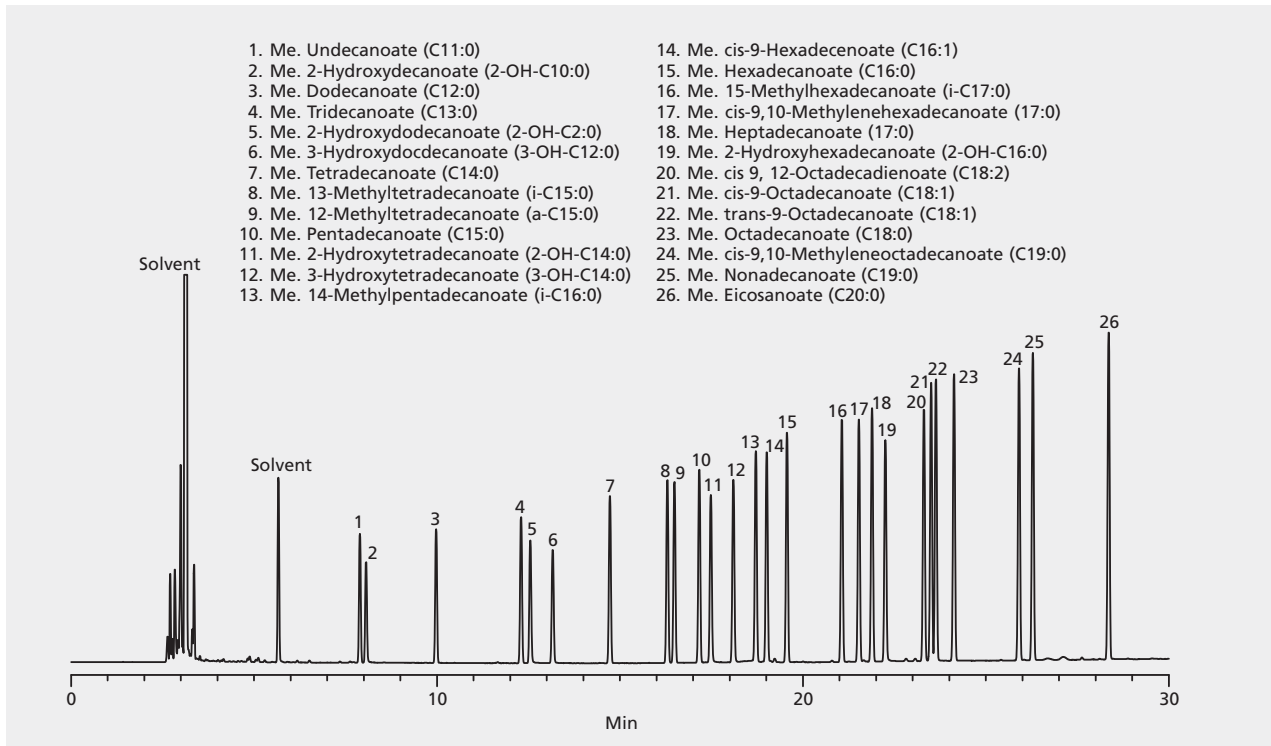
For more information on fatty acids analyses by capillary GC, request Bulletin 855.

GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of Bacterial Acid Methyl Esters (BAMES) on Equity®-1

column Equity-1, 30 m x 0.25 mm I.D., 0.25 µm (28046-U)
 oven 150 °C (4 min.), 4 °C/min. to 250°C (5 min.)
 inj. temp. 250 °C
 detector FID, 280 °C
 carrier gas helium, 20 cm/sec @ 150 °C
 injection 1 µL, split 100:1
 liner split, cup design
 sample 100ng on-column of a 26 component BAME standard (47080-U)
 Application No. G001694

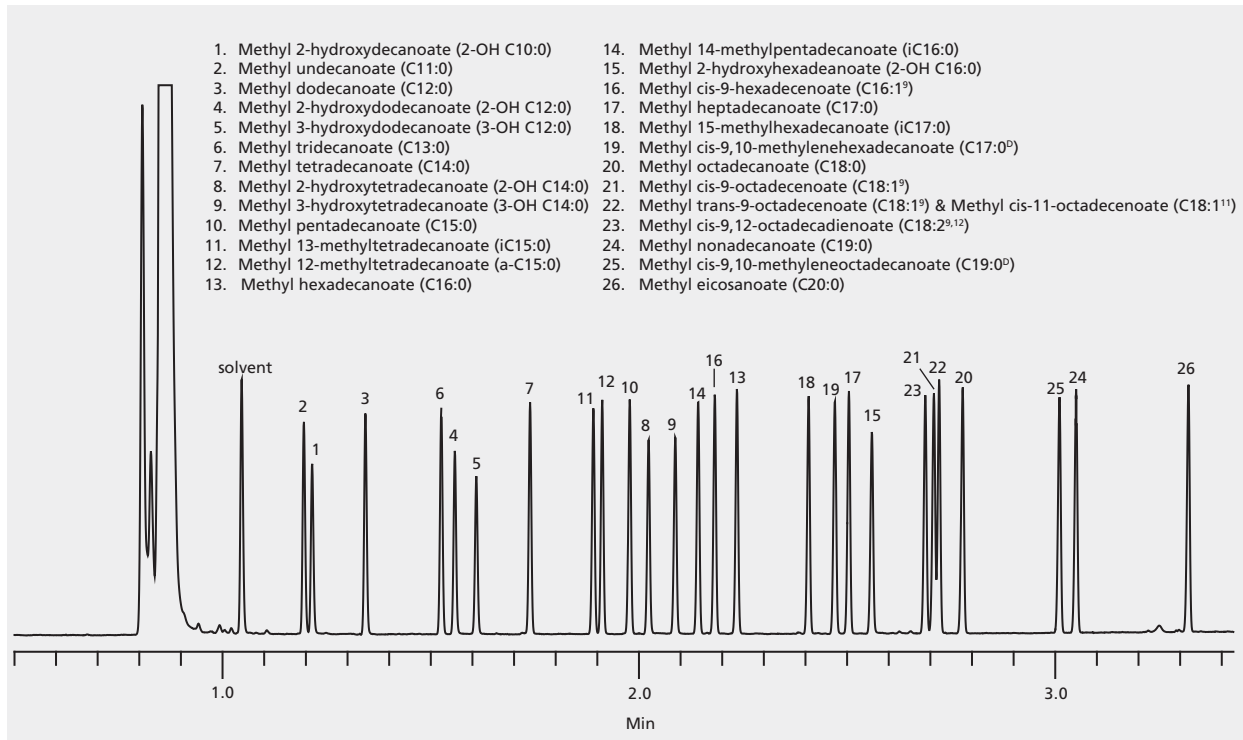


GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of Bacterial Acid Methyl Esters (BAMES) on Equity®-1 [Fast GC Analysis]

column Equity-1, 15 m x 0.10 mm I.D., 0.10 µm (28039-U)
 oven 175 °C, 30 °C/min. to 275 °C (1 min.)
 inj. temp. 280 °C
 detector FID, 280 °C
 carrier gas hydrogen, 45 cm/sec constant
 injection 0.5 µL, 200:1 split
 liner 4 mm I.D., split, cup design
 sample Bacterial Acid Methyl Ester (BAME) Mix (47080-U), methyl ester derivatives, total concentration of 10 mg/mL in methyl caproate
 Application No. G003884



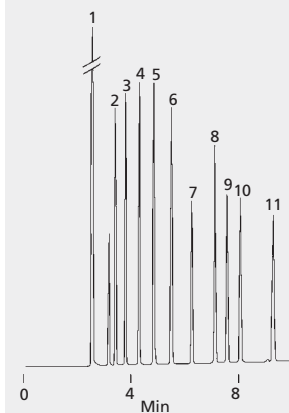
GC Applications

Fatty Acid Methyl Esters (FAMES)

GC Analysis of Dibasic Acid Methyl Esters on the SP™-2380

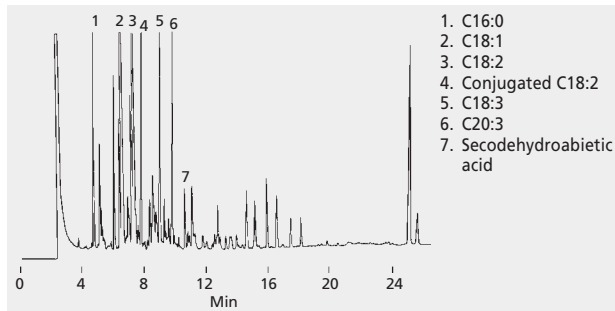
column SP-2380, 30 m x 0.25 mm I.D., 0.20 µm (24110-U)
 oven 170 °C, 4 °C/min. to 200 °C
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas helium, 20 cm/sec @ 185 °C
 injection 0.1 µL, split 100:1
 sample 1000 µg/mL each analyte in methylene chloride
 Application No. 713-0982

1. Dimethyl malonate (C3)
2. Dimethyl succinate (C4)
3. Dimethyl glutarate (C5)
4. Dimethyl adipate (C6)
5. Dimethyl pimelate (C7)
6. Dimethyl suberate (C8)
7. Dimethyl azelate (C9)
8. Dimethyl sebacate (C10)
9. Dimethyl terephthalate
10. Dimethyl isophthalate
11. Dimethyl phthalate



GC Analysis of Tall Oil Methyl Esters on the SP™-2380

column SP-2380, 30 m x 0.25 mm I.D., 0.20 µm (24110-U)
 oven 170 °C, 4 °C/min. to 260 °C (4 min.)
 inj. temp. 250 °C
 detector FID, 280 °C
 carrier gas helium, 20 cm/sec @ 185 °C
 injection 2 µL, split 100:1
 sample Tall oil methyl esters in methylene chloride
 Application No. 713-0981



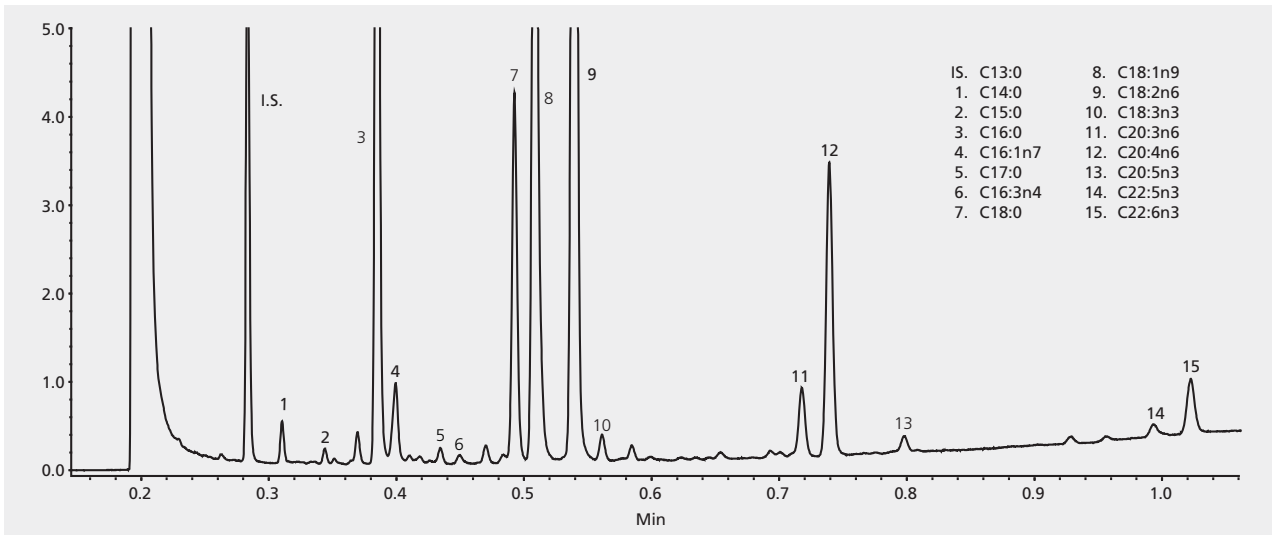
1. C16:0
2. C18:1
3. C18:2
4. Conjugated C18:2
5. C18:3
6. C20:3
7. Secodehydroabietic acid

GC Applications

Fatty Acid Methyl Esters (FAMES)

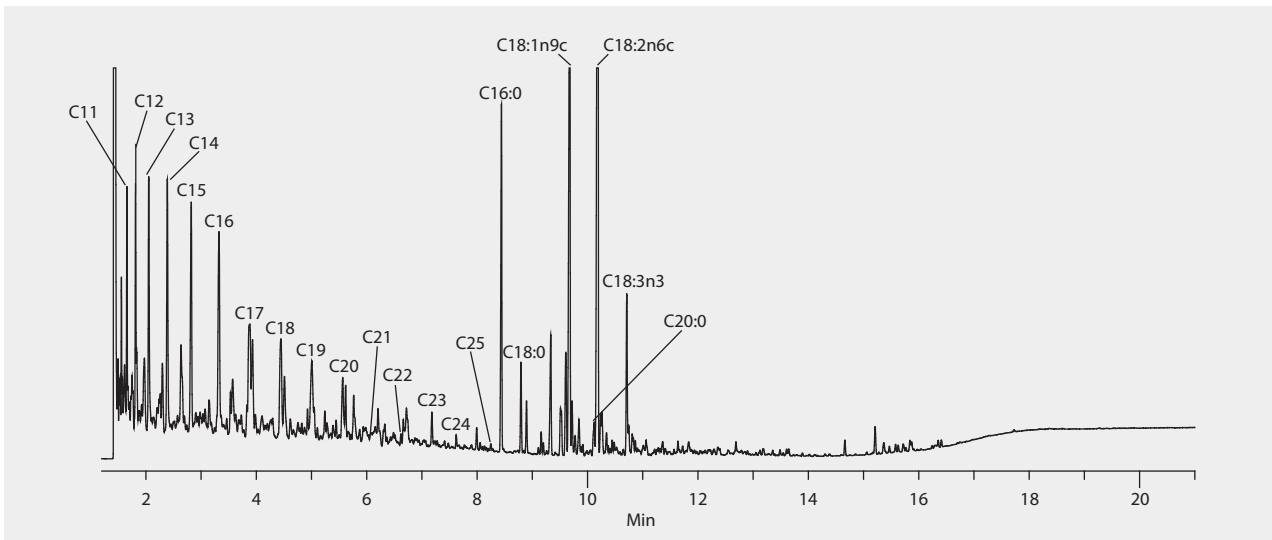
GC Analysis of Plasma FAMES on the SUPELCOWAX® 10 [Fast GC Analysis]

column SUPELCOWAX 10, 10 m x 0.10 mm I.D., 0.10 µm (25026-U)
 oven 220 °C, 60 °C/min. to 280 °C (1 min.)
 inj. temp. 280 °C
 detector FID, 280 °C
 carrier gas hydrogen, 120 cm/sec constant
 injection 0.5 µL, 30:1 split
 sample plasma FAMES in hexane
 Application No. G003839



GC Analysis of n-Alkanes and FAMES in B20 Blended Biodiesel on the SLB®-IL111

column SLB-IL111, 30 m x 0.25 mm I.D., 0.20 µm (28927-U)
 oven 50 °C, 13 °C/min. to 270 °C (5 min.)
 inj. temp. 250 °C
 detector FID, 270 °C
 carrier gas helium, 40 cm/sec
 injection 1 µL, 100:1 split
 liner 4 mm I.D. FocusLiner inlet liner (no taper)
 sample B20 biodiesel (soy source) diluted 1:20 in n-hexane
 Application No. G005423



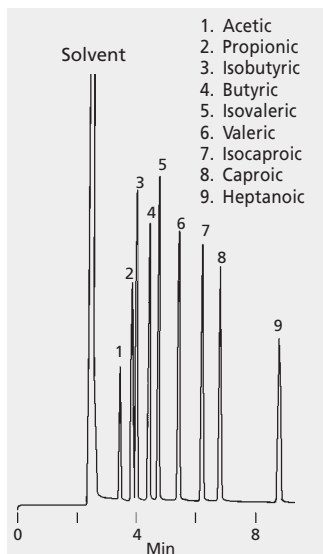
GC Applications

Fatty Acids

Fatty Acids

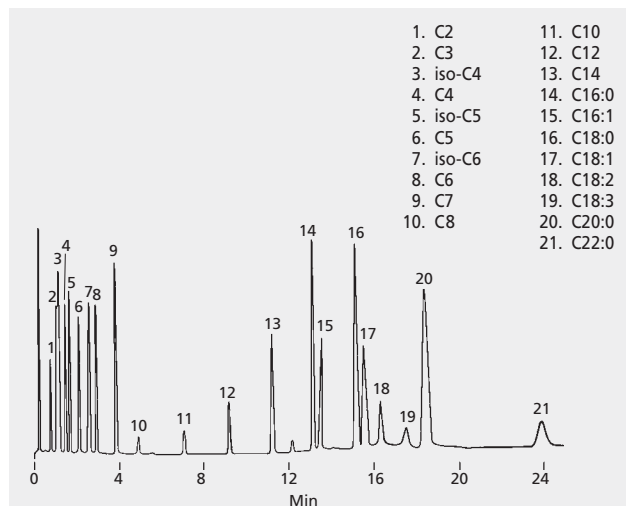
GC Analysis of C2-C7 Fatty Acids on Nukol™

column Nukol, 30 m × 0.25 mm I.D., 0.25 μm (24107)
 oven 185 °C
 inj. temp. 220 °C
 detector FID, 250 °C
 carrier gas helium, 20 cm/sec @ 185 °C
 injection 1 μL, 100:1 split
 sample Volatile Acid Standard Mix (46975-U), each analyte at 10 mM in deionized water
 Application No. 713-1071



GC Analysis of Volatile Fatty Acids on Nukol™

column Nukol, 15 m × 0.53 mm I.D., 0.5 μm (25326)
 oven 110 °C, 8 °C/min. to 220 °C
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas helium, 20 mL/min.
 injection 1 μL, direct
 sample 25-400 μg/mL each analyte
 Application No. 713-0967

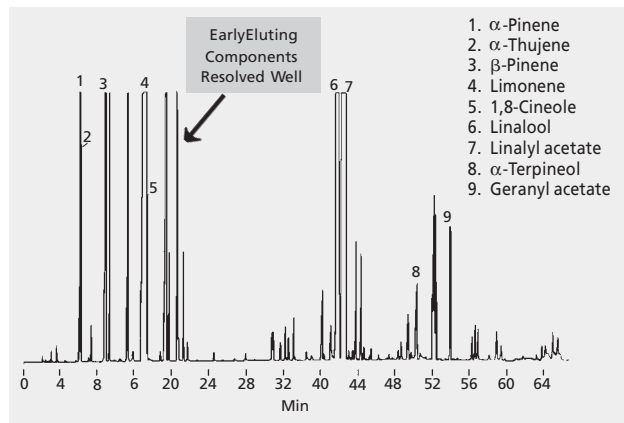


For more information, request Bulletin 855.

Foods, Flavors, and Fragrances

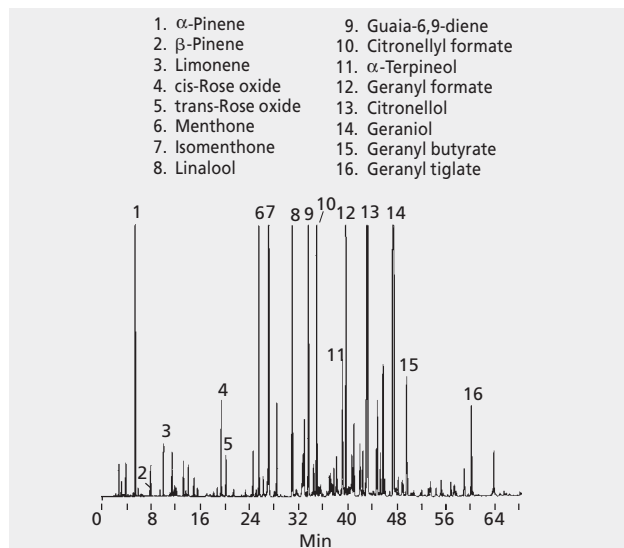
GC Analysis of Italian Bergamot Oil on the SUPELCOWAX® 10

column SUPELCOWAX 10, 30 m × 0.25 mm I.D., 0.25 μm (24079)
 oven 50 °C (2 min), 2 °C/min. to 230 °C (1 min.)
 detector FID
 carrier gas helium, 20 cm/sec @ 155 °C
 injection 0.2 μL, 100:1 split
 Application No. 794-0678



GC Analysis of Geranium Oil Bourbon on the SUPELCOWAX® 10

column SUPELCOWAX 10, 30 m × 0.25 mm I.D., 0.25 μm (24079)
 oven 50 °C (2 min), 2 °C/min. to 230 °C (1 min.)
 detector FID
 carrier gas helium, 20 cm/sec @ 155 °C
 injection 0.2 μL, 100:1 split
 sample neat oil
 Application No. 713-0615



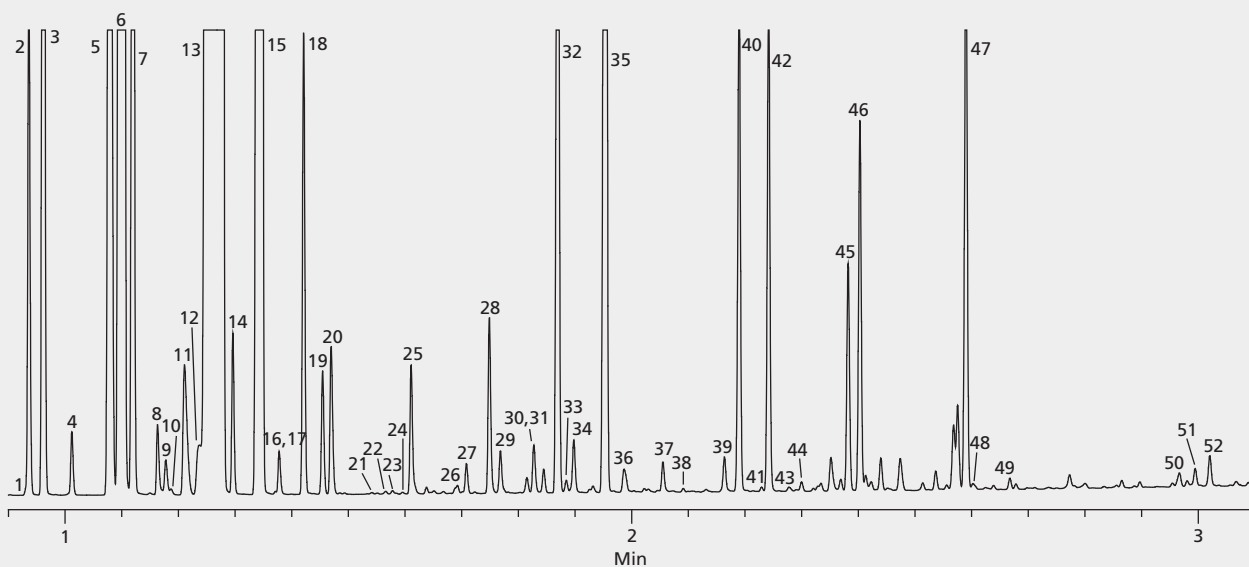
GC Applications

Foods, Flavors, and Fragrances

GC Analysis of Lemon Essential Oil on the SLB®-5ms [Fast GC Analysis]

column SLB-5ms, 10 m x 0.10 mm I.D., 0.10 μ m (28465-U)
 oven 40 $^{\circ}$ C, 50 $^{\circ}$ C/min. to 320 $^{\circ}$ C
 inj. temp. 320 $^{\circ}$ C
 detector FID, 320 $^{\circ}$ C
 carrier gas hydrogen, 81.5 cm/sec constant
 injection 0.4 μ L in the split mode (300:1)
 sample lemon essential oil in hexane
 Application No. G003786

- | | | | | |
|---------------------------|---------------------------|-------------------------|--------------------------|----------------------------------|
| 1. Tricyclene | 12. p-cymene | 23. (E)-myroxide | 34. Geraniol | 45. (E)-caryophyllene |
| 2. α -thujene | 13. Limonene | 24. Camphor | 35. Geranial | 46. trans- α -bergamotene |
| 3. α -pinene | 14. (E)- β -ocimene | 25. Citronellal | 36. Perilla aldehyde | 47. β -bisabolene |
| 4. Camphene | 15. γ -terpinene | 26. Borneol | 37. Undecanal | 48. (Z)- γ bisabolene |
| 5. Sabinene | 16. cis-sabinene hydrate | 27. Terpinen-4-ol | 38. Methyl geranoate | 49. (E)- γ bisabolene |
| 6. β -pinene | 17. Octanol | 28. α -terpineol | 39. Citronellyl acetate | 50. Norbornanol |
| 7. Myrcene | 18. terpinolene | 29. Decanal | 40. Neryl acetate | 51. Campherenol |
| 8. Octanal | 19. Linalool | 30. Citronellol | 41. Linalyl isobutanoate | 52. α -bisabolol |
| 9. α -phellandrene | 20. Nonanal | 31. Nerol | 42. Geranyl acetate | |
| 10. δ -3-carene | 21. cis-limonene oxide | 32. Neral | 43. 1-tetradecene | |
| 11. α -terpinene | 22. trans-limonene oxide | 33. Carvone | 44. Tetradecane | |



Chromatogram courtesy of Prof. Luigi Mondello (Univ. of Messina, Italy)

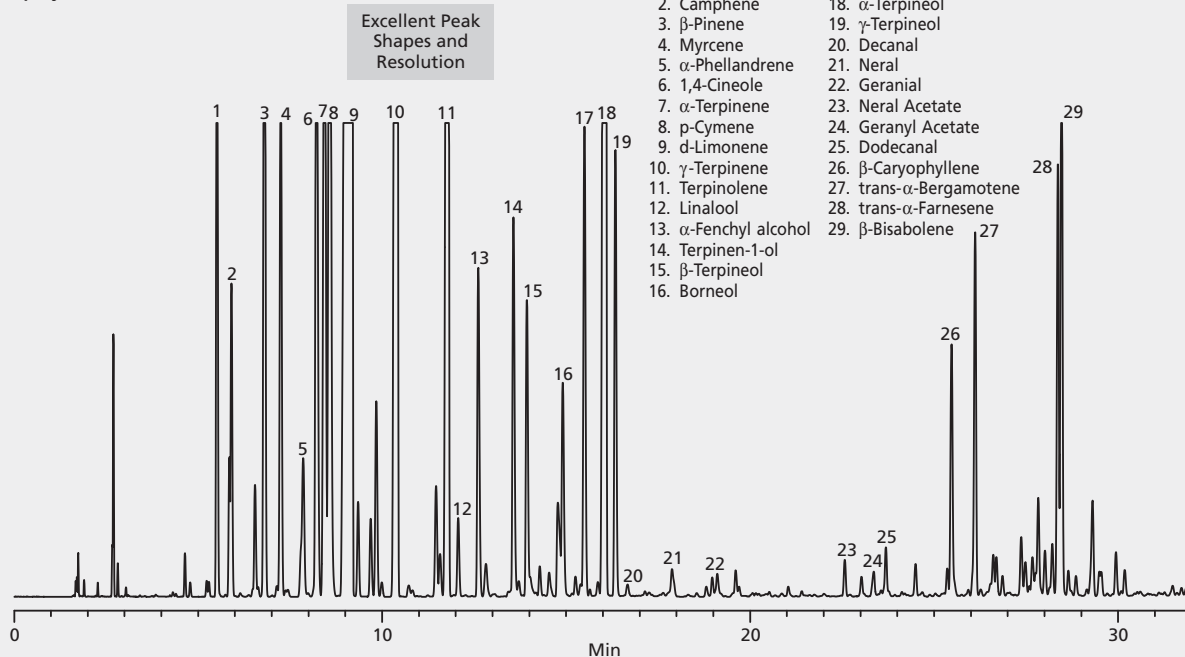
GC Applications

Foods, Flavors, and Fragrances

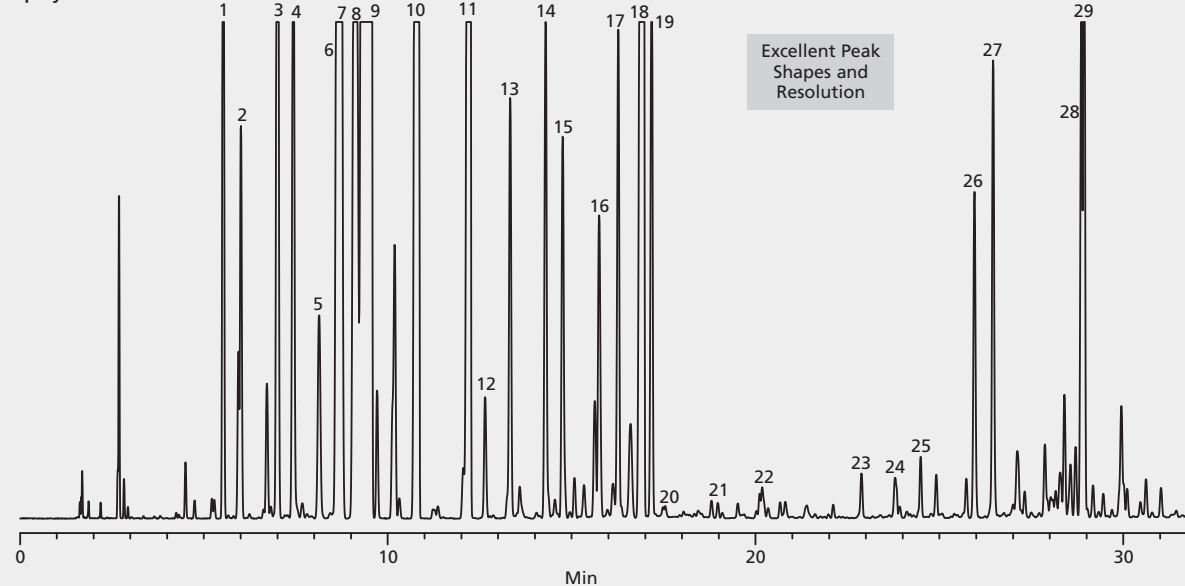
GC Analysis of Distilled Lime Oil on the Equity[®]-1 and Equity[®]-5

column Equity-1, 30 m x 0.25 mm I.D., 0.25 μ m (28046-U)
 column Equity-5, 30 m x 0.25 mm I.D., 0.25 μ m (28089-U)
 oven 75 $^{\circ}$ C (8 min), 4 $^{\circ}$ C/min. to 200 $^{\circ}$ C (10 min.)
 inj. temp. 250 $^{\circ}$ C
 detector FID, 250 $^{\circ}$ C
 carrier gas helium, 30 cm/sec @ 110 $^{\circ}$ C
 injection Wet Needle, 100:1 split
 liner split, cup design
 sample distilled lime oil
 Application No. G001700

Equity-1 Column



Equity-5 Column



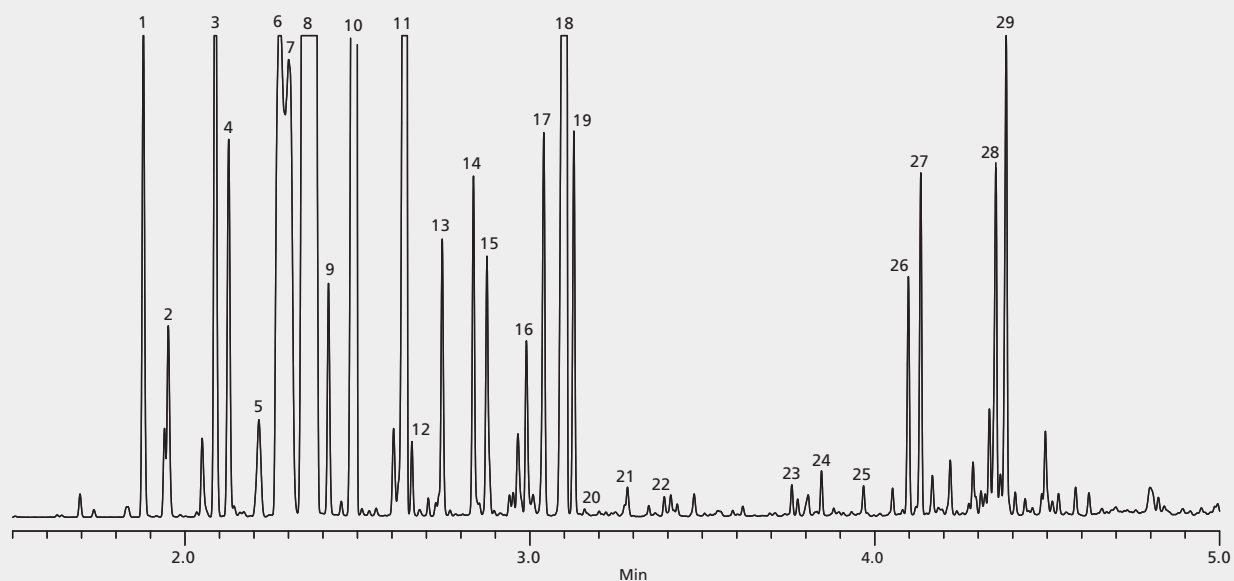
GC Applications

Foods, Flavors, and Fragrances

GC Analysis of Distilled Lime Oil on the Equity®-1 [Fast GC Analysis]

column Equity-1, 15 m x 0.10 mm I.D., 0.10 μ m (28039-U)
 oven 75 °C (1 min.), 35 °C/min. to 200 °C (1 min.)
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas helium, 45 cm/sec constant
 injection 0.10 μ L, 300:1 split
 liner 2 mm I.D., straight
 sample distilled lime oil, neat
 Application No. G003887

- | | | | | |
|---------------------------|-------------------------|------------------------------|-------------------------|----------------------------------|
| 1. α -Pinene | 7. α -Terpinene | 13. α -Fencyl alcohol | 19. γ -Terpineol | 25. Dodecanal |
| 2. Camphene | 8. p-Cymene | 14. Terpinen-1-ol | 20. Decanal | 26. β -Carophyllene |
| 3. β -Pinene | 9. δ -Limonene | 15. β -Terpineol | 21. Neral | 27. trans- α -Bergamotene |
| 4. Myrcene | 10. γ -Terpinene | 16. Borneol | 22. Geranial | 28. trans- α -Farnesene |
| 5. α -Phellandrene | 11. Terpinolene | 17. Terpinen-4-ol | 23. Neral acetate | 29. β -Bisabolene |
| 6. 1,4-Cineole | 12. Linalool | 18. α -Terpineol | 24. Geranyl acetate | |

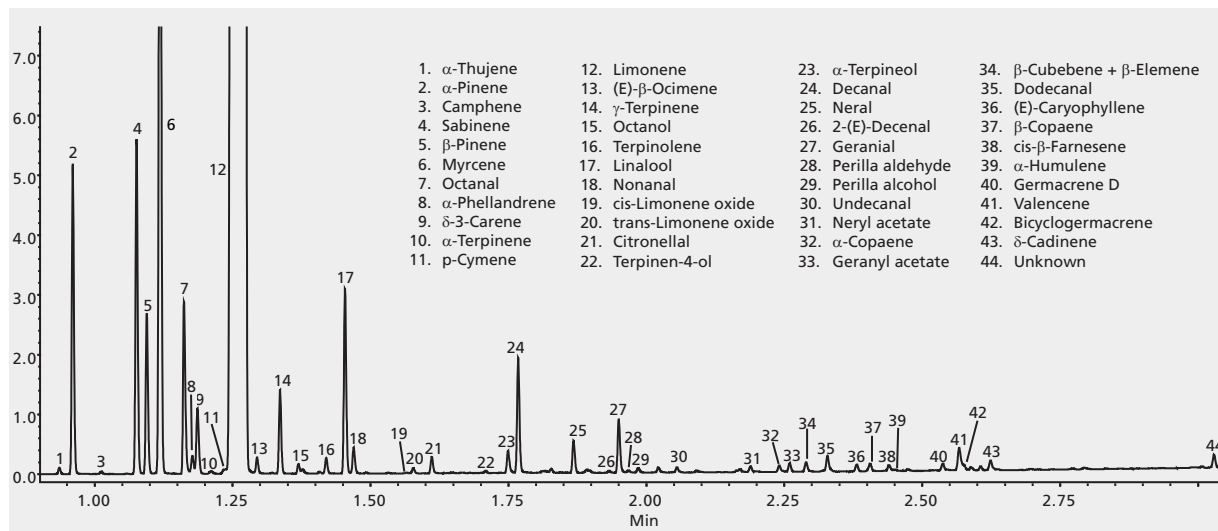


GC Applications

Foods, Flavors, and Fragrances

GC Analysis of Sweet Orange Essential Oil on the SLB®-5ms [Fast GC Analysis]

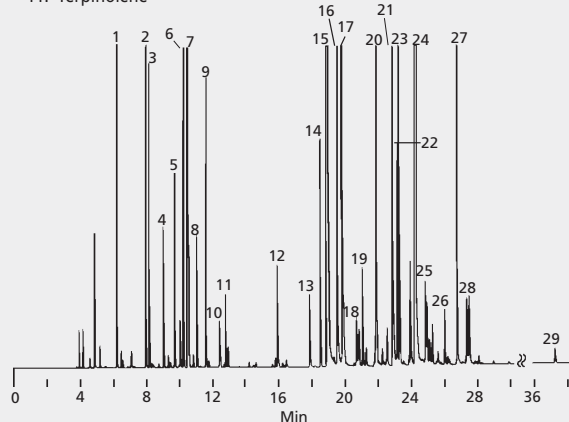
column SLB-5ms, 10 m x 0.10 mm I.D., 0.10 µm (28465-U)
 oven 40 °C, 50 °C/min. to 320 °C
 inj. temp. 320 °C
 detector FID, 320 °C
 carrier gas hydrogen, 81.5 cm/sec constant
 injection 0.4 µL, 300:1 split
 sample sweet orange essential oil in hexane
 Application No. G003840



GC Analysis of Peppermint Oil on SUPELCOWAX® 10

column SUPELCOWAX 10, 60 m x 0.25 mm I.D., 0.25 µm (24081)
 oven 75 °C (4 min), 4 °C/min. to 200 °C (5 min.)
 detector FID
 carrier gas helium, 25 cm/sec @ 155 °C
 injection 0.2 µL, 100:1 split
 Application No. 713-0614

- | | | |
|------------------------|---------------------------|----------------------------|
| 1. α -Pinene | 12. 3-Octanol | 21. Neo-menthol |
| 2. β -Pinene | 13. 1-Octen-3-ol | 22. Terpinene-4-ol |
| 3. Sabinene | 14. trans-Sabinenehydrate | 23. β -Caryophyllene |
| 4. Myrcene | 15. L-Menthone | 24. L-Menthol |
| 5. α -Terpinene | 16. Menthofuran | 25. Pulegone |
| 6. L-Limonene | 17. D-Isomenthone | 26. α -Terpineol |
| 7. 1,8-Cineole | 18. Beta-Bourbonene | 27. Gemacrene-D |
| 8. γ -Terpinene | 19. Linalool | 28. Piperitone |
| 9. para-Cymene | 20. Methyl acetate | 29. Viridiflorol |
| 10. para-Cymene | | |
| 11. Terpinolene | | |

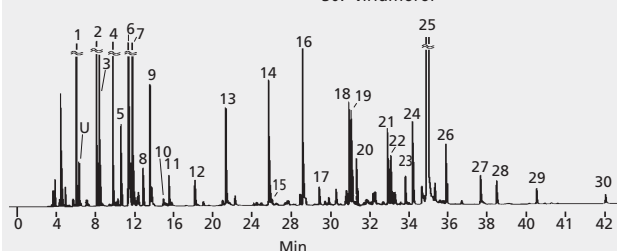


Mr. William Faas of A.M. Todd Company provided the sample and assisted with peak identification.

GC Analysis of Native Spearmint Oil on the SUPELCOWAX® 10

column SUPELCOWAX 10, 30 m x 0.25 mm I.D., 0.25 µm (24079)
 oven 75 °C (4 min), 4 °C/min. to 200 °C (5 min.)
 detector FID
 carrier gas helium, 25 cm/sec @ 155 °C
 injection 0.2 µL, 100:1 split
 Application No. 794-0677

- | | |
|---------------------------|---------------------------------|
| 1. α -Pinene | 16. Beta-Bourbonene |
| 2. β -Pinene | 17. Linalool |
| 3. Sabinene | 18. Terpinene-4-ol |
| 4. Myrcene | 19. β -Caryophyllene |
| 5. α -Terpinene | 20. Dihydrocarvone |
| U Unknown | 21. trans-Dihydrocarvyl acetate |
| 6. L-Limonene | 22. trans-Farnesene |
| 7. 1,8-Cineole | 23. α -Terpineol |
| 8. γ -Terpinene | 24. Gemacrene-D |
| 9. para-Cymene | 25. Carvone |
| 10. Terpinolene | 26. cis-Carvyl acetate |
| 11. Terpinolene | 27. trans-Carveol |
| 12. 3-Octyl acetate | 28. cis-Carveol |
| 13. 3-Octanol | 29. cis-Jasmone |
| 14. trans-Sabinenehydrate | 30. Viridiflorol |
| 15. L-Menthone | |



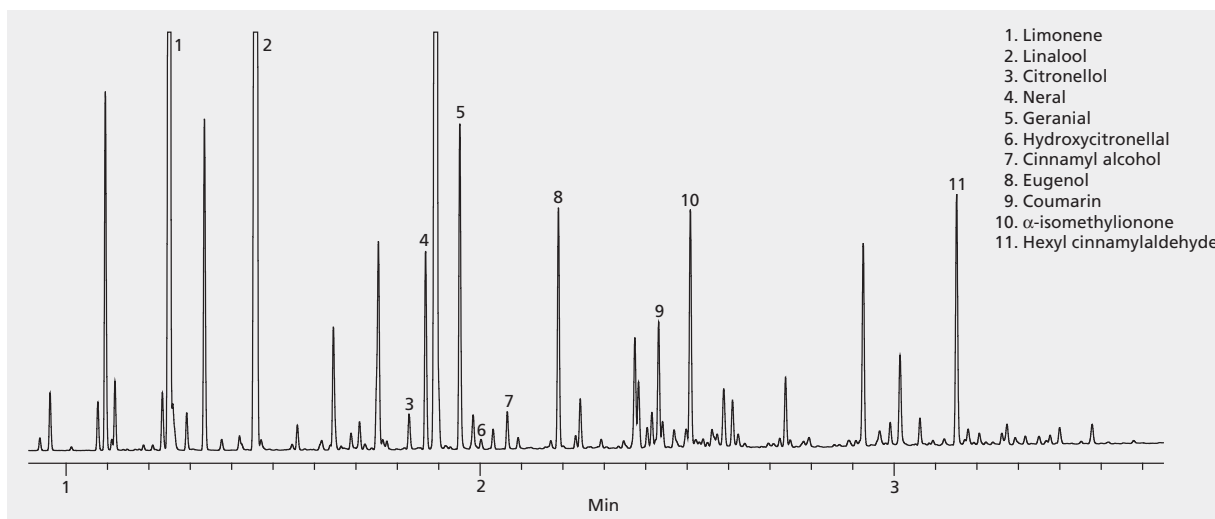
Mr. William Faas of A.M. Todd Company provided the sample and assisted with peak identification.

GC Applications

Foods, Flavors, and Fragrances

GC Analysis of Allergens in Commercial Perfume on the SLB®-5ms [Fast GC Analysis]

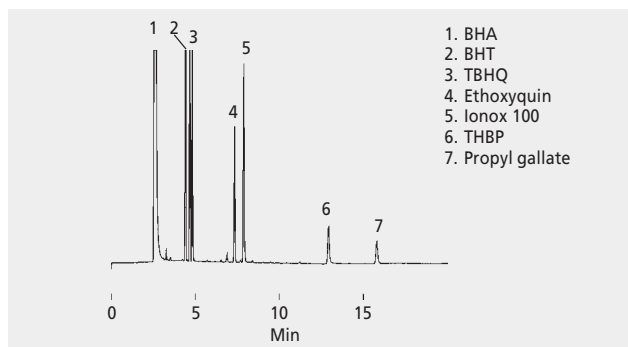
column SLB-5ms, 10 m x 0.10 mm I.D., 0.10 µm (28465-U)
 oven 40 °C, 50 °C/min. to 320 °C
 inj. temp. 320 °C
 detector FID, 320 °C
 carrier gas hydrogen, 81.5 cm/sec constant
 injection 0.2 µL in the split mode (500:1)
 sample neat perfume
 Application No. G003787



Chromatogram courtesy of Prof. Luigi Mondello (Univ. of Messina, Italy)

GC Analysis of Antioxidants on the SAC™-5

column SAC-5, 30 m x 0.25 mm I.D., 0.25 µm (24156)
 oven 200 °C
 detector FID, 250 °C
 carrier gas helium, 30 cm/sec
 injection 2 µL, split 100:1
 sample 200 µg/mL each component
 Application No. 795-0439



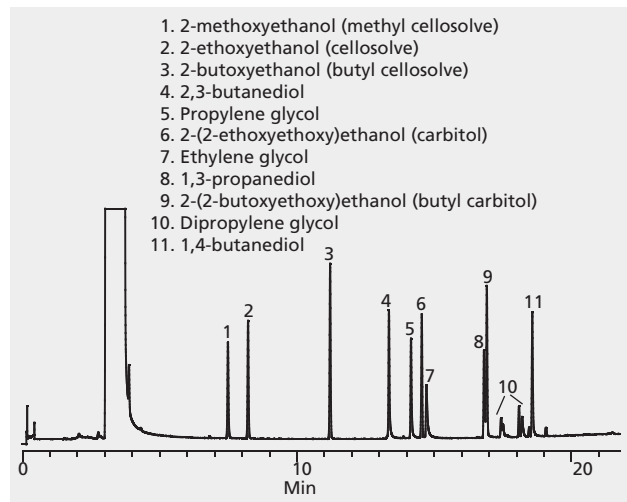
GC Applications

Glycols and Diols

Glycols and Diols

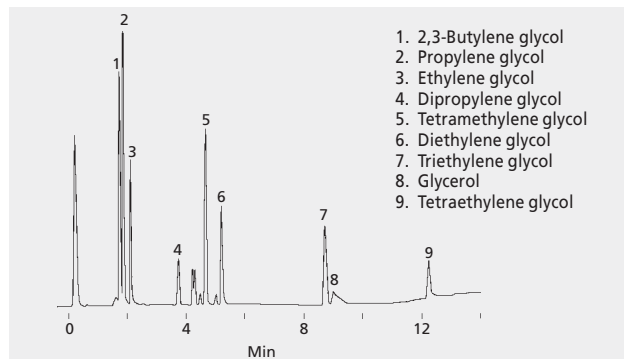
GC Analysis of Glycols and Diols on the SPB®-1000

column SPB-1000, 30 m x 0.53 mm I.D., 0.50 µm (25445)
 oven 50 °C (2 min.), 8 °C/min. to 200 °C (2 min.)
 inj. temp. 250 °C
 detector FID, 300 °C
 carrier gas helium, 37 cm/sec, constant
 injection 1 µL, pulsed (10 psi until 0.10 min.) splitless (0.75 min.)
 liner 2 mm I.D., straight
 sample each analyte 100 ppm in methanol
 Application No. G003736



GC Analysis of Glycols on the Nukol™

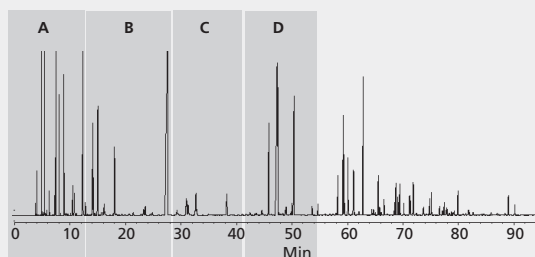
column Nukol, 15 m x 0.53 mm I.D., 0.5 µm (25326)
 oven 110 °C, 8 °C/min. to 220 °C
 detector FID, 250 °C
 carrier gas helium, 15 mL/min.
 injection 1 µL, direct
 sample 100 ppm each glycol in water
 Application No. 713-0792



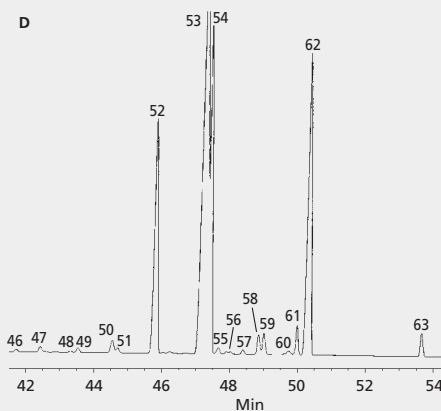
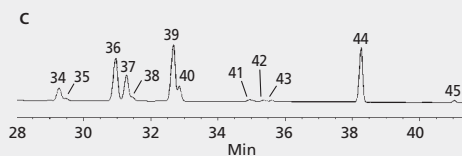
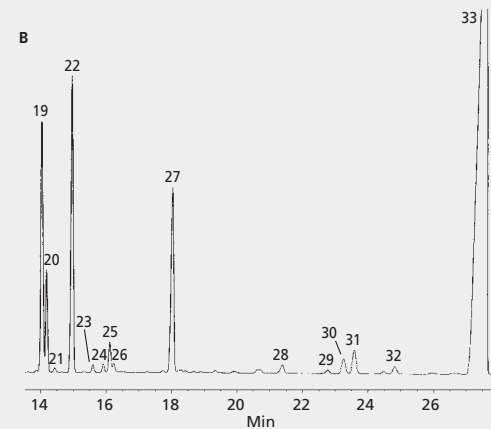
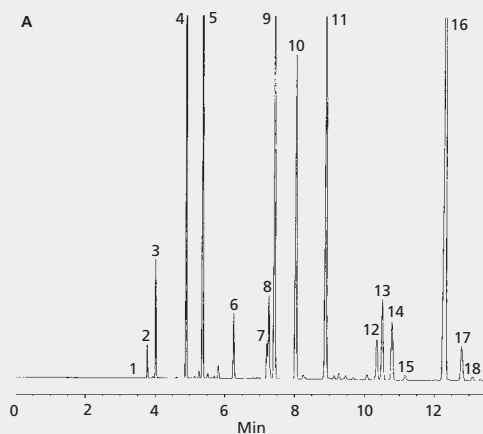
Hydrocarbons

ASTM D5134: GC Analysis of Hydrocarbons on the Petrocol® DH 50.2

column Petrocol DH 50.2, 50 m x 0.20 mm I.D., 0.50 µm (24133-U)
 oven 35 °C (30 min), 2 °C/min to 200 °C (15 min)
 inj. temp. 200 °C
 detector FID, 250 °C
 carrier gas helium, 19-21 cm/sec @ 35°C (see ASTM D5134)
 injection 0.2 µL, 200:1 split
 Application No. 797-0219



Qualitative Reference Reformate Standard (Cat. No. 48266)



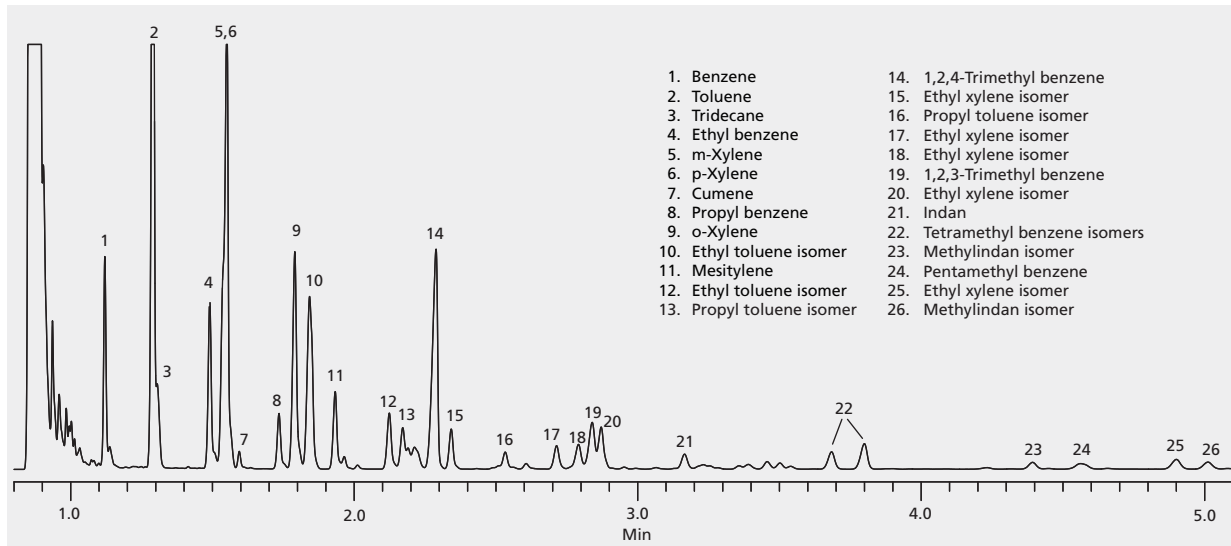
1. Propane
2. Iso-Butane
3. n-Butane
4. Iso-Pentane
5. n-Pentane
6. 2,2-Dimethylbutane
7. Cyclopentane
8. 2,3-Dimethylbutane
9. 2-Methylpentane
10. 3-Methylpentane
11. n-Hexane
12. 2,2-Dimethylpentane
13. Methylcyclopentane
14. 2,4-Dimethylpentane
15. 2,2,3-Trimethylbutane
16. Benzene
17. 3,3-Dimethylpentane
18. Cyclohexane
19. 2-Methylhexane
20. 2,3-Dimethylpentane
21. 1,1-Dimethylcyclopentane
22. 3-Methylhexane
23. cis-1,3-Dimethylcyclopentane
24. trans-1,3-Dimethylcyclopentane
25. 3-Ethylpentane
26. trans-1,2-Dimethylcyclopentane
27. n-Heptane
28. 2,2-Dimethylhexane
29. Ethylcyclopentane
30. 2,5-Dimethylhexane & 2,2,3-Trimethylpentane
31. 2,4-Dimethylhexane
32. 3,3-Dimethylhexane
33. Toluene
34. 2,3-Dimethylhexane
35. 2-Methyl-3-ethylpentane
36. 2-Methylheptane
37. 4-Methylheptane & 3-Methyl-3-ethylpentane
38. 3,4-Dimethylhexane
39. 3-Methylheptane
40. 3-Ethylhexane
41. trans-1,3-Ethylmethylcyclopentane & 2,2,5-Trimethylhexane
42. cis-1,3-Ethylmethylcyclopentane
43. trans-1,2-Ethylmethylcyclopentane
44. n-Octane
45. cis-1,2-Ethylmethylcyclopentane & 2,3,5-Trimethylhexane
46. 2,2-Dimethylheptane
47. 2,4-Dimethylheptane
48. 2-Methyl-4-ethylhexane
49. 2,6-Dimethylheptane
50. 2,5-Dimethylheptane
51. 3,3-Dimethylheptane & 3,5-Dimethylheptane
52. Ethylbenzene
53. m-Xylene
54. p-Xylene
55. 2,3-Dimethylheptane
56. 3,4-Dimethylheptane
57. 4-Ethylheptane
58. 4-Methyloctane
59. 2-Methyloctane
60. 3-Ethylheptane
61. 3-Methyloctane
62. o-Xylene
63. n-Nonane

GC Applications

Hydrocarbons

GC Analysis of Refinery Grade Unleaded Gasoline on the TCEP [Fast GC Analysis]

column TCEP, 15 m x 0.10 mm I.D., 0.18 μ m (28348-U)
 oven 100 $^{\circ}$ C
 inj. temp. 220 $^{\circ}$ C
 detector FID, 220 $^{\circ}$ C
 carrier gas hydrogen, 43 cm/sec
 injection 0.2 μ L, 500:1 split
 liner 4 mm I.D., split, cup design
 sample Unleaded gasoline (refinery grade)
 Application No. G003883



GC Applications

Hydrocarbons

GC Analysis of Reformulated Gasoline on the SLB®-IL111

column SLB-IL111, 30 x 0.25 mm I.D., 0.20 mm (28927-U)
 oven 50 °C (3 min.), 15 °C/min. to 260 °C (5 min.)
 inj. temp. 250 °C
 detector FID, 265 °C
 carrier gas helium, 30 cm/sec
 injection 0.5 µL, 100:1 split
 liner 4 mm I.D. FocusLiner inlet liner with taper
 sample Reformulated gasoline
 Application No. G005319

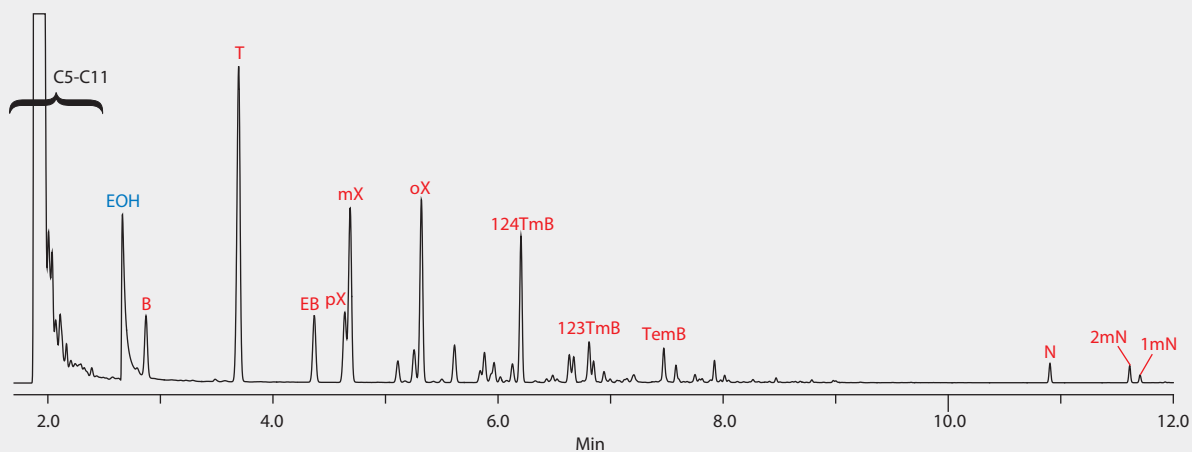
Boiling Point Order

C5 = Pentane
 C6 = Hexane
 EOH = Ethanol
 B = Benzene
 C7 = Heptane

T = Toluene
 C8 = Octane
 EB = Ethylbenzene
 pX = p-Xylene
 mX = m-Xylene

oX = o-Xylene
 C9 = Nonane
 124TmB = 1,2,4-Trimethylbenzene
 C10 = Decane
 123TmB = 1,2,3-Trimethylbenzene

C11 = Undecane
 TemB = 1,2,4,5-Tetramethylbenzene
 N = Naphthalene
 2mN = 2-Methylnaphthalene
 1mN = 1-Methylnaphthalene



GC Applications

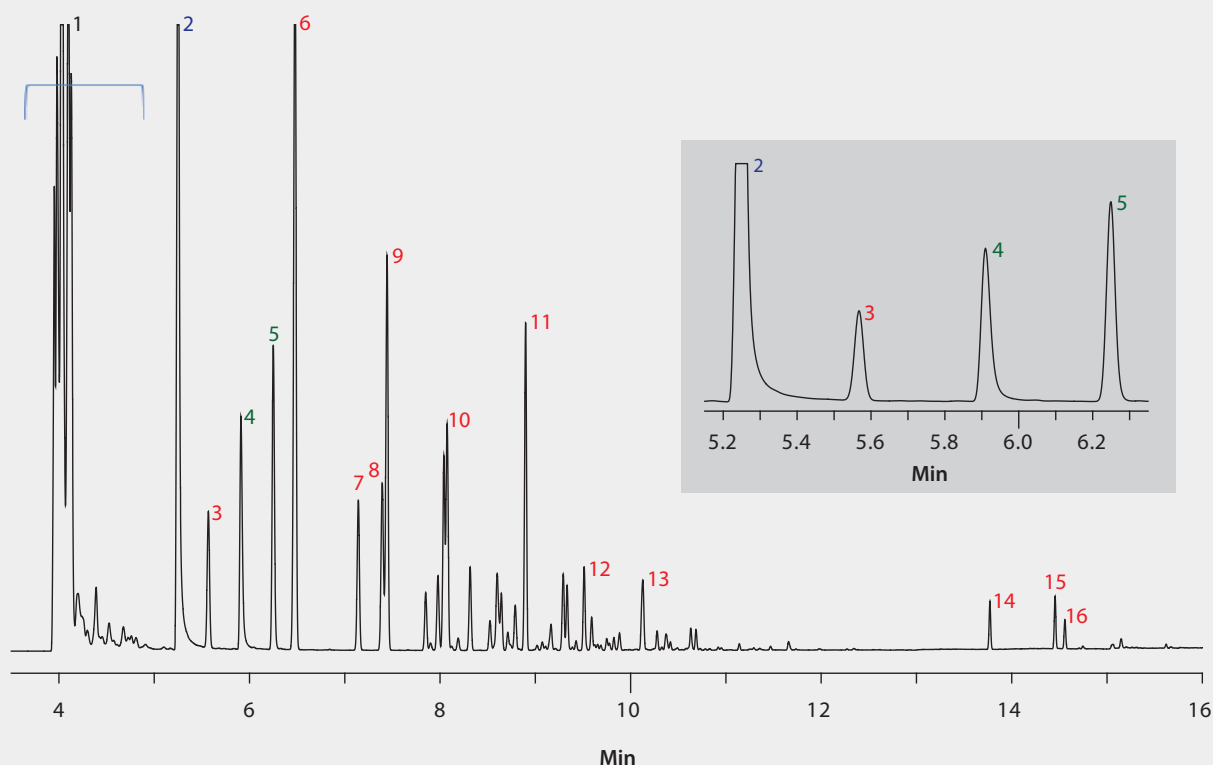
Hydrocarbons

GC Analysis of Benzene and Other Aromatics in Reformulated Gasoline on the SLB®-IL111

column SLB-IL111, 60 m x 0.25 mm I.D., 0.20 µm (28928-U)
 oven 50 °C (3 min), 15 °C/min to 265 °C (5 min)
 inj. temp. 250 °C
 detector FID, 275 °C
 carrier gas helium, 30 cm/sec
 injection 0.5 µL, 200:1 split
 liner 4 mm I.D., split type, single taper wool packed FocusLiner™ design
 sample Premium unleaded gasoline, plus ethanol at 20% (v/v) and two internals each at 4% (v/v)
 Application No. G005642

Peak IDs (black = aliphatic; red = aromatic; blue = alcohol; green = int. std.)

- | | |
|------------------------------------|--------------------------------|
| 1. C5-C11 Hydrocarbons | 9. m-Xylene |
| 2. Ethanol | 10. o-Xylene |
| 3. Benzene | 11. 1,2,4-Trimethylbenzene |
| 4. 2-Butanol (int. std.) | 12. 1,2,3-Trimethylbenzene |
| 5. Methyl ethyl ketone (int. std.) | 13. 1,2,4,5-Tetramethylbenzene |
| 6. Toluene | 14. Naphthalene |
| 7. Ethylbenzene | 15. 2-Methylnaphthalene |
| 8. p-Xylene | 16. 1-Methylnaphthalene |



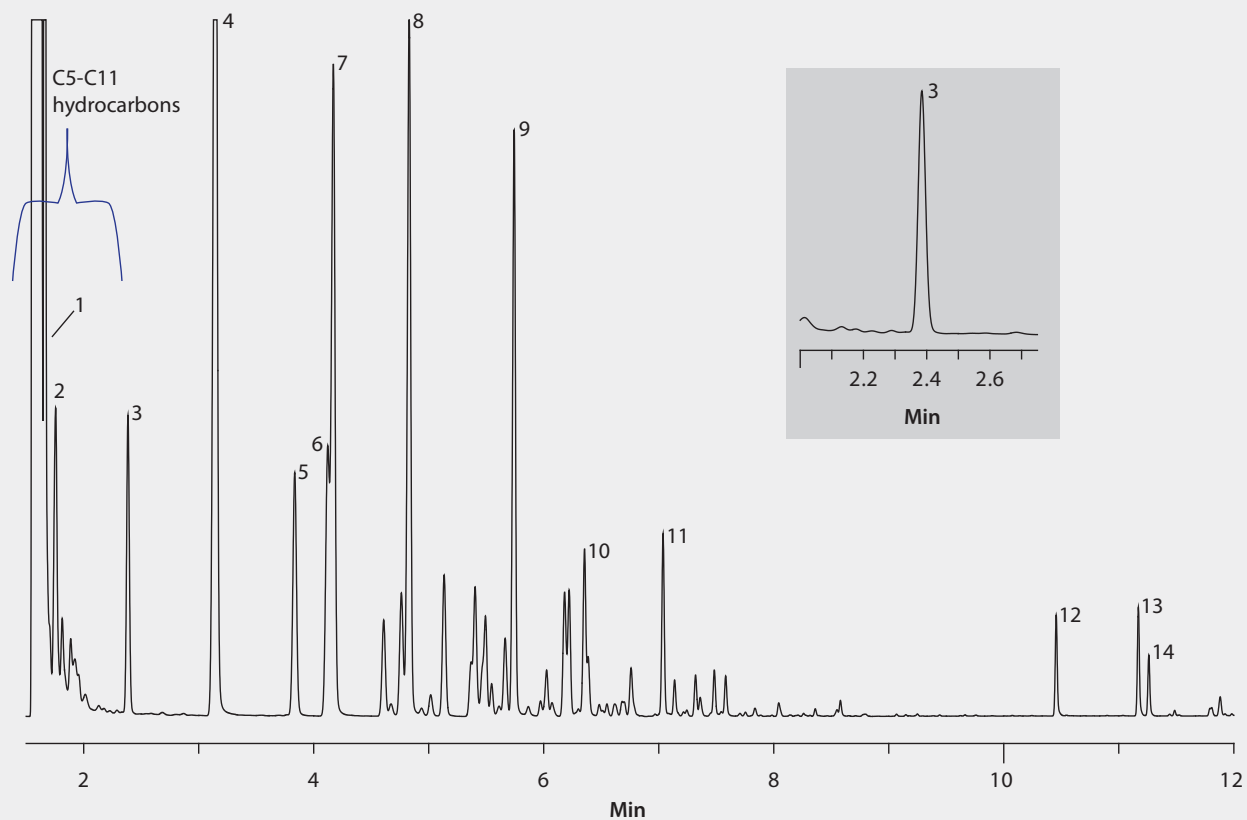
GC Applications

Hydrocarbons

GC Analysis of Benzene and Other Aromatics in Gasoline Containing MTBE and TAME on the SLB®-IL111

column SLB-IL111, 30 m x 0.25 mm I.D., 0.20 µm (28927-U)
 oven 50 °C (3 min), 15 °C/min to 265 °C (5 min)
 inj. temp. 250 °C
 detector FID, 275 °C
 carrier gas helium, 30 cm/sec
 injection 0.5 µL, 200:1 split
 liner 4 mm I.D., split/splitless type, wool packed single-taper FocusLiner™ design
 sample Premium unleaded gasoline with MTBE at 10% (v/v) and TAME at 1% (v/v)
 Application No. G005866

- | | |
|----------------------------|--------------------------------|
| 1. Methyl tert-butyl ether | 8. o-Xylene |
| 2. tert-Amyl methyl ether | 9. 1,2,4-Trimethylbenzene |
| 3. Benzene | 10. 1,2,3-Trimethylbenzene |
| 4. Toluene | 11. 1,2,4,5-Tetramethylbenzene |
| 5. Ethylbenzene | 12. Naphthalene |
| 6. p-Xylene | 13. 2-Methylnaphthalene |
| 7. m-Xylene | 14. 1-Methylnaphthalene |



GC Applications

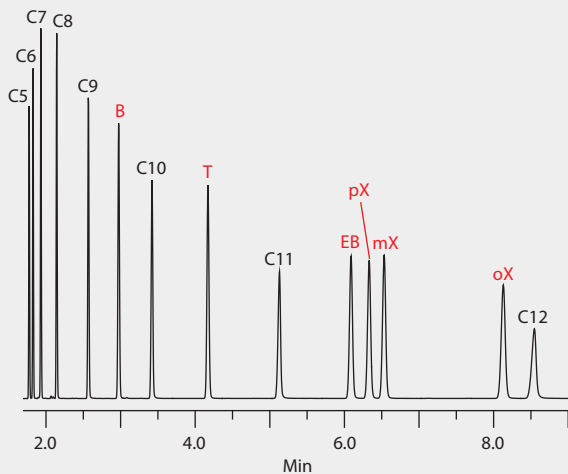
Hydrocarbons

GC Analysis of C5-C12 n-Alkanes and BTEX on the SUPELCOWAX® 10

column SUPELCOWAX 10, 30 m x 0.25 mm I.D., 0.25 µm (24079)
 oven 65 °C
 inj. temp. 250 °C
 detector FID, 265 °C
 carrier gas helium, 30 cm/sec
 injection wet needle, 200:1 split
 liner 4 mm I.D. FocusLiner™ inlet liner with taper
 sample neat mixture of C5-C12 n-alkanes + BTEX, equal volumes
 Application No. G005318

Boiling Point Order

C5 = Pentane	C8 = Octane	C9 = Nonane
C6 = Hexane	EB = Ethylbenzene	C10 = Decane
B = Benzene	pX = p-Xylene	C11 = Undecane
C7 = Heptane	mX = m-Xylene	C12 = Dodecane
T = Toluene	oX = o-Xylene	

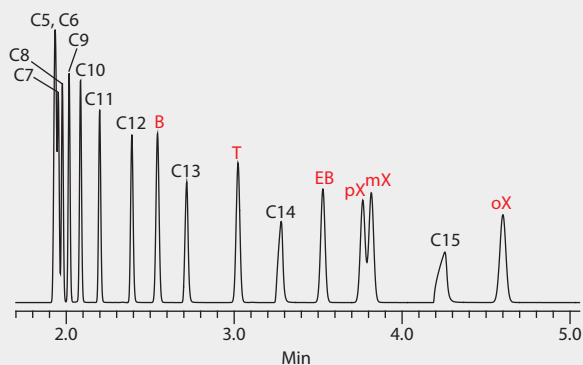


GC Analysis of C5-C15 n-Alkanes and BTEX on the SLB®-IL111

column SLB-IL111, 30 m x 0.25 mm I.D., 0.20 µm (28927-U)
 oven 65 °C
 inj. temp. 250 °C
 detector FID, 265 °C
 carrier gas helium, 30 cm/sec
 injection wet needle, 200:1 split
 liner 4 mm I.D. FocusLiner™ inlet liner with taper
 sample neat mixture of C5-C15 n-alkanes + BTEX, equal volumes
 Application No. G005317

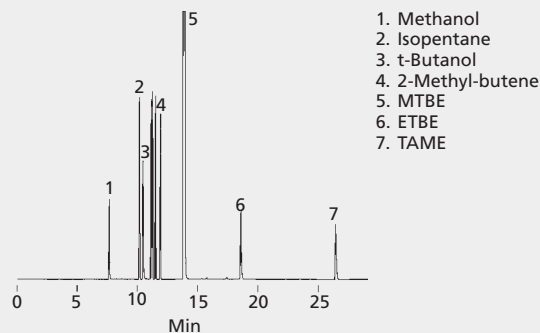
Boiling Point Order

C5 = Pentane	EB = Ethylbenzene	C11 = Undecane
C6 = Hexane	pX = p-Xylene	C12 = Dodecane
B = Benzene	mX = m-Xylene	C13 = Tridecane
C7 = Heptane	oX = o-Xylene	C14 = Tetradecane
T = Toluene	C9 = Nonane	C15 = Pentadecane
C8 = Octane	C10 = Decane	



GC Analysis of MTBE Contaminants on the Petrocol® DH Octyl

column Petrocol DH Octyl, 100 m x 0.25 mm I.D., 0.50 µm (24282)
 oven 35 °C (15 min.), 1 °C/min. to 200 °C (15 min.)
 inj. temp. 250 °C
 detector FID, 250 °C
 carrier gas helium, 24 cm/sec @ 35 °C
 injection 0.1 µL, 215:1 split
 Application No. 94-0373

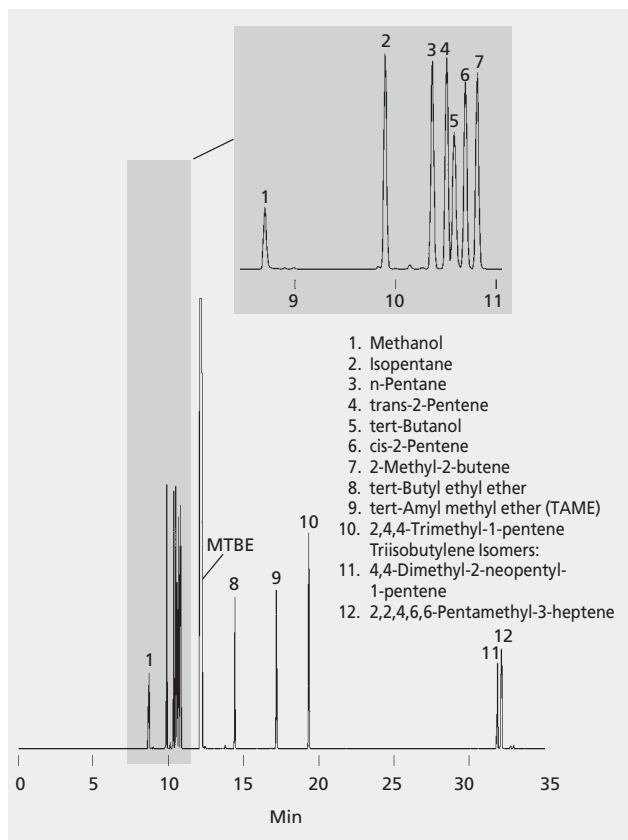


GC Applications

Hydrocarbons

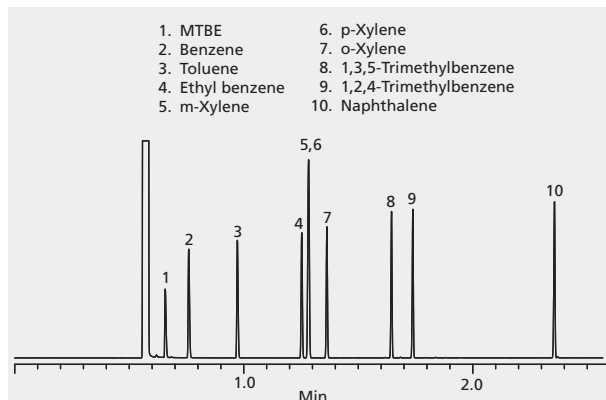
GC Analysis of MTBE Contaminants on the Petrocol® DH

column Petrocol DH, 100 m x 0.25 mm I.D., 0.50 µm (24160-U)
 oven 50 °C (13 min), 10 °C/min. to 180 °C
 inj. temp. 250 °C
 detector FID, 310 °C
 carrier gas helium, 20 cm/sec @ 35 °C
 injection 1 µL, 200:1 split
 sample MTBE Contaminants Mix A (47942)
 Application No. 713-1329



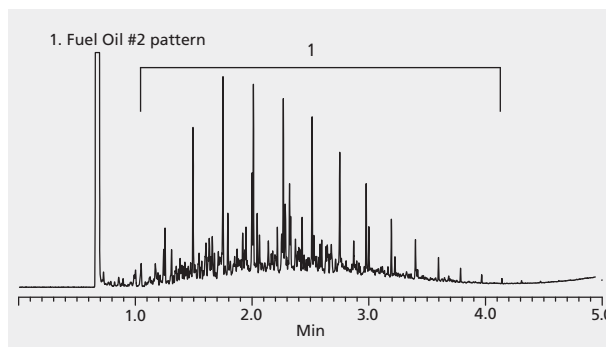
GC Analysis of Gasoline Range Organics [GRO] on the Equity®-1 [Fast GC Analysis]

column Equity-1, 15 m x 0.10 mm I.D., 0.10 µm (28039-U)
 oven 75 °C, 40 °C/min. to 110 °C, 7.5 °C/min. to 190 °C
 inj. temp. 200 °C
 detector FID, 250 °C
 carrier gas hydrogen, 57 cm/sec @ 75 °C
 injection 0.5 µL, 200:1 split
 liner 4 mm I.D., split, cup design
 sample UST Modified GRO Mix, each analyte at 1000 ppm in methanol
 Application No. G003882



GC Analysis of Fuel Oil #2 on the Equity®-1 [Fast GC Analysis]

column Equity-1, 15 m x 0.10 mm I.D., 0.10 µm (28039-U)
 oven 80 °C, 50 °C/min. to 325 °C
 inj. temp. 250 °C
 detector FID, 350 °C
 carrier gas hydrogen, 45 cm/sec constant
 injection 0.3 µL, 100:1 split, 0.02 min. pre-injection dwell time
 liner 2 mm I.D., straight
 sample No.2 fuel oil standard, 20 mg/mL in methanol
 Application No. G003905



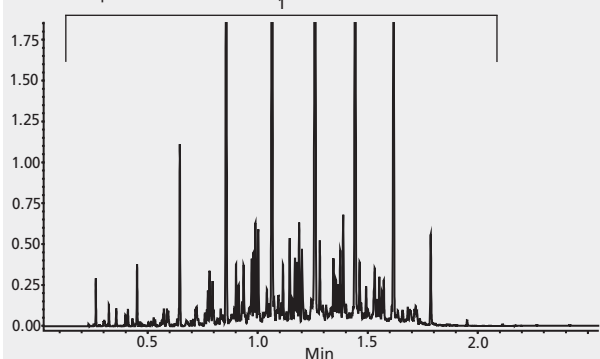
GC Applications

Hydrocarbons

GC Analysis of Kerosene on the SLB®-5ms [Fast GC Analysis]

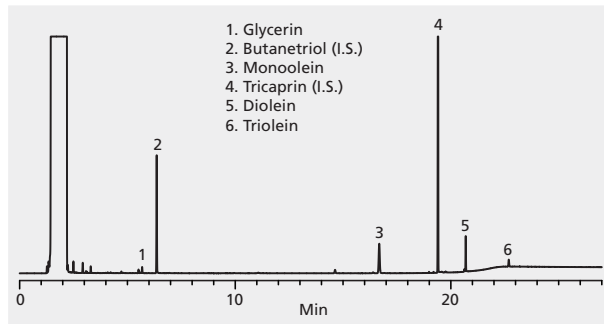
column SLB-5ms, 10 m × 0.10 mm I.D., 0.10 µm (28465-U)
 oven 40 °C, 80.0 °C/min. to 150 °C, 70.0 °C/min. to 250 °C, 50.0 °C/min. to 320 °C
 inj. temp. 320 °C
 detector FID, 320 °C
 carrier gas hydrogen, 85 cm/sec constant
 injection 0.2 µL, 800:1 split
 sample kerosene
 Application No. G003841

1. Kerosene pattern



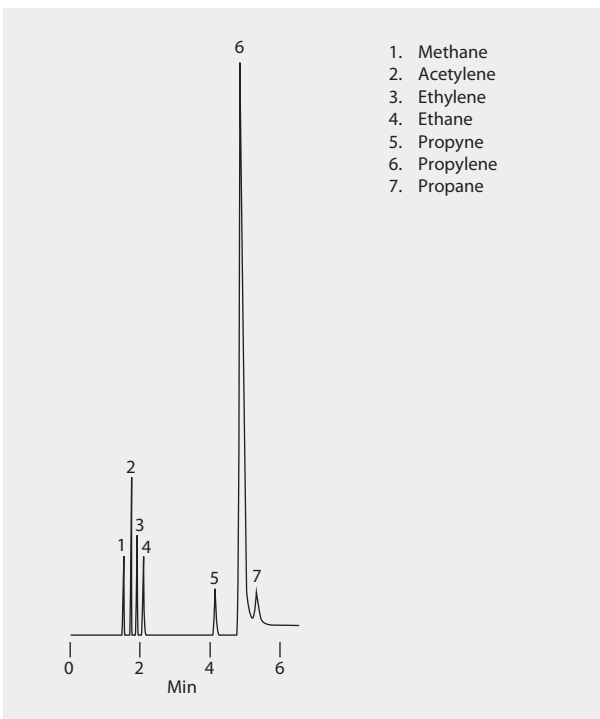
ASTM D6584: GC Analysis of Glycerin Impurity in B100 Biodiesel on the MET-Biodiesel

column .. MET-Biodiesel, 14 m × 0.53 mm I.D., 0.16 µm with integrated 2 m × 0.53 mm ID guard (28668-U)
 oven ... 50 °C (1 min.), 15 °C/min. to 180 °C, 7 °C/min. to 230 °C, 30 °C/min. to 380 °C (10 min.)
 detector FID, 380 °C
 carrier gas helium, 3.0 mL/min.
 injection 1 µL, cold on-column
 sample B100 Biodiesel plus Butanetriol Internal Standard (44896-U) and Tricaprin Internal Standard (44897-U), derivatized with MSTFA then diluted in heptane
 Application No. G004426



GC Analysis of Impurities in Propylene on the Carboxen®-1006 PLOT

column Carboxen-1006 PLOT, 30 m × 0.32 mm I.D. (24241-U)
 oven 200 °C (4 min.), 24 °C/min. to 250 °C
 inj. temp. 230 °C
 detector FID, 230 °C
 carrier gas helium, 76 cm/sec
 injection 20 µL
 sample 6 impurities in propylene, each at approximately 1.0%
 Application No. 794-0359

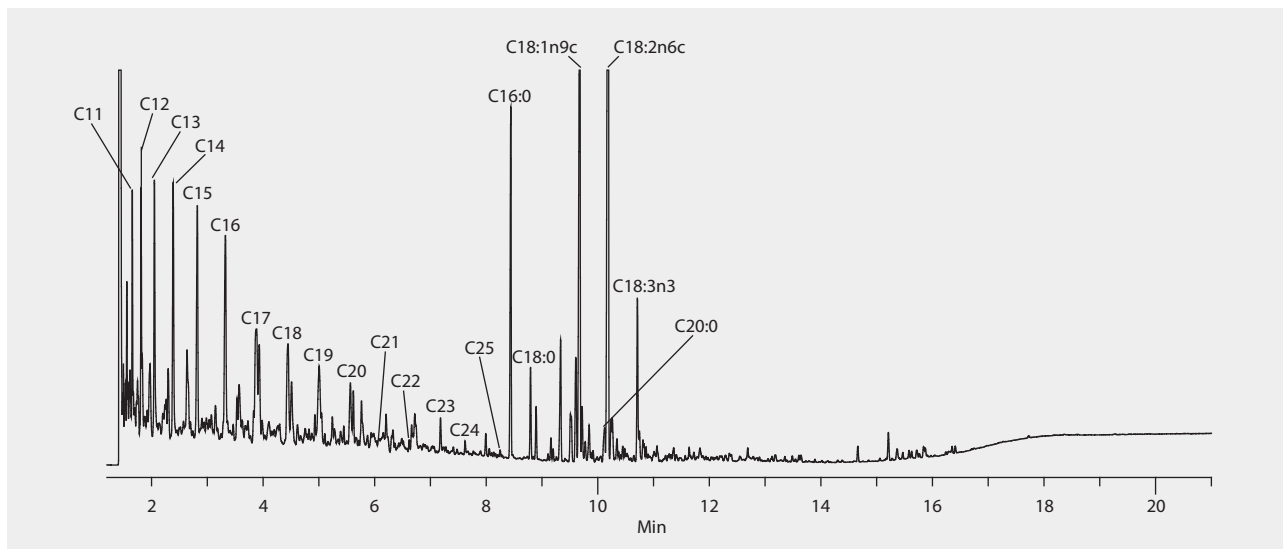


GC Applications

Hydrocarbons

GC Analysis of n-Alkanes and FAMES in B20 Blended Biodiesel on the SLB®-IL111

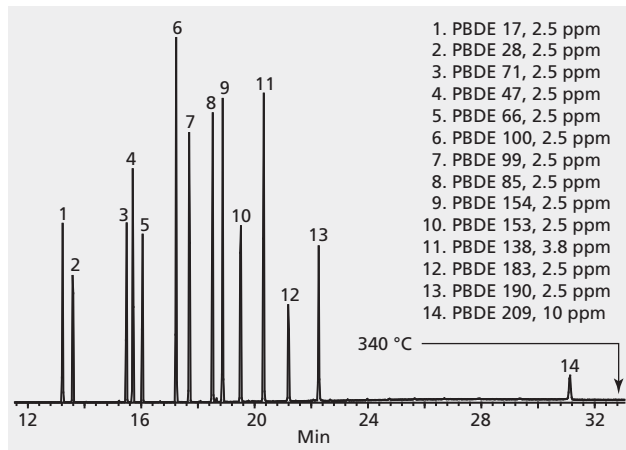
column SLB-IL111, 30 m x 0.25 mm I.D., 0.20 µm (28927-U)
 oven 50 °C, 13 °C/min. to 270 °C (5 min.)
 inj. temp. 250 °C
 detector FID, 270 °C
 carrier gas helium, 40 cm/sec
 injection 1 µL, 100:1 split
 liner 4 mm I.D. FocusLiner inlet liner (no taper)
 sample B20 biodiesel (soy source) diluted 1:20 in n-hexane
 Application No. G005423



PBDEs

GC Analysis of Polybrominated Diphenyl Ether (PBDE) Congeners on the SLB®-5ms

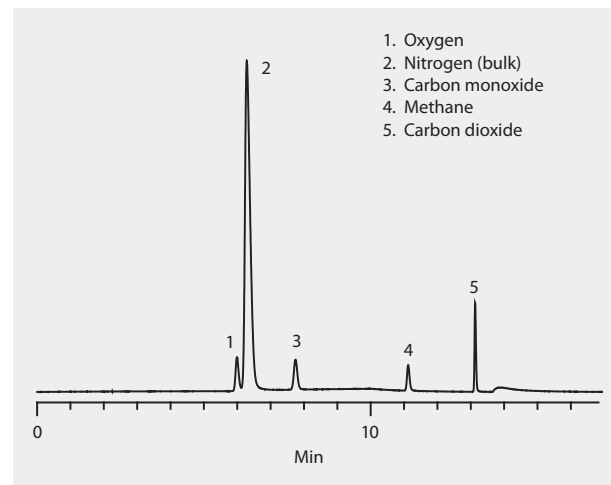
column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 µm (28471-U)
 oven 125 °C (1 min.), 10 °C/min. to 340 °C (15 min.)
 inj. temp. 300 °C
 MSD interface 340 °C
 scan range SIM
 carrier gas helium, 1.5 mL/min., constant
 injection 1 µL, splitless, pulsed (30 psi until 0.2 min.)
 liner 4 mm I.D. single taper
 sample PBDE standard, 2.5-10 µg/mL in n-nonane
 Application No. G003519



Permanent Gases and Light Hydrocarbons

GC Analysis of Permanent Gases on the Carboxen®-1010 PLOT

column Carboxen-1010 PLOT, 30 m x 0.53 mm I.D. (25467)
 oven 35 °C (7.0 min.), 24 °C/min. to 225 °C
 inj. temp. 200 °C
 detector TCD, 230 °C
 carrier gas helium, 3.0 mL/min.
 injection 10 µL, direct using a sample valve, 150 °C
 sample Oxygen, carbon monoxide, methane, and carbon dioxide, each at 1.0% in nitrogen
 Application No. G001074

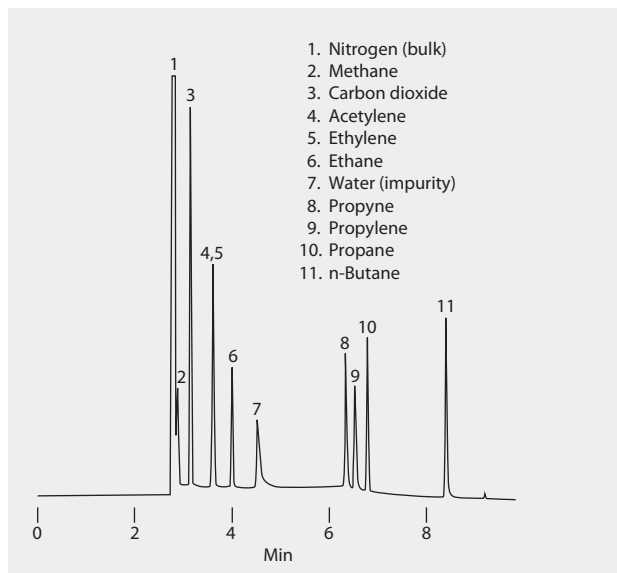


GC Applications

Permanent Gases and Light Hydrocarbons

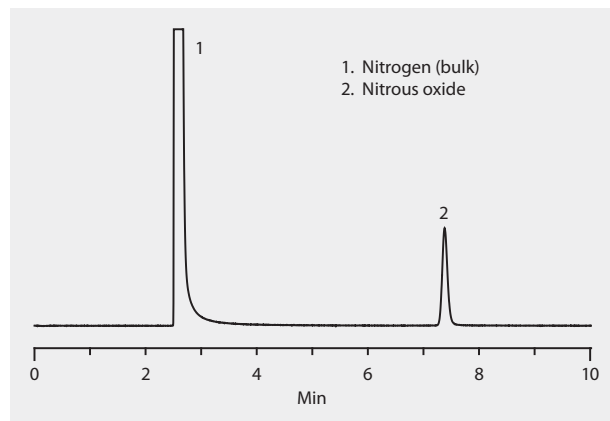
GC Analysis of Permanent Gases and Light Hydrocarbons on the Supel-Q™ PLOT

column Supel-Q PLOT, 30 m x 0.53 mm I.D. (25462)
 oven 35 °C (3 min.), 16 °C/min. to 250 °C
 inj. temp. 200 °C
 detector TCD, 250 °C
 carrier gas helium, 3 mL/min.
 injection 0.1 µL
 sample 9-Component permanent gas a light hydrocarbon standard, each analyte at 1.0% in nitrogen
 Application No. 794-0619



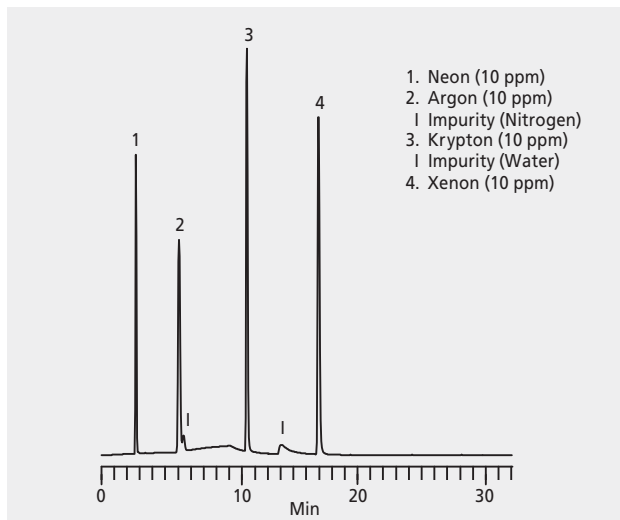
GC Analysis of Nitrogen and Nitrous Oxide on the Carboxen®-1010 PLOT

column Carboxen-1010 PLOT, 30 m x 0.53 mm I.D. (25467)
 oven 150 °C
 inj. temp. 200 °C
 detector TCD, 230 °C
 carrier gas helium, 3.0 mL/min.
 injection 10 µL, direct using a sample valve, 150 °C
 sample 500 ppm nitrous oxide in nitrogen
 Application No. G001081



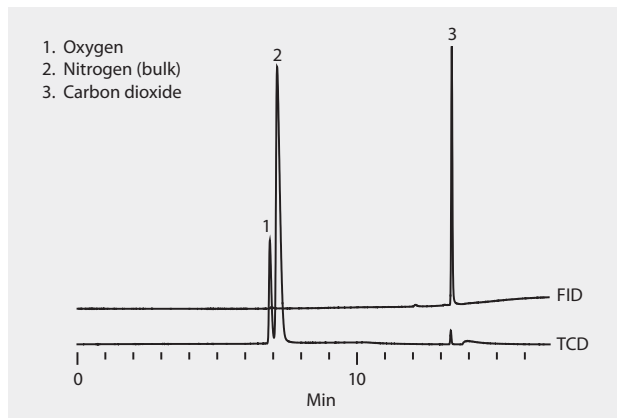
GC Analysis of Noble Gases on the Carboxen®-1010 PLOT

column Carboxen-1010 PLOT, 30 m x 0.53 mm I.D. (25467)
 oven 35 °C (6 min.), 24 °C/min. to 225 °C
 detector TCD
 carrier gas helium, 3 mL/min. @ 35 °C
 Application No. G001082



GC Analysis of Oxygen, Nitrogen, and Carbon Dioxide on the Carboxen®-1010 PLOT

column Carboxen-1010 PLOT, 30 m x 0.53 mm I.D. (25467)
 oven 35 °C (7.0 min.), 24 °C/min. to 225 °C
 inj. temp. 200 °C
 detector TCD, 230 °C, Methanizer, 375 °C, and FID, 230 °C in series
 carrier gas helium, 3.0 mL/min.
 injection 10 µL, direct using a sample valve, 150 °C
 sample Oxygen at 20% and carbon dioxide at 1.0% in nitrogen
 Application No. G001075



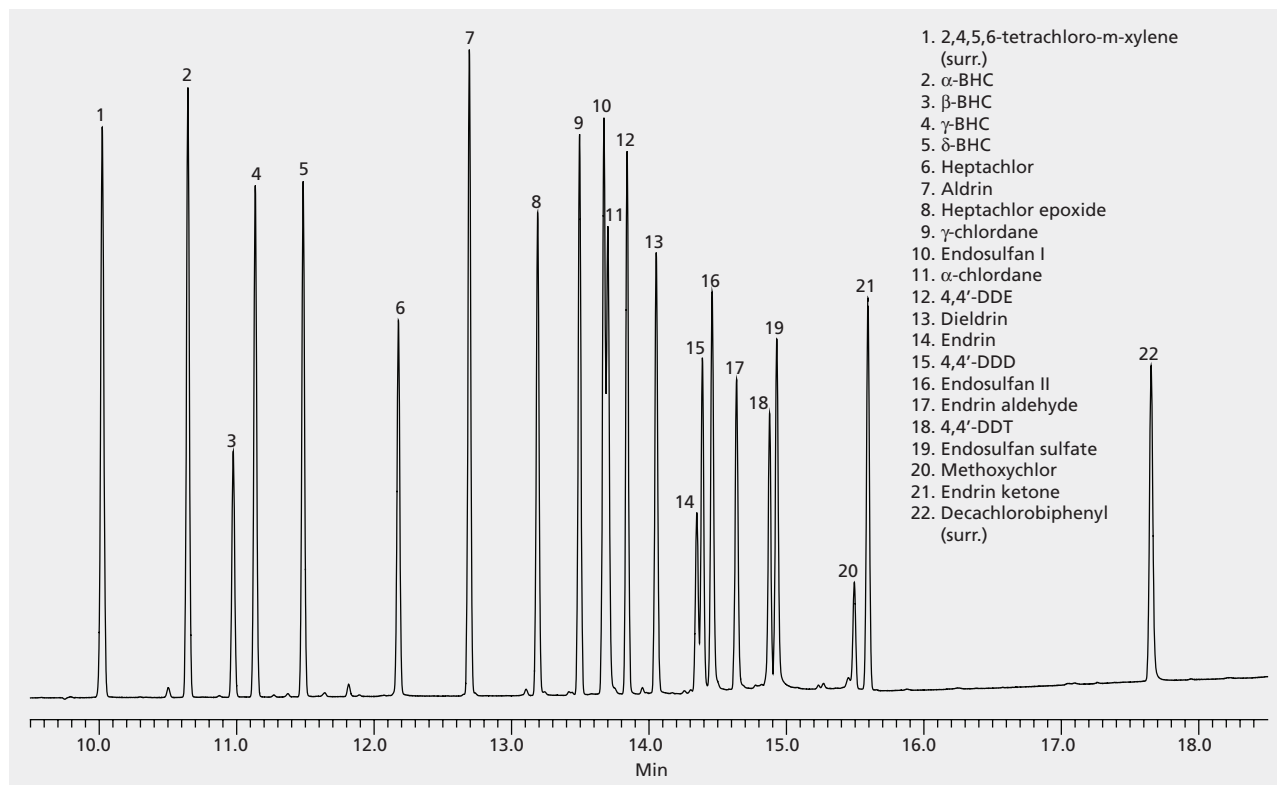
GC Applications

Pesticides and PCBs

Pesticides and PCBs

US EPA Method 608/8081/OLM04.2 PEST: GC Analysis of Organochlorine Pesticides on the SLB®-5ms

column SLB-5ms, 20 m x 0.18 mm I.D., 0.36 μ m (28576-U)
 oven 100 °C (2 min.), 15 °C/min. to 325 °C (3 min.)
 inj. temp. 250 °C
 detector micro-ECD, 325 °C
 carrier gas helium, 0.5 mL/min, constant flow
 injection 1.0 μ L, splitless (0.75 min.)
 liner 4 mm I.D., single taper
 sample chlorinated pesticide standard (46845-U), diluted to 50 ppb in n-hexane
 Application No. G003583

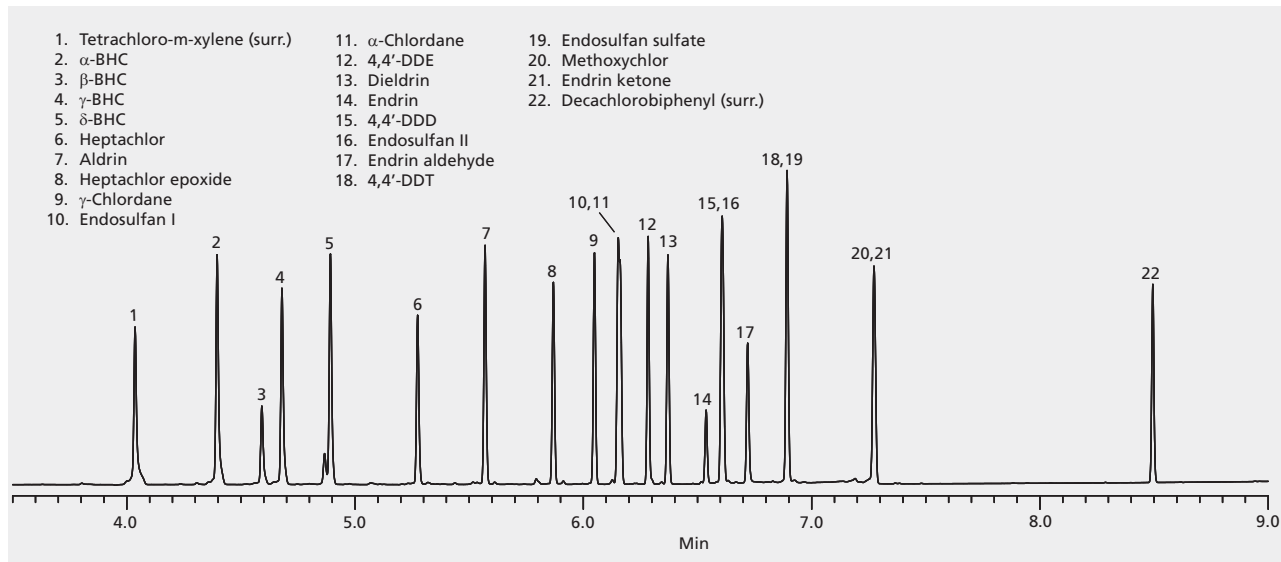


GC Applications

Pesticides and PCBs

US EPA Method 608/8081/OLM04.2 PEST: GC Analysis of Organochlorine Pesticides on the SLB®-5ms [Fast GC Analysis]

column SLB-5ms, 15 m x 0.10 mm I.D., 0.10 µm (28466-U)
 oven 100 °C, 25 °C/min. to 325 °C
 inj. temp. 225 °C
 detector ECD, 300 °C
 carrier gas hydrogen, 40 cm/sec constant
 injection 2 µL, splitless (0.75 min.)
 liner 4 mm I.D., single taper
 sample 50 ppb of a 22 component chlorinated pesticide standard in n-hexane
 Application No. G003899

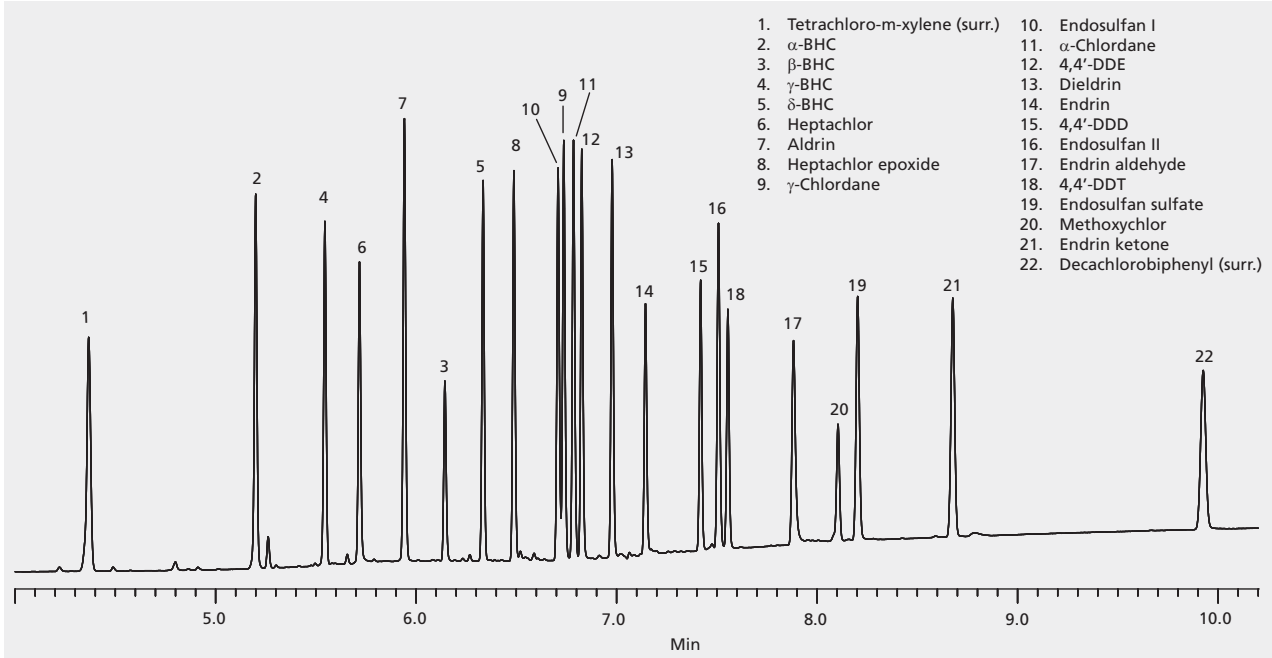


GC Applications

Pesticides and PCBs

US EPA Method 608/8081/OLM04.2 PEST: GC Analysis of Organochlorine Pesticides on the Equity®-1701 [Fast GC Analysis]

column Equity-1701, 15 m x 0.10 mm I.D., 0.10 µm (28343-U)
 oven 100 °C, 25 °C/min. to 280 °C
 inj. temp. 225 °C
 detector ECD, 300 °C
 carrier gas hydrogen, 40 cm/sec constant
 injection 2 µL, splitless (0.75 min.)
 liner 4 mm I.D., single taper
 sample 50 ppb of a 22 component chlorinated pesticide standard in n-hexane
 Application No. G003900

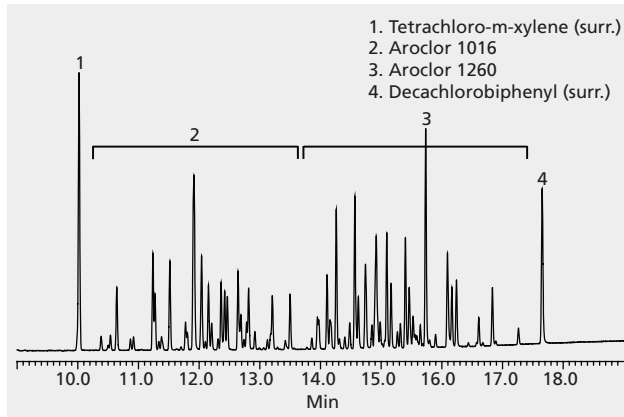


GC Applications

Pesticides and PCBs

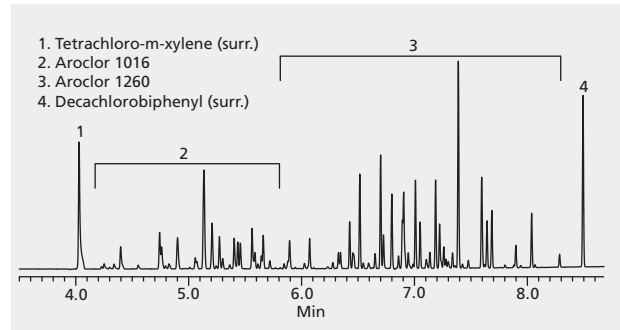
GC Analysis of Aroclor 1016/1260 on the SLB®-5ms

column SLB-5ms, 20 m x 0.18 mm I.D., 0.36 µm (28576-U)
 oven 100 °C (2 min.), 15 °C/min. to 325 °C (3 min.)
 inj. temp. 250 °C
 detector micro-ECD, 325 °C
 carrier gas helium, 0.5 mL/min, constant flow
 injection 1.0 µL, splitless (0.75 min.)
 liner 4 mm I.D., single taper
 sample ... Aroclor standard mix 1 (46846-U) diluted to 500 ppb / 50 ppb (Aroclors / surrogates) in n-hexane
 Application No. G003582



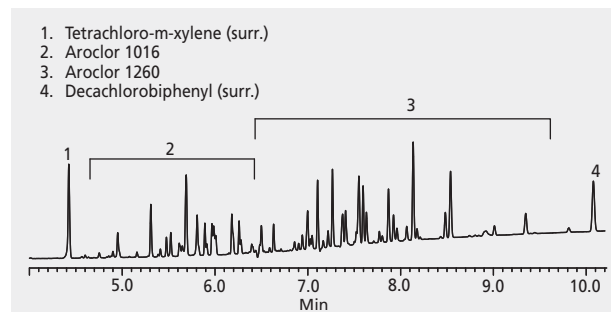
GC Analysis of Aroclor 1016/1260 on the SLB®-5ms [Fast GC Analysis]

column SLB-5ms, 15 m x 0.10 mm I.D., 0.10 µm (28466-U)
 oven 80 °C (0.5 min.), 50 °C/min. to 200 °C, 35 °C/min. to 360 °C (2 min.)
 inj. temp. 225 °C
 detector ECD, 360 °C
 carrier gas hydrogen, 40 cm/sec constant
 injection 2 µL, splitless (0.75 min.)
 liner 4 mm I.D., single taper
 sample ... Aroclor standard mix 1 (46846-U) diluted to 500 ppb / 50 ppb (Aroclors / surrogates) in n-hexane
 Application No. G003897



GC Analysis of Aroclor 1016/1260 on the Equity®-1701 [Fast GC Analysis]

..... compound class: dioxins/PCBs/PBDEs
 column Equity-1701, 15 m x 0.10 mm I.D., 0.10 µm (28343-U)
 oven 90 °C, 35 °C/min. to 280 °C (3 min.)
 inj. temp. 250 °C
 detector ECD, 280 °C
 carrier gas hydrogen, 50 cm/sec constant
 injection 2 µL, splitless (0.75 min.)
 liner 4 mm I.D., single taper
 sample Aroclor standard mix 1 (46846-U) diluted to 200 ppb / 20 ppb (Aroclors / surrogates) in n-hexane
 Application No. G003881



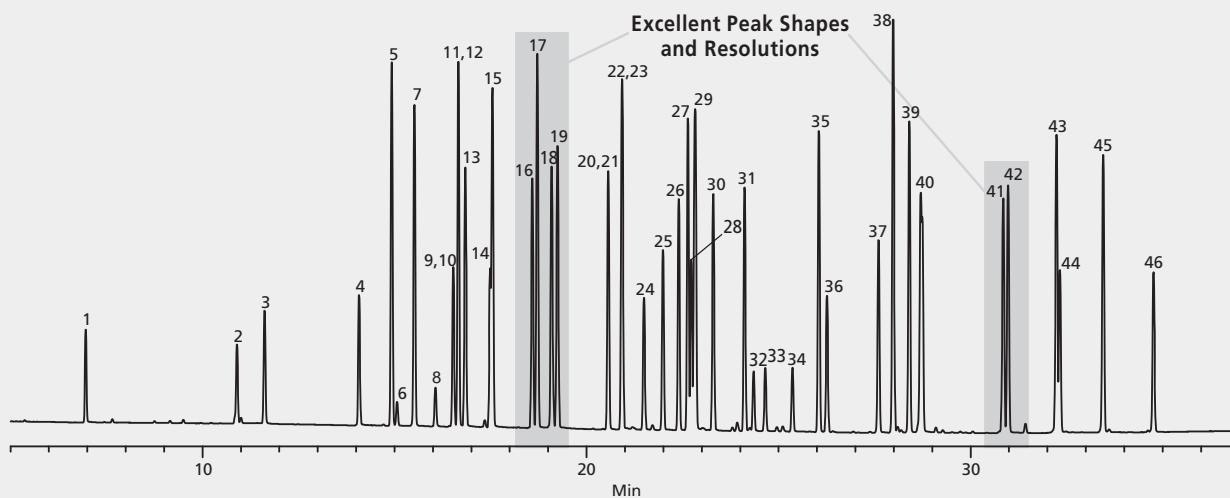
GC Applications

Pesticides and PCBs

US EPA Method 8141: GC Analysis of Organophosphorous Pesticides on the Equity®-5

column Equity-5, 30m x 0.25 mm I.D., 0.25 µm (28089-U)
 oven 120 °C (3 min), 5 °C/min, to 300 °C (5 min)
 inj. temp. 250 °C
 detector NPD, 320 °C
 carrier gas helium, 25 cm/sec @ 120 °C
 injection 1.0 µL splitless (0.5 min)
 liner 4 mm I.D., double taper
 sample 40ng on-column of a custom organophosphorus pesticides mix
 Application No. G001704

- | | | | |
|---------------------|-------------------------|---------------------|---------------------|
| 1. Dichlorvos | 13. Phorate | 25. Fenitrothion | 37. Ethion |
| 2. Mevinphos | 14. Demeton S | 26. Malathion | 38. Bolstar |
| 3. Trichlorfon | 15. Dimethoate | 27. Aspon | 39. Famphur |
| 4. TEPP | 16. Terbufos | 28. Chlorpyrifos | 40. Carbophenothion |
| 5. Thionazin | 17. Fonophos | 29. Fenthion | 41. Phosmet |
| 6. Demeton O | 18. Diazinon | 30. Trichloronate | 42. EPN |
| 7. Ethoprop | 19. Disulfoton | 31. Chlorfenvinphos | 43. Azinphos-methyl |
| 8. Naled | 20. Dichlorofenthion | 32. Crotoxyphos | 44. Leptophos |
| 9. Dicrotophos | 21. Phosphamidon | 33. Storophos | 45. Azinphos-ethyl |
| 10. Monocrotophos | 22. Chlorpyrifos methyl | 34. Tokuthion | 46. Coumaphos |
| 11. Sulfotepp | 23. Methyl parathion | 35. Merphos | |
| 12. Carbophenothion | 24. Ronnel | 36. Fensulfthion | |

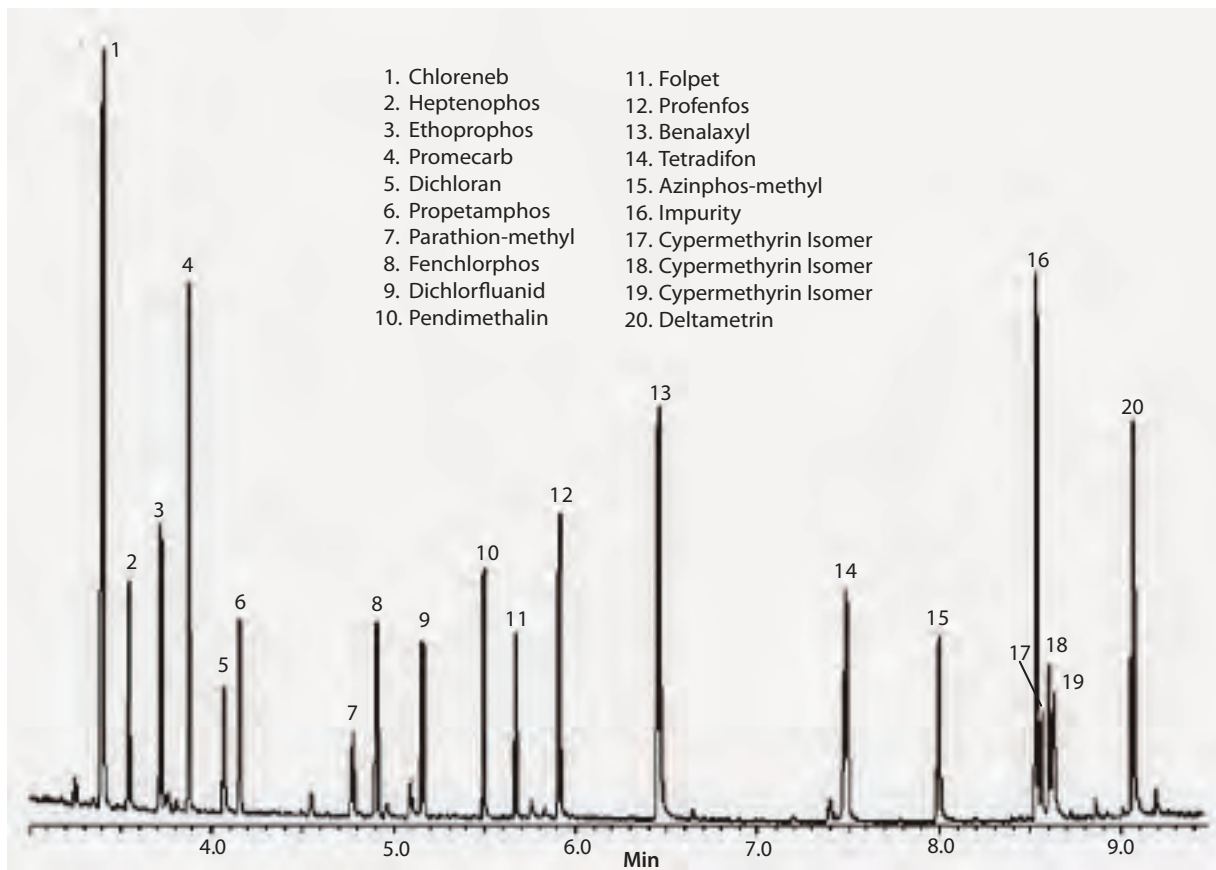


GC Applications

Pesticides and PCBs

GC Analysis of a 19-Component Pesticide Mix on the SLB®-5ms [Fast GC Analysis]

column SLB-5ms, 10 m x 0.10 mm I.D., 0.10 µm (28465-U)
 oven 40 °C (1 min.), 80 °C/min. to 160 °C, 5 °C/min. to 340 °C (2 min.)
 inj. temp. 280 °C
 MSD interface 280 °C
 scan range m/z = 45-470
 carrier gas helium, 0.52 mL/min.
 injection 0.5 µL, 10:1 split
 sample 19-component pesticide mix, each analyte at 0.8-2.0 µg/mL in hexane:acetone (50:50)
 Application No. G003912



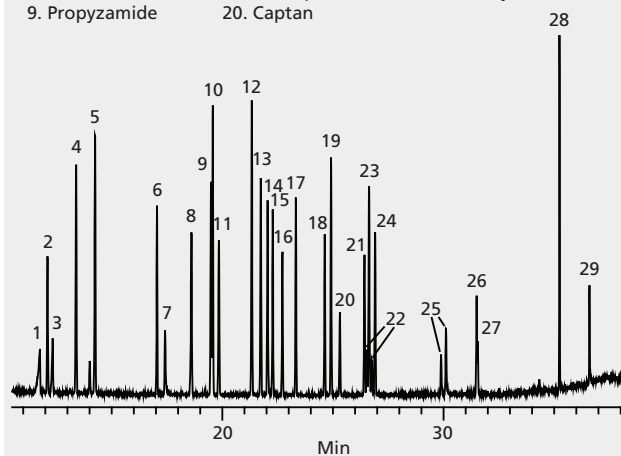
GC Applications

Pesticides and PCBs

GC Analysis of Agricultural Chemicals on the SLB®-5ms

column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 µm (28471-U)
 oven .. 50 °C (0.2 min.), 100 °C/min. to 100 °C, 5 °C/min. to 250 °C, 15 °C/min. to 325 °C (5 min.)
 inj. temp. 250 °C
 MSD interface 300 °C
 scan range m/z = 40-450
 carrier gas helium, 30 cm/sec constant
 injection 1 µL, splitless (0.75 min.)
 liner 2.6 mm I.D., straight
 sample 10 ppm pesticides in ethyl acetate
 Application No. G003676

- | | | |
|-------------------------------|---------------------|------------------------------|
| 1. Acephate | 10. Diazinon | 21. Butamifos |
| 2. Etridiazol | 11. Chlorothalonil | 22. Siduron isomers |
| 3. Chlorofos
(trichlorfan) | 12. Terbutcarb | 23. Napropamide |
| 4. Chloroneb | 13. Toclofos-methyl | 24. Isoprothiolane |
| 5. Mecoprop
(methyl ester) | 14. Metalaxyl | 25. Propiconazole
isomers |
| 6. Benfluralin | 15. Dithiopyr | 26. Pyridaphenthion |
| 7. Thiodicarb | 16. Fenitrothion | 27. Iprodione |
| 8. Simazine | 17. Chlorpyrifos | 28. Ethofenprox |
| 9. Propyzamide | 18. Pendimethalin | 29. Azoxystrobin |
| | 19. Isofenphos | |
| | 20. Captan | |



GC Applications

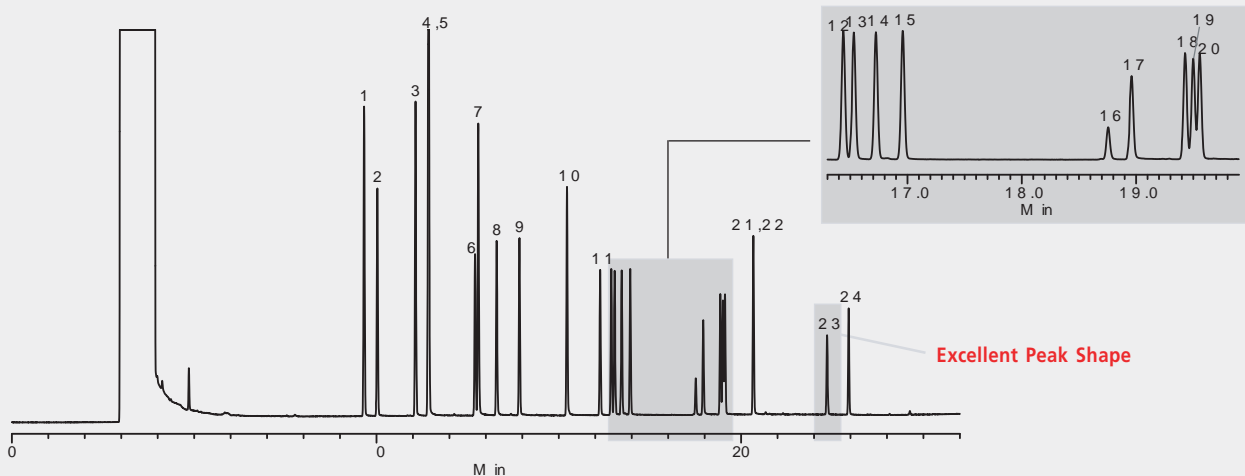
Phenols

Phenols

US EPA Method 8041: GC Analysis of Phenols on the Equity®-5

column Equity-5, 30 m x 0.25 mm I.D., 0.25 µm (25312)
 oven 40 °C, 8 °C/min to 300°C
 inj. temp. 225 °C
 detector FID, 340 °C
 carrier gas helium, 25 cm/sec @ 60 °C
 injection 1.0 µL 100:1 split
 liner split, cup design
 sample 10 µg/mL each component (47899)
 Application No. 713-1036

- | | | |
|-----------------------|-----------------------------|--------------------------------|
| 1. Phenol | 9. 2,6-Dichlorophenol | 17. 4-Nitrophenol |
| 2. 2-Chlorophenol | 10. 4-Chloro-3-methylphenol | 18. 2,3,5,6-Tetrachlorophenol |
| 3. 2-Methylphenol | 11. 2,3,5-Trichlorophenol | 19. 2,3,4,5-Tetrachlorophenol |
| 4. 3-Methylphenol | 12. 2,4,6-Trichlorophenol | 20. 2,3,4,6-Tetrachlorophenol |
| 5. 4-Methylphenol | 13. 2,4,5-Trichlorophenol | 21. 2-Methyl-4,6-dinitrophenol |
| 6. 2-Nitrophenol | 14. 2,3,4-Trichlorophenol | 22. 3,4,5-Trichlorophenol |
| 7. 2,4-Dimethylphenol | 15. 2,3,6-Trichlorophenol | 23. Pentachlorophenol |
| 8. 2,4-Dichlorophenol | 16. 2,4-Dinitrophenol | 24. Dinoseb |



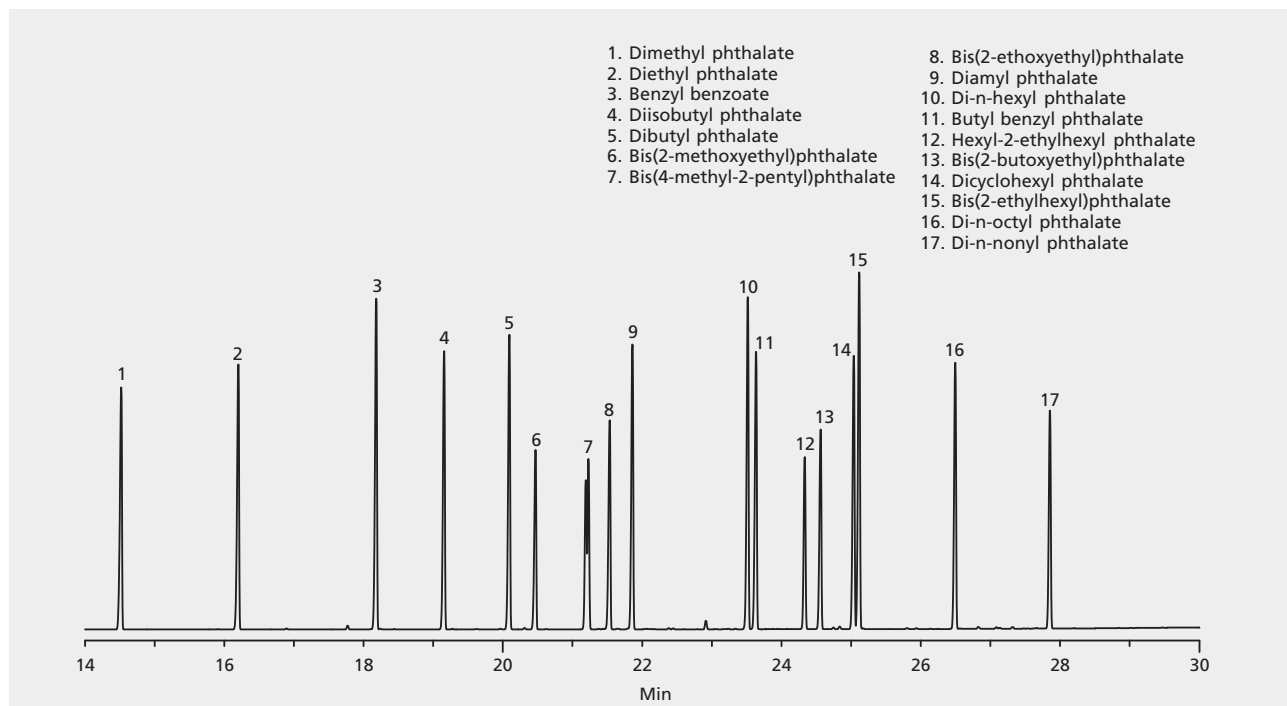
GC Applications

Phthalate Esters

Phthalate Esters

GC Analysis of Phthalate Esters on the Equity®-5

column Equity-5, 30 m x 0.25 mm I.D., 0.25 µm (28089-U)
 oven 40 °C (1 min.), 10 °C/min. to 325 °C
 inj. temp. 250 °C
 detector FID
 carrier gas helium, 1.3 mL/min constant flow
 injection 1 µL, splitless (0.75 min)
 liner 4 mm I.D., single taper
 sample 50 ng on-column of a custom phthalate ester mix
 Application No. G001708



GC Applications

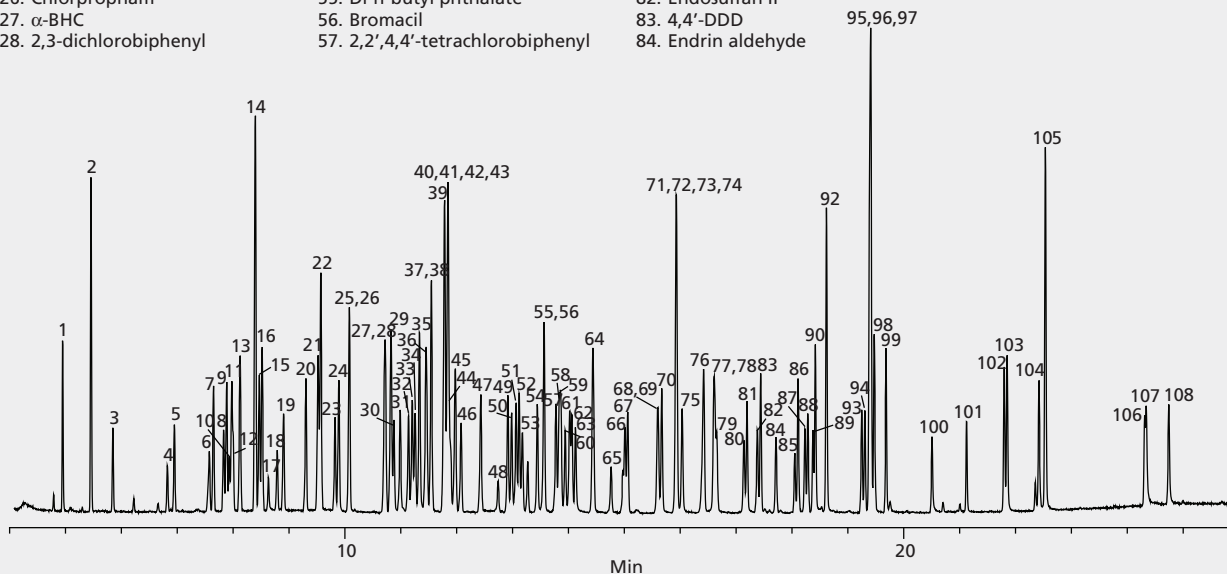
Semivolatiles

Semivolatiles

US EPA Method 525.2: GC Analysis of Semivolatiles on the SLB®-5ms

column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 μ m (28471-U)
 oven 45 °C (1 min), 50 °C/min. to 130 °C (1 min.), 12 °C/min. to 180 °C, 7 °C/min. to 240 °C, 12 °C/min. to 330 °C (2 min.)
 inj. temp. 275 °C
 MSD interface 330 °C
 scan range m/z = 45-450
 carrier gas helium, 0.9 mL/min., constant flow
 injection 1 μ L pulsed splitless (15 psi until 0.20 min.) (1.0 min.)
 liner 4 mm I.D., single taper
 sample 2 ppm, in ethyl acetate, of a 102 component semivolatiles standard plus 3 surrogate and 3 internal standard compounds (at 5 ppm)
 Application No. G003579

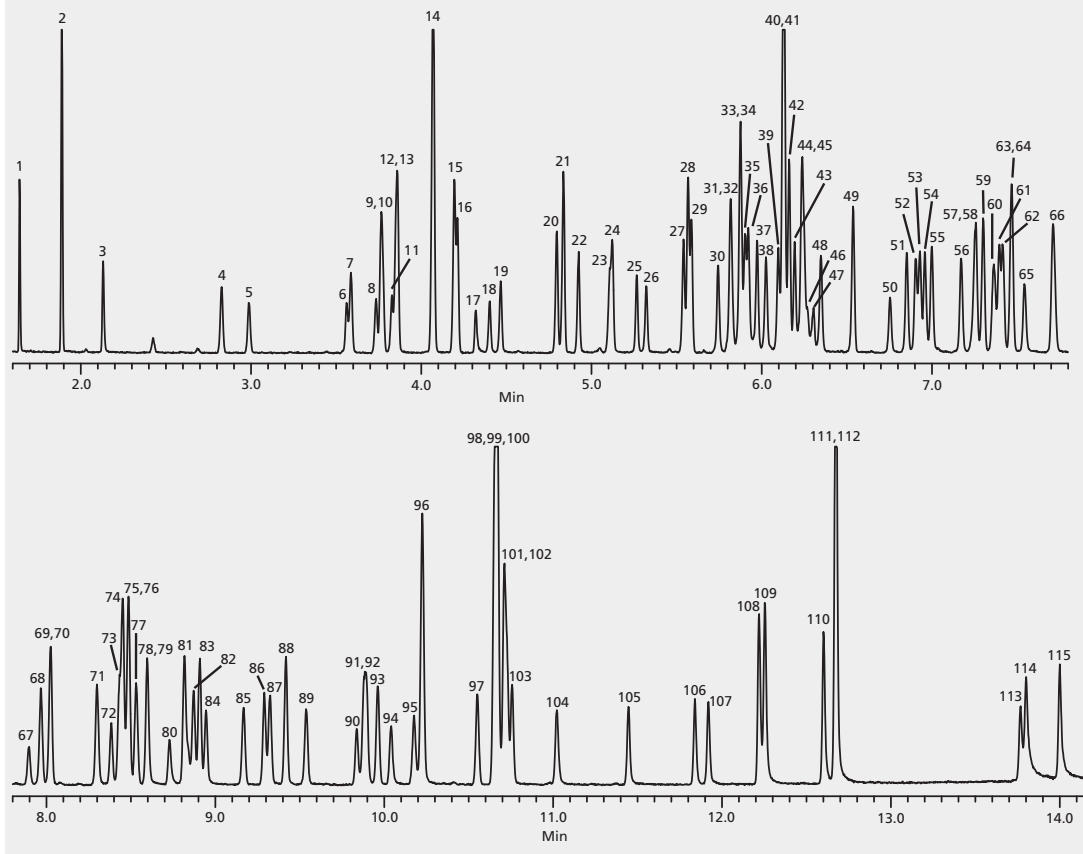
- | | | | |
|---|---|---------------------------------------|--|
| 1. Isophorone | 29. Hexachlorobenzene | 58. Metolachlor | 85. Norflurazon |
| 2. 1,3-dimethyl-2-nitrobenzene (surr.) | 30. Atraton | 59. Chlorpyrifos | 86. Butyl benzyl phthalate |
| 3. Dichlorvos | 31. Prometon | 60. Cyanazine | 87. Endosulfan sulfate |
| 4. Hexachlorocyclopentadiene | 32. Atrazine | 61. Dacthal | 88. 4,4'-DDT |
| 5. EPTC | 33. Propazine | 62. Aldrin | 89. Hexazinone |
| 6. Mevinphos | 34. β -BHC | 63. Triademefon | 90. Bis(2-ethylhexyl)adipate |
| 7. Butylate | 35. Pentachlorophenol (8 ppm) | 64. Diphenamid | 91. Methoxychlor |
| 8. Vernolate | 36. Terbufos | 65. MGK 264 | 92. Triphenylphosphate (surr.) |
| 9. Dimethyl phthalate | 37. Diazinon | 66. Heptachlor epoxide | 93. Endrin ketone |
| 10. Etridiazole | 38. Pronamide | 67. 2,2',3',4,6'-pentachlorobiphenyl | 94. 2,2',3,3',4,4',6'-Octachlorobiphenyl |
| 11. Pebulate | 39. Phenanthrene-d ₁₀ (I.S.) | 68. α -Chlordane | 95. 2,2',3,3',4,5',6'-Octachlorobiphenyl |
| 12. 2,6-dinitrotoluene | 40. Disulfoton | 69. Stirofos | 96. Benzo(a)anthracene |
| 13. Acenaphthylene | 41. Methyl paraoxon | 70. Butachlor | 97. Chrysene-d ₁₂ (I.S.) |
| 14. Acenaphthene-d ₁₀ (I.S.) | 42. Chlorothalonil | 71. Fenamiphos | 98. Chrysene |
| 15. Chlorneb | 43. Phenanthrene | 72. γ -Chlordane | 99. Bis(2-ethylhexyl)phthalate |
| 16. 2-chlorobiphenyl | 44. Terbacil | 73. Endosulfan I | 100. Fenarimol |
| 17. Tebuthiuron | 45. Anthracene | 74. Pyrene | 101. Permethrin (cis/trans) |
| 18. 2,4-dinitrotoluene | 46. δ -BHC | 75. Napropamide | 102. Benzo(b)fluoranthene |
| 19. Molinate | 47. 2,4,5-Trichlorobiphenyl | 76. 4,4'-DDE | 103. Benzo(k)fluoranthene |
| 20. Diethyl phthalate | 48. Metribuzin | 77. 2,2',4,4',5,6'-hexachlorobiphenyl | 104. Benzo(a)pyrene |
| 21. Fluorene | 49. Alachlor | 78. Dieldrin | 105. Perylene-d ₁₂ (surr.) |
| 22. Propachlor | 50. Simetryn | 79. Carboxin | 106. Indeno(1,2,3-cd)pyrene |
| 23. Ethoprop | 51. Ametryn | 80. Endrin | 107. Dibenzo(a,h)anthracene |
| 24. Cycloate | 52. Prometryn | 81. Chlorobenzilate | 108. Benzo(g,h,i)perylene |
| 25. Trifluralin | 53. Heptachlor | 82. Endosulfan II | |
| 26. Chlorpropham | 54. Terbutryn | 83. 4,4'-DDD | |
| 27. α -BHC | 55. Di-n-butyl phthalate | 84. Endrin aldehyde | |
| 28. 2,3-dichlorobiphenyl | 56. Bromacil | | |
| | 57. 2,2',4,4'-tetrachlorobiphenyl | | |



US EPA Method 525.2: GC Analysis of Semivolatiles on the SLB®-5ms [Fast GC Analysis]

column SLB-5ms, 20 m x 0.18 mm I.D., 0.18 µm (28564-U)
 oven 45 °C, 86 °C/min. to 130 °C (1.73 min.), 20 °C/min. to 180 °C, 12 °C/min. to 240 °C, 20 °C/min. to 330 °C (2 min.)
 inj. temp. 275 °C
 MSD interface 330 °C
 scan range m/z = 40-450
 carrier gas helium, 1.4 mL/min., constant
 injection 1 µL splitless (0.75 min.)
 liner 2 mm I.D. fast FocusLiner™ liner with taper
 sample 109 component semivolatile standard (each analyte at 2 ppm), plus 3 surrogate and 3 internal standard compounds (each at 5 ppm) in ethyl acetate
 Application No. G003969

1. Isophorone	30. Atraton	59. 2,2',4,4'-Tetrachlorobiphenyl	88. 4,4'-DDD
2. 1,3-Dimethyl-2-nitrobenzene (surr.)	31. Prometon	60. Metolachlor	89. Endrin aldehyde
3. Dichlorvos	32. Simazine	61. Chloropyrifos	90. Norflurazon
4. Hexachlorocyclopentadiene	33. Atrazine	62. Aldrin	91. Endosulfan sulfate
5. EPTC	34. β-BHC	63. Cyanazine	92. Butyl benzyl phthalate
6. Mevinphos	35. Pentachlorophenol (8 ppm)	64. Dacthal	93. 4,4'-DDT
7. Butylate	36. Propazine	65. Triademefon	94. Hexazinone
8. Vernolate	37. γ-BHC	66. Diphenamid	95. Bis(2-ethylhexyl)adipate
9. Dimethyl phthalate	38. Terbufos	67. MGK 264	96. Triphenylphosphate (surr.)
10. Etridiazole	39. Pronamide	68. Heptachlor epoxide	97. Endrin ketone
11. 2,6-Dinitrotoluene	40. Phenanthrene-d ₁₀ (I.S.)	69. 2,2',3',4,6'-Pentachlorobiphenyl	98. 2,2',3,3',4,4',6-Heptachlorobiphenyl
12. Pebulate	41. Diazinon	70. Merphos	99. Benzo(a)anthracene
13. Acenaphthylene	42. Phenanthrene	71. α-Chlordane	100. Chrysene-d ₁₂ (I.S.)
14. Acenaphthene-d ₁₀ (I.S.)	43. Chlorothalonil	72. Stirofos	101. 2,2',3,3',4,5',6,6'-Octachlorobiphenyl
15. 2-Chlorobiphenyl	44. Disulfoton	73. Butachlor	102. Chrysene
16. Chloroneb	45. Anthracene	74. Pyrene	103. Methoxychlor
17. Tebuthiuron	46. Methyl paraoxon	75. γ-Chlordane	104. Bis(2-ethylhexyl)phthalate
18. 2,4-Dinitrotoluene	47. Terbacil	76. Endosulfan I	105. Fenarimol
19. Molinate	48. δ-BHC	77. trans-Nonachlor	106. cis-Permethrin
20. Diethyl phthalate	49. 2,4,5-Trichlorobiphenyl	78. Napropamide	107. trans-Permethrin
21. Fluorene	50. Metribuzin	79. Fenamiphos	108. Benzo(b)fluoranthene
22. Propachlor	51. Alachlor	80. Tricyclazone	109. Benzo(k)fluoranthene
23. Ethoprop	52. Simetryn	81. 4,4'-DDE	110. Benzo(a)pyrene
24. Cycloate	53. Heptachlor	82. Dieldrin	111. Perylene-d ₁₂ (surr.)
25. Chlorpropham	54. Ametryn	83. 2,2',4,4',5,6'-Hexachlorobiphenyl	112. Fluoridone
26. Trifluralin	55. Prometryn	84. Carboxin	113. Indeno(1,2,3-cd)pyrene
27. α-BHC	56. Terbutryn	85. Endrin	114. Dibenzo(a,h)anthracene
28. 2,3-Dichlorobiphenyl	57. Di-n-butyl phthalate	86. Chlorbenzilate	115. Benzo(g,h,i)perylene
29. Hexachlorobenzene	58. Bromacil	87. Endosulfan II	



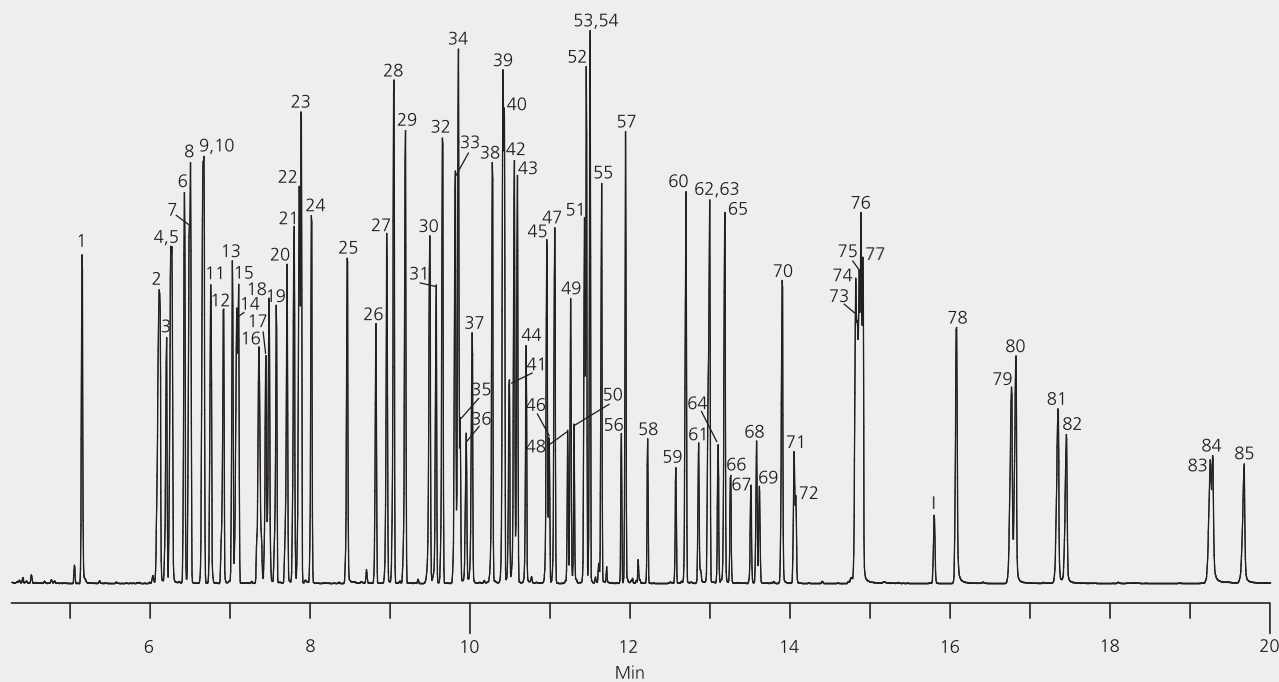
GC Applications

Semivolatiles

US EPA Method 625: GC Analysis of Semivolatiles on the SLB®-5ms

column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 μ m (28471-U)
 oven 40 °C (2 min), 22 °C/min. to 240 °C, 10 °C/min. to 330 °C (5 min.)
 inj. temp. 250 °C
 MSD interface 330 °C
 scan range m/z = 40-450
 carrier gas helium, 1 mL/min. constant (10 min.), ramped to 1.5 mL/min., hold for remainder of run
 injection 1 μ L, pulsed (15 psi until 0.10 min.) splitless (0.50 min.)
 liner 4 mm I.D., single taper
 sample 79 component semivolatile standard (each at 50 ppm), plus 6 internal standards (each at 40 ppm) in methylene chloride
 Application No. G003738

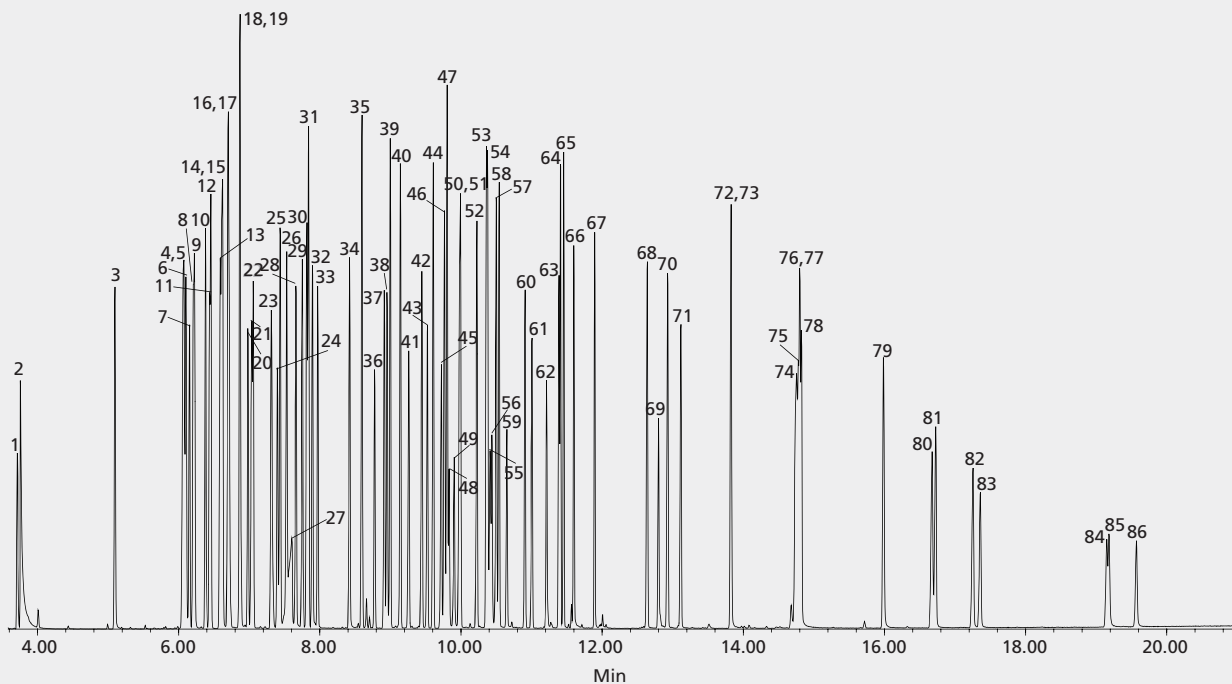
- | | | | |
|---|---|---------------------------------------|-------------------------------------|
| 1. 2-fluorophenol (surr.) | 23. Naphthalene | 45. 4-bromophenyl phenyl ether | 67. Endrin |
| 2. Phenol-d ₆ (surr.) | 24. Hexachlorobutadiene | 46. a-BHC | 68. 4,4'-DDD |
| 3. Bis(2-chloroethyl)ether | 25. 4-chloro-3-methylphenol | 47. Hexachlorobenzene | 69. Endosulfan II |
| 4. 2-chlorophenol-d ₄ (surr.) | 26. Hexachlorocyclopentadiene | 48. b-BHC | 70. Butylbenzyl phthalate |
| 5. 2-chlorophenol | 27. 2,4,6-trichlorophenol | 49. Pentachlorophenol | 71. 4,4'-DDT |
| 6. 1,3-dichlorobenzene | 28. 2-fluorobiphenyl (surr.) | 50. g-BHC | 72. Endosulfan sulfate |
| 7. 1,4-dichlorobenzene-d ₄ (I.S.) | 29. 2-chloronaphthalene | 51. Phenanthrene-d10 (I.S.) | 73. 3,3'-dichlorobenzidine |
| 8. 1,4-dichlorobenzene | 30. Dimethyl phthalate | 52. Phenanthrene | 74. Benzo(a)anthracene |
| 9. 1,2-dichlorobenzene-d ₄ (surr.) | 31. 2,6-dinitrotoluene | 53. d-BHC | 75. Chrysene-d ₁₂ (I.S.) |
| 10. 1,2-dichlorobenzene | 32. Acenaphthylene | 54. Anthracene | 76. Bis(2-ethylhexyl)phthalate |
| 11. Bis(2-chloroisopropyl)ether | 33. Acenaphthene-d ₁₀ (I.S.) | 55. Carbazole | 77. Chrysene |
| 12. n-Nitroso-di-n-propylamine | 34. Acenaphthene | 56. Heptachlor | 78. Di-n-octyl phthalate |
| 13. Hexachlorothane | 35. 2,4-dinitrophenol | 57. Di-n-butyl phthalate | 79. Benzo(b)fluoranthene |
| 14. Nitrobenzene-d ₅ (surr.) | 36. 4-nitrophenol | 58. Aldrin | 80. Benzo(k)fluoranthene |
| 15. Nitrobenzene | 37. 2,4-dinitrotoluene | 59. Heptachlor epoxide | 81. Benzo(a)pyrene |
| 16. Isophorone | 38. Diethyl phthalate | 60. Fluoranthene | 82. Perylene-d ₁₂ (I.S.) |
| 17. 2-nitrophenol | 39. 4-chlorophenyl phenyl ether | 61. Benzidine | 83. Indeno(1,2,3-cd)pyrene |
| 18. 2,4-dimethylphenol | 40. Fluorene | 62. Endosulfan I | 84. Dibenzo(a,h)anthracene |
| 19. Bis(2-chloroethoxy)methane | 41. 2-methyl-4,6-dinitrophenol | 63. Pyrene | 85. Benzo(g,h,i)perylene |
| 20. 2,4-dichlorophenol | 42. n-Nitrosodiphenylamine | 64. 4,4'-DDE | |
| 21. 1,2,4-trichlorobenzene | 43. Azobenzene | 65. Terphenyl-d ₁₄ (surr.) | |
| 22. Naphthalene-d ₈ | 44. 2,4,6-tribromophenol (surr.) | 66. Dieldrin | |



US EPA Method 8270: GC Analysis of Semivolatiles on the SLB®-5ms

..... compound class: semivolatiles
 column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 μ m (28471-U)
 oven 40 °C (2 min.), 22 °C/min. to 240 °C, 10 °C/min. to 330 °C, (1 min.)
 inj. temp. 250 °C
 MSD interface 330 °C
 scan range m/z = 40-450
 carrier gas helium, 1.0 mL/min. (11 min.), 10 mL/min² to 1.5 mL/min. (hold remainder of run)
 injection 0.5 μ L, splitless (0.50 min.)
 liner 2 mm I.D., straight
 sample 50 ng on-column of a 72 component semivolatile standard and 8 surrogate compounds, plus 6 internal standards (at 40 ng on-column)
 Application No. G003533

- | | | | |
|--|---------------------------------------|---|---------------------------------------|
| 1. N-nitrosodimethylamine | 23. Isophorone | 45. 3-nitroaniline | 67. Di-n-butyl phthalate |
| 2. Pyridine | 24. 2-nitrophenol | 46. Acenaphthene-d ₁₀ (I.S.) | 68. Fluoranthene |
| 3. 2-fluorophenol (surr.) | 25. 2,4-dimethylphenol | 47. Acenaphthene | 69. Benzidine |
| 4. Phenol-d ₆ (surr.) | 26. Bis(2-chloroethoxy)methane | 48. 2,4-dinitrophenol | 70. Pyrene |
| 5. Phenol | 27. Benzoic acid | 49. 4-nitrophenol | 71. Terphenyl-d ₁₄ (surr.) |
| 6. Aniline | 28. 2,4-dichlorophenol | 50. Dibenzofuran | 72. 3,3'-dimethylbenzidine |
| 7. Bis(2-chloroethyl)ether | 29. 1,2,4-trichlorobenzene | 51. 2,4-dinitrotoluene | 73. Butylbenzyl phthalate |
| 8. 2-chlorophenol-d ₄ (surr.) | 30. Naphthalene-d ₈ (I.S.) | 52. Diethyl phthalate | 74. 3,3'-dichlorobenzidine |
| 9. 2-chlorophenol | 31. Naphthalene | 53. 4-chlorophenyl phenyl ether | 75. Benzo(a)anthracene |
| 10. 1,3-dichlorobenzene | 32. 4-chloroaniline | 54. Fluorene | 76. Bis(2-ethylhexyl)phthalate |
| 11. 1,4-dichlorobenzene-d ₄ (I.S.) | 33. Hexachlorobutadiene | 55. 4-nitroaniline | 77. Chrysene-d ₁₂ (I.S.) |
| 12. 1,4-dichlorobenzene | 34. 4-chloro-3-methylphenol | 56. 2-methyl-4,6-dinitrophenol | 78. Chrysene |
| 13. Benzyl alcohol | 35. 2-methylnaphthalene | 57. N-nitrosodiphenylamine | 79. Di-n-octyl phthalate |
| 14. 1,2-dichlorobenzene-d ₄ (surr.) | 36. Hexachlorocyclopentadiene | 58. Azobenzene | 80. Benzo(b)fluoranthene |
| 15. 1,2-dichlorobenzene | 37. 2,4,6-trichlorophenol | 59. 2,4,6-tribromophenol (surr.) | 81. Benzo(k)fluoranthene |
| 16. 2-methylphenol | 38. 2,4,5-trichlorophenol | 60. 4-bromophenyl phenyl ether | 82. Benzo(a)pyrene |
| 17. Bis(2-chloroisopropyl)ether | 39. 2-fluorobiphenyl (surr.) | 61. Hexachlorobenzene | 83. Perylene-d ₁₂ (I.S.) |
| 18. N-nitroso-di-n-propylamine | 40. 2-chloronaphthalene | 62. Pentachlorophenol | 84. Indeno(1,2,3-cd)pyrene |
| 19. 4-methylphenol | 41. 2-nitroaniline | 63. Phenanthrene-d ₁₀ (I.S.) | 85. Dibenzo(a,h)anthracene |
| 20. Hexachloroethane | 42. Dimethyl phthalate | 64. Phenanthrene | 86. Benzo(g,h,i)perylene |
| 21. Nitrobenzene-d ₅ (surr.) | 43. 2,6-dinitrotoluene | 65. Anthracene | |
| 22. Nitrobenzene | 44. Acenaphthylene | 66. Carbazole | |



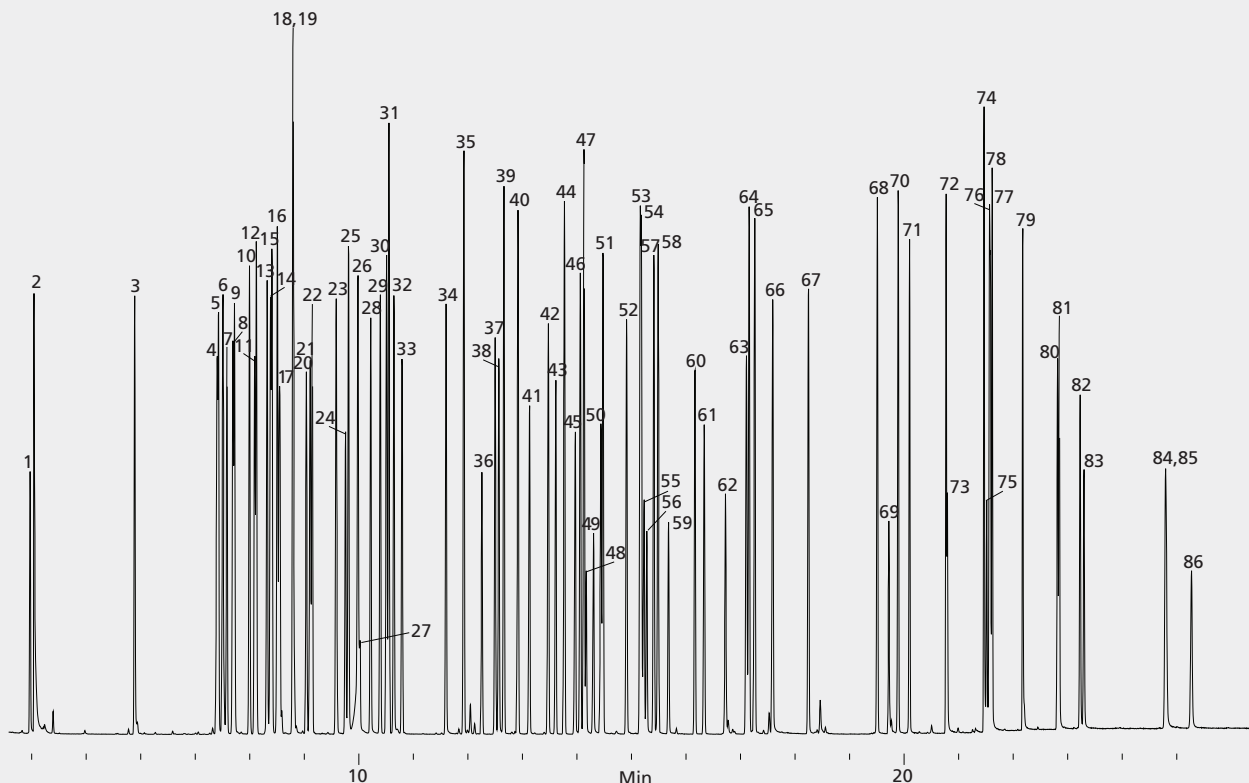
GC Applications

Semivolatiles

US EPA Method 8270: GC Analysis of Semivolatiles on the SLB®-5ms, 0.25 mm x 0.50 µm

column SLB-5ms, 30 m x 0.25 mm I.D., 0.50 µm (28473-U)
 oven 40 °C (1 min), 12 °C/min. to 250 °C, 25 °C/min. to 340 °C (4.5 min.)
 inj. temp. 250 °C
 MSD interface 340 °C
 scan range m/z = 40-450
 carrier gas helium, 1.5 mL/min constant flow
 injection 1.0 µL, splitless (0.50 min.)
 liner 4 mm I.D., single taper
 sample 50 ng on-column of a 72 component semivolatile standard and 8 surrogate compounds, plus 6 internal standards (at 40 ng on-column)
 Application No. G003578

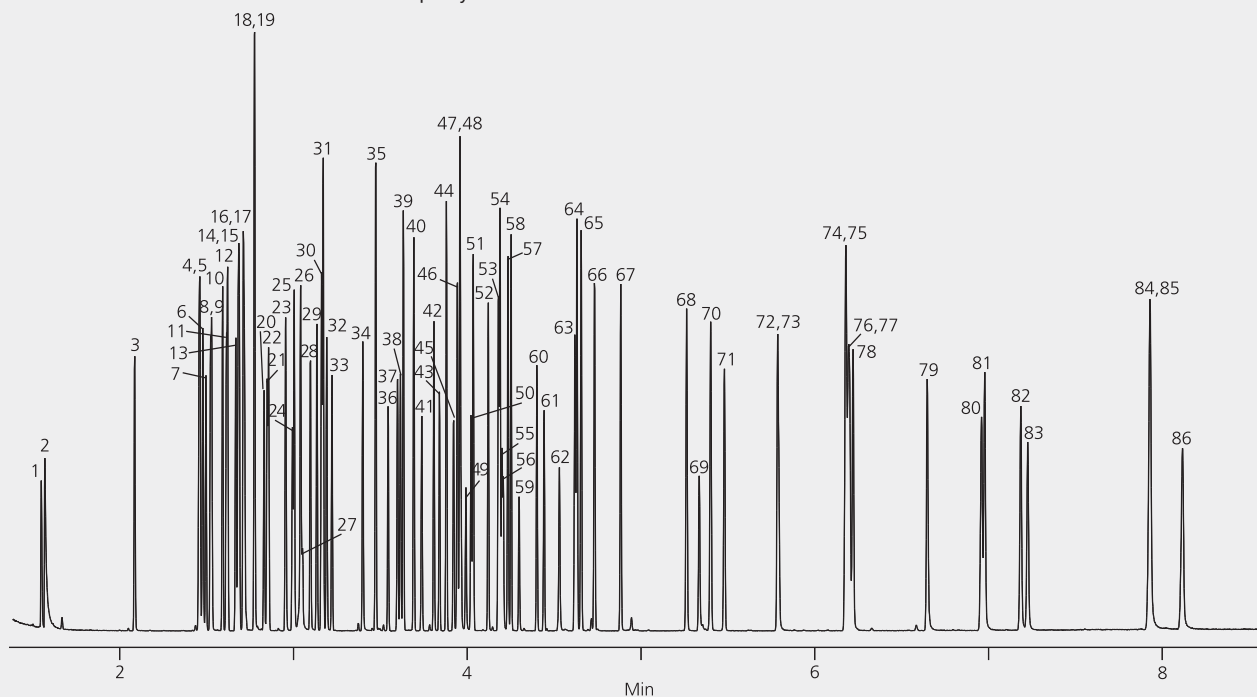
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|--|---------------------------------------|---|---------------------------------------|
| 1. N-nitrosodimethylamine | 23. Isophorone | 45. 3-nitroaniline | 67. Di-n-butyl phthalate |
| 2. Pyridine | 24. 2-nitrophenol | 46. Acenaphthene-d ₁₀ (I.S.) | 68. Fluoranthene |
| 3. 2-fluorophenol (surr.) | 25. 2,4-dimethylphenol | 47. Acenaphthene | 69. Benzidine |
| 4. Phenol-d ₆ (surr.) | 26. Bis(2-chloroethoxymethane) | 48. 2,4-dinitrophenol | 70. Pyrene |
| 5. Phenol | 27. Benzoic acid | 49. 4-nitrophenol | 71. Terphenyl-d ₁₄ (surr.) |
| 6. Aniline | 28. 2,4-dichlorophenol | 50. 2,4-dinitrotoluene | 72. Butylbenzyl phthalate |
| 7. Bis(2-chloroethyl)ether | 29. 1,2,4-trichlorobenzene | 51. Dibenzofuran | 73. 3,3'-dimethylbenzidine |
| 8. 2-chlorophenol-d ₄ (surr.) | 30. Naphthalene-d ₈ (I.S.) | 52. Diethyl phthalate | 74. Bis(2-ethylhexyl)phthalate |
| 9. 2-chlorophenol | 31. Naphthalene | 53. 4-chlorophenyl phenyl ether | 75. 3,3'-dichlorobenzidine |
| 10. 1,3-dichlorobenzene | 32. 4-chloroaniline | 54. Fluorene | 76. Benzo(a)anthracene |
| 11. 1,4-dichlorobenzene-d ₄ (I.S.) | 33. Hexachlorobutadiene | 55. 4-nitroaniline | 77. Chrysene-d ₁₂ (I.S.) |
| 12. 1,4-dichlorobenzene | 34. 4-chloro-3-methylphenol | 56. 2-methyl-4,6-dinitrophenol | 78. Chrysene |
| 13. Benzyl alcohol | 35. 2-methylnaphthalene | 57. N-nitrosodiphenylamine | 79. Di-n-octyl phthalate |
| 14. 1,2-dichlorobenzene-d ₄ (surr.) | 36. Hexachlorocyclopentadiene | 58. Azobenzene | 80. Benzo(b)fluoranthene |
| 15. 1,2-dichlorobenzene | 37. 2,4,6-trichlorophenol | 59. 2,4,6-tribromophenol (surr.) | 81. Benzo(k)fluoranthene |
| 16. 2-methylphenol | 38. 2,4,5-trichlorophenol | 60. 4-bromophenyl phenyl ether | 82. Benzo(a)pyrene |
| 17. Bis(2-chloroisopropyl)ether | 39. 2-fluorobiphenyl (surr.) | 61. Hexachlorobenzene | 83. Perylene-d ₁₂ (I.S.) |
| 18. N-nitroso-di-n-propylamine | 40. 2-chloronaphthalene | 62. Pentachlorophenol | 84. Indeno(1,2,3-cd)pyrene |
| 19. 4-methylphenol | 41. 2-nitroaniline | 63. Phenanthrene-d ₁₀ (I.S.) | 85. Dibenzo(a,h)anthracene |
| 20. Hexachloroethane | 42. Dimethyl phthalate | 64. Phenanthrene | 86. Benzo(g,h,i)perylene |
| 21. Nitrobenzene-d ₅ (surr.) | 43. 2,6-dinitrotoluene | 65. Anthracene | |
| 22. Nitrobenzene | 44. Acenaphthylene | 66. Carbazole | |



US EPA Method 8270: GC Analysis of Semivolatiles on the SLB®-5ms [Fast GC Analysis]

column SLB-5ms, 20 m x 0.18 mm I.D., 0.18 μ m (28564-U)
 oven 40 °C (0.7 min.), 55 °C/min. to 240 °C, 28 °C/min. to 330 °C (2 min.)
 inj. temp. 250 °C
 MSD interface 330 °C
 scan range m/z = 40-450
 carrier gas helium, 40 cm/sec, constant
 injection 0.5 μ L, 10:1 split
 liner 2 mm I.D., fast FocusLiner™ liner with taper (2879501-U)
 sample 80 component semivolatile standard at 50 ppm plus 6 internal standards (at 40 ppm) in methylene chloride
 Application No. G003739

- | | | | |
|--|---------------------------------------|---|--------------------------------------|
| 1. N-nitrosodimethylamine | 23. Isophorone | 45. 2,6-dinitrotoluene | 67. Di-n-butyl phthalate |
| 2. Pyridine | 24. 2-nitrophenol | 46. Acenaphthene-d10 (I.S.) | 68. Fluoranthene |
| 3. 2-fluorophenol (surr.) | 25. 2,4-dimethylphenol | 47. Acenaphthene | 69. Benzidine |
| 4. Phenol-d ₆ (surr.) | 26. Bis(2-chloroethoxymethane) | 48. 2,4-dinitrophenol | 70. Pyrene |
| 5. Phenol | 27. Benzoic acid | 49. 4-nitrophenol | 71. Terphenyl-d ₄ (surr.) |
| 6. Aniline | 28. 2,4-dichlorophenol | 50. 2,4-dinitrotoluene | 72. 3,3'-dimethylbenzidine |
| 7. Bis(2-chloroethyl)ether | 29. 1,2,4-trichlorobenzene | 51. Dibenzofuran | 73. Butylbenzyl phthalate |
| 8. 2-chlorophenol-d ₄ (surr.) | 30. Naphthalene-d ₈ (I.S.) | 52. Diethyl phthalate | 74. 3,3'-dichlorobenzidine |
| 9. 2-chlorophenol | 31. Naphthalene | 53. 4-chlorophenyl phenyl ether | 75. Bis(2-ethylhexyl)phthalate |
| 10. 1,3-dichlorobenzene | 32. 4-chloroaniline | 54. Fluorene | 76. Benzo(a)anthracene |
| 11. 1,4-dichlorobenzene | 33. Hexachlorobutadiene | 55. 4-nitroaniline | 77. Chrysene-d ₁₂ (I.S.) |
| 12. 1,4-dichlorobenzene-d ₄ (I.S.) | 34. 4-chloro-3-methylphenol | 56. 2-methyl-4,6-dinitrophenol | 78. Chrysene |
| 13. Benzyl alcohol | 35. 2-methylnaphthalene | 57. N-nitrosodiphenylamine | 79. Di-n-octyl phthalate |
| 14. 1,2-dichlorobenzene-d ₄ (surr.) | 36. Hexachlorocyclopentadiene | 58. Azobenzene | 80. Benzo(b)fluoranthene |
| 15. 1,2-dichlorobenzene | 37. 2,4,6-trichlorophenol | 59. 2,4,6-tribromophenol (surr.) | 81. Benzo(k)fluoranthene |
| 16. 2-methylphenol | 38. 2,4,5-trichlorophenol | 60. 4-bromophenyl phenyl ether | 82. Benzo(a)pyrene |
| 17. Bis(2-chloroisopropyl)ether | 39. 2-fluorobiphenyl (surr.) | 61. Hexachlorobenzene | 83. Perylene-d ₁₂ (I.S.) |
| 18. N-nitroso-di-n-propylamine | 40. 2-chloronaphthalene | 62. Pentachlorophenol | 84. Indeno(1,2,3-cd)pyrene |
| 19. 4-methylphenol | 41. 2-nitroaniline | 63. Phenanthrene-d ₁₀ (I.S.) | 85. Dibenzo(a,h)anthracene |
| 20. Hexachloroethane | 42. Dimethyl phthalate | 64. Phenanthrene | 86. Benzo(g,h,i)perylene |
| 21. Nitrobenzene-d ₅ (surr.) | 43. 3-nitroaniline | 65. Anthracene | |
| 22. Nitrobenzene | 44. Acenaphthylene | 66. Carbazole | |



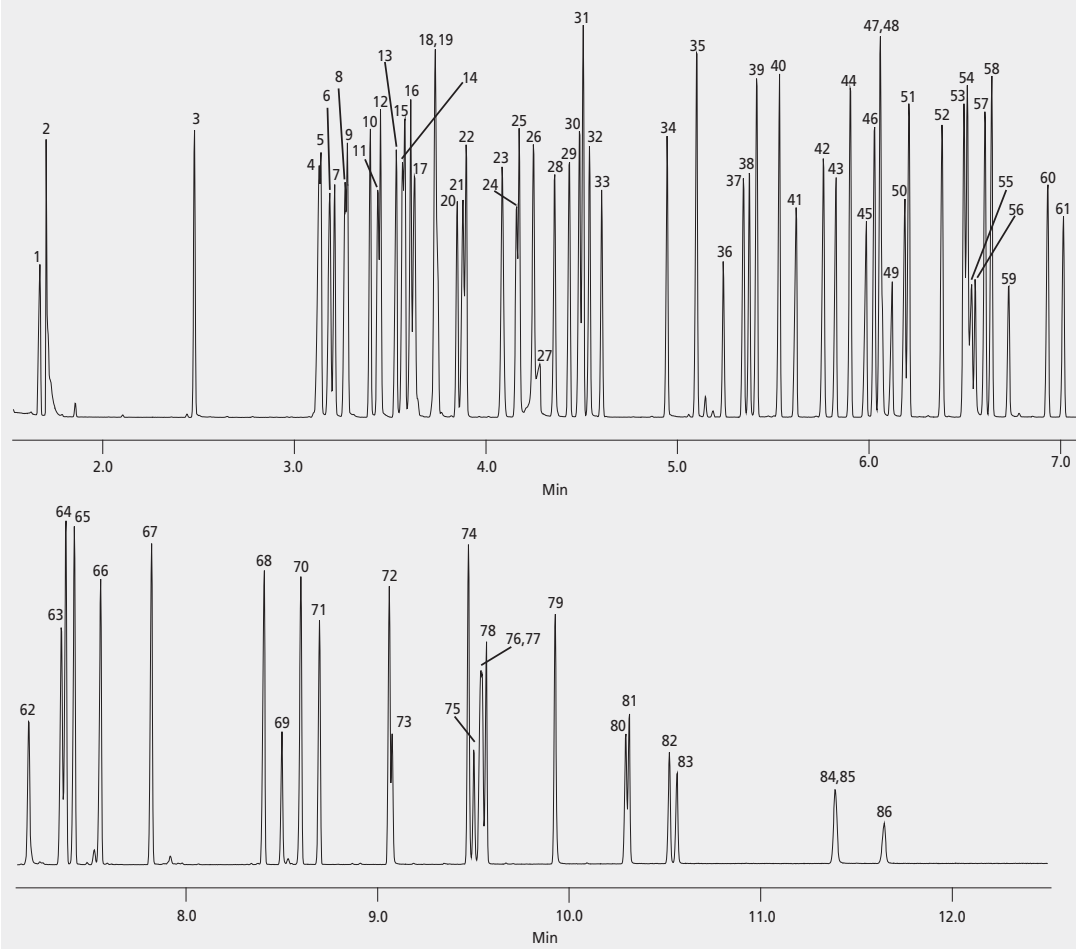
GC Applications

Semivolatiles

US EPA Method 8270: GC Analysis of Semivolatiles on the SLB®-5ms, 0.18 mm x 0.36 µm [Fast GC Analysis]

column SLB-5ms, 20 m x 0.18 mm I.D., 0.36 µm (28576-U)
 oven 50 °C (0.50 min.), 28 °C/min. to 250 °C, 35 °C/min. to 340 °C (5 min.)
 inj. temp. 250 °C
 MSD interface 340 °C
 scan range m/z = 40-450
 carrier gas helium, 1.4 mL/min. constant
 injection 0.50 µL, reduced pressure to 20 psi at injection (0.1 min.) (splitter open at 0.75 min.)
 liner 2 mm I.D., straight
 sample 80 component semivolatile standard at 50 ppm, plus 6 internal standards (at 40 ppm) in methylene chloride
 Application No. G003901

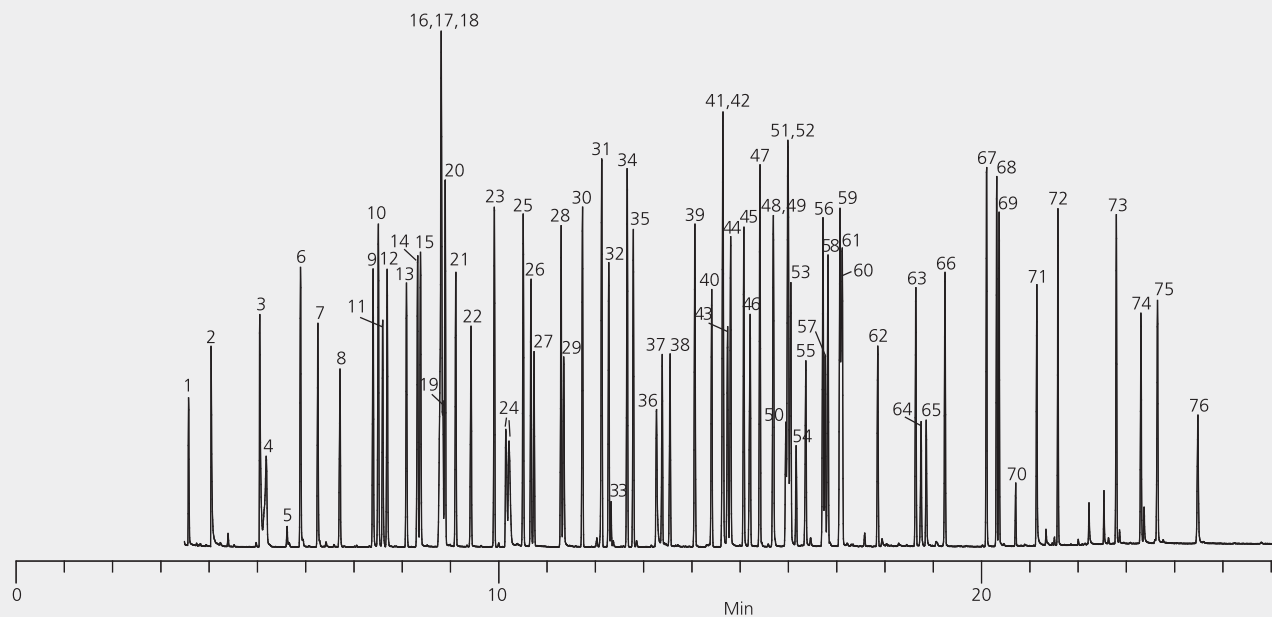
- | | | | |
|------------------------------------|--------------------------------|----------------------------------|--------------------------------|
| 1. N-Nitrosodimethylamine | 23. Isophorone | 45. 3-Nitroaniline | 67. Di-n-butyl phthalate |
| 2. Pyridine | 24. 2-Nitrophenol | 46. Acenaphthene-d10 (I.S.) | 68. Fluoranthene |
| 3. 2-Fluorophenol (surr.) | 25. 2,4-Dimethylphenol | 47. Acenaphthene | 69. Benzidine |
| 4. Phenol-d6 (surr.) | 26. Bis(2-chloroethoxymethane) | 48. 2,4-Dinitrophenol | 70. Pyrene |
| 5. Phenol | 27. Benzoic acid | 49. 4-Nitrophenol | 71. Terphenyl-d14 (surr.) |
| 6. Aniline | 28. 2,4-Dichlorophenol | 50. 2,4-Dinitrotoluene | 72. Butylbenzyl phthalate |
| 7. Bis(2-chloroethyl)ether | 29. 1,2,4-Trichlorobenzene | 51. Dibenzofuran | 73. 3,3'-Dimethylbenzidine |
| 8. 2-Chlorophenol-d4 (surr.) | 30. Naphthalene-d8 (I.S.) | 52. Diethyl phthalate | 74. Bis(2-ethylhexyl)phthalate |
| 9. 2-Chlorophenol | 31. Naphthalene | 53. 4-Chlorophenyl phenyl ether | 75. 3,3'-Dichlorobenzidine |
| 10. 1,3-Dichlorobenzene | 32. 4-Chloroaniline | 54. Fluorene | 76. Benzo(a)anthracene |
| 11. 1,4-Dichlorobenzene-d4 (I.S.) | 33. Hexachlorobutadiene | 55. 4-Nitroaniline | 77. Chrysene-d12 (I.S.) |
| 12. 1,4-Dichlorobenzene | 34. 4-Chloro-3-methylphenol | 56. 2-Methyl-4,6-dinitrophenol | 78. Chrysene |
| 13. Benzyl alcohol | 35. 2-Methylnaphthalene | 57. N-Nitrosodiphenylamine | 79. Di-n-octyl phthalate |
| 14. 1,2-Dichlorobenzene-d4 (surr.) | 36. Hexachlorocyclopentadiene | 58. Azobenzene | 80. Benzo(b)fluoranthene |
| 15. 1,2-Dichlorobenzene | 37. 2,4,6-Trichlorophenol | 59. 2,4,6-Tribromophenol (surr.) | 81. Benzo(k)fluoranthene |
| 16. 2-Methylphenol | 38. 2,4,5-Trichlorophenol | 60. 4-Bromophenyl phenyl ether | 82. Benzo(a)pyrene |
| 17. Bis(2-chloroisopropyl)ether | 39. 2-Fluorobiphenyl (surr.) | 61. Hexachlorobenzene | 83. Perylene-d12 (I.S.) |
| 18. 4-Methylphenol | 40. 2-Chloronaphthalene | 62. Pentachlorophenol | 84. Indeno(1,2,3-cd)pyrene |
| 19. N-Nitroso-di-n-propylamine | 41. 2-Nitroaniline | 63. Phenanthrene-d10 (I.S.) | 85. Dibenzo(a,h)anthracene |
| 20. Hexachloroethane | 42. Dimethyl phthalate | 64. Phenanthrene | 86. Benzo(g,h,i)perylene |
| 21. Nitrobenzene-d5 (surr.) | 43. 2,6-Dinitrotoluene | 65. Anthracene | |
| 22. Nitrobenzene | 44. Acenaphthylene | 66. Carbazole | |



US EPA Method 8270 Appendix IX: GC Analysis of Semivolatiles on the SLB®-5ms

column SLB-5ms, 30 m x 0.25 mm I.D., 0.50 µm (28473-U)
 oven 40 °C (1 min), 12 °C/min. to 250 °C, 25 °C/min. to 340 °C (4.5 min.)
 inj. temp. 250 °C
 MSD interface 340 °C
 scan range m/z = 40-450
 carrier gas helium, 1.5 mL/min constant
 injection 1.0 µL, splitless (0.50 min.)
 liner 4 mm I.D., single taper
 sample 50 ng on-column of a 62 component semivolatile standard and 8 surrogate compounds, plus 6 internal standards (at 40 ng on-column)
 Application No. G003746

- | | | | |
|--|---|---|---|
| 1. 1,4-dioxane | 21. Nitrobenzene-d ₅ (surr.) | 41. 2,3,5,6-tetrachlorophenol | 60. Dinoseb |
| 2. Pyridine | 22. N-nitrosopiperidine | 42. 1-naphthylamine | 61. Phenanthrene-d ₁₀ (I.S.) |
| 3. 2-picoline | 23. O,O,O-triethyl phosphorothioate | 43. 2,3,4,6-tetrachlorophenol | 62. Methyl parathion |
| 4. N-nitrosomethylethylamine | 24. α,α-Dimethylphenethylamine | 44. 2-naphthylamine | 63. Parathion |
| 5. Methyl methanesulfonate | 25. Naphthalene-d ₈ (I.S.) | 45. Thionazin | 64. 4-nitroquinoline-1-oxide |
| 6. 2-fluorophenol (surr.) | 26. 2,6-dichlorophenol | 46. 5-nitro-O-toluidine | 65. Methapyrilene |
| 7. N-nitrosodiethylamine | 27. Hexachloropropene | 47. Diphenylamine | 66. Isodrin |
| 8. Ethyl methanesulfonate | 28. n-Nitrosodi-n-butylamine | 48. 2,4,6-tribromophenol | 67. p-Terphenyl-d ₁₄ (surr.) |
| 9. Phenol-d ₆ (surr.) | 29. p-Phenylenediamine | 49. O,O,O,O-tetraethyl dithiopyrophosphate (sulfotep) | 68. 4-dimethylaminoazobenzene |
| 10. Aniline | 30. Safrole | 50. 1,3,5-trinitrobenzene | 69. Chlorobenzilate |
| 11. Pentachloroethane | 31. 1-methylnaphthalene | 51. Phorate | 70. Famphur |
| 12. 2-chlorophenol-d ₄ (surr.) | 32. 1,2,4,5-tetrachlorobenzene | 52. Diallate isomer | 71. 2-acetylaminofluorene |
| 13. 1,4-dichlorobenzene-d ₄ (I.S.) | 33. Isosafrole isomer | 53. Phenacetin | 72. Chrysene-d ₁₂ |
| 14. Benzyl alcohol | 34. 2-fluorobiphenyl (surr.) | 54. Diallate isomer | 73. 7,12-dimethylbenz(a)anthracene |
| 15. 1,2-dichlorobenzene-d ₄ (surr.) | 35. Isosafrole isomer | 55. Dimethoate | 74. Perylene-d ₁₂ (I.S.) |
| 16. N-nitrosopyrrolidine | 36. 1,4-naphthoquinone | 56. 4-aminobiphenyl | 75. 3-methylcholanthrene |
| 17. 3-methylphenol | 37. 1,3-dinitrobenzene | 57. Pentachloronitrobenzene | 76. Dibenz(a,j)acridine |
| 18. Acetophenone | 38. 1,4-dinitrobenzene | 58. Pronamide | |
| 19. N-nitrosomorpholine | 39. Acenaphthene-d ₁₀ (I.S.) | 59. Disulfoton | |
| 20. O-toluidine | 40. Pentachlorobenzene | | |



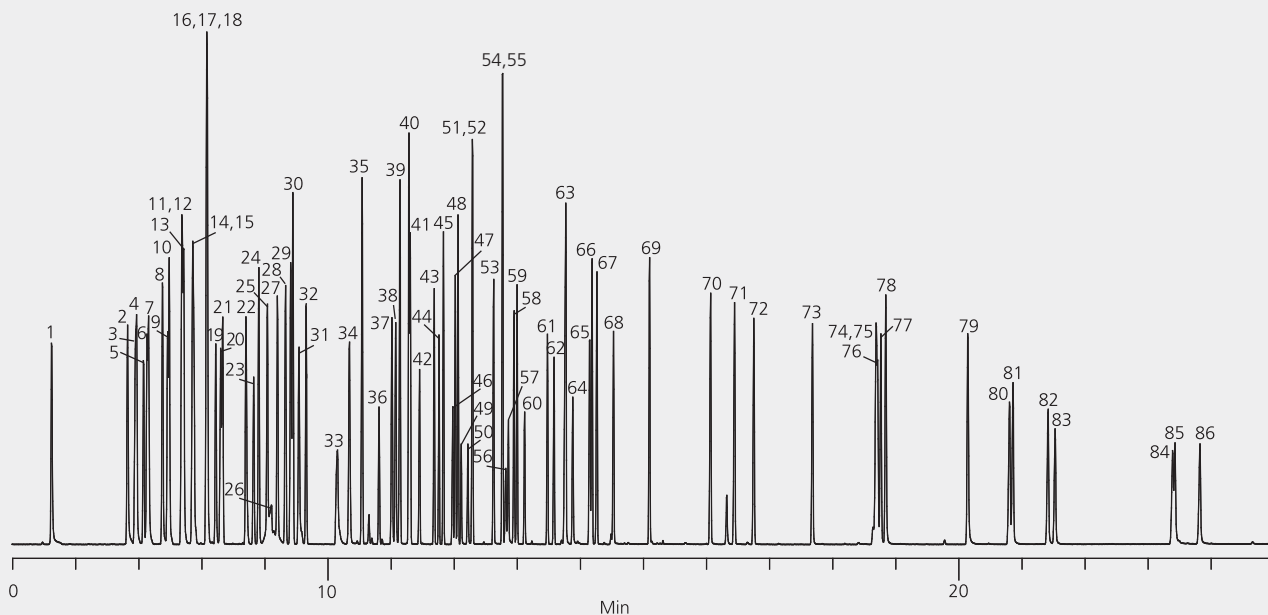
GC Applications

Semivolatiles

US EPA Method OLM04.2 SVOA: GC Analysis of Semivolatiles on the SLB®-5ms

column SLB-5ms, 30 m x 0.25 mm I.D., 0.25 μ m (28471-U)
 oven 40 °C (2 min.), 15 °C/min. to 240 °C, 10 °C/min. to 330 °C (2 min.)
 inj. temp. 250 °C
 MSD interface 330 °C
 scan range m/z = 40-450
 carrier gas helium, 1.0 mL/min. (11 min.), ramp to 1.5 mL/min. (constant for remainder of run)
 injection 1 μ L, pulsed splitless (15 psi until 0.10 min.), (0.75 min.)
 liner 4 mm I.D., single taper
 sample 50 ppm of an 80 component semivolatile standard, plus 6 internal standards (at 40 ppm) in methylene chloride
 Application No. G003745

- | | | | |
|--|---------------------------------------|---|--------------------------------------|
| 1. 2-fluorophenol (surr.) | 23. 2-nitrophenol | 45. Acenaphthylene | 67. Anthracene |
| 2. Benzaldehyde | 24. 2,4-dimethylphenol | 46. 3-nitroaniline | 68. Carbazole |
| 3. Phenol-d ₆ (surr.) | 25. bis(2-chloroethoxy)methane | 47. Acenaphthene-d ₁₀ (I.S.) | 69. Di-n-butyl phthalate |
| 4. Phenol | 26. Benzoic acid | 48. Acenaphthene | 70. Fluoranthene |
| 5. Bis(2-chloroethyl)ether | 27. 2,4-dichlorophenol | 49. 2,4-dinitrophenol | 71. Pyrene |
| 6. 2-chlorophenol-d ₄ (surr.) | 28. 1,2,4-trichlorobenzene | 50. 4-nitrophenol | 72. Terphenyl-d ₄ (surr.) |
| 7. 2-chlorophenol | 29. Naphthalene-d ₈ (I.S.) | 51. 2,4-dinitrotoluene | 73. Butylbenzyl phthalate |
| 8. 1,3-dichlorobenzene | 30. Naphthalene | 52. Dibenzofuran | 74. 3,3'-dichlorobenzidine |
| 9. 1,4-dichlorobenzene-d ₄ (I.S.) | 31. 5-chloroaniline | 53. Diethyl phthalate | 75. Benzo(a)anthracene |
| 10. 1,4-dichlorobenzene | 32. Hexachlorobutadiene | 54. 4-chlorophenyl phenyl ether | 76. Chrysene-d ₁₂ (I.S.) |
| 11. Benzyl alcohol | 33. Caprolactam | 55. Fluorene | 77. Chrysene |
| 12. 1,2-dichlorobenzene (surr.) | 34. 4-chloro-3-methylphenol | 56. 4-nitroaniline | 78. Bis(2-ethylhexyl)phthalate |
| 13. 1,2-dichlorobenzene | 35. 2-methylnaphthalene | 57. 2-methyl-4,6-dinitrophenol | 79. Di-n-octyl phthalate |
| 14. 2-methylphenol | 36. Hexachlorocyclopentadiene | 58. n-Nitrosodiphenylamine | 80. Benzo(b)fluoranthene |
| 15. bis(2-chloroisopropyl)ether | 37. 2,4,6-trichlorophenol | 59. Azobenzene | 81. Benzo(k)fluoranthene |
| 16. 4-methylphenol | 38. 2,4,5-trichlorophenol | 60. 2,4,6-tribromophenol (surr.) | 82. Benzo(a)pyrene |
| 17. n-Nitroso-di-n-propylamine | 39. 2-fluorobiphenyl (surr.) | 61. 4-bromophenyl phenyl ether | 83. Perylene-d ₁₂ (I.S.) |
| 18. Acetophenone | 40. 1,1'-biphenyl | 62. Hexachlorobenzene | 84. Indeno(1,2,3-cd)pyrene |
| 19. Hexachloroethane | 41. 2-chloronaphthalene | 63. Atrazine | 85. Dibenzo(a,h)anthracene |
| 20. Nitrobenzene-d ₅ (surr.) | 42. 2-nitroaniline | 64. Pentachlorophenol | 86. Benzo(g,h,i)perylene |
| 21. Nitrobenzene | 43. Dimethyl phthalate | 65. Phenanthrene-d ₁₀ (I.S.) | |
| 22. Isophorone | 44. 2,6-dinitrotoluene | 66. Phenanthrene | |



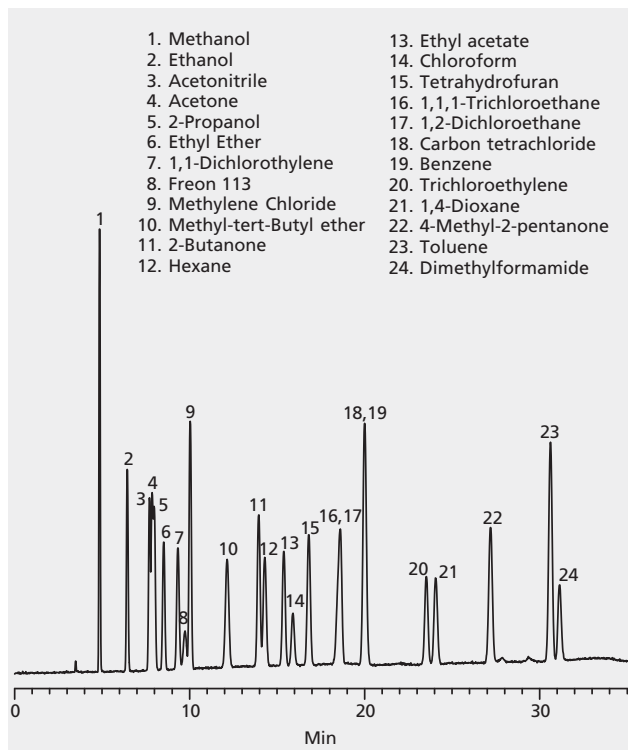
GC Applications

Solvents

Solvents

GC Analysis of Residual Solvents on the Equity®-5

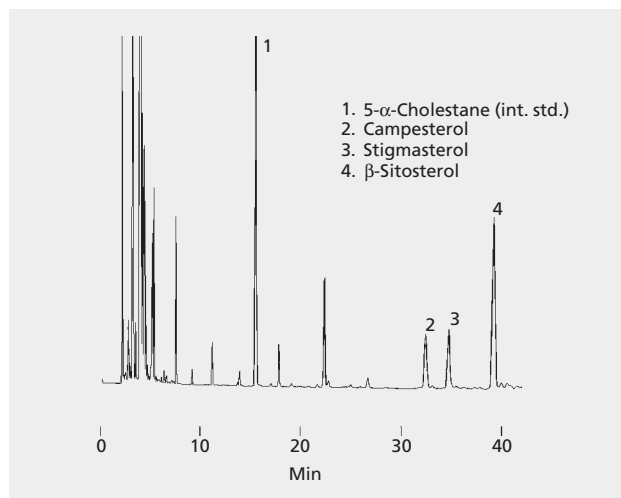
column Equity-5, 30 m x 0.53 mm I.D., 5.0 µm (28279-U)
 oven 40 °C (6 min), 2 °C/min to 100 °C
 inj. temp. 225 °C
 detector FID, 250 °C
 carrier gas helium, 20 cm/sec @ 40 °C
 injection 1 µL, 10:1 split
 liner split, cup design
 sample 5 ng on-column of a 24 component solvent standard in DMSO
 Application No. G001697



Sterols

GC Analysis of Sterols in Soybean Oil on the SAC™-5

column SAC-5, 30 m x 0.25 mm I.D., 0.25 µm (24156)
 oven 265 °C
 inj. temp. 300 °C
 detector FID, 300 °C
 carrier gas helium, 20 cm/sec @ 265 °C
 injection 1 µL, 100:1 split
 sample soybean oil
 Application No. 713-0099



GC Applications

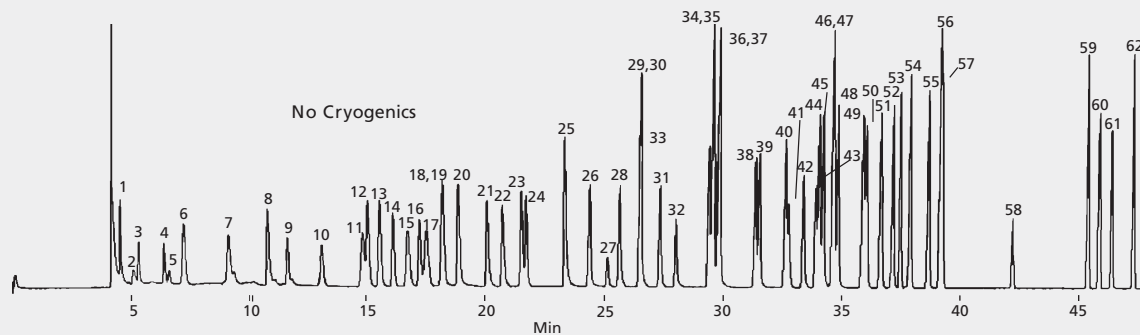
Volatiles

Volatiles

US EPA Method 524.2: GC Analysis of Volatiles on the VOCOL® after Purge & Trap using a "K" Trap

sample/matrix 10 ppb each component in 5 mL water
 purge trap VOCARB 3000 (21066-U)
 purge 40 mL/min. for 11 min.
 dry purge 3 min
 desorption process 250 °C for 4 min.
 bake 280 °C for 10 min.
 column VOCOL, 105 m x 0.53 mm I.D., 3.0 µm (25358)
 oven 35 °C (10 min), 4 °C/min. to 200 °C (10 min.)
 scan range m/z = 35-260 at 0.6 scan/sec
 carrier gas helium, 10 mL/min.
 Application No. 92-0134

- | | | | |
|-------------------------------|-------------------------------|-------------------------------|--|
| 1. Dichlorodifluoromethane | 17. Carbon tetrachloride | 33. Chlorobenzene | 49. tert-Butylbenzene |
| 2. Chloromethane | 18. 1,2-Dichloroethane | 34. 1,1,1,2-Tetrachloroethane | 50. 1,2,4-Trimethylbenzene |
| 3. Vinyl chloride | 19. Benzene | 35. Ethylbenzene | 51. sec-Butylbenzene |
| 4. Bromomethane | 20. Fluorobenzene (int std) | 36. m-Xylene | 52. p-Isopropyltoluene |
| 5. Chloroethane | 21. Trichloroethylene | 37. p-Xylene | 53. 1,3-Dichlorobenzene |
| 6. Trichlorofluoromethane | 22. 1,2-Dichloropropane | 38. o-Xylene | 54. 1,4-Dichlorobenzene |
| 7. 1,1-Dichloroethylene | 23. Bromodichloromethane | 39. Styrene | 55. n-Butylbenzene |
| 8. Methylene chloride | 24. Dibromomethane | 40. Isopropylbenzene | 56. 1,2-Dichlorobenzene-d ₄ (int std) |
| 9. trans-1,2-Dichloroethylene | 25. cis-1,3-Dichloropropene | 41. Bromoform | 57. 1,2-Dichlorobenzene |
| 10. 1,1-Dichloroethane | 26. Toluene | 42. 1,1,2,2-Tetrachloroethane | 58. 1,2-Dibromo-3-chloropropane |
| 11. 2,2-Dichloropropane | 27. trans-1,3-Dichloropropene | 43. 1,2,3-Trichloropropane | 59. 1,2,4-Trichlorobenzene |
| 12. cis-1,2-Dichloroethylene | 28. 1,1,2-Trichloroethane | 44. n-Propylbenzene | 60. Hexachlorobutadiene |
| 13. Chloroform | 29. 1,3-Dichloropropane | 45. Bromobenzene | 61. Naphthalene |
| 14. Bromochloromethane | 30. Tetrachloroethylene | 46. 1,3,5-Trimethylbenzene | 62. 1,2,3-Trichlorobenzene |
| 15. 1,1,1-Trichloroethane | 31. Chlorodibromomethane | 47. 2-Chlorotoluene | |
| 16. 1,1-Dichloropropene | 32. 1,2-Dibromoethane | 48. 4-Chlorotoluene | |



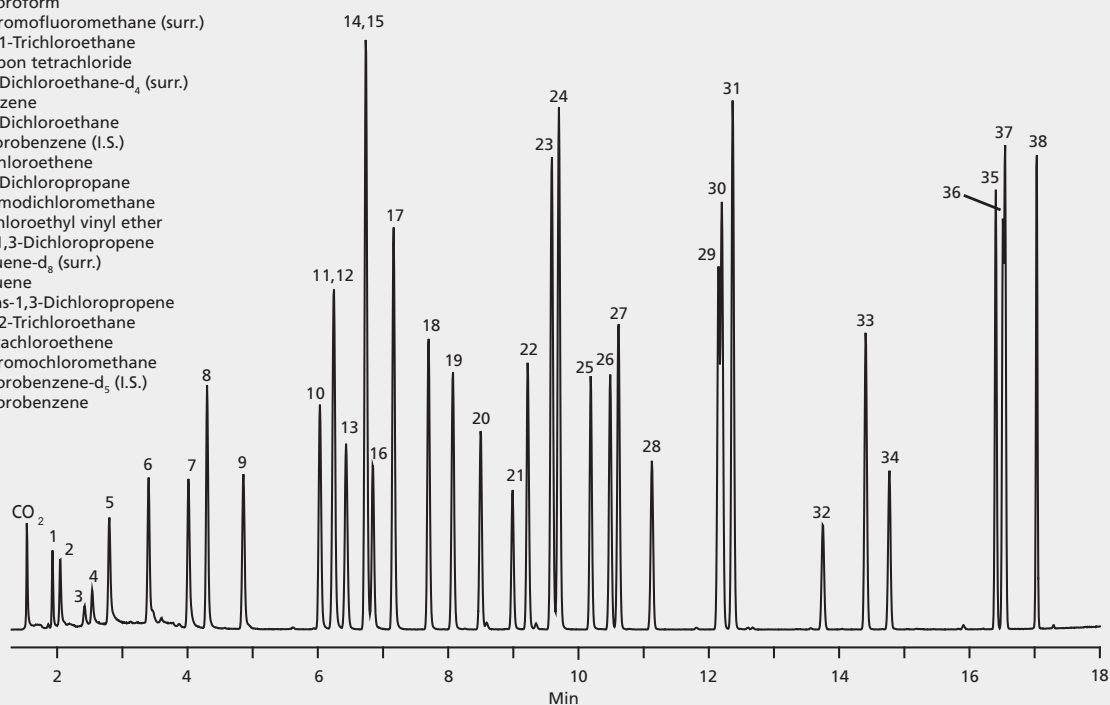
GC Applications

Volatiles

US EPA Method 624: GC Analysis of Volatiles on the SPB®-624 after Purge & Trap using a "K" Trap

sample/matrix each analyte at 50 ppb in 5 mL water
 purge trap VOCARB 3000 "K"
 purge 40 mL/min. at 25 °C for 11 min.
 dry purge 2 min.
 desorption preheat 205 °C
 desorption process 40 mL/min. at 210 °C for 2 min.
 bake 260 °C for 10 min.
 transfer line/valve temp. 110 °C
 column SPB-624, 30 m x 0.25 mm I.D., 1.4 µm (24255)
 oven 40 °C (2 min.), 7 °C/min. to 135 °C, 30 °C/min. to 230 °C (3 min.)
 inj. temp. 150 °C
 MSD interface 200 °C
 scan range m/z = 35-400
 carrier gas helium, 1.1 mL/min.
 injection 30:1 split
 liner 0.75 mm I.D. SPME
 Application No. G004172

- | | |
|---|---|
| 1. Chloromethane | 31. Ethylbenzene |
| 2. Vinyl chloride | 32. Bromoform |
| 3. Bromomethane | 33. 4-Bromofluorobenzene (surr.) |
| 4. Chloroethane | 34. 1,1,2,2-Tetrachloroethane |
| 5. Trichlorofluoromethane | 35. 1,3-Dichlorobenzene |
| 6. 1,1-Dichloroethene | 36. 1,4-Dichlorobenzene-d ₄ (I.S.) |
| 7. Methylene chloride | 37. 1,4-Dichlorobenzene |
| 8. trans-1,2-Dichloroethene | 38. 1,2-Dichlorobenzene |
| 9. 1,1-Dichloroethane | |
| 10. Chloroform | |
| 11. Dibromofluoromethane (surr.) | |
| 12. 1,1,1-Trichloroethane | |
| 13. Carbon tetrachloride | |
| 14. 1,2-Dichloroethane-d ₄ (surr.) | |
| 15. Benzene | |
| 16. 1,2-Dichloroethane | |
| 17. Fluorobenzene (I.S.) | |
| 18. Trichloroethene | |
| 19. 1,2-Dichloropropane | |
| 20. Bromodichloromethane | |
| 21. 2-Chloroethyl vinyl ether | |
| 22. cis-1,3-Dichloropropene | |
| 23. Toluene-d ₈ (surr.) | |
| 24. Toluene | |
| 25. trans-1,3-Dichloropropene | |
| 26. 1,1,2-Trichloroethane | |
| 27. Tetrachloroethene | |
| 28. Dibromochloromethane | |
| 29. Chlorobenzene-d ₅ (I.S.) | |
| 30. Chlorobenzene | |



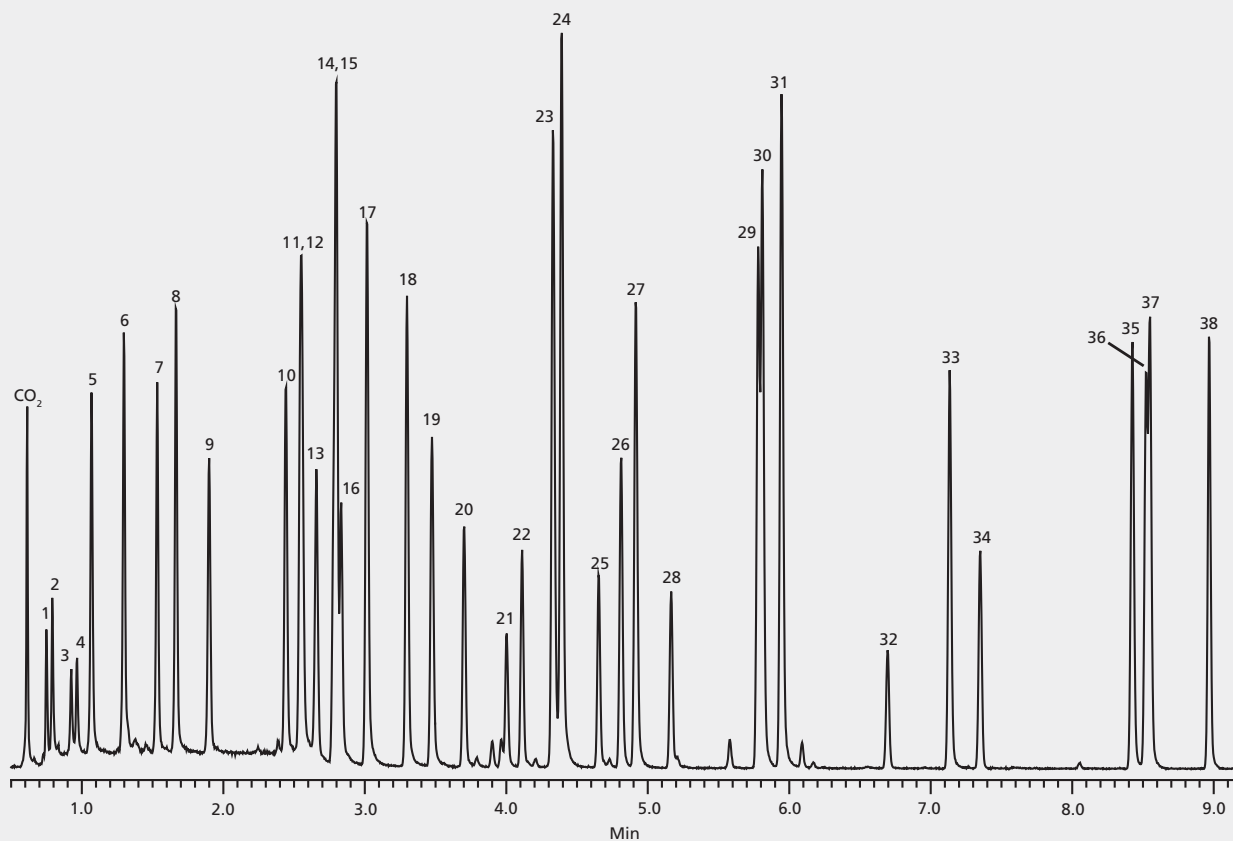
GC Applications

Volatiles

US EPA Method 624: GC Analysis of Volatiles on the SPB®-624 after Purge & Trap using a "K" Trap [Fast GC Analysis]

sample/matrix each analyte at 50 ppb in 5 mL water
 purge trap VOCARB 3000 "K"
 purge 40 mL/min. at 25 °C for 11 min.
 dry purge 2 min.
 desorption preheat 205 °C
 desorption process 150 mL/min. at 210 °C for 2 min.
 bake 260 °C for 10 min.
 transfer line/valve temp. 110 °C
 column SPB-624, 20 m x 0.18 mm I.D., 1.0 µm (28662-U)
 oven 40 °C (1 min), 11 °C/min. to 125 °C, 35 °C/min. to 230 °C (2 min.)
 inj. temp. 150 °C
 MSD interface 200 °C
 scan range m/z = 35-400
 carrier gas helium, 1.5 mL/min.
 injection 100:1 split
 liner 0.75 mm I.D. SPME
 Application No. G004053

- | | | | |
|-----------------------------|---|---|---|
| 1. Chloromethane | 11. Dibromofluoromethane (surr.) | 21. 2-Chloroethyl vinyl ether | 31. Ethylbenzene |
| 2. Vinyl chloride | 12. 1,1,1-Trichloroethane | 22. cis-1,3-Dichloropropene | 32. Bromoform |
| 3. Bromomethane | 13. Carbon tetrachloride | 23. Toluene-d ₈ (surr.) | 33. 4-Bromofluorobenzene (surr.) |
| 4. Chloroethane | 14. 1,2-Dichloroethane-d ₄ (surr.) | 24. Toluene | 34. 1,1,2,2-Tetrachloroethane |
| 5. Trichlorofluoromethane | 15. Benzene | 25. trans-1,3-Dichloropropene | 35. 1,3-Dichlorobenzene |
| 6. 1,1-Dichloroethene | 16. 1,2-Dichloroethane | 26. 1,1,2-Trichloroethane | 36. 1,4-Dichlorobenzene-d ₄ (I.S.) |
| 7. Methylene chloride | 17. Fluorobenzene (I.S.) | 27. Tetrachloroethene | 37. 1,4-Dichlorobenzene |
| 8. trans-1,2-Dichloroethene | 18. Trichloroethene | 28. Dibromochloromethane | 38. 1,2-Dichlorobenzene |
| 9. 1,1-Dichloroethane | 19. 1,2-Dichloropropane | 29. Chlorobenzene-d ₅ (I.S.) | |
| 10. Chloroform | 20. Bromodichloromethane | 30. Chlorobenzene | |

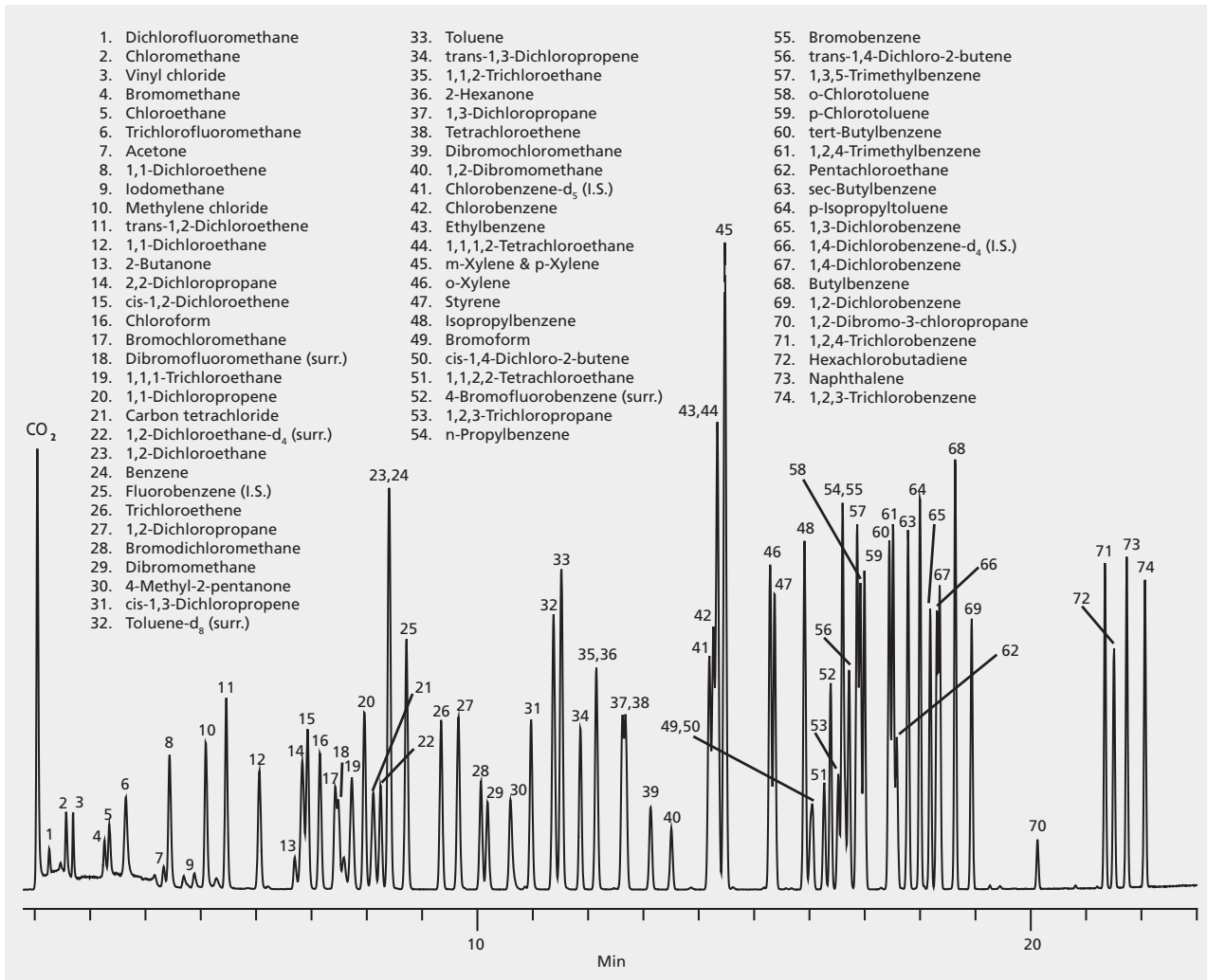


GC Applications

Volatiles

US EPA Method 8260: GC Analysis of Volatiles on the VOCOL® after Purge & Trap using a "K" Trap

..... compound class: volatiles
 sample/matrix each analyte at 50 ppb in 5 mL water
 purge trap VOCARB 3000 "K"
 purge 40 mL/min. at 25 °C for 11 min.
 dry purge 2 min.
 desorption preheat 205 °C
 desorption process 40 mL/min. at 210 °C for 2 min.
 bake 260 °C for 10 min.
 transfer line/valve temp. 110 °C
 column VOCOL, 30 m x 0.25 mm I.D., 1.5 µm (24205-U)
 oven 40 °C (2 min.), 7 °C/min. to 125 °C, 12 °C/min. to 220 °C (5 min.)
 inj. temp. 150 °C
 MSD interface 200 °C
 scan range m/z = 35-400
 carrier gas helium, 0.7 mL/min.
 injection 30:1 split
 liner 0.75 mm I.D. SPME
 Application No. G004173

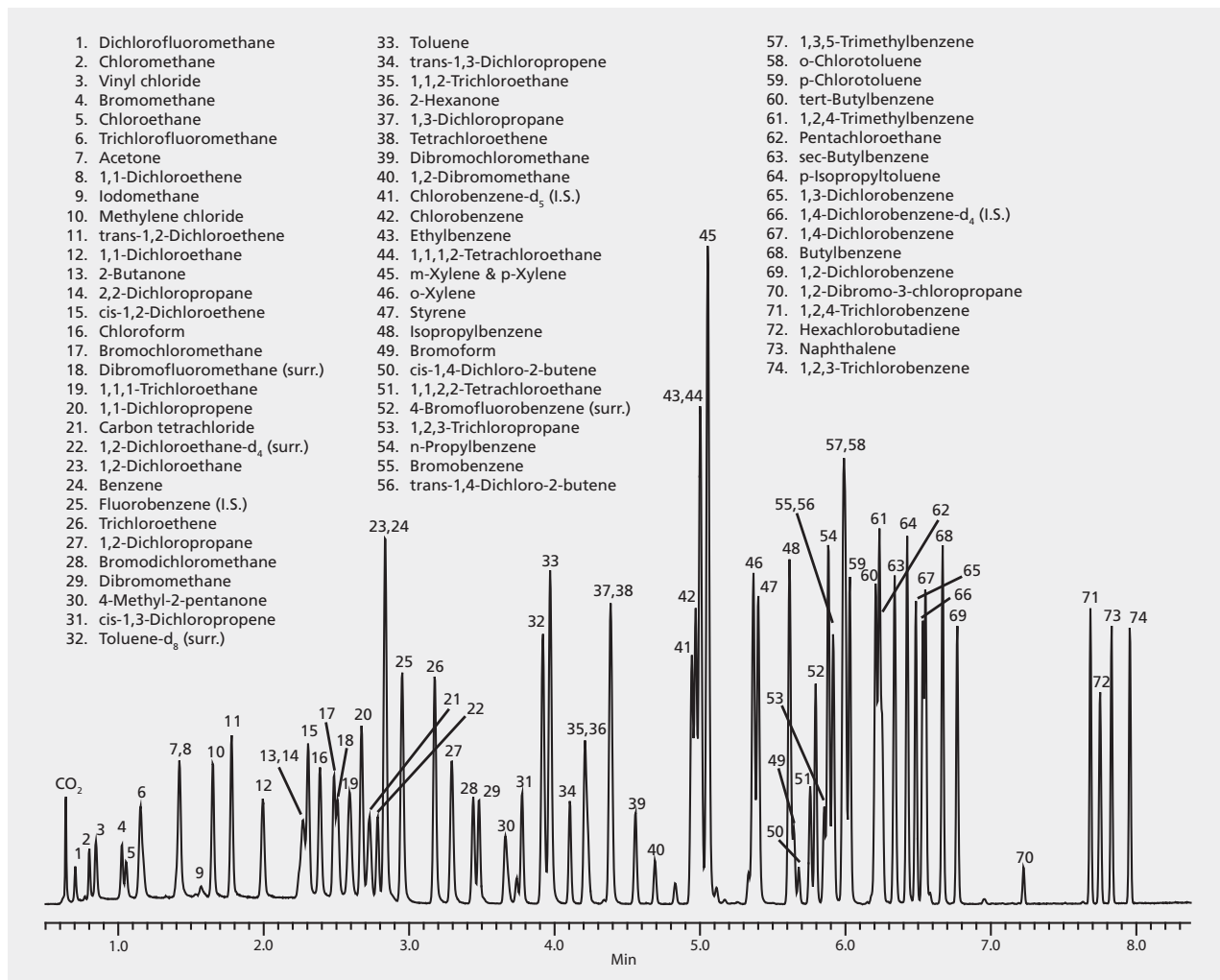


GC Applications

Volatiles

US EPA Method 8260: GC Analysis of Volatiles on the VOCOL® after Purge & Trap using a "K" Trap [Fast GC Analysis]

sample/matrix each analyte at 50 ppb in 5 mL water
 purge trap VOCARB 3000 "K"
 purge 40 mL/min. at 25 °C for 11 min.
 dry purge 1 min.
 desorption preheat 205 °C
 desorption process 150 mL/min. at 210 °C for 1 min.
 bake 260 °C for 10 min.
 transfer line/valve temp. 110 °C
 column VOCOL, 20 m x 0.18 mm I.D., 1.0 µm (28463-U)
 oven 40 °C (0.8 min), 19 °C/min. to 125 °C, 32 °C/min. to 220 °C (1 min.)
 inj. temp. 150 °C
 MSD interface 220 °C
 scan range m/z = 35-400
 carrier gas helium, 1.5 mL/min.
 injection 100:1 split
 liner 0.75 mm I.D. SPME
 Application No. G004054



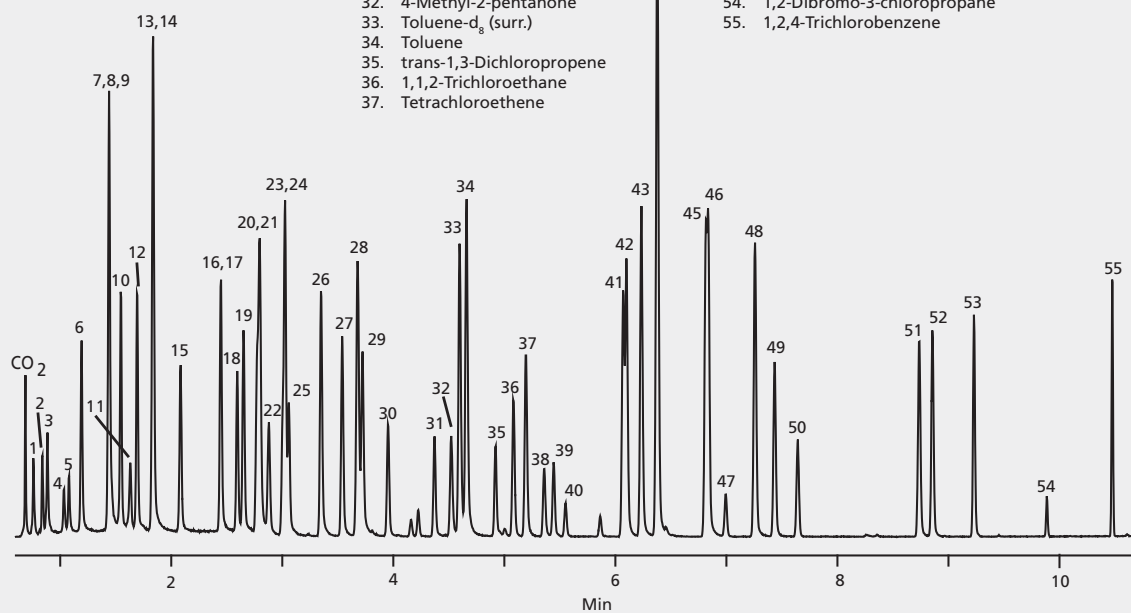
GC Applications

Volatiles

US EPA Method OLM04.2 VOA: GC Analysis of Volatiles on the SPB®-624 after Purge & Trap using a "K" Trap [Fast GC Analysis]

sample/matrix each analyte at 50 ppb in 5 mL water
 purge trap VOCARB 3000 "K"
 purge 40 mL/min. at 25 °C for 11 min.
 dry purge 2 min.
 desorption preheat 205 °C
 desorption process 124 mL/min. at 210 °C for 2 min.
 bake 260 °C for 10 min.
 transfer line/valve temp. 110 °C
 column SPB-624, 20 m x 0.18 mm I.D., 1.0 µm (28662-U)
 oven 40 °C (1 min.), 11 °C/min. to 125 °C, 35 °C/min. to 230 °C (2 min.)
 inj. temp. 150 °C
 MSD interface 200 °C
 scan range m/z = 35-400
 carrier gas helium, 1.2 mL/min.
 injection 100:1 split
 liner 0.75 mm I.D. SPME
 Application No. G004174

- | | | |
|--|---|---|
| 1. Dichlorofluoromethane | 16. 2-Butanone | 38. 2-Hexanone |
| 2. Chloromethane | 17. cis-1,2-Dichloroethene | 39. Dibromochloromethane |
| 3. Vinyl chloride | 18. Bromochloromethane (I.S.) | 40. 1,2-Dibromomethane |
| 4. Bromomethane | 19. Chloroform | 41. Chlorobenzene-d ₅ (I.S.) |
| 5. Chloroethane | 20. 1,1,1-Trichloroethane | 42. Chlorobenzene |
| 6. Trichlorofluoromethane | 21. Cyclohexane | 43. Ethylbenzene |
| 7. 1,1,2-Trichloro-1,2,2-trifluoroethane | 22. Carbon tetrachloride | 44. m-Xylene & p-Xylene |
| 8. 1,1-Dichloroethene | 23. 1,2-Dichloroethane-d ₄ (surr.) | 45. o-Xylene |
| 9. Acetone | 24. Benzene | 46. Styrene |
| 10. Carbon disulfide | 25. 1,2-Dichloroethane | 47. Bromoform |
| 11. Methyl acetate | 26. 1,4-Difluorobenzene (I.S.) | 48. Isopropylbenzene |
| 12. Methylene chloride | 27. Trichloroethene | 49. 4-Bromofluorobenzene (surr.) |
| 13. Methyl-tert-butyl ether | 28. Methylcyclohexane | 50. 1,1,2,2-Tetrachloroethane |
| 14. trans-1,2-Dichloroethene | 29. 1,2-Dichloropropane | 51. 1,3-Dichlorobenzene |
| 15. 1,1-Dichloroethane | 30. Bromodichloromethane | 52. 1,4-Dichlorobenzene |
| | 31. cis-1,3-Dichloropropene | 53. 1,2-Dichlorobenzene |
| | 32. 4-Methyl-2-pentanone | 54. 1,2-Dibromo-3-chloropropane |
| | 33. Toluene-d ₈ (surr.) | 55. 1,2,4-Trichlorobenzene |
| | 34. Toluene | |
| | 35. trans-1,3-Dichloropropene | |
| | 36. 1,1,2-Trichloroethane | |
| | 37. Tetrachloroethene | |

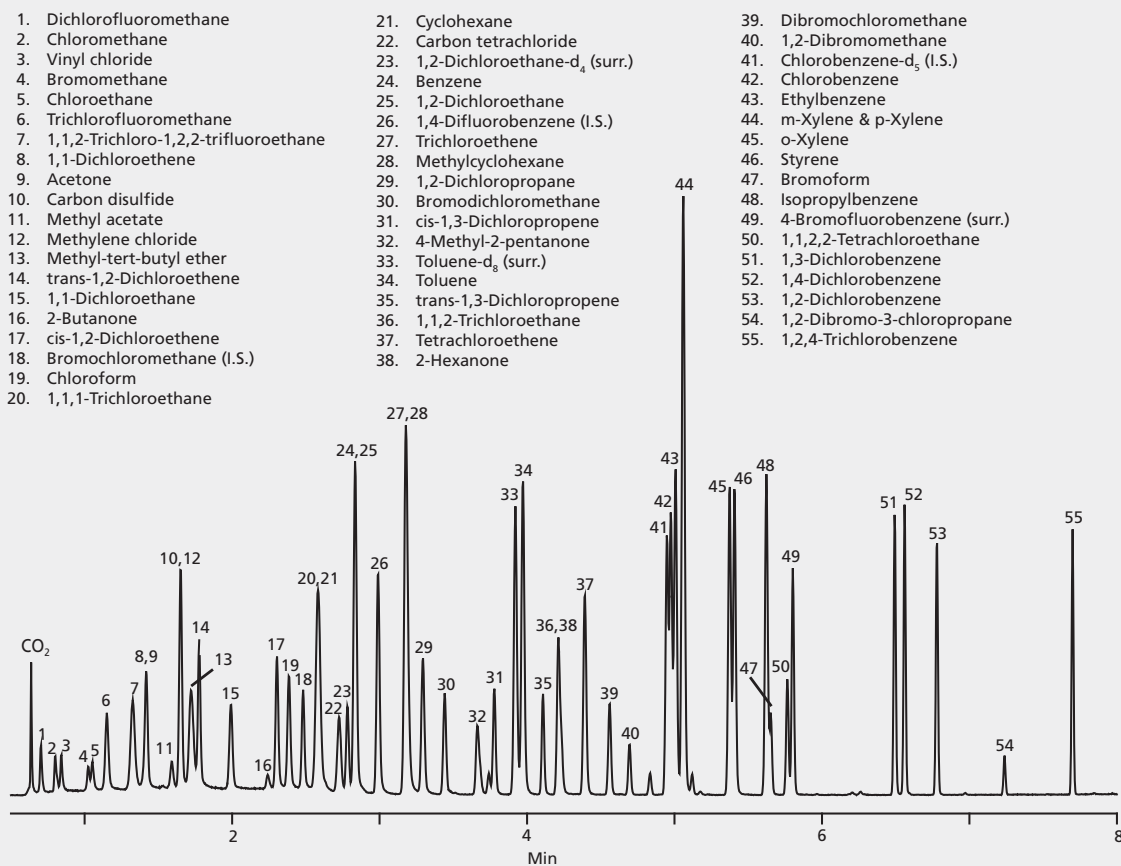


GC Applications

Volatiles

US EPA Method OLM04.2 VOA: GC Analysis of Volatiles on the VOCOL® after Purge & Trap using a "K" Trap [Fast GC Analysis]

sample/matrix each analyte at 50 ppb in 5 mL water
 purge trap VOCARB 3000 "K"
 purge 40 mL/min. at 25 °C for 11 min.
 dry purge 2 min.
 desorption preheat 205 °C
 desorption process 150 mL/min. at 210 °C for 2 min.
 bake 260 °C for 10 min.
 transfer line/valve temp. 110 °C
 column VOCOL, 20 m x 0.18 mm I.D., 1.0 µm (28463-U)
 oven 40 °C (0.8 min.), 19 °C/min. to 125 °C, 32 °C/min. to 220 °C (1 min.)
 inj. temp. 150 °C
 MSD interface 200 °C
 scan range m/z = 35-400
 carrier gas helium, 1.4 mL/min.
 injection 100:1 split
 liner 0.75 mm I.D. SPME
 Application No. G004175





AIR MONITORING

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Introduction to Active Air Sampling

Introduction to Active Air Sampling

In addition to capturing analytes of interest from air, an active sampling device must ensure minimal background interference, exhibit sufficient capacity or breakthrough volume for the application for which it is intended, and provide an acceptable pressure drop during sampling. Supelco air sampling media meet these requirements, and conform to NIOSH, OSHA, US EPA, and ASTM specifications as required. Consistency and reproducibility are met through our stringent quality control testing. Many of the adsorbents we manufacture are proprietary and have unique and superior performance characteristics. Examples of these materials include our carbon molecular sieves and graphitized carbons.

Solvent Desorption Sampling Media

ASSET™ EZ-4 NCO Dry Sampler for Isocyanates

Isocyanates are used in the production of polyurethane (PUR) materials. Workers who are exposed to these compounds are at risk for respiratory disorders, asthma and other ailments. It is known with current methods that particulates form incomplete reactions with both the reagent and the isocyanate monomers to be measured which result in underestimation of exposure.

The new active sampling device is a unique dry sampler based on derivatization of isocyanate groups with di-*n*-butylamine (DBA). The sampler consists of a denuder and a filter, both impregnated with DBA.

The design offers several advantages over existing devices such as:

- the ability to achieve low detection limits for the collection of both vapor and particulate phase isocyanates
- sampling from 5 minutes > 8 hrs
- fast derivatization reactions into stable derivatives
- no storage limits before and after sampling
- high capacity
- no interferences
- no breakthrough
- no field extraction

NEW PRODUCTS

ASSET™ EZ4-NCO Dry Sampler

for use with LC-MS or LC-MS/MS



ASSET™EZ4-NCO Dry Sampler

	Cat. No.	Qty
ASSET™ EZ4-NCO Dry Sampler		
for sampling isocyanates	5027-U	10 ea
for sampling isocyanates	5028-U	10 ea

Sampling and Detection of Carbonyls in Air

The sampling of aldehydes and ketones requires an on-site derivatization most typically on an adsorbent coated with dinitrophenylhydrazine (DNPH). Supelco's product range includes the low back press LpDNPH cartridge configurations for active sampling, which ensure longer pump operation. Our products are suitable for OSHA, NIOSH, ASTM, EPA and CARB methods and manufactured in a controlled, low background environment.

Features and Benefits:

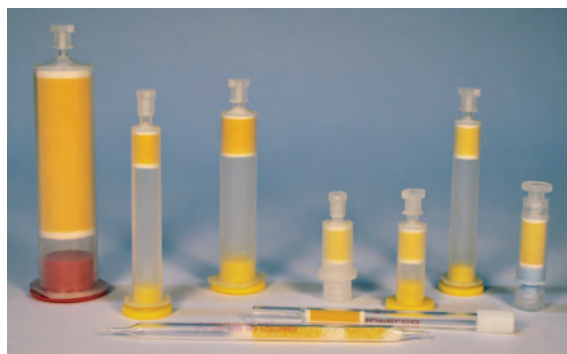
- High purity adsorbent coated with 2,4-DNPH
- Low background contamination
- Low backpressure
- Select products vacuum packaged in a low background storage bag

LpDNPH Rezorian™ Cartridge

Rezorian cartridges are made from a low background polypropylene and feature a luer lock end-fitting. The luer lock enables the user to connect the cartridge to a pump tubing or use two cartridges in a series (piggyback), without an adaptor, to monitor breakthrough or to increase sampling capacity.

composition

High Purity Silica Gel Coated with 2,4-dinitrophenylhydrazine (DNPH)



Cat. No.	Qty
54074-U	10 ea
54075-U	50 ea

Solvent Desorption Sampling Media

Sampling and Detection of Carbonyls in Air

LpDNPH S10 Cartridge

The design of the S10 cartridge makes it easy to use in the field and laboratory. Reusable adaptors are available for connecting the cartridge to the sampling pump. The built in reservoir eliminates the need to attach a syringe for sample extraction/elution.



Cat. No.	Qty
21014	50 ea
21026-U	10 ea
21024-U	10 ea
54072-U	50 ea
23124-U	50 ea

LpDNPH Ozone Scrubber

Ozone scrubbers are recommended for sampling carbonyls in high humidity environments. These cartridges contain 1.5 g of high purity potassium iodide (KI) and are available in two cartridge styles. KI traps the ozone which causes a negative formaldehyde interference in DNPH coated devices. The reversible cartridge offers a slip luer end-fitting, and the rezorian cartridge offers a luer lock end-fitting, to enable you to connect your cartridge of choice directly to the inlet of any DNPH cartridge with a like end-fitting. Testing (200 ppb ozone, 50 % RH, 25°C) indicates the ozone scrubber to have an ozone capacity of 100,000 ppb/hr.



Cat. No.	Qty
505285	10 ea
54078-U	10 ea

LpDNPH S10L Cartridge

The S10L cartridges features a reversible design and is for analysts who prefer shorter dimensions and does not require an adaptor for sampling. The cartridge is eluted by connecting to a syringe barrel (empty SPE cartridge) that acts as a reservoir for gravity-fed elution solvent. Meets EPA TO-11A requirements.



Cat. No.	Qty
505358	10 ea
505361-U	50 ea

LpDNPH S10x Cartridge

The S10x cartridge is shorter than the S10 cartridge and designed to fit into automated instruments such as XonTech, Inc. and ATEC Atmospheric Technology. Using the S10x cartridge, the air sampling flow is in the direction *opposite* compared to the S10 cartridge in order to accommodate the instruments flow pattern.



Cat. No.	Qty
505293	10 ea

LpDNPH H Series Cartridges

The H series of LpDNPH cartridges contain higher loadings of 2,4-DNPH and/or larger bed weights compared the S10 series and Rezorian cartridges. This provides a higher capacity for carbonyls making the H series cartridges the preferred choice for use in high concentration environments. The H series is available in 3 sizes: H10 (350 mg), H30 (1 g) and H300 (10 g) cartridges.

for sampling in high concentration environments



Description	Cat. No.	Qty
H10	505315	10 ea
H10	505320-U	10 ea
H30	505323	10 ea
H300	505331	10 ea

LpDNPH Cartridge Specifications

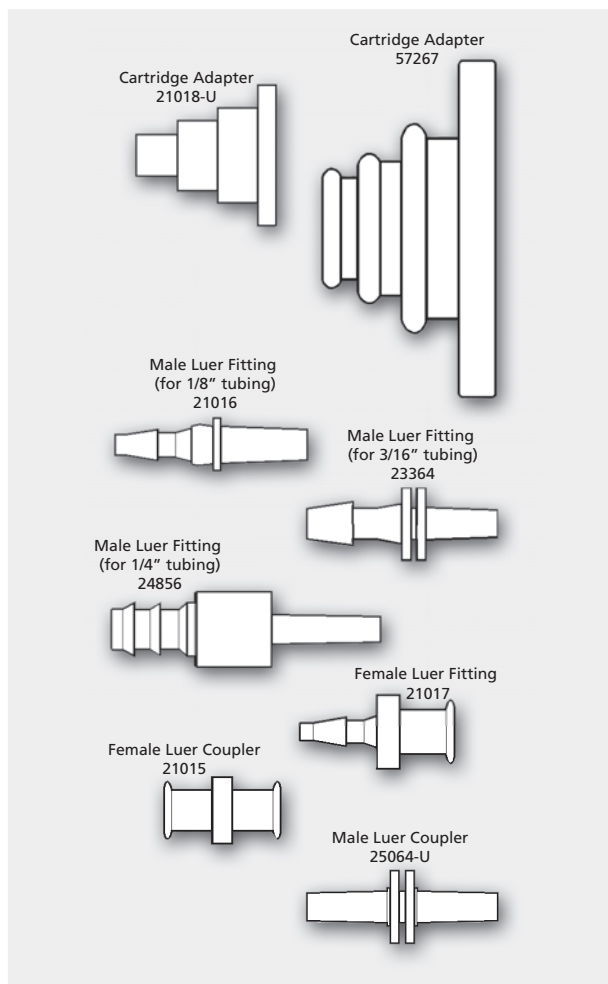
Adsorbent:	Chromatographic grade, high purity silica gell coated with: DNPH: 2,4-dinitrophenylhydrazine BPE: trans-1,2-bis(4-pyridyl)ethylene	
Particle Size:	150–250 µm (60/100 mesh)	
DNPH Loading:	0.29% (1 mg/cartridge) 0.38% (1 mg/cartridge, BPE-DNPH) 0.86% (3 mg/cartridge, H series) 0.21% (0.25 mg/cartridge, ORBO-DNPH)	
Capacity (total carbonyls):	75 µg (S10 series, BPE-DNPH) 225 µg (H10) 643 µg (H30) 6.4 mg (H300) 18.8 µg (ORBO-DNPH) 26 µg ozone capacity (BPE-DNPH)	
Cartridge Length:	74 cm (S10) 3.8 cm (S10x) 4.0 cm (S10L) 4.0 cm (Rezorian, BPE-DNPH) 9.0 cm (ORBO-DNPH)	
Background:	SPE Style Cartridges	ORBO-DNPH
	<0.06 µg formaldehyde	<0.025 µg formaldehyde
	<0.10 µg acetaldehyde	<0.035 µg acetaldehyde
	<0.3 µg acetone	<0.120 µg acetone
Pressure Drop:	<7 KPA at 1.5 L/min (S10) (<28 in. water/<2.1 in. mercury)	<20 in. water at 167 mL/min
Storage:	Refrigerate (4 °C), protect from light	
Shelf Life:	12 months	

Solvent Desorption Sampling Media

Sampling and Detection of Carbonyls in Air

LpDNPH Accessories

LpDNPH Accessories are manufactured from high quality polypropylene and designed to fit standard tubing and cartridges.



Compatibility	Cat. No.	Qty
Cartridge Adapter for S10, H10, H30 Cartridges		
for use with 1, 3 & 6 mL SPE cartridges	21018-U	10 ea
Cartridge Adapter for H300 Cartridges		
for use with 12, 20, & 60 mL SPE tubes	57267	6 ea
Male Luer Fitting for 1/8 in. Tubing		
-	21016	20 ea
Male Luer Fitting for 3/16 in. tubing		
-	23364	20 ea
Male Luer Fitting for 1/4 in. Tubing		
-	24856	10 ea
Female Luer Fitting for 1/8 in. Tubing		
-	21017	20 ea
Female Luer Coupler		
for use with male luer to male luer	21015	20 ea
Male Luer Coupler		
for use with male Luer to male Luer	25064-U	20 ea
Male Luer Plug		
configured for plugging luer holes	504351	12 ea
Lapel Clips		
LpDNPH cartridges	21019-U	6 ea
Empty SPE Tube (no frits)		
for use with S10L Elution reservoir	57242	30 ea
Universal Elution Rack for LpDNPH Cartridges		
for use with LpDNPH Cartridges	21043-U	1 ea
Female Luer Cap		
for use with Visidry Drying Attachment Supelco configured for capping luer tips	57098	12 ea



Solvent Desorption Sampling Media

ORBO™ Solvent Desorption Tubes

ORBO™ Solvent Desorption Tubes

ORBO™ Charcoal



Product Name	Sorbent	Bed A (mg)	Bed B (mg)	O.D. × L (mm)	Separators	Cat. No.	Qty
ORBO™ 32 Small	activated coconut charcoal	100	50	6 × 75	W,F,F	20267-U	50 ea
ORBO™ 32 Large	Activated coconut charcoal	400	200	8 × 110	W,W,F	20228	50 ea
ORBO™ 33	Activated petroleum charcoal	700	390	8 × 150	W,F,F	20259	50 ea
ORBO™ 34	activated coconut charcoal (specially treated)	400	200	8 × 105	W,GFF,F	20211	25 ea
ORBO™ 304	Charcoal ((low Ni))	120	60	6 × 80	W,F,F	20041	50 ea
ORBO™ 306	Petroleum charcoal	400	200	8 × 110	W,F,F	20073-U	50 ea
ORBO™ 351	4-tert-butyl catechol on charcoal	100	50	6 × 75	W,W,W	20042	50 ea
ORBO™ 353	HBr on petroleum charcoal	100	50	6 × 75	W,W,W	20044	25 ea
ORBO™ 354	KOH on Activated Coconut Charcoal (AVL Barneby Cheney)	100	50	6 × 75	W,F,F	20045	50 ea
ORBO™ 356	4-tert-butyl catechol (4-TBC) on charcoal	400	200	8 × 110	W,W,W	20047	50 ea

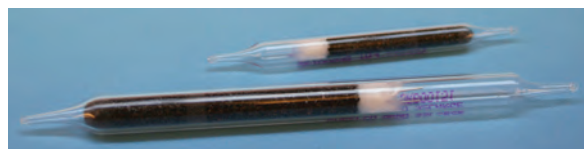
ORBO™ 303 Activated Petroleum Charcoal (20/40), 100/50 mg

Petroleum Charcoal Tube
particle size

20-40 mesh

Product Name	Sorbent	Bed A (mg)	Bed B (mg)	O.D. × L (mm)	Separators	Cat. No.	Qty
ORBO™ 303	Activated petroleum charcoal	100	50	6 × 70	W,F,F	20019-U	50 ea

ORBO™ Carbon



Product Name	Sorbent	Bed A (mg)	Bed B (mg)	O.D. × L (mm)	Separators	Cat. No.	Qty
ORBO™ 91	Carbosieve® S-III Carbon Molecular Sieve (CMS) (specially treated)	130	65	6 × 75	W,W,W	20360	25 ea
ORBO™ 90	Carboxen® 564 Carbon Molecular Sieve (CMS)	160	80	6 × 75	W,F,F	20358	25 ea
ORBO™ 92	Carboxen® 564 Carbon Molecular Sieve (CMS)	160	80	6 × 75	W,F,F	20362	25 ea
ORBO™ 78	Carboxen® 564 Carbon Molecular Sieve (CMS) c/w Hydrogen Bromide (HBr) (specially cleaned)	400	200	6 × 110	W,W,W	20355	25 ea
ORBO™ 101	Carbotrap® B Graphitized Carbon Black (GCB) (20/40)	100	50	6 × 70	W,W,W	20254-U	25 ea
ORBO™ 100	Carbotrap® B Graphitized Carbon Black (GCB) c/w Hydrogen Bromide (HBr)	350	175	7 × 110	W,W,W	20255-U	25 ea
ORBO™ 77	H ₂ SO ₄ -treated carbon bead	500	250	8 × 150	W,W,W	20036	50 ea
ORBO™ 91T	Carbosieve® S-III Carbon Molecular Sieve (CMS) (Bed B & Bed C) Carbotrap® B Graphitized Carbon Black (GCB) (Bed A)	100	200 (Bed C 100mg)	7 × 150	W,W,W	20366-U	25 ea
ORBO™ 76	TEA-coated Molesieve w/Oxidizer (3 bed tube)	400	800 (Bed C 400mg)	7 × 125	W,W,Insert,W,W	20826-U	25 ea

Solvent Desorption Sampling Media

ORBO™ Solvent Desorption Tubes

ORBO™ Silica Gel



Product Name	Sorbent	Bed A (mg)	Bed B (mg)	O.D. × L (mm)	Separators	Cat. No.	Qty
ORBO™ 52 Small	Activated silica gel	150	75	6 × 75	W,W,F	20229	50 ea
ORBO™ 52 Large	Activated silica gel	150	150	8 × 75	W,W,W	20263	50 ea
ORBO 53	Activated silica gel (specially cleaned)	400	200	7 × 100	GFF,F,F	20265	50 ea
ORBO™ 502	activated silica gel	100	50	6 × 75	W,W,F	20030-U	50 ea
ORBO™ 506	Activated silica gel	300	150	8 × 75	W,W,W	20032	50 ea
ORBO™ 507	Silica Gel	520	260	8 × 110	W,W,F	20870-U	50 ea
ORBO™ 554	H ₂ SO ₄ coated silica gel	150	75	6 × 75	W,W,W	20033	50 ea

ORBO™ LpDNPH

LpDNPH ORBO™ Tube



Product Name	Sorbent	Bed A (mg)	Bed B (mg)	O.D. × L (mm)	Separators	Cat. No.	Qty
ORBO™ 555	2,4-dinitrophenylhydrazine (DNPH) on High Purity Silica Gel	Bed A 300	150	6 × 105	W,W,W	54020-U	20 ea
ORBO™ DNPH	DNPH coated silica gel	bed wt. 120	-	6 × 90 (w/frangible seal)	PE	20081-U	10 ea

Florisol®

Product Name	Sorbent	Bed A (mg)	Bed B (mg)	O.D. × L (mm)	Separators	Cat. No.	Qty
ORBO™ 60	Florisol® magnesium silicate ((purified/deactivated))	100	50	6 × 75	W,F,F (specially cleaned)	20351	50 ea

ORBO™ Porous Polymers



Product Name	Sorbent	Bed A (mg)	Bed B (mg)	O.D. × L (mm)	Separators	Cat. No.	Qty
ORBO™ 42 Small	XAD-2 (specially treated)	66	33	6 × 75	W,F,F (specially treated)	20262	50 ea
ORBO™ 42 Large	XAD-2 (specially treated)	100	50	10 × 100	W,W,W (specially treated)	20264-U	50 ea
ORBO™ 43	XAD-2 (specially treated)	100	50	8 × 100	W,W,W (specially treated)	20258	50 ea
ORBO™ 44	XAD-2 (specially treated)	100	50	8 × 100	W,W,W (specially treated)	20260-U	50 ea
ORBO™ 49P	XAD-2 (specially cleaned)	270	140	13 to 8 × 75 (OSHA Versatile Sampler (OVS) Tube)	RC,GFF,F,F (specially cleaned)	20350	10 ea
ORBO™ 23	XAD-2 2-(Hydroxymethyl)piperidine on XAD-2	120	60	6 × 85	W,W,W	20257-U	25 ea

Solvent Desorption Sampling Media

ORBO™ Solvent Desorption Tubes

Product Name	Sorbent	Bed A (mg)	Bed B (mg)	O.D. × L (mm)	Separators	Cat. No.	Qty
ORBO™ 24	XAD-2 2-(Hydroxymethyl)piperidine (2-HMP) on XAD-2	150	75	6 × 105	W,W,W	20231	25 ea
ORBO™ 25	XAD-2 2-(Hydroxymethyl)piperidine (2-HMP) on XAD-2	450	225	8 × 115	W,W,W	20357	25 ea
ORBO™ 605	XAD-2 (specially cleaned)	100	50	6 × 100	W,W,W	20049	50 ea
ORBO™ 608	XAD-2	150	75	8 × 110	W,W,W	20050-U	50 ea
ORBO™ 609	XAD-2	400	200	8 × 110	W,W,W	20051	50 ea
ORBO™ 613	XAD-4	80	40	6 × 75	W,W,W	20052	50 ea
ORBO™ 65M	XAD-4 (specially cleaned)	160	80	13 to 8 × 75 (OSHA Versatile Sampler (OVS))	RC,MCE-F,SP,F,F (specially treated)	20028-U	10 ea
ORBO™ 65P	XAD-4 (specially cleaned)	160	80	13 to 8 × 75 (OSHA Versatile Sampler (OVS))	RC,GFF,F,F (specially cleaned)	20029-U	10 ea
ORBO™ 47	XAD-7 (specially treated)	100	50	6 × 90	W,W,W	20349	50 ea
ORBO™ 70	5% Na ₂ CO ₃ on Chromosorb-P	335	165	8 × 100	W,W,W	20256-U	50 ea
ORBO™ 1102	Porapak P	100	50	6 × 75	W,W,F	20062	50 ea
ORBO™ 1103	Porapak Q	150	75	6 × 100	W,W,W	20063	50 ea
ORBO™ 601	XAD-8	100 ((single-bed sorbent tube))	-	6 × 75	W,W	20048	50 ea
ORBO™ 615	XAD-7	60	30	6 × 75	W,W,W	20053	50 ea
ORBO™ 655	XAD-7 (phosphoric acid treated)	80	40	6 × 75	W,W,W	20054	50 ea
ORBO™ 657	XAD-7 1-(2-pyridyl) piperazine on XAD-7	80	40	6 × 90	W,W,W	20055	50 ea
ORBO™ 706	Chromosorb 102	100	50	8 × 100	W,W,W	20057	50 ea
ORBO™ 711	Chromosorb 106	600	300	10 × 115	W,W,W	20059	50 ea
ORBO™ 402	Tenax TA (specially treated)	100	50	8 × 100	W,W,W	20832-U	50 ea
ORBO™ 403	Tenax TA (specially treated)	100	50	6 × 105	W,W,W	20034	50 ea

ORBO™ Accessories



20596



22406

Description	Cat. No.	Qty
Puller/Insertion Tool	22406	2 ea
ORBO™ Tube Cutter, for ORBO tube cutting	20596	1 ea
Tube Cutter Adjustable Replacement Blade	20575	1 ea

Filters and Cassettes

We have carefully selected these cassettes, filters, and accessories to best meet your air sampling needs. These products, cited in numerous Occupational Safety and Health Administration (OSHA) and National Institute of Occupational Safety and Health (NIOSH) methods in the United States, are universally respected for quality and reliability.

ORBO™ 80 Coated Filter

ORBO™ 80 is a glass fiber filter coated with 1-(2-Pyridyl)piperazine. The ORBO™ 80 is used for sampling diisocyanates in air (OSHA methods 42 and 47)

suitable for 47 per OSHA

Description	Cat. No.	Qty
with cassettes No, filter O.D. 37 mm	20811	25 ea
with cassettes (unassembled)	20812-U	25 ea

Air Monitoring Cassette with GN-4 Metrical® Membrane

We offer preassembled 3-piece design cassettes which includes a GN-4 Metrical® membrane and support pad. Banded cassettes are available for critical application and assure an air-tight seal, are leak-proof and tamper-resistant.

Features and Benefits:

- 0.8 mm GN-4 Metrical (mixed cellulose ester) membrane filters have a low fiber background count.
- Accepted for air monitoring of fibers such as asbestos fibers and airborne metals such as lead (NIOSH methods 7400 and 7402).
- Can be used to monitor respirable particulates such as silica, metal, and dust.

Description	Cat. No.	Qty
cassette 25 mm, pore 0.8 µm	23371	50 ea
cassette 25 mm, pore 0.8 µm	23374	50 ea
cassette 37 mm, pore 0.8 µm	23368	50 ea

Solvent Desorption Sampling Media

Filters and Cassettes

Membrane Filters



	Cat. No.	Qty
Borosilicate Glass Fiber Filter		
A/E Glass Fiber, 1 µm, O.D. 13 mm	23376	500 ea
A/E Glass Fiber, 1 µm, O.D. 25 mm	23377	500 ea
A/E Glass Fiber, 1 µm, O.D. 37 mm	23378	500 ea
Polyvinylchloride (PVC) Membrane Filter		
GLA-5000 membrane, 5 µm, O.D. 37 mm	23387	100 ea
Mixed Cellulose Ester (MCE) Membrane Filter		
GN-4 Metrical® membrane, 0.8 µm, O.D. 25 mm	23380-U	100 ea
GN-4 Metrical® membrane, 0.8 µm, O.D. 37 mm	23381	100 ea
GN-6 Metrical® membrane, 0.45 µm, O.D. 37 mm	23379	100 ea
PTFE Membrane Filter		
TF-1000 membrane, 1 µm, O.D. 37 mm	23383	100 ea
Zefluor™ membrane, 0.5 µm, O.D. 25 mm	23395	100 ea
Zefluor™ membrane, 1 µm, O.D. 37 mm	23391	50 ea
Zefluor™ membrane, 2 µm, O.D. 37 mm	23390-U	50 ea
Zylon™ membrane, 5 µm, O.D. 37 mm	23389	50 ea

Empty Air Monitoring Cassettes



Left to right: 23372, 23370-U (3 shown), 23369 (2 shown), 23367

	Cat. No.	Qty
Empty Air Monitoring Cassettes		
13 mm, piece: 2 (with washer)	23367	5 ea
25 mm, piece: 3	23372	50 ea
37 mm, piece: 2	23369	100 ea
37 mm, piece: 3 (with spacer ring)	23370-U	100 ea

Filter Support Pad

Used with Air Sampling 37 mm Filter Cassette

Part O.D. (mm)	Cat. No.	Qty
37	23385	100 ea
37	23382	500 ea

Filter Accessories

Description	Cat. No.	Qty
PTFE Washer for 13mm Cassettes	23388	1 ea
Sealing Band for Cassette, for use with 25mm Cassette	23365	100 ea
Sealing Band for Cassette, for use with 37mm Cassette	23366	100 ea

ORBO™ PUF Cartridges

Several US EPA and ASTM methods require a polyurethane foam (PUF) adsorbent cartridge for monitoring semivolatiles in stack, ambient, indoor, and workplace atmospheres. A low pressure drop across the cartridge facilitates high volume sampling. Refer to the table for descriptions of our PUF cartridges. We thoroughly clean our PUF plugs, then test them to ensure absence of contamination.



Clockwise from Upper Left 20037, 21235-U, 21233-U, 20557, 21031

Small PUF Cartridges

Specifications for Small PUF (Low Volume)

	ORBO-1000 Small PUF	ORBO-1500 PUF/XAD-2/PUF Layers
Dimensions:	22 mm O.D. × 7.6 cm length	PUF: 22 mm O.D. × 30 mm length XAD-2: 1.5 g PUF: 22 mm O.D. × 30 mm length
Sampling Rate:	1–5 L/min	1–5 L/min
PUF Density:	0.022 g/cm ³	0.022 g/cm ³
Applications:	ASTM D4861–Pesticides/PCBs ASTM D4947–Chlordane/Heptachlor EPA IP-8–Pesticides/PCBs EPA TO-10A–Pesticides/PCBs	Pesticides/PCBs

Description	Cat. No.	Qty
ORBO™ 1000 Precleaned Small PUF Cartridge, O.D. 22 mm × L 7.6 cm	20557	3 ea
ORBO™ 1000 Precleaned Small PUF Plug, Replacement, O.D. 22 mm × L 7.6 cm	20600-U	3 ea
ORBO™ 1500 Precleaned Small PUF/Amberlite® XAD®-2/PUF Cartridge, O.D. 22 mm × L 10 cm	21233-U	3 ea
Glass Cartridge for Small PUF Plug	20556	1 ea

Solvent Desorption Sampling Media

ORBO™ PUF Cartridges: *Large PUF Cartridges*

Large PUF Cartridges

Specifications for Large PUF (High Volume)

	ORBO-2000 Large PUF	ORBO-2500 PUF/XAD-2/PUF Layers
Dimensions:	6 cm O.D. × 7.6 cm length	PUF: 6 cm O.D. × 50 mm length XAD-2: 10 g PUF: 6 cm O.D. × 25 mm length
Sampling Rate:	20–225 L/min	20–225 L/min
PUF Density:	0.022 g/cm ³	0.022 g/cm ³
Applications:	ASTM D6209–PAHs EPA IP-7–PAHs EPA TO-4A–Pesticides/PCBs EPA TO-9A–Dioxins EPA TO-13A–PAHs	Pesticides/PCBs PAHs Dioxins

Description	Cat. No.	Qty
ORBO™ 2000 Precleaned Large PUF Cartridge, O.D. 6 cm × L 7.6 cm	20037	1 ea
ORBO™ 2000 Precleaned Large PUF Plug, Replacement, O.D. 6 cm × L 7.6 cm	20038	1 ea
ORBO™ 2500 Precleaned Large PUF/Amberlite® XAD®-2/PUF Cartridge, O.D. 6.5 cm × L 125 mm	21235-U	1 ea
Glass Cartridge and Screen for Large PUF Plug	20563	1 ea
Stainless Steel Screen	21008-U	2 ea

Adsorbents for PUF Cartridges

Supelpak™-2

Supelpak™-2 is purified Amberlite® XAD-2® that has been cleaned to meet and exceed US EPA-recommended criteria for purity, as outlined in Level I Environmental Assessment Procedures Manual. It is the best resin to use for standard air sampling methods requiring resin tested for background TCO (total chromatographic organics) level. Packaged in glass containers.

surface area	~300 m ² /g
density	1.07 g/mL, 25 °C (skeletal)
density	1.02 g/mL, 25 °C (true wet)
pore volume	~0.65 mL/g
mean pore size	90 Å
max. temp.	200 °C

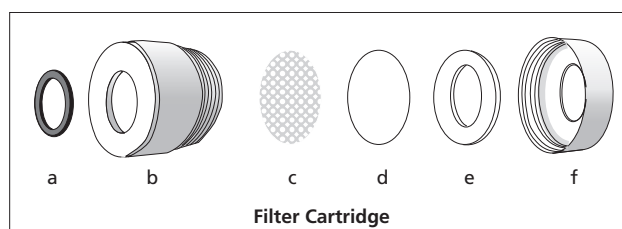
	Cat. No.	Qty
Supelpak™-2		
matrix styrene-divinylbenzene, 20-60 mesh	20279	100 g
matrix styrene-divinylbenzene, 20-60 mesh	20279	100 g
	21130-U	1 kg

Filter Cartridge

An optional filter cartridge can be attached to the inlet of an ORBO-1000 or ORBO-1500 cartridge, to trap aerosol and particulate forms of semivolatiles. The filter cartridge contains a replaceable 32 mm diameter quartz microfiber filter with a stainless steel support screen.

Filter Cartridge Assembly includes 1 O-ring (a), 1 filter cartridge body (b), 1 stainless steel screen (c), 1 quartz filter (d), 1 filter ring (e), 1 cartridge screw cap (f), and 2 end caps.

Filter Cartridge consists of 1 O-ring (a), 1 filter cartridge body (b), 1 filter ring (e), and 1 cartridge screw cap (f).



Filter Cartridge

Description	Cat. No.	Qty
Filter Cartridge Assembly	21031	1 ea
Filter Cartridge	21033	1 ea

Filter Cartridge Replacement Parts

Description	Cat. No.	Qty
O-Ring for Filter Cartridge, (a)	21037	2 ea
Quartz Filter, 32mm diameter, (d)	21038	10 ea
Filter Ring, (e)	21035	1 ea
Filter Cartridge Body, (b)	21034	1 ea
Cartridge Screw Cap, (f)	21036	1 ea

Thermal Desorption Tubes

Thermal Desorption Tubes for PerkinElmer®, Markes, Dani, OI and Shimadzu™ Instruments

Thermal Desorption Tubes

Thermal Desorption Tubes for PerkinElmer®, Markes, Dani, OI and Shimadzu™ Instruments



Stainless Steel Preconditioned Thermal Desorption Tubes

Supelco offers pre-conditioned Stainless Steel Thermal Desorption Tubes that are compatible with PerkinElmer, Markes, DANI, OI Analytical, and Shimadzu Instruments. Each tube is etched with a unique number for sample identification and is sealed individually in a TDS³ Storage container.

Dimensions: 1/4 in. O.D. x 3.5 in. Long. (6.35 mm O.D. x 89 mm Long)
ID: 5 mm

NEW PRODUCTS

Description	Suitability	Cat. No.	Pkg
Tenax® TA	US EPA IP-1B US EPA TO-1	20010-U	10 ea
Tenax® GR	(extends range of Tenax GR)	20011-U	10 ea
Carbosieve® SIII	US EPA TO-2	20012-U	10 ea
Carbotrap® 217	US EPA TO-14 (Air Toxics) US EPA TO-17	20013-U	10 ea
Carbotrap® 202	(C5-C20 Compounds in Air)	20083-U	10 ea
Carbotrap® 300	US EPA TO-17 US EPA TO-1 US EPA TO-2 US EPA TO-3	21705-U	10 ea
Empty Tube for Thermal Desorption	-	21822-U	10 ea

Glass-Fritted, Barcode Labeled, Preconditioned Thermal Desorption Tubes

Supelco offers pre-conditioned glass-fritted thermal desorption tubes that are compatible with PerkinElmer, Markes, DANI, OI Analytical, and Shimadzu Instruments. Each tube is labeled with a high temperature ceramic barcode label (code-128) which features a unique number for easy sample identification. Each tube is sealed individually in a TDS³ Storage Container.

Advantages of the Glass-Fritted TD Tube:

- Prevents the adsorbent from blowing out and contaminating the thermal desorber.
- Maintains the adsorbent(s) in the heated zone resulting in more consistent recovery of higher molecular weight compounds.
- Produces more consistent backpressure from tube to tube.
- Provides longer serviceable life of the tubes because the adsorbent(s) stay intact.
- Helps to prevent channelling during sampling because the adsorbent(s) stay intact.

*Note: Overtime the glass frit may darken due to the fines from the adsorbents. This does not affect the performance of the tube.



NEW PRODUCTS

Description	Suitability	Cat. No.	Pkg
Tenax® TA	US EPA IP-1B US EPA TO-1	29530-U	10 ea
Carbotrap® 217	US EPA TO-14 US EPA TO-17	29531-U	10 ea
Carbotrap® 300	US EPA TO-3 US EPA TO-1 US EPA TO-2 US EPA TO-17	29532-U	10 ea
Carboxen® 569	(For sampling in high humidity conditions)	29534-U	10 ea
Carbopack™ B	(For sampling a wide range of VOCs)	29535-U	10 ea
Carboxen® 1016	(An alternative to Tenax TA)	29536-U	10 ea
Carbopack™ X	US EPA TO-17 (For sampling 1,3-butadiene)	29537-U	10 ea

Glass-Fritted, Barcode Labeled, Unconditioned Thermal Desorption Tubes

NEW PRODUCTS

Description	Suitability	Cat. No.	Pkg
Tenax® TA	US EPA IP-1B US EPA TO-1	30132-U	10 ea
Tenax® TA	US EPA TO-1 IP-1B	30134-U	10 ea
Carbopack™ B	ASTM D6196	30136-U	10 ea

Thermal Desorption Tubes

Thermal Desorption Tubes for PerkinElmer®, Markes, Dani, Ol and Shimadzu™ Instruments: *Glass-Fritted, Barcode Labeled, Unconditioned Thermal Desorption Tubes*

Description	Suitability	Cat. No.	Pkg
Carbotrap® 217	US EPA TO-14 (Air Toxics)	30138-U	10 ea
Carbotrap® 300	US EPA TO-17 US EPA TO-3 US EPA TO-2 US EPA TO-1	30141-U	10 ea
Empty Tube for Thermal Desorption	-	29538-U	10 ea

Glass, Non-Fritted, Barcode Labeled, Preconditioned Thermal Desorption Tubes Sealed with Swagelok Endfittings

NEW PRODUCTS

Description	Cat. No.	Qty
Tenax® TA, 60-80 mesh, glass TD tube (non-fritted), O.D. 1/4 in. x L 3 1/2 in., preconditioned, Sealed with (Swagelok® End-fittings)	28715-U	10 ea
Tenax® TA / Carboxen® 1018, glass TD tube, preconditioned, O.D. 1/4 in. x L 3 1/2 in., Sealed with (Swagelok® End-Fittings)	28718-U	10 ea
Empty Tube for Thermal Desorption, glass TD tube (non-fritted), O.D. 1/4 in. x L 3 1/2 in., with (Tension Springs (qty 10))	28714-U	10 ea

Passive Sampling Accessories (Stainless Steel Tubes Only)

Description	Cat. No.	Qty
Diffusion Caps, Standard	28017-U	10 ea
Diffusion Caps, with Silicone Membrane	28018-U	10 ea
Pen Clips for SS Tubes, pk 10	28016-U	10 ea



28017-U



28016-U



28018-U

Storage Endcaps (For Glass or Stainless Steel Tubes)

Description	Cat. No.	Qty
Replacement Ferrules for TMX Brass Caps, pk 20	28012-U	20 ea
Storage Container Cap, PTFE, for use with PerkinElmer ATD-400	28019-U	20 ea
TurboMatrix storage cap, brass, for use with PerkinElmer Turbomatrix	28011-U	20 ea
PTFE End Caps for Turbomatrix	28002-U	1 ea



28012-U



28011-U

Thermal Desorption Accessories

PTFE Packed Column Ferrule, 1/4 in. Column O.D.



► configured for 1/4 in. O.D. Column

I.D. 1/4 in.



[29024-U](#)

10 ea

Stainless Steel Tension Springs for TD Tubes

[23393-U](#)

100 ea

Thermal Desorption Tubes

Thermal Desorption Tubes for PerkinElmer®, Markes, Dani, Ol and Shimadzu™ Instruments: *Glass, Non-Fritted, Barcode Labeled, Preconditioned Thermal Desorption*

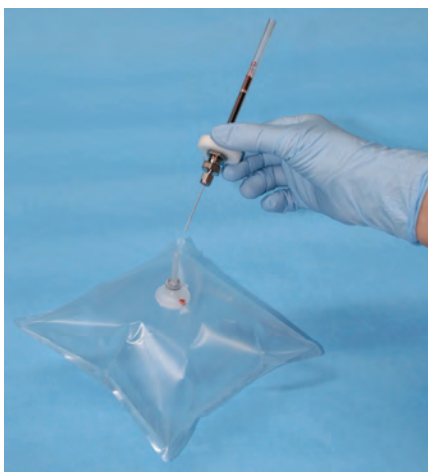
Needle Kit for Thermal Tubes

The needle sampling kit is an accessory designed to assist users of thermal desorption tubes to attach a needle to the inlet of the tube for various sampling applications. The kit includes ferrules for thermal desorption tubes with outside diameters of 1/4 in. or 6 mm. Choose the ferrule for the size of tube you are using.

The kit includes the following:

- Stainless steel 22s gauge needle with bevel point
- Stainless steel fitting
- Acetal/stainless steel thumbwheel
- 1/4 in. PTFE ferrule (white)
- 1/4 in. M-2 VESPEL™ ferrule (orange)
- 6 mm M-2A VESPEL graphite ferrule (black)

for use with thermal desorption tubes



29023-U

1 kit

Tubes for Gerstel® ThermoDesorption System

Supelco offers both stainless steel and glass preppacked sampling tubes that are fully compatible with the Gerstel® instrument. Each tube is thermally conditioned, and batch tested for back pressure and background. The preppacked tubes are sealed in our exclusive TDS³ storage containers. All of the preppacked glass sampling tubes incorporate a glass frit at the inlet, which increases their performance, and are individually numbered. The stainless steel tubes use a SS screen at both inlet and outlet to keep the adsorbent beds secure during use. Each stainless steel tube includes two stainless steel screens.

Fits Models TDS A & TDS 2.

6mm O.D. × 7 in. Long, 4mm I.D.



GERSTEL® Stainless Steel Thermal Desorption Tubes

Description	Suitability	Cat. No.	Pkg
Tenax® TA	US EPA IP-1B US EPA TO-1	28271-U	1 ea
Tenax® GR	(extends range of Tenax TA)	28272-U	1 ea
Carbotrap® 300	US EPA TO-1 US EPA TO-17 US EPA TO-2 US EPA TO-3	28273-U	1 ea
Carbosieve® SIII	US EPA TO-2	28274-U	1 ea
Empty Stainless Steel Tube w/ Screens for GERSTEL® TD	-	28276-U	1 ea
Screens for GERSTEL® TD Tubes	-	28277-U	10 ea

GERSTEL® Glass Thermal Desorption Tubes

6 mm O.D. × 7in. long, 4 mm I.D.. 28286-U is a fritted empty tube and 28287-U is non-fritted.

Description	Suitability	Cat. No.	Pkg
Tenax® TA	US EPA IP-1B US EPA TO-1	28281-U	1 ea
Tenax® GR	(extends range of Tenax TA)	28282-U	1 ea
Carbotrap® 300	US EPA TO-17	28283-U	1 ea
Carbosieve® SIII	US EPA TO-2	28284-U	1 ea
Chromosorb® 106	MDHS 72 ASTM D6196	28285-U	1 ea
Carbotrap® 349	US EPA IP-1B NIOSH 2549	28311-U	1 ea
Carbotrap® 217	US EPA TO-17	28312-U	1 ea
Carbotrap® 202	(C5-C20 Compounds in Air)	28313-U	1 ea
Empty Tube with Frit for GERSTEL® TD	-	28286-U	1 ea
Empty Tube for GERSTEL® TD, No-Frit	-	28287-U	1 ea
Screens for GERSTEL® TD Tubes	-	28277-U	10 ea

Thermal Desorption Tubes

Dynatherm™ Sampling Tubes

Dynatherm™ Sampling Tubes

Thermal Desorption Tubes for DYNATHERM Instruments

Supelco offers a complete line of both prepacked and empty tubes for the DYNATHERM Thermal Desorbers. Each tube is individually numbered, thermally conditioned, and batch tested for back-pressure and background. The prepacked Standard Sampling Tubes are sealed in our exclusive TDS³ storage containers and the Fast-Flow Tubes are sealed with Swagelok fittings. All of the prepacked sampling tubes incorporate a glass frit at the inlet, which increases their performance. The Focusing tubes are used to refocus the sample for better chromatography of the early eluting compounds.



Dynatherm™ Standard Sampling Tubes (Glass-Fritted)

Glass tubes 6 mm O.D. x 4.5in. Long, 4 mm I.D.. Fits: Models 850 / 890 TDU, ACEM-900, MTDU and OI Analytical Air Tube Desorber or DMP-16. Empty Tube for Thermal Desorption 20235-U is fritted and 20380-U is non-fritted.

Description	Suitability	Cat. No.	Pkg
Tenax® TA	US EPA IP-1B US EPA TO-1	20896-U	1 ea
Carbotrap® 100	ASTM D6196	20872	1 ea
Carbotrap® 150	(for sampling large molecules in air or aqueous samples)	20381	1 ea
Carbotrap® 202	US EPA TO-17 (for sampling C2-C14 compounds in air)	20873	1 ea
Carbotrap® 217	US EPA TO-17	20895-U	1 ea
Carbotrap® 300	US EPA TO-3 US EPA TO-2 US EPA TO-1 US EPA TO-17	20875	1 ea

Description	Suitability	Cat. No.	Pkg
Carbotrap® 302	(for sampling volatile compounds in aqueous solutions)	20356	1 ea
Carbotrap® 317	US EPA TO-17	20877	1 ea
Carbotrap® 349	NIOSH 2549 NIOSH 2549 US EPA IP-1B	20243	1 ea
Carbotrap® 400	(for sampling C2 and larger compounds in aqueous samples)	20882	1 ea
Empty Glass Sampling Tube for Dynatherm™ TDUs, Non-Fritted	-	20235-U	5 ea

Empty Tube for Thermal Desorption

Description	Cat. No.	Qty
glass TD tube, fritted, O.D. 6 mm x L 4.5 in.	20380-U	3 ea

Dynatherm™ Fast Flow Sampling Tubes (Glass)

These glass tubes have a 7mm I.D. that allow faster flow rates to pass through the tubes while sampling. Fits only ACEM-900 and MTDU equipped with the fast-flow option ("FF" designation). 10 mm O.D. x 4.5in. Long (6 mm O.D. ends).

Sealed using Swagelok® fittings.

for use with Dynatherm™ ACEM-9300, IACEM-980, ACEM 900 and MTDU equipped with fast-flow "FF"

I.D. x O.D. x L 7 mm x 10 mm x 4.5 in.

Description	Suitability	Cat. No.	Pkg
Carbotrap® 317	US EPA TO-17	20881	1 ea
Tenax® TA	US EPA TO-1 US EPA IP-1B	20894	1 ea

Dynatherm™ Focusing Tubes for ACEM 850/890 TDU

Fits models: ACEM-850/890 TDU

Description	Cat. No.	Qty
Carbotrap® 201, for use with Dynatherm™ 850/890 TDU, I.D. 1 mm x O.D. 6 mm x L 4.5 in., glass TD tube (focusing tube)	20361	1 ea
Carbotrap® 300, for use with Dynatherm™ 850/890 TDU, I.D. 2 mm x O.D. 6 mm x L 4.5 in.	20382	1 ea
Carbotrap® 301, I.D. 1 mm x O.D. 6 mm x L 4.5 in., ID tapers to 0.75mm	20354	1 ea
Empty Tube for Thermal Desorption, I.D. 2 mm x O.D. 6 mm x L 4.5 in.	20237	5 ea

Dynatherm™ Focusing Tubes for ACEM 900/901FF

Description	Cat. No.	Qty
Carbotrap® 201, for use with Dynatherm™ ACEM 900/901-FF, I.D. 1 mm x O.D. 6 mm x L 7.25 in.	20865	1 ea

Thermal Desorption Tubes

Dynatherm™ Sampling Tubes

Color Coded Tenax® TA Dynatherm™ Standard Sampling Tubes

Simplify your field sampling process and reduce error in the field with our color-coded glass fritted sampling tubes. Each color can represent a different sample in the field or a different protocol in the laboratory. All tubes contain Tenax® TA. Suitable for EPA TO-1, and EPA IP-1B.

suitable for IP-1B per US EPA

suitable for TO-1 per US EPA

glass TD tube

matrix Tenax TA porous polymer
I.D. x O.D. x L 4 mm x 6 mm x 4.5 in.



Tenax® TA

Preconditioned	Cat. No.	Qty
Yes	11271-U	1 ea
White dot		
Yes	11272-U	1 ea
Black dot		
yes	11273-U	1 ea
Red dot		

VOST Stack Sampling Tubes

VOST Tubes (Volatile Organic Sampling Train) are designed to meet the specifications in US EPA SW-846, Method 0030. Each tube is individually numbered, pre-conditioned, and sealed with stainless steel Swagelok fitting before being placed in a glass storage container. Each lot is tested for background and backpressure. 16mm O.D. x 5 in. Long (1/4 in. O.D. Ends)



Description	Cat. No.	Qty
VOST Stack Sampling Tube, matrix Tenax TA porous polymer, 35-60 mesh	20074-U	1 ea
VOST Stack Sampling Tube, Tenax TA: Petroleum Charcoal, 2:1	20075-U	1 ea
VOST Stack Sampling Tube, empty	21993	1 ea
VOST Storage Container	21998	1 ea

Thermal Desorption Tubes for Teledyne-Tekmar® Instruments

Supelco offers both stainless steel and glass preppacked tubes for the Teledyne-Tekmar Instruments. The preppacked tubes are thermally conditioned and tested for background levels and backpressure. The 1/4 in. O.D. tubes are sealed in our exclusive TDS³ storage container. The 1/2 in. O.D. tubes are sealed in a glass storage container.

Fits: AEROTrap 6000 instrument



Tekmar® Thermal Desorption Tubes, stainless steel, 1/4 in. OD X 7 in. Long, 5 mm ID

for use with Tekmar AEROTrap 6000 models

Description	Cat. No.	Qty
Carbotrap® 100	20241	1 ea
Carbotrap® 300	20370-U	1 ea
Empty Tube for Thermal Desorption	20920-U	1 ea
Tenax® TA	20913-U	1 ea

Tekmar® Thermal Desorption Tubes (Glass, 1/4 in.OD X 7 in. Long, 4 mm ID)

Description	Cat. No.	Qty
Carbotrap® 300	20912-U	1 ea
Empty Tube for Thermal Desorption	20918	1 ea

Tekmar® Thermal Desorption Tubes, stainless steel, 1/2 in. OD X 7 in. Long, 12 mm ID

Description	Cat. No.	Qty
Storage Container For 1/2 in. x 7 in. TD Tube	20853	1 ea
Tenax® TA	20984	1 ea

Tekmar® Thermal Desorption Tubes (Glass, 1/2 in. OD X 7 in. Long, 10 mm ID)

Description	Cat. No.	Qty
Storage Container For 1/2 in. x 7 in. TD Tube	20853	1 ea

Impingers/Bubblers/Accessories

Impingers/Bubblers/Accessories

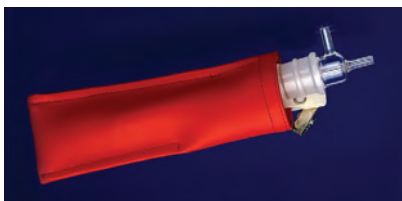
Impinger Accessories

In-Line Impinger Trap

Bottom Cap allows easy emptying. 15 mL capacity for absorbing solution. Can be packed with charcoal or other adsorbent (not included). Cap and PTFE liner included. Length: 152mm (6 in.); 20 mm threads.

Impinger Holder

Insert your impinger, bubbler, or in-line trap in this holder and attach the holder to your lapel, shirt pocket, or belt.



20271



64833

Description	Cat. No.	Qty
In-line impinger trap w/ 20mm thread	64833	1 ea
Impinger holder	20271	1 ea

Impingers and Bubblers

Impinger/Bubbler

These borosilicate glass impingers (for particles) and bubblers (for gases and vapors) are ideal for NIOSH and OSHA methods that require collection of airborne contaminants by drawing them into a solution. Available with ground glass joints or threaded PTFE micro-connectors.

Threaded Midget Impingers and Bubblers make your sampling more convenient with these borosilicate glass apparatus. The vial can be capped after sampling, thus reducing sample handling in the field (no transferring of samples from reservoir to a separate vial). The reservoir may be easily replaced with a standard or graduated screw-top vial of the same size.

Specifications:

Threaded Midget Impinger

Length (without vial): 143 mm (5 $\frac{5}{8}$ in.)

Vial capacity: 22 mL

Thread: 20 mm

Threaded Midget Bubbler

Length (without vial): 143 mm (5 $\frac{5}{8}$ in.)

Vial capacity: 22 mL

Graduation mark: 15 mL

Thread: 20 mm

Spill-resistant Midget Bubbler

Length (without vial): 143 mm (5 $\frac{5}{8}$ in.)

Vial capacity: 40mL

Graduation mark: 15 mL

Thread: 24 mm

Standard Midget Impinger and Bubbler

Length: 186 mm (7.3in.)

Reservoir length: 152 mm (6in.)

Reservoir capacity: 25 mL

Graduations: 5 mL

Glass joint: ∇ 24/40 taper

Impinger: standard glass stem

Bubbler: fritted glass stem



Left to right: 20270-U, 64835-U



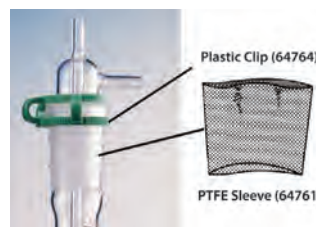
Left to right: 64712-U, 64834-U, 64832

Description	Cat. No.	Qty
Threaded Midget Impinger, volume 22 mL	64712-U	2 ea
Threaded Midget Bubbler, volume 22 mL	64834-U	1 ea
Spill-Resistant Midget Bubbler, bubbler volume 40 mL	64832	1 ea
Standard Midget Impinger, reservoir volume 25 mL	20270-U	1 ea
Standard Midget Bubbler, reservoir volume 25 mL	64835-U	1 ea

Plastic Clips/PTFE Sleeves

Plastic clips fit over the connection on our 24/40 taper ground glass joints to ensure secure connections. Use full length PTFE sleeves in ground glass joints for inert, tight seals without the possibility of frozen joints. For use with standard impingers and bubblers.

Description	Cat. No.	Qty
Plastic Clip, for use with 24/40 ∇	64764	5 ea
PTFE Sleeve, for use with 24/40 ∇	64761	5 ea



Thermal Desorption Tubes and Storage Containers

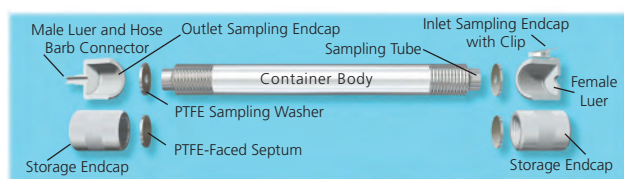
TDS³ Storage Containers

Thermal Desorption Tubes and Storage Containers

TDS³ Storage Containers

TDS³™ Storage Container

Use our TDS³ storage sampling system to simplify the Thermal Desorption sample prep process. The TDS³ storage containers will maintain the sample integrity of both the tubes to be sampled or those which already have a sample adsorbed. The optional Sampling Caps convert the TDS³ storage container into a convenient tube holder that makes connecting the tube to the sampling pump very easy.



	Cat. No.	Qty
TDS³™ Storage Container		
for use with PerkinElmer ATD-50, ATD-400, Turbomatrix, for use with Markes International Unity	25097-U	1 ea
for use with Dynatherm™ 850/890, ACEM 900/901-FF (Standard sampling tube)	25096-U	1 ea
for use with Chrompack	25098-U	1 ea
for use with Tekmar AEROTrap 6000, for use with Gerstel® TDS 2/TDS/A	25095-U	1 ea
for use with Gerstel 60mm TDU Tubes	28307-U	1 ea

TDS³™ Accessories

	Cat. No.	Qty
Female Luer Cap		
polypropylene, configured for capping luer tips	57098	12 ea
Male Luer Plug		
configured for plugging luer holes	504351	12 ea
Replacement septa for storage containers		
for use with all TDS ³ Containers	25073	50 ea
TDS³™ Sampling Caps with Washers for 1/4 in. Containers		
for use with TDS ³ to convert it to sampling	25069	10 ea
Male Luer Fitting for 1/8 in. Tubing		
-	21016	20 ea
Male Luer Fitting for 3/16 in. tubing		
-	23364	20 ea
Male Luer Fitting for 1/4 in. Tubing		
-	24856	10 ea
Male Luer Coupler		
-	25064-U	20 ea

Thermal Desorption Accessories

PTFE Packed Column Ferrule, 1/4 in. Column O.D.



Description	Cat. No.	Qty
configured for 1/4 in. O.D. Column	29024-U	10 ea

Whole Air Sampling - Gas Sampling Bags and Bulbs

About Supelco Gas Sampling Bags

For over 40 years, Supelco is regarded as a world leader in adsorbent technology having introduced the graphitized carbon blacks Carbo-pack and Carbotrap; and the carbon molecular sieves Carbosieve and Carboxen. These are complemented by polymeric materials, analytical standards, sample preparation products and HPLC and GC Columns. We bring our analytical expertise to all air monitoring products including our expanded line of gas sampling bags.

We offer 2 valve fitting styles manufactured from high grade inert polypropylene. Our fittings are designed with 3/16 inch O.D. stems for use with most 1/4 inch O.D. inert tubing used for air sampling. Our Thermogreen LB-2 Septa is incorporated into the valve's fitting. *The Thermogreen polymer has the industry's lowest bleed material preventing sample contamination originating from the septum.*

Push-Pull Lock Valve (PLV)

Is our traditional valve style where the stem of the valve is perpendicular to the bag surface. To open the valve, you push the stem downward, to close the valve you pull the stem up and turn to lock. This style is ideal when your application requires exact flow rates. The design will not deadhead the pump.



Whole Air Sampling - Gas Sampling Bags and Bulbs

Supel™-Inert Film Gas Sampling Bags with Thermogreen® LB-2 Septa (for Sampling VOCs)

Supel™-Inert Film Gas Sampling Bags with Thermogreen® LB-2 Septa (for Sampling VOCs)



SupelInert Film is a proprietary fluoropolymer developed specifically for air sampling applications as an alternative to Tedlar film. Our SupelInert line of products features our Thermogreen LB-2 septa installed in the valve fitting.

Push/Pull Lock Valve (PLV)

NEW PRODUCTS

Description	Cat. No.	Qty
Supel™ Inert Film, maximum volume 1 L, Push/Pull Lock Valve (PLV)	30213-U	10 ea
Supel™ Inert Film, maximum volume 2 L, Push/Pull Lock Valve (PLV)	30214-U	10 ea
Supel™ Inert Film, maximum volume 5 L, Push/Pull Lock Valve (PLV)	30215-U	10 ea
Supel™ Inert Film, maximum volume 10 L, Push/Pull Lock Valve (PLV)	30216-U	10 ea
Supel™ Inert Film, maximum volume 25 L, Push/Pull Lock Valve (PLV)	30217-U	5 ea

Screw Cap Valve (SCV)

NEW PRODUCTS

Description	Cat. No.	Qty
Supel™ Inert Film, maximum volume 1 L, Screw Cap Valve (SCV)	30221-U	10 ea
Supel™ Inert Film, maximum volume 2 L, Screw Cap Valve (SCV)	30222-U	10 ea
Supel™ Inert Film, maximum volume 5 L, Screw Cap Valve (SCV)	30223-U	10 ea
Supel™ Inert Film, maximum volume 10 L, Screw Cap Valve (SCV)	30224-U	10 ea
Supel™ Inert Film, maximum volume 25 L, Screw Cap Valve (SCV)	30225-U	5 ea

Tedlar Gas Sampling Bags

Tedlar is recommended in several US EPA methods for sampling VOCs and sulfur compounds. Our Tedlar is made from a high-quality 2 mil Tedlar film for superior inertness, impermeability, sample integrity and good recovery data. Our Push Lock Valve (PLV) and seam-sealing process ensure that these bags are sturdy and virtually leak-proof, even under the most demanding sampling and shipping conditions. *Does not contain our Thermogreen LB-2 low bleed septa.*

Description	Cat. No.	Qty
Tedlar® Gas Sampling Bag, Tedlar®	24633	10 ea
Tedlar® Gas Sampling Bag, Tedlar®	24654	10 ea
Tedlar® Gas Sampling Bag, Tedlar®	24655	10 ea
Tedlar® Gas Sampling Bag, Tedlar®	24634	10 ea

Supel™-Inert Multi-Layer Foil Gas Sampling Bags with Thermogreen® LB-2 Septa



SupelInert multi-layer foil gas sampling bags with Thermogreen LB-2 septa are ideal for sampling low molecular weight compounds such as carbon monoxide (CO), carbon dioxide (CO₂) and permanent gases. They are also suitable for sampling sulfur compounds such as hydrogen sulfide (H₂S), carbon disulfide (CS₂) and mercaptans.

Key Features and Benefits:

- Multi-layer foil composed of two outer layers of aluminum film providing a great barrier to gases permeating through walls of the bag.
- Proven low-bleed Thermogreen LB-2 septa installed in the valve fitting.
- Chemically inert with moisture and light protection
- Not recommended for low ppm VOCs due to background levels (*we recommend the SupelInert PVDF Tedlar replacement film for VOCs*).
- Two valve choices available: Screw Cap Valve (SCV) and Push/Pull Lock Valve (PLV)
- 4 sizes: 1L, 2L, 5L, and 10L

Method Applications:

SupelInert Multi-Layer Foil Gas Sampling Bags are suitable for the following methods and applications.

- NIOSH 6603: Carbon Dioxide (CO₂)
- OSHA ID-172: Carbon Dioxide in Workplace Atmospheres
- OSHA ID-210: Carbon Monoxide (CO)
- Landfill and Biogas (LFG): Hydrogen, Hydrogen Sulfide, Methane, Nitric Oxide, Oxygen
- Calibration Mixes and Gas Transfer

Whole Air Sampling - Gas Sampling Bags and Bulbs

Supel™-Inert Multi-Layer Foil Gas Sampling Bags with Thermogreen® LB-2 Septa: *Push/Pull Lock Valve (PLV)*

Push/Pull Lock Valve (PLV)

NEW PRODUCTS

Description	Cat. No.	Qty
Supel™-Inert Multi-Layer Foil , maximum volume 1 L x W 7 in. x L 9 in.	30237-U	10 ea
Supel™-Inert Multi-Layer Foil , maximum volume 2 L, Push/Pull Lock Valve	30238-U	10 ea
Supel™-Inert Multi-Layer Foil , maximum volume 5 L, Push/Pull Lock Valve (PLV)	30239-U	10 ea
Supel™-Inert Multi-Layer Foil , maximum volume 10 L, Push/Pull Lock Valve (PLV)	30240-U	10 ea

Screw Cap Valve (SCV)

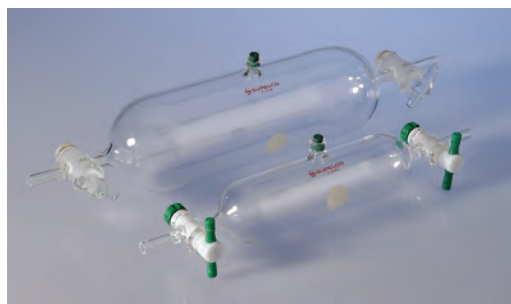
NEW PRODUCTS

Description	Cat. No.	Qty
Supel™-Inert Multi-Layer Foil , maximum volume 1 L, Screw Cap Valve (SCV)	30226-U	10 ea
Supel™-Inert Multi-Layer Foil , maximum volume 2 L, Screw Cap Valve (SCV)	30227-U	10 ea
Supel™-Inert Multi-Layer Foil , maximum volume 5 L, Screw Cap Valve (SCV)	30228-U	10 ea
Supel™-Inert Multi-Layer Foil , maximum volume 10 L, Screw Cap Valve (SCV)	30229-U	10 ea

Gas Sampling Bulbs

Use these glass bulbs to trap and transport a gas sample, then remove an aliquot (through the plug-type septum) for analysis. Oven annealed to resist damage during transportation and on-site use. Available with PTFE or high vacuum glass stopcocks. One half-hole cylindrical Thermogreen septum is included with each bulb.

	Cat. No.	Qty
Gas Sampling Bulb		
125 mL, glass stopcock	22146-U	1 ea
250 mL, glass stopcock	22147-U	1 ea
500 mL, glass stopcock	22148-U	1 ea
1000 mL, glass stopcock	22144-U	1 ea
125 mL, PTFE stopcock	22161	1 ea
250 mL, PTFE stopcock	22162-U	1 ea
500 mL, PTFE stopcock	22163-U	1 ea
1000 mL, PTFE stopcock	22145-U	1 ea
Stopcock Plug		
PTFE	64779-U	1 ea
Thermogreen® LB-1 Septa, cylindrical		
septum type cylindrical with half-hole	20668	100 ea



Top to Bottom: Cat. Nos. 22147, 22161

Static Dilution Bottle

- Two-liter, round-bottom flask with a threaded neck
- Accommodates a Mininert valve

Use the static dilution bottle to prepare gaseous volatile organic standards, using a technique developed by the US EPA for air analyses. Simply inject neat compound through the valve and allow it to vaporize; then withdraw the aliquots using a gas-tight syringe. Multicomponent standards are conveniently prepared and may be stored for at least one week.



21992 cork base not included

Description	Cat. No.	Qty
Static Dilution Bottle w/ Mininert® Valve	21992	1 ea
Septum inserter for Mininert® Valve, Tool for inserting septa	33311	1 ea
Replacement septa for Mininert® valves, Replacement Mininert Septa, L 0.308 in. x O.D. 0.125 in.	33310-U	50 ea
Mininert® Valve, screw thread, for use with 24/400 mm thread	33304	12 ea

ATIS Adsorbent Tube Injector System



ATIS Adsorbent Tube Injector System



The Supelco ATIS is a sample preparation device for adsorbent tubes. The Adsorbent Tube Injector System employs the technique of flash vaporization to vaporize the sample into a continuous flow of an inert gas, which carries the sample to the adsorbent tube. The sample pathway of the Adsorbent Tube Injector System is constructed of glass and stainless steel. The calibration standard is injected by a syringe through a replaceable septum in the center of the injection glassware, which is heated.

- Injecting calibration standards onto adsorbent tubes, to calibrate your analytical system
- Injecting surrogates and system monitoring compounds onto adsorbent tubes before or after sampling
- Removes moisture from tubes prior to analysis (Dry purging)
- Connect an air-sampling bag to the outlet of the ATIS to vaporize calibration standards prior to assure complete vaporization.

The ATIS will accept either $\frac{1}{4}$ in. or 6 mm O.D. Thermal Desorption tubes. Included is a Luer/hose barb adapter to connect a variety of solvent desorption tubes.

The temperature range of the ATIS is ambient to 120 °C. The flow range is 0 to 100 mL/min.

The ATIS includes the injection glassware, a constant flow controller with an on/off valve, the heating source, spare parts along with all the necessary fittings and tubing. You simply plumb it to a regulated source of nitrogen or helium and plug it in to the appropriate electrical source.

ATIS Adsorbent Tube Injector System

Description	Cat. No.	Qty
ATIS Adsorbent Tube Injector System 110V	28520-U	1 ea
ATIS Adsorbent Tube Injector System 230V	28521-U	1 ea
ATIS Replacement Luer/Hose Barb Adapter	28525-U	1 ea
ATIS Replacement Standard Injection Glassware	28526-U	1 ea
ATIS Replacement Thumbwheel Nut	28529-U	1 ea

Thermal Extraction Glassware

Use the ATIS to thermally extract samples onto an adsorbent tube. The opening in the glassware will accept solid samples up to $\frac{1}{2}$ in. (13mm) in diameter and up to 3 in. long (76mm) to be inserted into the glassware. The extraction glassware simply slides into the ATIS heating block. Two types of glass joints are available.

Description	Cat. No.	Qty
ATIS Extraction Glassware with Ground Joint Connector	28524-U	1 ea
ATIS Extraction Glassware with Micro Connector	28523-U	1 ea



Purge and Trap/Humidifier Module for the ATIS

Description	Cat. No.	Qty
ATIS Purge and Trap/Humidifier Module	28522-U	1 ea
ATIS Replacement Purge and Trap/Humidifier Glassware	28527-U	1 ea
ATIS Replacement Purge and Trap Transfer Tube	28528-U	1 ea

A separate module is available that will allow you to purge aqueous samples onto an adsorbent tube at ambient temperatures. This module can also be used to generate a dynamic humidified stream of the carrier gas for spiking calibration standards. The purge and trap module includes purge and trap glassware, and a separate flow controller that allows the user to set a separate purge (wet) flow rate independently of the dry flow rate. The purge and trap module accepts standard 22mL threaded vials to simplify your sample prep.



Introduction to Passive Sampling

Introduction to Passive Sampling

Passive/diffusive sampling relies on the unassisted molecular diffusion of gaseous agents (analytes) through a diffusive surface onto an adsorbent. Unlike active (pumped) sampling, passive samplers require no pumps (electricity), have no moving parts, and are simple to use (no pump operation or calibration). After sampling, the adsorbed analytes are desorbed off the adsorbent through solvent or thermal desorption.

Benefits of Passive/Diffusive Sampling:

- Compact, portable, unobtrusive, and inexpensive
- Offers indication of average pollution levels over time periods of 8 hours to weeks/months
- Requires no supervision, is non-flammable and operates quietly.
- Low cost allows for sampling at multiple locations (e.g., for highlighting pollution "hotspots"; fence-line monitoring; and for determining long-term data trends in a specific geographic area)
- Amenable to personal monitoring (breathing zone), industrial hygiene, indoor air analysis and outdoor ambient air analysis.

From Fick's Law we know that the sampling Rate (Q) is a function of the diffusion coefficient of a given analyte (D) and the geometric constant of the sampler (K): $Q = D \times K$. The diffusion coefficient (D) always remains constant for a given analyte; therefore, to improve sampling rate (Q) the geometric constant (K) must be improved where $K = S/l$ where S is the diffusive surface and l is the distance between the diffusive and adsorbing surface.

Most commercially available passive/diffusive samplers are planar or axial in shape and offer lower sampling rates and limited sampling capacity. As a result, sensitivity can suffer during short-term (ST) analysis due to low sampling rates, or long-term (LT) sampling due to analyte back diffusion to low capacity. A radial coaxial design circumvents this issue by improving the geometry, resulting in up to 10x higher sampling rates. Supelco offers two radial design passive/diffusive samplers - Radiello and DSD-DNPH.

Radiello™ Diffusive Sampling System



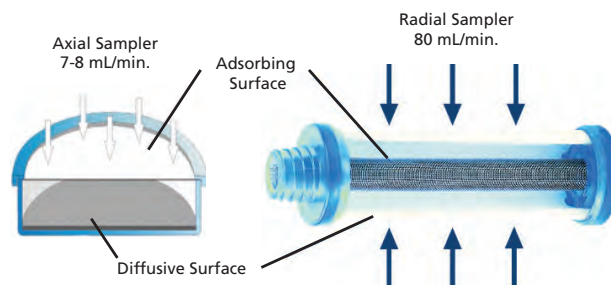
Radiello Starter Kit



FONDAZIONE SALVATORE MAUGERI
CLINICA DEL LAVORO E DELLA RIABILITAZIONE
I.R.C.C.S.

What is Radiello?

In the mid 1990s, Dr. Vincenzo Cocheo, Director of the Fondazione Salvatore Maugeri (FSM), Padova, Italy, in collaboration with the European Commission Joint Research Center and other institutions, developed and patented a revolutionary diffusive sampling design - Radial symmetry (now a registered trademarked as radiello). It consists of a microporous cylindrical polypropylene diffusive body. Housed within the diffusive body is a removable cartridge adsorbent. Each cartridge adsorbent contains a unique adsorbent that is application specific. The radial symmetry design offers a very large diffusive surface relative to the adsorbing surface allowing for an exponential increase in uptake rate when compared to traditional passive samplers. This translates to shorter sampling times.



Due to the tortuous nature of the diffusive path inside the micro-porous diffusive membrane, uptake rates are not affected by wind or air currents. The stiffness of the diffusive wall and cartridge, in conjunction with tight design specifications of all Radiello components, greatly reduces uptake rate variation. In addition, uptake rates are experimentally measured using a controlled atmospheric chamber where such variables as analyte concentration, temperature, relative humidity, and air speed are tested. Radiello cartridge adsorbents also offer higher capacity allowing for long term sampling without risk of back or reverse diffusion.



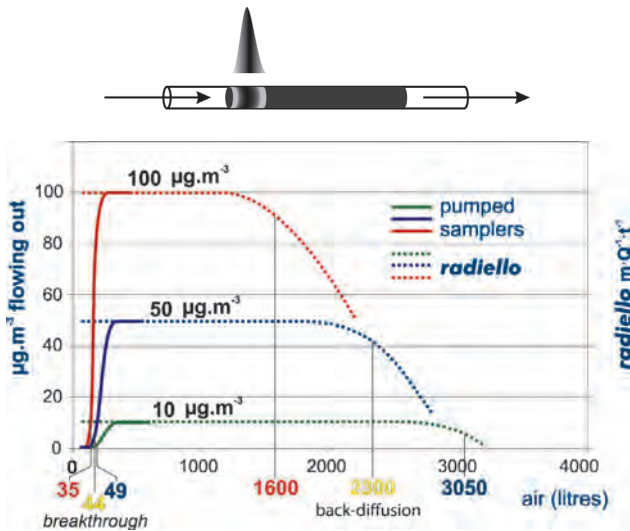
Atmospheric chamber used to measure uptake rates for Radiello cartridge adsorbents.

Radiello™ Diffusive Sampling System

Radiello™ Features & Benefits

Radiello™ Features & Benefits

- The Radiello design offers high uptake rates resulting in faster sampling
- Greater adsorbent capacity offers minimal reverse diffusion and greater uptake rate consistency resulting in more reproducible results
- All uptake rates are precisely measured (not calculated) resulting in more precise measurements
- The water repellent diffusive body makes Radiello amenable to harsh weather conditions
- All cartridge adsorbents undergo a complex conditioning and QC procedure resulting in cartridge background levels three times lower than instrument noise
- The combination of low detection limits, high uptake rates, and high capacity allow for sampling time ranges from 15 min. to 30 days (1 ppb – 1000 ppm)
- Detailed desorption and analytical conditions are available in the Radiello manual (IYP) which can be viewed at sigma-aldrich.com/radiello
- Predominately solvent desorption which does not require thermal desorption equipment
- Amenable to TD and GC-MS with low interferences resulting in precise and very sensitive measurements
- Touch and chemically inert making the sampler robust in use
- Reusable hardware for economic sampling
- Available accessories (outdoor shelter) for ambient air analyses making Radiello samplers amenable to a wide range of application areas



Radiello was able to achieve sampling volumes of 1600, 2300, and 3050 liters sampled air at concentrations of 10, 50, and 100 micrograms per cubic meter benzene, respectively, before back diffusion occurred.

Radiello™ Applications

Radiello is designed to sample the following airborne contaminants (lower level):

- VOCs and BTEX (solvent desorption)
- VOCs and BTEX (thermal desorption)
- Aldehydes
- Ammonia (NH_3)
- Anesthetic gases and vapors (nitrous oxide, isoflurane, ethrane, halothane, and sevoflurane)
- Hydrochloric acid (HCl)
- Hydrofluoric acid (HF)
- Hydrogen sulfide (H_2S)
- Nitrogen and Sulfur Dioxide (NO_2 and SO_2)
- Ozone (O_3)
- Phenols (methylphenol, phenol, and dimethylphenol (thermal desorption))



The Radiello Process

Affix Radiello sampler to clothes or fixture (wall, telephone pole, tree, lamp, etc.)
Record time and temperature.

Organic gases/chemical agent(s) diffuse onto sorbent.

At end of sampling period, sampler is removed, resealed and time/temperature noted.

Radiello sampler is sent to laboratory for analysis.

Analysis technique dependent on chemical agent(s). Mostly chromatography.

Other common applications include:

- Indoor Air Quality (IAQ) of public facilities, homes, classrooms, offices, etc.
- Personal monitoring (breathing zone assessment) of employees to hazardous substances
- Air sampling of work place environment (industrial hygiene)
- Urban sampling to map concentration gradients within a city or other geographic area
- Identification of pollution "hotspots" for further assessment and resolution
- Outdoor sampling around high traffic area (pedestrian or auto) and/or industrial sites
- Measurement of gaseous components derived from materials used in buildings, new homes, carpets, furniture, and other fixtures
- Monitoring of anesthetic gases in hospitals
- Air quality assessment in museum environments – artwork exposure to aggressive gases such as formic and acetic acid

Radiello™ Diffusive Sampling System

Radiello™ Applications



Indoor air quality (IAQ) of public facilities, homes, classrooms, offices, etc.



Outdoor shelter for suspending Radiello samplers for environmental/ambient air sampling.



Personal monitoring (breathing zone assessment) of employees to hazardous substances.

Using Radiello™ Samplers

Assembly of the Radiello samplers is simple. Sampling using Radiello monitors begins with a quick assembly of the support plate. The adsorbent cartridges used to collect samples are housed in a sealed glass tube that is used to store the cartridge before and after sampling. Prior to sampling, the adsorbent cartridge needs to be transferred to the appropriate diffusive body, which is then screwed onto the triangular support plate horizontally for stationary sampling, or vertically (with adapter) for personal sampling. The overall design of the Radiello sampler allows users to easily transfer the adsorbent cartridges to and from the diffusive body without touching the adsorbent itself. An optional protective outdoor shelter is recommended for environmental or ambient air sampling.



1. Transfer adsorbent cartridge from the storage container into the diffusive body.



2a. Screw diffusive body into triangular support plate.



2b. Use vertical adapter for personal sampling.

Radiello™ Diffusive Sampling System

Using Radiello™ Samplers



3. Insert label into sampler pocket and document date and time on the enclosed barcode label.



4. At the conclusion of sampling, transfer the adsorbent cartridge from the diffusive body to the original sealed glass tube. Document date, time, and temperature on the barcode label, and transfer label to glass tube.



5. Desorb and analyze adsorbing cartridge, or submit to laboratory for analysis.

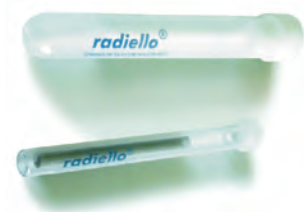
Radiello™ Key Components

Radiello™ Cartridge Adsorbents

Several different Radiello cartridge adsorbents are available. Each of which are specific for sampling different classes of compounds. The dimensions for each cartridge are 60 mm L x 4.8 or 5.8 mm D. Each cartridge is designed for one time use with the exception of Radiello thermal desorption (TD) cartridge adsorbents.

Each cartridge arrives in a sealed glass or plastic tube wrapped in a transparent thermally sealed polyethylene (PE) bag. The same sealed tube can be used to store the cartridge after sampling prior to desorption/analysis. A sufficient number of adhesive barcode labels are included with every pack of cartridges for easy tracking of sampling date and time.

Note: To conduct air sampling using the Radiello system, Radiello diffusive bodies and triangular support plates must be ordered (separately) in addition to cartridge adsorbents. Radiello Starter Kits (RADxxxS) include all the necessary parts to complete a sampling.



Compatible	Matrix	Cat. No.	Qty
Aldehydes	SS net with 2,4-DNPH coated FLORISIL®	RAD165	20 ea
Ammonia (NH ₃)	microporous PE impregnated with phosphoric acid	RAD168	20 ea
Anaesthetic Gases/Vapors	SS net with mix of mol sieve and activated charcoal (30-50 mesh)	RAD132	20 ea
BTEX and VOCs (CS ₂ Desorption)	SS net (100 mesh, 5.8 mm diam.), activated with activated charcoal (30-50 mesh)	RAD130	20 ea
1,3-Butadiene and Isoprene	SS net packed with Carboxpack X	RAD141	20 ea
BTEX and VOCs (thermal desorption)	SS net (3 x 8 µm, 4.8 mm diam.), Carbograph	RAD145	20 ea
HCl	SS net with silica gel (100-400 µm particle size)	RAD169	20 ea
HF, NO ₂ , and SO ₂	microporous PE impregnated with wet TEA	RAD166	20 ea
Hydrogen Sulfide (H ₂ S)	microporous PE coated with zinc acetate	RAD170	20 ea
Ozone (O ₃)	microporous PE tube with 4,4'-dipyridylethylene coated silica	RAD172	20 ea
Phenolic Compounds (thermal desorption)	SS net (100 mesh, 4.8 mm diam.), Tenax-TA	RAD147	20 ea

Radiello™ Diffusive Sampling System

Radiello™ Key Components

Radiello™ Diffusive Bodies

The diffusive bodies are designed to house Radiello cartridge adsorbents during sampling. The diffusive bodies are threaded at one end for easy attachment to the Radiello triangular support plate. Unlike most of the cartridge adsorbents, the diffusive bodies are reusable and can be cleaned with a mild detergent between use. The diffusive bodies will collect dust (especially during outdoor sampling) and replacement is recommended after 4-5 uses.

Dimensions are 60 mm height x 16 mm diameter. There are four different diffusive bodies available. Each of which are application specific in design.



Color	Configured For	Body	Size	Pore Size (µm)	Cat. No.	Qty
white	general use	polyethylene	thickness x diffusive path length 1.7 x 18 mm	25	RAD120	20 ea
blue	sampling light sensitive compounds	polyethylene	thickness x diffusive path length 1.7 x 18 mm	25	RAD1201	20 ea
yellow	reduced sampling rates	polyethylene	thickness x diffusive path length 5 x 150 mm	10	RAD1202	20 ea
(permeative)	anaesthetic gases and vapors	silicone (strengthened by SS net)	thickness 50 µm	-	RAD1203	20 ea

Radiello™ ready-to-use Diffusive Sampler

The Radiello *ready-to-use* (rtu) Diffusive Samplers come pre-assembled with the cartridge adsorbent pre-sealed within the diffusive body using a polycarbonate screw-thread cap. To avoid premature sampling, the entire unit (diffusive body plus pre-sealed cartridge adsorbent) is enclosed within an airtight polypropylene (PP) container. Just before use, the unit is removed from the PP container, and snapped into the rtu vertical adapter pre-fixed to the triangular support plate. Once sampling is complete, the diffusive sampling unit is removed from the support plate and resealed into the PP container.

Each rtu sampler includes: a sampler unit (sealed diffusive body with cartridge adsorbent), glass or plastic tube to house the cartridge adsorbent after sampling prior to desorption, rtu vertical adapter, barcode label, and PP container. Triangular support plates must be ordered separately.

Note that the rtu diffusive samplers are ideal for work place sampling campaigns, but not for sampling low concentrations in outdoor or domestic environments. Shelf life for the rtu samplers are 3 months.



Compatible	Description	Cat. No.	Qty
for sampling BTEX and VOCs (CS ₂ Desorption)	Includes RAD120 White Diffusive Body and RAD130 Cartridge Adsorbent	RAD1231	5 ea
for sampling BTEX and VOCs (Thermal Desorption)	Includes RAD1202 Yellow Diffusive Body and RAD145 Cartridge Adsorbent	RAD1232	5 ea
for sampling HF, NO ₂ , and SO ₂	Includes RAD1201 Blue Diffusive Body and RAD166 Cartridge Adsorbent	RAD1233	5 ea
for sampling Aldehydes	Includes RAD1201 Blue Diffusive Body and RAD165 Cartridge Adsorbent	RAD1234	5 ea

Radiello™ Diffusive Sampling System

Radiello™ Key Components

Compatible	Description	Cat. No.	Qty
for sampling Ozone (O ₃)	Includes RAD1201 Blue Diffusive Body and RAD172 Cartridge Adsorbent	RAD1235	5 ea
for sampling Hydrogen Sulfide (H ₂ S)	Includes RAD1201 White Diffusive Body and RAD168 Cartridge Adsorbent	RAD1236	5 ea
for sampling Ammonia (NH ₃)	Includes RAD1201 Blue Diffusive Body and RAD168 Cartridge Adsorbent	RAD1237	5 ea
for sampling HCl	Includes RAD120 White Diffusive Body and RAD1369 Cartridge Adsorbent	RAD1238	5 ea

Radiello™ ready-to-use Diffusive Sampler Accessories

Description	Cat. No.	Qty
Pk.20 polycarbonate caps for ready to use sampler	RAD1241	20 ea
Pk.20 polypropylene containers for ready to use sampler	RAD1242	20 ea

Radiello™ Triangular Support Plate

The triangular support plate acts as both a closure and means of suspension for the Radiello diffusive body and cartridge adsorbent during passive air sampling. Each support plate is threaded for easy diffusive body attachment. Each plate includes a clip and transparent adhesive pocket to hold the Radiello barcode label.



Cat. No.	Qty
RAD121	20 ea

Radiello™ Vertical Adapter

For personal sampling (breathing zone assessment) a vertical adapter is available to position the Radiello diffusive body vertically on the Radiello triangular support plate.



Radiello standard vertical adapter (RAD122)



Radiello ready to use vertical adapter (RAD1221)

Cat. No.	Qty
RAD122	20 ea
RAD1221	20 ea

Radiello™ Anesthetic Gases and Vapor Sampler

This kit was developed for sampling of nitrous oxide, isoflurane, ethrane, halothane, and sevoflurane in surgical theaters. Parts for one complete sampler are packed separately in one sealed and sterile bag. Pack of 10 sterile bags.

Each sterile bag contains:

- 1 permeative body
- 1 support plate
- 1 vertical adapter
- 1 adsorbing cartridge



Description	Cat. No.	Qty
Radiello™ Anesthetic Gases and Vapor Sampler	RAD125	10 ea

Radiello™ Diffusive Sampling System

Radiello™ Starter Kits

Radiello™ Starter Kits

Radiello Starter Kits are ideal for introducing you to the product and include everything you need to take one complete sample. No additional parts are required.

For Solvent Desorption

Solvent Desorption

RAD130S and RAD170S Starter Kit Includes:

Two radiello cartridge adsorbents (RAD141 or RAD145)

(Note: 1 x cartridge for sampling, 1 x for blank)

1 x Triangular Support Plate (RAD121)

1 x Vertical Adapter for personal sampling (RAD122)

1 x White Diffusive Body (RAD120)

1 x Barcode Label (RAD190)

Detailed sampling and analysis instructions

NEW PRODUCTS

Description	Cat. No.	Qty
Radiello™ Hydrogen Sulfide Starter Kit	RAD170S	2 ea
Radiello™ BTEX/VOC Starter Kit, CS2 Desorption	RAD130S	2 ea

For Thermal Desorption

Thermal Desorption

RAD141S and RAD145S Starter Kit Includes:

Two radiello cartridge adsorbents (RAD141 or RAD145)

(Note: 1 x cartridge for sampling, 1 x for blank)

1 x Triangular Support Plate (RAD121)

1 x Vertical Adapter for personal sampling (RAD122)

1 x Yellow Diffusive Body (RAD1202)

1 x Barcode Label (RAD190)

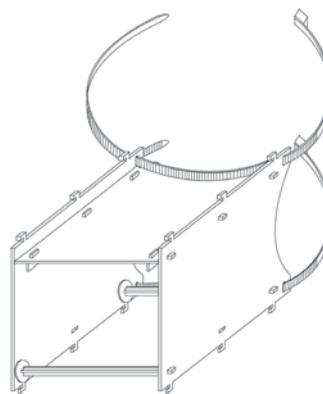
Detailed sampling and analysis instructions

Description	Cat. No.	Qty
Radiello™ BTEX/VOC Starter Kit, Thermal Desorption	RAD145S	2 ea
Radiello™ 1,3-Butadiene Starter Kit, Thermal Desorption	RAD141S	2 ea

Radiello™ Accessories and Replacement Parts

Radiello™ Outdoor Shelter

A polypropylene protective outdoor shelter is available for housing up to four Radiello samplers during outdoor/ambient air sampling. The shelter allows for adequate ventilation while simultaneously protecting the samplers from harsh weather conditions. The shelter can be mounted to a variety of fixtures including lamp posts, traffic lights, and telephone poles of various diameters. The shelter can easily be transported from the lab and mounted without the use of tools. Two mounting strips are included with each shelter.



Description	Cat. No.	Qty
Radiello™ Outdoor Shelter	RAD196	10 ea
Radiello™ Replacement Mounting Strips, for use with Radiello Outdoor Shelter	RAD198	100 ea

Radiello™ Diffusive Sampling System

Radiello™ Accessories and Replacement Parts

Description	Cat. No.	Qty
Radiello™ Outdoor Shelter	RAD196	10 ea
Radiello™ Replacement Mounting Strips, for use with Radiello Outdoor Shelter	RAD198	100 ea
Radiello™ On-Field Thermometer, Includes one standard Radiello vertical adapter (RAD122) for each thermometer, configured for standard use	RAD126	3 ea
Radiello™ On-Field Thermometer, configured for ready-to-use (rtu) samplers, Include one rtu vertical adapter for each thermometer	RAD1261	3 ea
Radiello™ On-Field Thermometer, Reader	RAD127	1 ea
Radiello™ Barcode Labels	RAD190	198 ea
Radiello™ Clips, sufficient for, suspending Radiello triangular support plate	RAD195	20 ea
Radiello™ Filtration Kit	RAD174	20 ea

Radiello™ Calibration Solutions and Kits

Description	Cat. No.	Qty
Calibration solution for glutaraldehydes, 10mL	RAD301	10 mL
Radiello™ Aldehyde Calibration Standard, 50 µg/mL each component in acetonitrile	RAD302	10 mL
Radiello™ BTEX Calibration Kit (CS ₂ Desorption)	RAD405	1 kit
Radiello™ BTEX Calibration Kit (Thermal Desorption)	RAD407	1 kit
Radiello™ Methylene Blue Calibration Standard for H ₂ S (Hydrogen Sulfide)	RAD171	100 mL
Radiello™ VOC Calibration Kit (Workplace Environment)	RAD406	1 kit

DSD-DNPH Diffusive Sampling Device

High Efficiency Diffusive Sampler for Determination of Aldehydes and Ketones in Indoor Air

The DSD-DNPH diffusive sampler was first introduced in Japan and was an integral device for monitoring carbonyls in indoor air, specifically related to "sick house syndrome". Sick house syndrome results from exposure to building materials that emit VOC's such as formaldehyde.

The DSD-DNPH is comprised of a porous polyethylene tube, which acts like a diffusive membrane, to which is attached a small syringe barrel used for elution of the analytes from the adsorbent. Because the diffusive membrane is round, it permits exposure from all sides, making it unique to other diffusive samplers. Silica gel coated with 2,4-dinitrophenylhydrazine (DNPH) acts as the adsorbent and moves from the diffusive end during sample collection to the syringe end for sample extraction, by inverting the device. Aldehydes and ketones diffuse through the membrane reacting with DNPH to form stable derivatives. The DNPH-derivatives are then eluted with acetonitrile and analyzed by high performance liquid chromatography (HPLC).

- Specified in OSHA Method 1007 for Determination of Aldehydes
- Collection and analysis of carbonyls without transfer of adsorbent, which minimizes the risk of contamination
- High-purity adsorbent provides collection of ppb levels of a wide range of carbonyls in a convenient, easy to use configuration
- Excellent uptake rates-faster, stable for wind, temperature, and humidity
- Stable blank data - important for LOQ
- Simple elution
- Versatile - use for Indoor Air (IH, Vapor Intrusion), personal sampling, and ambient air.

DSD-DNPH Diffusive Sampling Device



Description	Cat. No.	Qty
DSD-DNPH Diffusive Sampling Device	28221-U	1 ea
DSD-DNPH Tube Holder	28222-U	1 ea
pk20 Female Luer Fitting, 5/32in Tubing, Polypropylene	28224-U	1 ea
Lapel Clips	21019-U	6 ea
Empty SPE Tube (no frits), volume 6 mL	57242	30 ea
Visiprep™ SPE Vacuum Manifold, DL (Disposable Liner), 12-port model	57044	1 ea
Visi-1 Single SPE Tube Processor	57080-U	1 ea

Air Sampling Pumps

Escort™ Elf Sampling Pump

Air Sampling Pumps

Escort™ Elf Sampling Pump



Description	Cat. No.	Qty
Escort™ Elf Air Sampling Pump	28160-U	1 ea
Escort™ Elf Twin Port Sampler	28118-U	1 ea

Omega Battery Charger

for use with Escort Elf Air Sampling Pump

Omega Battery Charger	Cat. No.	Qty
12 V	28155-U	1 ea
110 V, units charged: 1	28157-U	1 ea
240 V, units charged: 1	28158-U	1 ea
120 V / 240 V, units charged: 5	28159-U	1 ea

PAS-500 Micro Air Sampler

This low flow pump is lightweight (4 oz.) and compact (7 in. high), fitting easily into your shirt pocket. The adsorbent tube connects directly to the inlet of the pump.

The PAS-500 sampler is versatile. It adapts to fit both 6mm and 8mm diameter tubes. The flow range is 40-200 cc/min. A low flow adapter enables you to sample at 20 cc/min.

The unit is powered by a convenient, easily replaceable 9-volt battery. A full flow regulation feature provides constant voltage to the pump, even as the battery voltage drops. This sampler is intrinsically safe - a built-in resistor limits the power current, preventing any short circuit.



	Cat. No.	Qty
Carrying Case for PAS-500		
made to hold single pump	24871	1 ea
PAS-500 Micro Air Sampler with Low Flow Orifice		
Includes 6 mm tube holder, screw-driver, and two 9-volt batteries	24865	1 ea

	Cat. No.	Qty
Tube Holder for PAS-500 Pump		
for use with 6mm sorbent tube	24867	1 ea
for use with 8mm sorbent tube	24868	1 ea
for use with detector tube	24869	1 ea

Vacuum Sampling Pumps

Air Sampling Pumps

Description	Cat. No.	Qty
Vacuum Sampling Pumps, Model 1060 Bag Sampler (Single 1-2 Liter Bags)	24622-U	1 ea
Vacuum Sampling Pumps, Model 1062 Bag Sampler (Single 1-10 Liter Bags)	24623	1 ea
Vacuum Sampling Pumps, Model 1063 Bag Sampler (Six 1 Liter Bags)	24647	1 ea
Vacuum Sampling Pumps, Model 1067 Tube Sampler (Dual channel)	507113	1 ea

Battery charger not included with 24622-U, 24623 and 24647, must be ordered separately.

A universal charger (110/240 V) is included with 507113.

Accessories for Vacuum Sampling Pumps

	Cat. No.	Qty
Battery charger		
for use with Model 1060 Bag Sampler, 110 V	24643	1 ea
for use with Model 1062 & 1063 Bag Samplers, 110 V	24644	1 ea
universal charger, for use with 1060, 1062, 1063, & 1067 Air Samplers, 110 V / 240 V	24697-U	1 ea
Battery for Vacuum Sampling Pump		
for use with Model 1060	24635	1 ea
for use with Model 1062, 1063, & 1067	24636	1 ea
Critical Orifice For Model 1063 Bag Sampler		
flow rate: 1 mL/min	24667	1 ea
Filter for Critical Orifices		
stainless steel filter, 40 µm	24672	1 ea



24843

Air Sampling Pumps

Escort™ Elf Sampling Pump

Flow Calibration Devices for Air Sampling Pumps

Description	Cat. No.	Qty
Mini-Buck Flow Calibrator, model M-5, flow rate: 1-6000 mL/min	24843	1 ea
Mini-Buck Flow Calibrator, model M-30, flow rate: 0.1-30 mL/min	24845	1 ea
Battery charger for M-5 / M-30, 110 V	24844	1 ea
Battery charger for M-5 / M-30, 220 V	24846	1 ea

Battery charger not included with 24843 and 24845, must be ordered separately.

Bubble Flowmeters



20414

Description	Cat. No.	Qty
Manual Bubble Flowmeter (Large Version), 500 mL	20414	1 ea
Manual Bubble Flowmeter (Large Version), 1000 mL	20415	1 ea
Replacement 500 mL Glass Flow Tube	20427-U	1 ea
Replacement 1000 mL Glass Flow Tube	20428-U	1 ea

Adsorbent Materials

Adsorbent materials can be used for such diverse applications as collection media for air sampling, packings in gas chromatography (GC) columns and solid phase extraction (SPE) hardware, and for the purification of various gas streams. Their use for these applications is widely published in many methodologies and technical journals.

Sigma-Aldrich offers some of the best adsorbents in the world, led by our highly engineered **specialty carbon** materials (Carbotrap®, Carbo-pack™, Carboxen®, and Carbosieve®). No other materials in the world offer the same adsorption/desorption characteristics. Our commitment to carbon adsorbent research and product development spans more than two decades. Understanding how thermodynamic and kinetic properties affect the performance characteristics of both existing and novel carbons is our primary focus. The knowledge gained from this fundamental research has led to innovative new carbons and subsequent advances in the performance of many others. Today, we offer 50 different specialty carbons ranging in particle size from <0.2 to 841 μm and surface areas from 5 to 1500 m²/g. The unique and valuable characteristics of our carbons warranted their inclusion in experiments onboard the 1995 Galileo Mission to Jupiter, the 2005 Cassini-Huygens Missions to Saturn's largest moon Titan, and the 2008 Phoenix Mission to Mars.

Our **Supelpak™** adsorbents are purified versions of the popular styrene-divinylbenzene resin Amberlite® XAD®-2. We also offer several of the most commonly used **molecular sieve** and **porous polymer** adsorbents, allowing access to these materials in various quantities. Lastly, the **general purpose** adsorbents activated coconut charcoal, carbon black, and silica gel are offered in limited package sizes.

Additional Information

Want more information than shown here? Simply check out our adsorbents web pages at sigma-aldrich.com/adsorbents

Custom Capabilities

If you do not see an adsorbent material that fits your exact need, please contact our Technical Service group (techservice@sial.com). Our very knowledgeable R&D staff has decades of experience engineering specialty carbons for numerous applications. We can also process porous polymers as desired (for example, to remove fines and/or residual monomers).

Adsorbent Materials

Graphitized Carbon Black (GCB)

Graphitized Carbon Black (GCB)

Graphitized carbon black (GCB) materials generally are nonporous. Consequently, surface interactions depend solely on dispersion (London) forces. GCBs exhibit hydrophobic surface characteristics, meaning that small, polar molecules such as water are not adsorbed. Therefore, analyte displacement by water is significantly reduced, allowing them to be effectively used in trapping organic compounds despite high humidity. We offer two groups of GCB adsorbents:

- **Carbotrap® and Carbopack™ Materials** are widely used, and referenced in numerous methods. Carbotrap® signifies material that is 20/40 mesh, whereas Carbotrap® signifies material that is smaller than this mesh.
- **Small Particle Size Materials** are suitable for use in electrochemical and bioprocessing applications.

	Cat. No.	Qty
Carbotrap®/Carbopack™ Adsorbent		
matrix Carbotrap® B, 20-40 mesh	20287	10 g
matrix Carbotrap® B, 20-40 mesh	11325-U	144 x 190 mg
matrix Carbopack B, 60-80 mesh	20273	10 g
matrix Carbotrap® C, 20-40 mesh	20309	10 g
matrix Carbotrap® C, 20-40 mesh	11047-U	500 g
matrix Carbopack™ C, 60-80 mesh	10257	10 g
matrix Carbopack™ C, 80-100 mesh	10258	10 g
matrix Carbotrap® X, 20-40 mesh	10435-U	10 g
matrix Carbopack™ X, 40-60 mesh	10436	10 g
matrix Carbopack™ X, 60-80 mesh	10437-U	10 g
matrix Carbopack™ X, 120-400 mesh	10439-U	50 g
matrix Carbotrap® Y, 20-40 mesh	10460-U	10 g
matrix Carbopack™ Y, 40-60 mesh	10461-U	10 g
matrix Carbopack™ Y, 60-80 mesh	10462	10 g
matrix Carbopack™ Y, 120-400 mesh	10464-U	50 g
matrix Carbopack™ Z, 60-80 mesh	11051-U	10 g
Small Particle Graphitized Carbon Black Adsorbent		
matrix Mesoporous Carbon, 45 µm	14030-U	50 g
matrix Graphitized Carbon, <200 nm	14029-U	50 g

Carbon Molecular Sieve (CMS)

A carbon molecular sieve (CMS) is the porous carbon skeletal framework remaining after the pyrolysis of a polymeric precursor. Due to their high porosity, these materials are primarily used for collecting very small molecular-sized compounds (C2-C5). The size and shape of an analyte molecule and the size and shape of the pores in the CMS particle determine how well the analyte is adsorbed and desorbed. These materials are hydrophobic and can be used to ensure accurate sampling in high humidity environments.

As a general rule, CMS materials have a greater relative adsorptive strength compared to GCB materials. Therefore, analytes with a molecular size >C5 may be strongly retained, and may not release/desorb during the chemical or thermal desorption process. To prevent this, it is recommended to use a weaker adsorbent bed upstream when used in air monitoring tubes, and to use multi-column switching when used in GC columns. Supelco offers two CMS product lines:

- **Carboxen® Materials** have through-pore structures, resulting in efficient adsorption/desorption characteristics.
- **Carbosieve® Materials** have closed-pore structures, resulting in strong adsorption characteristics.

	Cat. No.	Qty
Carboxen® Adsorbent		
matrix Carboxen® 563, 20-45 mesh	10263	10 g
matrix Carboxen® 564, 20-45 mesh	10264	10 g
matrix Carboxen® 564, 20-45 mesh	11324-U	144 x 290 mg
matrix Carboxen® 569, 20-45 mesh	10269	10 g
matrix Carboxen® 569, 20-45 mesh	11048-U	500 g
matrix Carboxen® 572, 20-45 mesh	11072-U	10 g
matrix Carboxen® 1000, 40-60 mesh	10477-U	50 g
matrix Carboxen® 1000, 60-80 mesh	10478-U	10 g
matrix Carboxen® 1003, 40-60 mesh	10471	10 g
matrix Carboxen® 1016, 60-80 mesh	11021-U	10 g
Carbosieve® Adsorbent		
matrix Carbosieve® G, 45-60 mesh	10197	5 g
matrix Carbosieve® G, 60-80 mesh	10198	5 g
matrix Carbosieve® G, 80-100 mesh	10199	5 g
matrix Carbosieve® S-II, 60-80 mesh	10189	10 g
matrix Carbosieve® S-II, 80-100 mesh	10190-U	10 g
matrix Carbosieve® S-III, 60-80 mesh	10184	10 g

Adsorbent Materials

Carbon Adsorbent Sampler Kits

Carbon Adsorbent Sampler Kits

Often choosing the right adsorbent or combination of adsorbents can be difficult. The goal in selecting the proper adsorbent is to choose one or more that can retain a specific analyte, or group of analytes, for a specific application. However, equally important is that the adsorbent(s) must also be able to release the analyte(s) during the desorption process. By using one of our Carbon Adsorbent Sampler Kits, the method developer obtains a cost-effective way to evaluate several of our specialty carbon adsorbents (Carbotrap®, Carbo-pack™, Carboxen®, and/or Carbosieve®) when designing adsorbent-based applications and products. Three convenient kits are offered that cover a wide range of our specialty carbon materials:

- **20/40 Graphitized Carbon Black Kit** contains 5 g each of five GCB materials, all in 20/40 mesh (Carbotrap B, Carbotrap C, Carbotrap F, Carbotrap X, and Carbotrap Y).
- **60/80 Graphitized Carbon Black Kit** contains 5 g each of six GCB materials, all in 60/80 mesh (Carbo-pack B, Carbo-pack C, Carbo-pack F, Carbo-pack X, Carbo-pack Y, and Carbo-pack Z).
- **Carbon Molecular Sieve Kit** contains 5 g each of eight CMS materials (20/45 Carboxen 569, 60/80 Carboxen 1000, 80/120 Carboxen 1012, 60/80 Carboxen 1016, 60/80 Carboxen 1018, 60/80 Carboxen 1021, 60/80 Carbosieve G, and 60/80 Carbosieve S-III).

	Cat. No.	Qty
Carbon Adsorbent Sampler Kit		
matrix Graphitized Carbon, 20-40 mesh	13027-U	1 kit
matrix Graphitized Carbon, 60-80 mesh	13026-U	1 kit
matrix Carbon Molecular Sieve, (various mesh)	13028-U	1 kit

Supelpak™

Our Supelpak™ adsorbents are purified versions of the popular styrene-divinylbenzene resin Amberlite® XAD®-2. Two products are offered, both packaged in glass containers:

- **Supelpak™-2** is cleaned to meet and exceed US EPA-recommended criteria for purity, as outlined in Level I Environmental Assessment Procedures Manual. It is the best resin to use for standard air sampling methods requiring resin tested for background TCO (total chromatographic organics) level.
- **Supelpak™-2SV** is specially cleaned and tested for optimal performance in the capturing and extraction of semivolatiles organics.

	Cat. No.	Qty
Supelpak™-2		
matrix styrene-divinylbenzene, 20-60 mesh	20279	100 g
	21130-U	1 kg
Supelpak™-2SV		
matrix styrene-divinylbenzene, 20-60 mesh	13673-U	100 g
	13682-U	250 g
	13674-U	1 kg

Molecular Sieve

Molecular Sieves are synthetically produced zeolites (naturally occurring aluminosilicate minerals), and are characterized by pores and internal cavities of extremely uniform dimensions. These crystalline materials have three-dimensional structures based on silicon oxide (SiO₄) and aluminum oxide (AlO₄) polyhedra. The polyhedra are linked by their corners to produce an open structure with internal cavities in which molecules can be trapped. These materials are engineered so that access to the internal cavities is through specific and uniform sized pores.

	Cat. No.	Qty
Molecular Sieve Adsorbent		
matrix Molecular Sieve 5A, 30-40 mesh	20300	50 g
matrix Molecular Sieve 5A, 45-60 mesh	20301	50 g
matrix Molecular Sieve 5A, 60-80 mesh	20302	50 g
matrix Molecular Sieve 13X, 45-60 mesh	20304	50 g
matrix Molecular Sieve 13X, 60-80 mesh	20305	50 g
matrix Molecular Sieve 13X, 100-120 mesh	20307	50 g

Porous Polymer

Porous Polymers are synthetic materials that are able to adsorb/desorb a wide range of compounds. Three of the most commonly used porous polymer adsorbents are offered, allowing access to these materials in various quantities:

- **Tenax Adsorbents** - widely used; unique structure provides alternate and desirable adsorption/desorption characteristics compared to other porous polymers.
- **HayeSep Adsorbents** - second generation materials with minimal shrinkage and monomer bleed.
- **Porapak Adsorbents** - first generation materials.

	Cat. No.	Qty
Tenax® Porous Polymer Adsorbent		
matrix Tenax TA, 60-80 mesh	11982	10 g
matrix Tenax TA (refined), 60-80 mesh	12168-U	100 g
matrix Tenax TA, 80-100 mesh	21009-U	10 g
matrix Tenax GR, 20-35 mesh	11049-U	500 g
HayeSep® Porous Polymer Adsorbent		
matrix HayeSep A, 60-80 mesh	10282	75 cc
matrix HayeSep A, 80-100 mesh	10283	75 cc
matrix HayeSep A, 100-120 mesh	10284	75 cc
matrix HayeSep B, 80-100 mesh	10286	75 cc
matrix HayeSep C, 60-80 mesh	10288	75 cc
matrix HayeSep C, 80-100 mesh	10289	75 cc
matrix HayeSep C, 100-120 mesh	10290	75 cc
matrix HayeSep D, 60-80 mesh	10291	75 cc
matrix HayeSep D, 80-100 mesh	10292	75 cc
matrix HayeSep D, 100-120 mesh	10293	75 cc
matrix HayeSep DB, 80-100 mesh	10280-U	75 cc
matrix HayeSep DB, 100-120 mesh	10281-U	75 cc

Adsorbent Materials

Porous Polymer

	Cat. No.	Qty
matrix HayeSep N, 60-80 mesh	10294	75 cc
matrix HayeSep N, 80-100 mesh	10295	75 cc
matrix HayeSep N, 100-120 mesh	10296	75 cc
matrix HayeSep P, 60-80 mesh	10297	75 cc
matrix HayeSep P, 80-100 mesh	10298	75 cc
matrix HayeSep Q, 60-80 mesh	10300-U	75 cc
matrix HayeSep Q, 80-100 mesh	10301-U	75 cc
matrix HayeSep Q, 100-120 mesh	10302-U	75 cc
matrix HayeSep R, 60-80 mesh	10303	75 cc
matrix HayeSep R, 80-100 mesh	10304	75 cc
matrix HayeSep R, 100-120 mesh	10305-U	75 cc
matrix HayeSep S, 60-80 mesh	10306	75 cc
matrix HayeSep S, 80-100 mesh	10307	75 cc
matrix HayeSep T, 60-80 mesh	10309	75 cc
matrix HayeSep T, 80-100 mesh	10310	75 cc
matrix HayeSep T, 100-120 mesh	10311	75 cc
Porapak™ Porous Polymer Adsorbent		
matrix Porapak N, 50-80 mesh	20324	75 cc
matrix Porapak N, 80-100 mesh	20325	75 cc
matrix Porapak N, 100-120 mesh	20326	75 cc
matrix Porapak P, 50-80 mesh	20327	75 cc
matrix Porapak P, 80-100 mesh	20328	75 cc
matrix Porapak P, 100-120 mesh	20329	75 cc
matrix Porapak PS, 50-80 mesh	20345	75 cc
matrix Porapak PS, 80-100 mesh	20346	75 cc
matrix Porapak Q, 50-80 mesh	20330-U	75 cc
matrix Porapak Q, 80-100 mesh	20331	75 cc
matrix Porapak Q, 100-120 mesh	20332	75 cc
matrix Porapak QS, 50-80 mesh	20342	75 cc
matrix Porapak QS, 80-100 mesh	20343	75 cc
matrix Porapak QS, 100-120 mesh	20344	75 cc
matrix Porapak R, 50-80 mesh	20333	75 cc
matrix Porapak R, 80-100 mesh	20334	75 cc
matrix Porapak R, 100-120 mesh	20335	75 cc
matrix Porapak S, 80-100 mesh	20337	75 cc
matrix Porapak S, 100-120 mesh	20338	75 cc
matrix Porapak T, 50-80 mesh	20339	75 cc
matrix Porapak T, 80-100 mesh	20340	75 cc

General Purpose

Some of the most widely used general purpose adsorbents are activated cocounut charcoal, carbon black, and silica gel.

	Cat. No.	Qty
General Purpose Adsorbent		
matrix Activated Cocounut Charcoal, 20-40 mesh	10275	10 g
matrix Purified Carbon Black, <200 nm	14028-U	50 g
matrix Davison Grade 12 Silica Gel, 60-80 mesh	20290-U	100 g



Related Information

For more in-depth information on adsorbents, visit sigma-aldrich.com/adsorbents and view T402025, "A Tool for Selecting an Adsorbent for Thermal Desorption Applications" which includes adsorption/desorption data on 43 common air pollutants on 24 different adsorbents; and T402026, "Characterization of Adsorbents for Sample Preparation Process" which describes the past, present, and future of carbon adsorbent research at Supelco.



AIR MONITORING APPLICATIONS

Air Monitoring Applications

2

Air Monitoring Applications

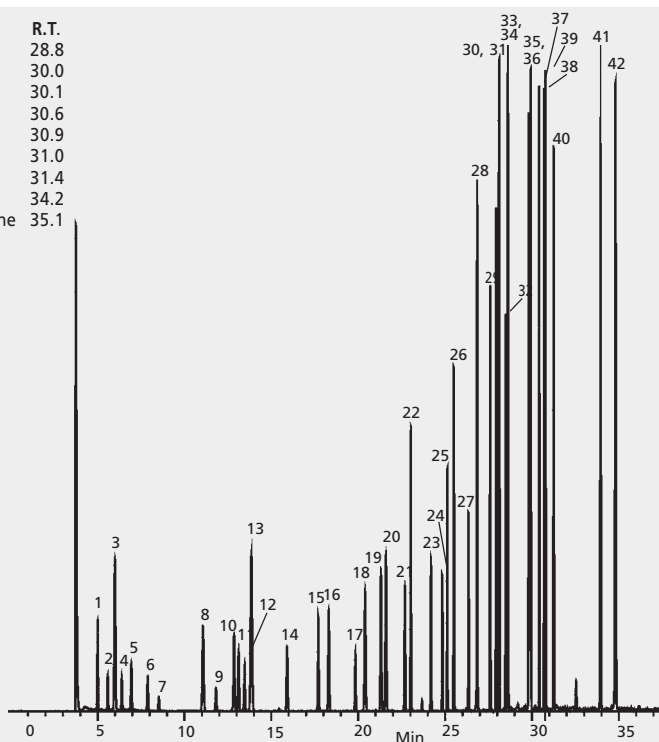
Air Monitoring Applications

GC Analysis of Volatiles on the SPB®-1 after Collection/Desorption using Carbotrap® 300

► application for air monitoring, application for GC

sample/matrix JHAP-43 Gas Mix (500429), 1ppm each component, 20mL
 adsorbent tube Carbotrap 300 (28283-U)
 desorption process 20 mL/min. at 330 °C for 6 min. (cryo-focused to inlet @ -150°C)
 column SPB-1, 60 m x 0.25 mm I.D., 3.0 µm
 oven 35°C (8 min), 5°C/min to 100°C (0 min), 15°C/min to 230°C (8 min)
 detector MSD, scan range 35-269
 carrier gas helium 31cm/sec
 Application No. G001723

	R.T.		R.T.
1. Halocarbon 12	5.0	34. o-Xylene	28.8
2. Chloromethane	5.6	35. 4-Ethyltoluene	30.0
3. Halocarbon 114	6.0	36. 1,3,5-Trimethylbenzene	30.1
4. Vinyl Chloride	6.4	37. 1,2,4-Trimethylbenzene	30.6
5. 1,3-Butadiene	7.0	38. 1,3-Dichlorobenzene	30.9
6. Bromomethane	7.9	39. 1,4-Dichlorobenzene	31.0
7. Ethyl Chloride	8.6	40. 1,2-Dichlorobenzene	31.4
8. Halocarbon 11	11.2	41. 1,2,4-Trichlorobenzene	34.2
9. Acrylonitrile	11.9	42. Hexachloro-1,3-butadiene	35.1
10. 1,1-Dichloroethylene	13.0		
11. Methylene Chloride	13.2		
12. 3-Chloropropylene	13.6		
13. Halocarbon 113	14.0		
14. 1,1-Dichloroethane	16.1		
15. cis-1,2-Dichloroethane	17.9		
16. Chloroform	18.5		
17. 1,2-Dichloroethane	20.0		
18. 1,1,1-Trichloroethane	20.6		
19. Benzene	21.5		
20. Carbon Tetrachloride	21.8		
21. 1,2-Dichloropropane	22.8		
22. Trichloroethylene	23.2		
23. cis-1,3-Dichloropropene	24.3		
24. trans-1,3-Dichloropropene	25.0		
25. 1,1,2-Trichloroethane	25.3		
26. Toluene	25.6		
27. 1,2-Dibromoethane	26.5		
28. Tetrachloroethylene	27.0		
29. Chlorobenzene	27.7		
30. Ethylbenzene	28.1		
31. m,p-Xylene	28.3		
32. Styrene	28.6		
33. 1,1,2,2-Tetrachlorethylene	28.8		

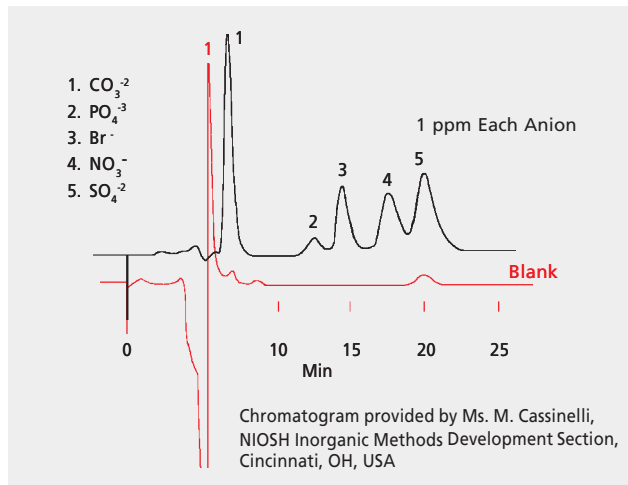


Air Monitoring Applications

NIOSH Method 7903: IC Analysis of Inorganic Acids after Collection/Desorption using ORBO™-53

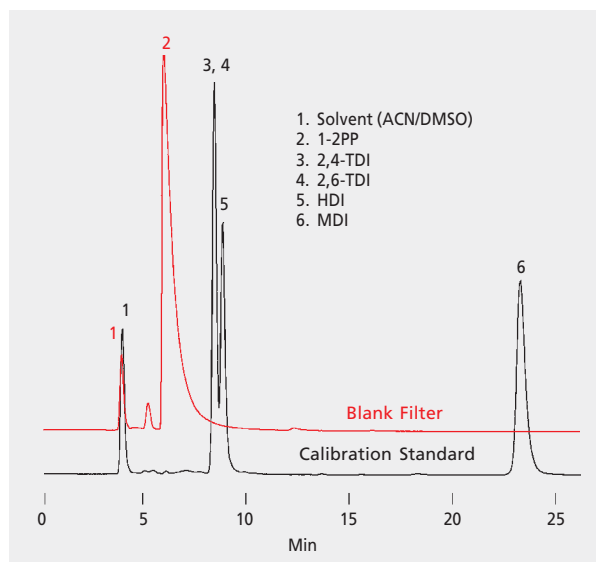
▶ application for air monitoring, application for HPLC

sample/matrix 1 ppm of each component
 adsorbent tube ORBO-53 (20265)
 column Dionex S2 Fast Run Anion, 25 cm x 3 mm I.D.
 mobile phase 3 mM NaHCO₃/2.4 mM Na₂CO₃
 flow rate 3 mL/min
 detector conductivity (10µSiemens/ cm)
 Application No. 713-0873

**OSHA Method 42/47 and ASTM® D5836: HPLC Analysis of Isocyanates on the SUPELCOSIL™ LC-8 after Collection/Desorption using ORBO™-80**

▶ application for air monitoring, application for HPLC

sample/matrix .. calibration standard: isocyanate derivatives, 5 µg/mL in acetonitrile blank: 1-(2-pyridyl)piperazine (1-2PP) coated glass fiber filter desorbed in ACN/DMSO, 9:1
 adsorbent tube ORBO-80 (20811)
 column SUPELCOSIL LC-8, 25 cm x 4.6 mm I.D., 5 µm particles (58297)
 mobile phase .. 0.05 M ammonium acetate in water:acetonitrile, 70:30 (pH 6-6.2 with acetic acid)
 flow rate linear gradient, 0.7 mL/min to 2 mL/min in 15 min.
 detector UV, 254 nm
 injection 10 µL
 Application No. 796-0376

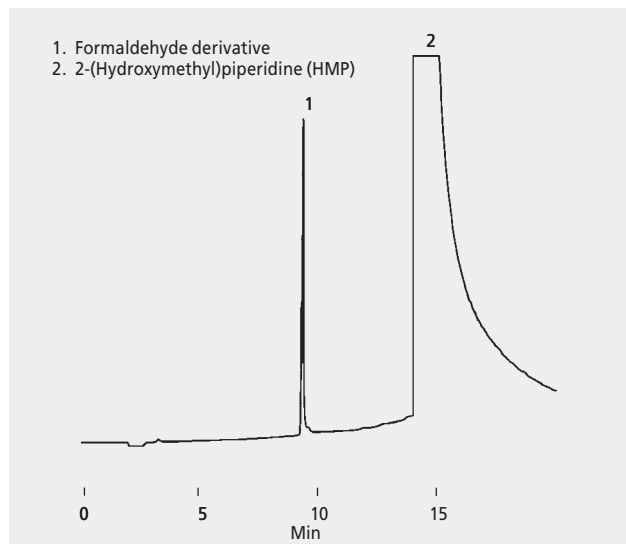


Air Monitoring Applications

OSHA Method 52: GC Analysis of Formaldehyde on the SUPELCOWAX® 10 after Collection/Desorption using ORBO™-24

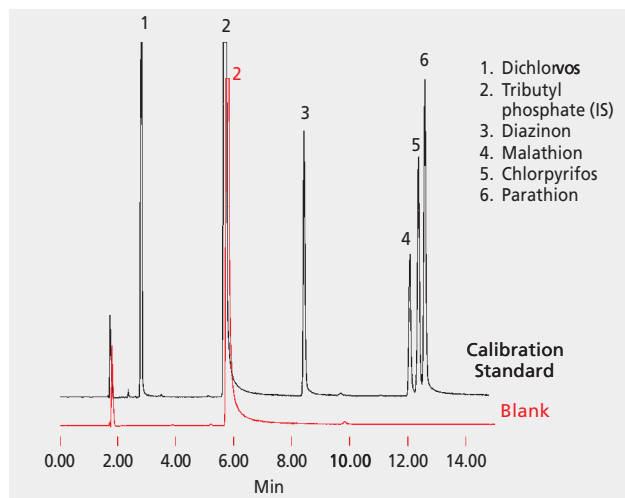
▶ application for air monitoring, application for GC

sample/matrix HMP-coated Supelpak 20 spiked with formaldehyde (10 µg)
 adsorbent tube ORBO-24 (20231)
 column SUPELCOWAX 10, 30m x 0.53 mm I.D., 0.5 µm (25325)
 oven 50 °C (2 min) to 200 °C at 10 °C/min
 detector NPD, 220 °C
 carrier gas helium, 7 mL/min
 injection 1 µL direct, 220 °C
 Application No. 713-0264

**OSHA Method 62: GC Analysis of Organophosphorus Pesticides on the SPB®-20 after Collection/Desorption using ORBO™-49P**

▶ application for air monitoring, application for GC

sample/matrix .. calibration standard: 12 µg/mL each pesticide, 78 µg/mL tributyl phosphate (int. std.) in hexane (blank: 270 mg Supelpak 20, glass fiber filter desorbed in toluene + 78 µg/mL tributyl phosphate.)
 adsorbent tube ORBO-49P (20350)
 column SPB-20, 60 m x 0.53 mm I.D., 1.0 µm film (available on request)
 oven 200 °C (2 min) to 250 °C at 4 °C/min
 detector FPD, 300 °C
 carrier gas helium, 8 mL/min
 injection 1 µL direct injection, 220 °C (packed column injector)
 Application No. 794-0713



Air Monitoring Applications

US EPA Method 0030: GC Analysis of Volatiles on the SPB®-624 after Collection/Desorption using VOST 100

▶ application for air monitoring, application for GC

sample/matrix .. calibration standard: volatiles in methanol; blank Tenax TA tube with surrogate thermally desorbed into purge & trap system

adsorbent tube VOST 100 (20074-U)

purge trap VOCARB 4000 (20308)

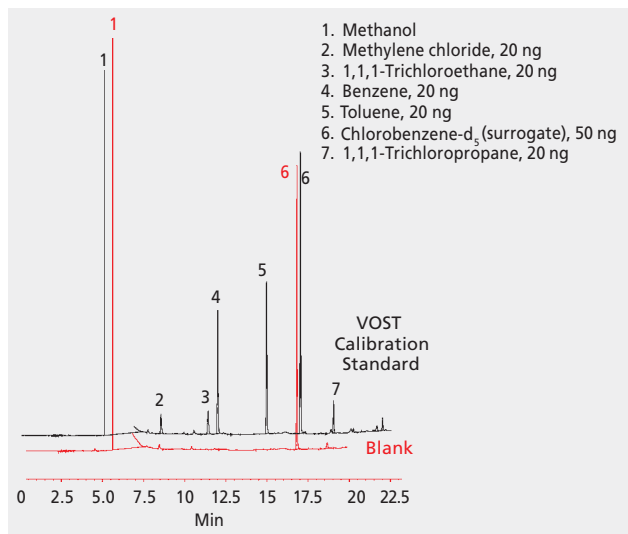
column SPB-624, 75 m × 0.53 mm I.D., 3.0 µm film (25432)

oven 35 °C (5 min) to 200 °C at 10 °C/min, hold 2 min

detector FID, 300 °C

carrier gas helium, 8 mL/min

Application No. 796-0315



US EPA Method TO-17: GC Analysis of Volatiles on the VOCOL® after Collection/Desorption using Air Toxics

▶ application for air monitoring, application for GC

sample/matrix 10-50 ng each analyte introduced onto tube (calibration standard, Cat. No. 41900)

adsorbent tube Air Toxics (glass) (25086)

column VOCOL, 60 m × 0.25 mm I.D., 1.5 µm film (24154)

oven 37 °C (4 min) to 200 °C at 4 °C/min, hold 10 min

detector FID

carrier gas helium, 2 mL/min

Application No. 797-0015

- | | |
|-----------------------------|-------------------------------|
| 1. Halocarbon 12 | 21. Toluene |
| 2. Halocarbon 114 | 22. trans-1,3-dichloropropene |
| 3. Chloromethane | 23. 1,1,2-Trichloroethane |
| 4. Vinyl chloride | 24. Tetrachloroethene |
| 5. Bromomethane | 25. 1,2-dibromoethane |
| 6. Ethyl chloride | 26. Chlorobenzene |
| 7. Halocarbon 11 | 27. Ethylbenzene |
| 8. Halocarbon 113 | 28. m-Xylene |
| 9. 1,1-Dichloroethene | 29. p-Xylene |
| 10. Methylene chloride | 30. o-Xylene |
| 11. 1,1-Dichloroethane | 31. Styrene |
| 12. cis-1,2-Dichloroethene | 32. 1,1,2,2-Tetrachloroethane |
| 13. Chloroform | 33. 1,3,5-Trimethylbenzene |
| 14. 1,1,1-Trichloroethane | 34. 1,2,4-Trimethylbenzene |
| 15. Carbon tetrachloride | 35. 1,3-Dichlorobenzene |
| 16. 1,2-Dichloroethane | 36. 1,4-Dichlorobenzene |
| 17. Benzene | 37. 1,2-Dichlorobenzene |
| 18. Trichloroethene | 38. 1,2,4-Trichlorobenzene |
| 19. 1,2-Dichloropropane | 39. Hexachloro-1,3-butadiene |
| 20. cis-1,3-Dichloropropene | |

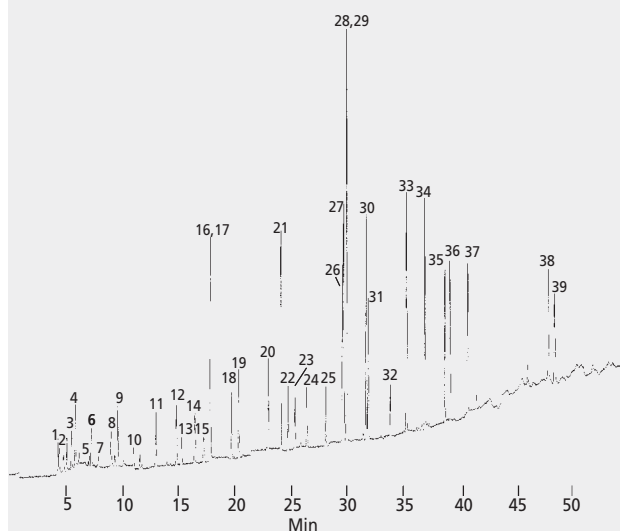


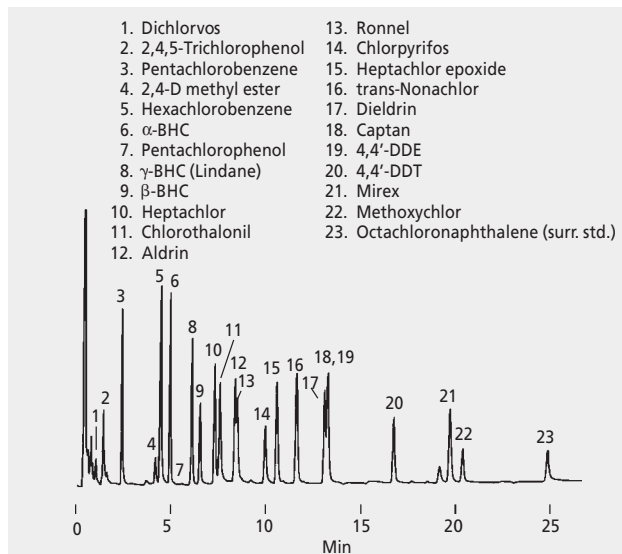
Figure provided by G. Howe, Research Triangle Institute, Research Triangle Park, NC, USA 27709

Air Monitoring Applications

US EPA Method TO-10A/IP-8 and ASTM® D4861: GC Analysis of Pesticides on the SPB®-608 after Collection/Desorption using ORBO™-1000

▶ application for air monitoring, application for GC

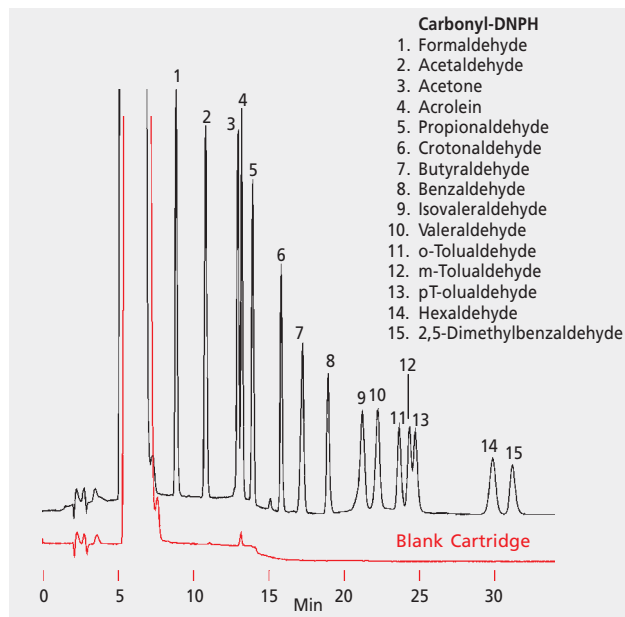
sample/matrix polyurethane foam (PUF) spiked with 250 ng each pesticide
 adsorbent tube ORBO-1000 (20557)
 column SPB-608, 30 m × 0.53 mm I.D., 0.5 µm film (25312)
 oven 150 °C (1 min) to 270 °C at 4 °C/min
 detector ECD
 carrier gas helium, 7 mL/min
 injection 1 µL
 Application No. 92-0201



US EPA Method TO-11/IP-6A and ASTM® D5197: HPLC Analysis of Aldehydes and Ketones on the SUPELCOSIL™ LC-18 after Collection/Desorption using LpDNPH

▶ application for air monitoring, application for HPLC

sample/matrix ... 5 µg each carbonyl-DNPH on LpDNPH cartridge. Cartridge eluted with 5.0 mL acetonitrile
 adsorbent tube LpDNPH Cartridge (21024-U)
 column SUPELCOSIL LC-18, 25 cm × 4.6 mm I.D., 5 µm particles (58298)
 mobile phase .. A: acetonitrile:tetrahydrofuran:water, 30:10:60 B: acetonitrile:water, 60:40 gradient 0% B for 1 min, linear gradient to 100% B over 10 min
 flow rate 1.5 mL/min
 detector VIS, 360 nm
 injection 25 µL of extract
 Application No. 795-0298





RESINS & MEDIA

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Resins & Media

Resins & Media

The selection of chromatographic media is a vital step towards successful chromatographic separation and desirable purification results. Columns packed with a variety of materials, inorganic and organic, are used in various chromatographic modes such as adsorption, ion exchange, hydrophobic interaction and size exclusion in applications ranging from purification and isolation of small molecular weight compounds to more sensitive bio-separations. Sigma-Aldrich offers many brands and types of media for general and specialized applications. Our product range extends from traditional inorganic adsorbents including silica and bonded phase silica, alumina and Florisil® to synthetic polymers for specialized applications.

Inorganic Adsorption Media

Our Inorganic Adsorbents section includes silica and functionalized (bonded phase) silicas, alumina and magnesium silicate (FLORISIL). Also included in this section are Celite® and our Lipid Removal Agent (LRA) products. Adsorbent media is commonly used for the purification and isolation of low molecular weight compounds for environmental analysis and other applications.

Silica Gel for Chromatographic Purification

We offer a broad range of silica gel, including spherical and irregular particle silica, as well as bare and modified/bonded phases. Our selection includes Sigma-Aldrich, Davisil and Merck KGaA products. These silica are available in various grades, particle and pore sizes and are useful for all types of low pressure, medium pressure, and flash column chromatography. They can be applied to the cleanup and purification of a wide range of synthetic and natural compounds.

Silica Grade:

In distinguishing between grades (or purities), the following information is helpful to consider in regard to application specific requirements:

- **High purity grade silica gel** - Offers the lowest moisture content, tightest particle size distribution, minimal impurities and greatest lot-to-lot consistency which results in greater reproducibility of the separation process.
- **Technical grade silica gel** - Offers the most economical choice for general separations where reproducibility and lot-to-lot consistency are not as critical.

Silica Particle Shape:

Particle shape can have a significant impact on separation efficiency. A spherical particle shape results in more homogenous packing characteristics, providing a sharper peak adsorption and elution curve. The end result is elution in a narrower band width with less solvent. This, in turn, allows for improved separation of closely eluting compounds and evaporation time-savings. We offer both spherical silica for optimal resolution efficiency, and irregular silica for economical purifications.



Spherical Silica Gels & Modified Silica Adsorbents

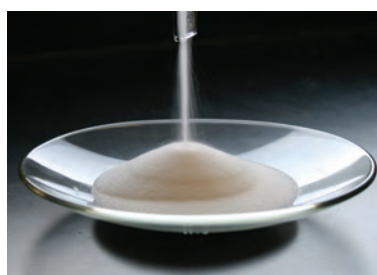
Non-Modified Spherical Silica Gels

Name	Particle Size	Pore Size (Å)	Surface Area (m ² /g)	Cat. No.	Qty
Silica gel spherical	particle size 40 - 75 µm	60	450-550	53698-100G	100 g
	particle size 200 - 400 mesh			53698-1KG	1 kg
				53698-5KG	5 kg
Silica gel spherical	particle size 20 - 45 µm	60-80	420-530	93875-100G-F	100 g
	particle size 325 - 632 mesh				
Silica gel spherical	particle size 40 - 75 µm	70	480	97728-U	100 g
	particle size 200 - 400 mesh				
Silica gel spherical	particle size 40 - 75 µm	70	480	97729-U	1 kg
	particle size 200 - 400 mesh				
Silica gel spherical	particle size 40 - 75 µm	110	250-350	80442-100G	100 g
	particle size 200 - 400 mesh			80442-1KG	1 kg
				80442-5KG	5 kg
Silica gel spherical	particle size 75 - 200 µm	110	250-350	78991-100G	100 g
				78991-1KG	1 kg
				78991-5KG	5 kg

Resins & Media

Spherical Silica Gels & Modified Silica Adsorbents: *Modified Spherical Silica Gels**Modified Spherical Silica Gels*

Name	Particle Size	Pore Size (Å)	Surface Area (m ² /g)	Cat. No.	Qty
Amino-functionalized silica gel spherical	particle size 40 - 75 µm	110	-	79297-100G 79297-1KG	100 g 1 kg
Amino-functionalized silica gel spherical	particle size 75 - 200 µm	110	-	59791-100G 59791-1KG	100 g 1 kg
C18 Silica gel spherical	particle size 40 - 75 µm particle size 200 - 400 mesh	70	480	97727-U	100 g
Diol-functionalized silica gel spherical	particle size 40 - 75 µm	110	~300	93981-100G 93981-1KG	100 g 1 kg
Diol-functionalized silica gel spherical	particle size 75 - 200 µm	110	~300	41735-100G 41735-1KG	100 g 1 kg

Irregular Silica Gels & Modified Silica Adsorbents*Silica Gel (22 Angstrom)*

Grade	Brand	Particle Size	Pore Volume (cm ³ /g)	Surface Area (m ² /g)	Cat. No.	Qty
high-purity grade (Davisil Grade 12)	Davisil®	75 - 650 µm 28 - 200 mesh	0.43	800	214396-250G 214396-1KG 214396-5KG	250 g 1 kg 5 kg

Silica Gel (30 Angstrom)

Grade	Brand	Particle Size	Pore Volume (cm ³ /g)	Surface Area (m ² /g)	Cat. No.	Qty
high-purity grade (Davisil Grade 923)	Davisil®	75 - 150 µm 100 - 200 mesh	0.40	430-530	214477-50G 214477-250G 214477-1KG	50 g 250 g 1 kg

Silica Gel (40 Angstrom)

Grade	Brand	Particle Size	Pore Volume (cm ³ /g)	Surface Area (m ² /g)	Cat. No.	Qty
high-purity grade (Merck Grade 10180)	Merck™	particle size 63 - 200 µm particle size 70 - 230 mesh	~ 0.68	750	403563-100G 403563-1KG 403563-5KG	100 g 1 kg 5 kg
high-purity grade (Merck Grade 10181)	Merck™	particle size 200 - 500 µm particle size 35 - 70 mesh	~ 0.68	675	242179-100G 242179-500G 242179-2KG	100 g 500 g 2 kg

Silica Gel (60 Angstrom, <40 µm)

Grade	Brand	Particle Size	Pore Volume (cm ³ /g)	Surface Area (m ² /g)	Cat. No.	Qty
high-purity grade	Sigma-Aldrich®	particle size ≤40 µm particle size ≥400 mesh	0.8	500	60751-500G	500 g
high-purity grade (Merck Grade 15111)	Merck™	particle size 15 - 40 µm particle size 400 - 800 mesh	~ 0.8	550	59258-100G	100 g

Resins & Media

Irregular Silica Gels & Modified Silica Adsorbents: *Silica Gel (60 Angstrom, 35-75 µm)**Silica Gel (60 Angstrom, 35-75 µm)*

Grade	Brand	Particle Size	Pore Volume (cm ³ /g)	Surface Area (m ² /g)	Cat. No.	Qty
technical grade	Sigma-Aldrich*	particle size 35 - 75 µm particle size 200 - 425 mesh	0.75 (approx.)	500-600 (approx.)	645524-500G	500 g
					645524-2.5KG	2.5 kg
					645524-5KG	5 kg
					645524-25KG	25 kg
high-purity grade	Sigma-Aldrich*	particle size 35 - 75 µm particle size 220 - 440 mesh	0.8	500	60738-250G	250 g
					60738-1KG	1 kg
					60738-5KG	5 kg
					60738-25KG	25 kg
high-purity grade (Davisil Grade 633)	Davisil*	particle size 35 - 75 µm particle size 200 - 425 mesh	0.75	480	236772-100G	100 g
					236772-1KG	1 kg
technical grade	Sigma-Aldrich*	particle size 40 - 63 µm particle size 230 - 400 mesh	0.7-0.85 (approx.)	≥480 (approx.)	717185-100G	100 g
					717185-1KG	1 kg
					717185-5KG	5 kg
					717185-25KG	25 kg
high-purity grade	Sigma-Aldrich*	particle size 40 - 63 µm particle size 230 - 400 mesh	0.8	530	60737-500G	500 g
					60737-1KG	1 kg
					60737-2.5KG	2.5 kg
					60737-5KG	5 kg
					60737-25KG	25 kg
high-purity grade (Merck Grade 9385)	Merck™	particle size 40 - 63 µm particle size 230 - 400 mesh	~ 0.8	550	227196-100G	100 g
					227196-1KG	1 kg
					227196-5KG	5 kg
					227196-25KG	25 kg
technical grade (w/ Ca, ~0.1%)	Sigma-Aldrich*	particle size 40 - 63 µm particle size 230 - 400 mesh	-	-	12479-500G	500 g
					12479-1KG	1 kg
					12479-5KG	5 kg
					12479-25KG	25 kg
high-purity grade (w/ Ca, ~0.1%)	Sigma-Aldrich*	particle size 40 - 63 µm particle size 230 - 400 mesh	0.8	500	60752-1KG	1 kg
					60752-5KG	5 kg
					60752-25KG	25 kg
high-purity grade	Sigma-Aldrich	particle size 40 - 75 µm particle size 200 - 400 mesh	0.75	500	288594-500G	500 g
					288594-1KG	1 kg
					288594-6X1KG	6 × 1 kg
					288594-6KG	6 kg
					288594-10KG	10 kg

Silica Gel (60 Angstrom, 63-250 µm)

Grade	Brand	Particle Size	Pore Volume (cm ³ /g)	Surface Area (m ² /g)	Cat. No.	Qty
technical grade	Sigma-Aldrich*	63 - 200 µm 70 - 230 mesh	0.7-0.85 (approx.)	≥480 (approx.)	717177-100G	100 g
					717177-1KG	1 kg
					717177-5KG	5 kg
					717177-25KG	25 kg
high-purity grade	Sigma-Aldrich*	63 - 200 µm 70 - 230 mesh	0.8	500	60741-1KG	1 kg
					60741-6X1KG	6 × 1 kg
					60741-5KG	5 kg
					60741-25KG	25 kg
high-purity grade	Sigma-Aldrich*	63 - 200 µm 70 - 230 mesh	0.75	~500	288624-250G	250 g
					288624-1KG	1 kg
					288624-5KG	5 kg
high-purity grade (Merck Grade 7734)	Merck™	63 - 200 µm 70 - 230 mesh	~ 0.8	550	391484-100G	100 g
					391484-1KG	1 kg
					391484-5KG	5 kg
					391484-25KG	25 kg
high-purity grade (Merck Grade 7754)	Merck™	63 - 200 µm 70 - 230 mesh	~ 0.8	550	403598-25G	25 g
					403598-100G	100 g
					403598-500G	500 g
technical grade (w/ fluorescent indicator)	Sigma-Aldrich*	63 - 200 µm (70-230 mesh)	0.8 (approx.)	500 (approx.)	60743-1KG	1 kg
high-purity grade (puriss)	Sigma-Aldrich*	63 - 200 µm 70 - 230 mesh	0.8	500	60740-500G	500 g
high-purity grade (Davisil Grade 635)	Davisil*	150 - 250 µm 60 - 100 mesh	0.75	480	236799-100G	100 g
					236799-1KG	1 kg
					236799-10KG	10 kg

Resins & Media

Irregular Silica Gels & Modified Silica Adsorbents: *Silica Gel (60 Angstrom, >250 µm)**Silica Gel (60 Angstrom, >250 µm)*

Grade	Brand	Particle Size	Pore Volume (cm ³ /g)	Surface Area (m ² /g)	Cat. No.	Qty
high-purity grade	Sigma-Aldrich®	particle size 200 - 500 µm particle size 35 - 60 mesh	0.8	500	60742-250G 60742-1KG 60742-25KG	250 g 1 kg 25 kg
high-purity grade (Davisil Grade 636)	Davisil®	particle size 250 - 500 µm particle size 35 - 60 mesh	0.75	480	236802-100G 236802-1KG 236802-25KG	100 g 1 kg 25 kg

Silica Gel (150 Angstrom)

Grade	Brand	Particle Size	Pore Volume (cm ³ /g)	Surface Area (m ² /g)	Cat. No.	Qty
high-purity grade (Davisil Grade 643)	Davisil®	35 - 70 µm 200 - 425 mesh	1.15	300	236810-100G 236810-1KG	100 g 1 kg
high-purity grade (Davisil Grade 62)	Davisil®	75 - 250 µm 60 - 200 mesh	1.15	300	243981-500G 243981-2.5KG	500 g 2.5 kg
high-purity grade (Davisil Grade 646)	Davisil®	250 - 500 µm 35 - 60 mesh	1.15	300	236845-100G 236845-1KG	100 g 1 kg

NOTE:

Davisil silica gels have been processed to minimize or eliminate impurities such as minor metallic oxides, which can modify the surface nature and unpredictably alter adsorption processes. Low metal oxides content minimizes olefin polymerization. *Typical Elemental Analysis:* Sodium (as Na₂O) 600 ppm; Iron (as Fe₂O₃) <100 ppm; Carbon (C) <100 ppm; heavy metals <5 ppm

- Davisil 12 silica is recommended for ASTM Method D-2007 (rubber extender/processing oils).
- Davisil 923 silica meets ASTM D-1319-70 specifications for hydrocarbon analysis.

Merck silica gels contain <0.02% iron and <0.02% chloride. We have listed the Merck products by their EM catalog number (Grade). For the proper identification, simply insert Silica Gel or Kieselgel before the pore size; for example, Silica Gel 40 or Kieselgel 40.

Bonded/Modified Irregular Silica Gels

By chemically bonding organosilane groups to silica gel, the surface polarity can be dramatically modified, producing chromatographic media with unique separation properties. Use of these functionalized silica can complement bare silica, providing alternative resolution or separations of difficult compounds. These products are generally used for sample clean-up, bulk or preparative processing.

Name	Particle Size	Pore Size (Å)	Surface Area (m ² /g)	Cat. No.	Qty
Aluminum chloride, functionalized silica gel	40 - 63 µm	60	500	630063-5G 630063-25G	5 g 25 g
3-Aminopropyl-functionalized silica gel	40 - 63 µm	60	550	364258-10G 364258-50G 364258-250G	10 g 50 g 250 g
Butyl-functionalized silica gel	200 - 400 mesh	60	500	553549-10G	10 g
C ₁₈ -reversed phase silica gel	40 - 63 µm 230 - 400 mesh	90	400	60757-50G 60757-250G	50 g 250 g
C ₁₈ -Reversed phase silica gel	15 - 25 µm	100	380	60756-50G 60756-250G	50 g 250 g
C ₁₈ -Reversed phase silica gel	40 - 63 µm 230 - 400 mesh	100	380	60758-50G 60758-250G	50 g 250 g
3-Chloropropyl-functionalized silica gel	230 - 400 mesh	60	~550	364266-50G	50 g
2-Cyano-functionalized silica gel	200 - 400 mesh	60	500	553484-10G	10 g
3-(Diethylenetriamino)propyl-functionalized silica gel	200 - 400 mesh	60	500	537926-5G 537926-25G 537926-100G	5 g 25 g 100 g
Phenyl-functionalized silica gel	200 - 400 mesh	60	500	553492-10G 553492-100G	10 g 100 g
Silver nitrate on silica gel	+230 mesh	-	-	248762-50G 248762-250G	50 g 250 g
3-(1-Thioleido)propyl, functionalized silica gel	200 - 400 mesh	60	500	569879-5G 569879-25G 569879-100G	5 g 25 g 100 g

Resins & Media

FLORISIL® Magnesium Silicate Adsorbents

FLORISIL® Magnesium Silicate Adsorbents

FLORISIL adsorbents are used in preparative and analytical chromatography, and are available in pesticide-residue (PR) and standard grades, in powdered and granular forms. All grades have a surface area of 300m²/g, pH 8.5 and have been activated.

- **PR grade 60/100 FLORISIL** is specially tested for separating chlorinated pesticides, as described by Mills. It provides consistent results for column cleanup and separation of chlorinated pesticide residues, prior to gas or thin layer chromatography. Each batch meets the performance characteristics described in Changes of Official Methods of Analysis, JAOAC, Chapter 24, 208(h), Vol. 49, p 233, 1966.

Grade	Particle Size (µm)	Mesh (mesh)	Desc.	Cat. No.	Pkg
standard	<74	<200	fine powder	288705-50G 288705-250G 288705-1KG	50 g 250 g 1 kg
PR grade	149 - 250	60 - 100	coarse powder	20280-U	454 g
standard	74 - 149	100 - 200	fine powder	20281	454 g
standard	595 - 1190	16 - 30	granular	46381-500G	500 g
standard	250 - 595	30 - 60	granular	288691-250G 288691-1KG 288691-6KG	250 g 1 kg 6 kg
standard	250 - 595	30 - 60	granular	46384-500G-F	500 g
standard	149 - 250	60 - 100	coarse powder	46385-500G-F 46385-5KG-F	500 g 5 kg
PR grade (analysis acc. to FDA)	149 - 250	60 - 100	coarse powder	46382-500G	500 g

Activated Alumina

Activated Alumina

Applications

- Neutral alumina can be used for removing impurities from natural alkaloids, vitamins, antibiotics, glycosides, and synthetic hormones, and for drying and purifying solvents.
- Basic alumina can be used for removing peroxides from ethers and hydrocarbons, extracting polar compounds (such as alcohols), drying solvents (diethylether, benzene, chloroform), separating xylenes, or in dioxin analyses (EPA Method 1613) or pesticide analyses.
- Acidic alumina is useful for adsorbing polar compounds (such as vitamins), inorganic cations, water-soluble dyes, morphine, fatty acids, plant waxes, and in dioxin analyses (EPA Method 1613).

Highly porous in nature, aluminas can be effective desiccants and have numerous applications in catalysis. We offer four types of activated alumina (Al₂O₃) designed for column chromatography: acidic, weakly acidic, basic, and neutral. All grades have a Brockmann activity of I.

Prepare Brockmann II-V grades simply by adding the appropriate amount of water to the Brockmann I grade. Shake the material well to disintegrate lumps and allow it to equilibrate in a closed vessel overnight.

powder

Brockmann aluminum oxides are suitable for column chromatography and adsorptive filtration.

surface area 155 m²/g

Cat. No.	CAMAP	Type	pH ¹	Cl ⁻ (meq/g)
199974	507-C-I	neutral	7.0±0.5	~0.03
199443	5016-A-I	basic	9.5±0.5	~0.00
199966	504-C-I	acidic	4.5±0.5	~0.14
267740	506-C-I	weakly acidic	6.0±0.5	~0.06

¹5% stirred aqueous suspension

Characteristics of Standard Grades of Activated Alumina (Brockmann No. 1)

Density (g/mL):		3.97
Particle Size (mesh):		~150
Pore Diameter (Å):		58
Surface Area (m ² /g):		155
Water (%):		~1.5
Na ₂ O (%):		<0.4
Fe ₂ O ₃ (% max.):		<0.03
SiO ₂ (% max.):		<0.03
Description	Cat. No.	Qty
neutral	199974-5G	5 g
	199974-100G	100 g
	199974-1KG	1 kg
	199974-5KG	5 kg
basic	199443-5G	5 g
	199443-100G	100 g
	199443-1KG	1 kg
	199443-5KG	5 kg
	199443-20KG	20 kg
acidic	199966-100G	100 g
	199966-1KG	1 kg
	199966-5KG	5 kg
weakly acidic	267740-250G	250 g
	267740-1KG	1 kg
	267740-5KG	5 kg

Resins & Media

Activated Alumina



Helpful Hints

For aluminas in solid phase extraction tubes, refer to the Sample Preparation section of this catalog.

Amount of Water to Be Added to Brockmann I Grade	Approx. Water Content (% Karl Fischer Method)
For grade II: 3%	4–4.5
For grade III: 6%	7–7.5
For grade IV: 10%	11–11.5
For grade V: 15%	16–16.5

Typical Particle Size Distribution for Activated Alumina (All Grades)

Sieve Opening (mm)	Mesh Size	% Retained
0.25	60	≤0.1
0.20	~75	2–5
0.15	100	15–20
0.10	~150	55–65
0.07	~210	72–85
0.04	~360	95–98

Celite®

Celite® 545 AW

Diatomaceous earth, flux-calcined
[68855-54-9] MDL MFCD00132803

► Celite® Filter Aid
reagent grade

Reagent-grade Celite® 545 AW. Acid-washed, high-purity fluxcalcined diatomaceous silica, especially prepared for chromatography and other laboratory applications.

20199-U	454 g
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Celite® Analytical Filter Aid II (CAFA II)

Diatomaceous earth, calcined
[91053-39-3] MDL MFCD00132803
CAFA II 100g (Celite® Analytical Filter Aid II)

11484-U	100 g
11485-U	500 g
11486-U	1 kg

Celite® R566

64843-1KG-U	1 kg
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Lipid Removal Agent

Lipid Removal Agent (LRA)

LRA media is a synthetic calcium silicate hydrate. It is composed of 32% calcium oxide, 48% silicon dioxide, and residual levels of sodium, magnesium, and iron. LRA is intended for use as a lipid sorbent in the production of biopharmaceuticals. It can also be used in sample preparation and solid phase extraction. LRA media provides outstanding performance in terms of lipid capacity, filterability, product recovery, and scalability. The specificity of LRA media for lipids and lipoproteins is high, allowing for the removal of contaminating lipids from biological streams without an adverse effect on non-lipids.

13360-U	500 g
13358-U	100 g

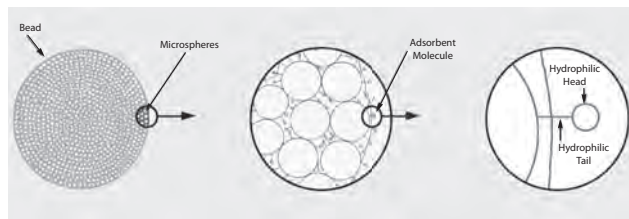
Resins & Media

Organic (Polymeric) Adsorbents

Organic (Polymeric) Adsorbents

Comprising many different polymer formulations, organic adsorbents are stable at virtually all pH values. This permits high and low pH operation and the ability to clean with caustic solutions, conditions under which silica-based materials are unsuitable.

Supelpak™-2 Resins



The Supelpak™-2 series of resins is purified Amberlite® XAD®-2 adsorbent, optimized for various applications, meeting or exceeding the cleanliness needed for the high recovery of specific analytes.

Amberlite® XAD®-2 resin is a macroreticular, styrene-divinylbenzene copolymer, nonionic bead. Each bead is an agglomeration of microspheres with a sponge-like structure that offers excellent physical and chemical stability. The discrete pores allow rapid mass transfer of analytes, and the 20-60 mesh particle size ensures low back pressure during use. The hydrophobic chemical nature of the resin makes the XAD®-2 an excellent adsorbent under reversed phase conditions, such as for the removal of aromatic compounds (non-polar solute) from water (polar solvent).

The Supelpak™-2 series of resins has evolved to provide our customers with adsorbents that have lower background levels and increased recovery of specific target analytes.

density: 1.07 g/mL, 25 °C (skeletal) density: 1.02 g/mL, 25 °C (true wet)
max. temp. 200 °C

Supelpak™-2 is purified Amberlite® XAD®-2 that has been cleaned to meet and exceed US EPA-recommended criteria for purity, as outlined in Level I Environmental Assessment Procedures Manual. It is the best resin to use for standard air sampling methods requiring resin tested for background TCO (total chromatographic organics) level. Packaged in glass containers.

Supelpak™-2B is purified Amberlite® XAD®-2. It has been cleaned to meet and exceed US EPA requirements for determining PCBs in water according to the Great Lakes National Program Office (GLNPO). Packaged in glass containers.

Supelpak™-2SV is purified Amberlite® XAD®-2 that has been specially cleaned and tested for optimal performance in the capturing and extraction of semivolatiles organics. Packaged in glass containers.

Supelpak™-2SVM is purified Amberlite® XAD®-2 that has been specially cleaned and tested for optimal performance in the capturing and extraction of semivolatiles organics. It is specially modified to improve flow and pourability. Packaged in glass containers.

Matrix	Particle Size (mesh)	Mean Pore Size (Å)	Surface Area (m ² /g)	Pore Volume (mL/g)	Cat. No.	Qty
Supelpak™-2						
styrene-divinylbenzene	20 - 60	90	~300	~ 0.65	20279	100 g
styrene-divinylbenzene	20 - 60	90	~300	~ 0.65	21130-U	1 kg
Supelpak™-2B						
styrene-divinylbenzene	20 - 60	90	~300	~ 0.65	13670	100 g
Supelpak™-2SV						
styrene-divinylbenzene	20 - 60	90	~300	~ 0.65	13673-U	100 g
styrene-divinylbenzene	20 - 60	90	~300	~ 0.65	13682-U	250 g
styrene-divinylbenzene	20 - 60	90	~300	~ 0.65	13674-U	1 kg
Supelpak™-2SVM						
Styrene-Divinyl-benzene	20 - 60	90	~300	~ 0.65	14056-U	500 g

Resins & Media

Organic (Polymeric) Adsorbents: *Polymeric Adsorbent Resins: Styrenic and Acrylic***Polymeric Adsorbent Resins: Styrenic and Acrylic****Supelite DAX-8**

Adsorbent resin with moderate polarity for compounds up to 150,000 MW. Most commonly used for adsorption of fulvic and humic acids, treatment of paper pulp mill waste and removal of alcohols, surfactants, and colorants from samples.

density: 1.23 g/mL, 25 °C (skeletal)

density: 1.09 g/mL, 25 °C (true wet)

Poly(styrene-co-divinylbenzene)

CAS No. 9003-70-7

May be used for synthesis or adsorption of hydrophobic compounds.

Styrene-divinylbenzene Copolymer

Synthetic starting material, filtering aid; drilling mud; hydrophobic compounds.

Matrix	Particle Size	Mean Pore Size (Å)	Surface Area (m ² /g)	Pore Volume (mL/g)	Cat. No.	Qty
Supelite™ DAX-8						
acrylic ester	40 - 60 mesh	225	160	~ 0.79	20278	100 g
acrylic ester	40 - 60 mesh	225	160	~ 0.79	21567-U	1 kg
acrylic ester	40 - 60 mesh	225	160	~ 0.79	21568-U	5 kg
Poly(styrene-co-divinylbenzene)						
Poly(styrene-co-divinylbenzene)	8 µm	-	-	-	468312-100G 468312-250G	100 g 250 g
Poly(styrene-co-divinylbenzene)	200 - 400 mesh	-	-	-	434442-50G 434442-250G	50 g 250 g
Styrene-divinylbenzene Copolymer						
styrene/divinylbenzene gel	18 - 100 mesh	-	-	-	13390	1 kg

Amberlite® & Amberchrom® Polymeric Adsorbents**Amberlite® & Amberchrom® Polymeric Adsorbents**

Amberlite® and Amberchrom® are non-ionic, macro-reticular resins that adsorb and release ionic species through hydrophobic and polar interactions. Can be used under isocratic or reverse phase conditions.

Amberlite® XAD2

Polyaromatic adsorbent resin for hydrophobic compounds up to MW 20,000: phenols, organic removal, surfactants, aroma compounds, antibiotic recovery. May be used as support for catalyst or metals removal. For cleaned US EPA versions, see Supelpak-2 and Supelpak-2B.

Amberlite® XAD4

Polyaromatic adsorbent for small hydrophobic compounds, surfactants, pharmaceutical manufacturing, phenols, chlorinated organics, pesticide removal and recovery, and organic removal from aqueous food streams.

Amberlite® XAD7HP

Weakly polar adsorbent resin for compounds up to 60,000 MW: insulin, fulvic and humic compounds, dry waste, organic removal and recovery, and antibiotic recovery.

Amberlite® XAD16N

Hydrophobic compounds up to 40,000 MW; antibiotics; pharmaceutical manufacturing; surfactants; bitters; separation of large organic molecules (especially proteins). More efficient than XAD2.

Amberlite® XAD1180N

Polymeric adsorbent for hydrophobic compounds: antibiotics, vitamins, amino acids, enzymes; for purification: gallium, myxovirescins, phosphoric acid, riboflavin salts.

Amberchrom® CG300

Polyaromatic resin for rapid adsorption of hydrophobic compounds: surfactants, medium-sized proteins, polypeptides, large peptides, antibiotics.

Matrix	Particle Size	Mean Pore Size (Å)	Surface Area (m ² /g)	Pore Volume (mL/g)	Cat. No.	Qty
Amberlite® XAD®-2						
styrene-divinylbenzene (macroreticular)	20 - 60 mesh	90	~300	~ 0.65	20275	100 g
styrene-divinylbenzene (macroreticular)	20 - 60 mesh	90	~300	~ 0.65	10357	500 g
styrene-divinylbenzene (macroreticular)	20 - 60 mesh	90	~300	~ 0.65	SU853005	5 kg
styrene-divinylbenzene (macroreticular)	20 - 60 mesh	90	~300	~ 0.65	52672-U	10 kg
styrene-divinylbenzene (macroreticular)	20 - 60 mesh	90	~300	~ 0.65	3025-U	25 kg
Amberlite® XAD4						
styrene-divinylbenzene	20 - 60 mesh	100	750	~ 0.98	20276	100 g
styrene-divinylbenzene	20 - 60 mesh	100	750	~ 0.98	10358	500 g
styrene-divinylbenzene	20 - 60 mesh	100	750	~ 0.98	06444-100G 06444-500G	100 g 500 g
styrene-divinylbenzene	20 - 60 mesh	100	750	~ 0.98	XAD4-500G XAD4-1KG	500 g 1 kg

Resins & Media

Organic (Polymeric) Adsorbents: *Amberlite®* & *Amberchrom®* Polymeric Adsorbents

Matrix	Particle Size	Mean Pore Size (Å)	Surface Area (m ² /g)	Pore Volume (mL/g)	Cat. No.	Qty
Amberlite® XAD7HP						
acrylic	560 - 710 µm 20 - 60 mesh	300-400	380	0.5	XAD7-100G XAD7-500G XAD7-1KG	100 g 500 g 1 kg
Amberlite® XAD16N						
styrene-divinylbenzene	560 - 710 µm 20 - 60 mesh	200	800	~ 0.55	XAD16-500G XAD16-1KG	500 g 1 kg
Amberlite® XAD1180N						
styrene/divinylbenzene	350 - 600 µm 20 - 60 mesh	300-400	450	1.4	06474-250G 06474-1KG	250 g 1 kg
styrene/divinylbenzene	350 - 600 µm 20 - 60 mesh	300-400	450	1.4	10378	500 g
Amberchrom® CG300						
styrene-divinylbenzene	50 - 100 µm	300	700	0.7	13909-U	100 mL

*Diaion®/Sepabeads®/MCI GEL®***Diaion® HP-2MG**

Aliphatic adsorbent for moderately polar compounds, such as: antibiotics, color bodies, and aliphatic analytes. The resin exhibits broad spectrum adsorption of small and large molecules.

Swelling in toluene = 5%

density: 1.09 g/mL, 25 °C (true wet)

Diaion® HP-20

Polyaromatic adsorbent resin for hydrophobic compounds: antibiotics, biomolecules; useful for desalting; broad application base.

Swelling in toluene = 30%

density: 1.01 g/mL, 25 °C (true wet)

Diaion® HP-20SS

Polyaromatic adsorbent for the separation of hydrophobic compounds and biomolecules from fermentation broths. This resin provides rapid kinetics for large molecules, works well in non-aqueous applications, and can be used for scale-up industrial fractionation of small biomolecules.

Swelling in toluene = 30%

density: 1.01 g/mL, 25 °C (true wet)

Sepabeads® SP-207

Dense resin popular for collecting hydrophobic compounds from thick fermentation broths. The bromination makes it superior to styrene-divinylbenzene polymers: strongly hydrophobic, high density, large capacity. Especially useful with upflow fluidized bed applications.

Swelling in toluene = 18%

density: 1.18 g/mL, 25 °C (true wet)

Sepabeads® SP70

Polyaromatic adsorbent for debittering juices and related food products; has shown a high capacity for naringen. This resin is precleaned and meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

density: 1.01 g/mL, 25 °C (true wet)

Sepabeads® SP825L

Polyaromatic adsorbent resin for antibiotics, organics, decolorization; high capacity for small molecules. This resin has been classified and only requires equilibration before use.

Swelling in toluene = 19%

density: 1.01 g/mL, 25 °C (true wet)

Sepabeads® SP850

Polyaromatic adsorbent for hydrophobic compounds: antibiotics, organics, adsorbing large quantities of small molecules.

Swelling in toluene = 19%

density: 1.01 g/mL, 25 °C (true wet)

Sepabeads® SP-20SS

Polyaromatic adsorbent resin for separation of hydrophobic compounds: small and medium proteins, peptides, amino acids. Excellent for reversed phase applications.

Swelling in toluene = 30%

density: 1.30 g/mL, 25 °C (true wet)

MCI GEL® CHP20P

Polyaromatic adsorbent resin designed for biopharmaceutical separations: aromatic compounds, peptides, steroids, desalting, etc. Very good for reversed phase chromatography applications, even with non-aqueous solvents.

density: 1.01 g/mL, 25 °C (true wet)

Matrix	Particle Size	Mean Pore Size (Å)	Surface Area (m ² /g)	Pore Volume (mL/g)	Cat. No.	Qty
Diaion® HP-2MG						
polymethacrylate	25 - 50 mesh	170	~500	1.2	13601	100 g
polymethacrylate	25 - 50 mesh	170	~500	1.2	13603	1 kg
Diaion® HP-20						
styrene-divinylbenzene	250 - 850 µm	260	~500	~ 1.30	13605	100 g
styrene-divinylbenzene	250 - 850 µm	260	~500	~ 1.30	13606	500 g
styrene-divinylbenzene	250 - 850 µm	260	~500	~ 1.30	13607	1 kg
Diaion® HP-20SS						
styrene-divinylbenzene	75 - 150 µm	260	~500	~ 1.30	13613-U	100 g
styrene-divinylbenzene	75 - 150 µm	260	~500	~ 1.30	13615-U	1 kg
Sepabeads® SP-207						
brominated styrene-divinylbenzene	20 - 60 mesh	105	650	~ 1.20	13623-U	1 kg

Resins & Media

Organic (Polymeric) Adsorbents: *Diaion*[®]/*Sepabeads*[®]/*MCI GEL*[®]

Matrix	Particle Size	Mean Pore Size (Å)	Surface Area (m ² /g)	Pore Volume (mL/g)	Cat. No.	Qty
Sepabeads[®] SP70						
styrene-divinylbenzene	250 - 850 µm	65	~700	~ 1.1	13962-U	1 kg
Sepabeads[®] SP825L						
styrene-divinylbenzene	250 - 600 µm (fines removed) 20 - 60 mesh	90-125	~1000	~ 1.40	13883	1 kg
Sepabeads[®] SP850						
styrene-divinylbenzene	250 - 850 µm 20 - 60 mesh	38 (sharp distribution)	~1000	~ 1.20	13597-U	100 g
styrene-divinylbenzene	250 - 850 µm 20 - 60 mesh	38 (sharp distribution)	~1000	~ 1.20	13599	1 kg
Sepabeads[®] SP-20SS						
styrene-divinylbenzene	50 - 100 µm	260	~500	~ 1.01	13617-U	100 g
styrene-divinylbenzene	50 - 100 µm	260	~500	~ 1.01	13618-U	500 g
MCI GEL[®] CHP20P						
styrene-divinylbenzene	75 - 150 µm	400-600	~500	~ 1.30	13629-U	100 g
styrene-divinylbenzene	75 - 150 µm	400-600	~500	~ 1.30	13630-U	500 g

Dowex Optipore[®] Polymeric AdsorbentsDowex Optipore[®] L-493

Polyaromatic adsorbent for the concentration of organics from water; considered a better option than carbon.

Dowex Optipore[®] SD-2

Functionalized adsorbent used for decolorization, and taste and odor removal in sweetener applications. This resin meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Dowex Optipore[®] V503

Polymeric Adsorbent for Removal of Organics from Humid Air Streams. Dowex Optipore V503 is a 1.0 mm diameter, spherical bead material, designed to give lower pressure drop in vapor phase applications while retaining all the other attributes of the smaller particle size adsorbent, Dowex Optipore V493. In contrast to activated carbon, Dowex Optipore V503 adsorbent can be used to adsorb reactive solvents without catalyzing their decomposition, due to its extremely low mineral ash content. Because Dowex Optipore V503 is a powerful adsorbent, it may adsorb odors and solvents during transportation and storage. The adsorbent can be pre-cycled through a regeneration cycle prior to use to remove these materials.

Matrix	Particle Size	Mean Pore Size (Å)	Surface Area (m ² /g)	Pore Volume (mL/g)	Cat. No.	Qty
Dowex Optipore[®] L-493						
styrene-divinylbenzene (macroporous)	20 - 50 mesh	46	1100	1.16	573698-100G 573698-500G	100 g 500 g
Dowex Optipore[®] SD-2						
styrene-divinylbenzene (macroporous)	20 - 50 mesh	50	800	0.8	14043-U	100 g
styrene-divinylbenzene (macroporous)	20 - 50 mesh	50	800	0.8	14045-U	1 kg
Dowex Optipore[®] V-503						
styrene-divinylbenzene	1 mm	34	>1100	0.94	13678	1 kg

Ion Exchange Media

Polymeric ion exchange resins are commonly used for protein purification, water softening and polishing, chelation, metal processing and many other applications.

Resins & Media

Strong Anion Exchange Media: *Amberlite® Strong Anion Exchange Resins*

Strong Anion Exchange Media

Amberlite® Strong Anion Exchange Resins

Amberlite® IRA-400 chloride form

Strongly basic (type I) anion exchange resin used for treatment of waters that are essentially free of organic material. Applications include deionization (including silica reduction), deoxygenation, removal of amino acids at high pH, and separation of kanamycin A & B.

Amberlite® IRN78 hydroxide form

Strongly basic (type I) anion exchange resin for water treatment, RADwaste, decontamination, etc.; useful for boron thermal regeneration. As a nuclear grade resin, a minimum of 95% of the available exchange sites are in the hydroxide form.

Amberlite® IRA402 chloride form

Strongly basic (type I) anion exchange resin for water conditioning, removal of weakly acidic contaminants. Chemically the same as Amberlite® IRA400, but with lower cross-linkage to give better diffusion rates with large organics.

Amberlite® IRA-410 chloride form

Strongly basic (type II) anion exchange resin for water conditioning, removing iodine ions, neutralization of solutions, capturing xanthan and xanthene dyes, etc.; better regeneration efficiency than type I base resin.

Amberlite® IRA458 chloride form

Strongly basic (type I) anion exchanger used for demineralization. Its acrylic structure makes it more hydrophilic than styrenic resins, and more resistant to organic fouling.

Amberlite® IRA-900 chloride form

Strongly basic (type I) anion exchange resin for decolorizing intermediate to light solutions, concentrating heparin at neutral pH, removing metal ions, etc.

Amberlite® IRA910 chloride form

Strongly basic (type II) anion exchange resin for water conditioning and deionization, removal of sulfuric acid and color, etc. The type II base provides improved regeneration efficiency over type I base resin.

Amberlite® IRA958 chloride form

Strongly basic (type I) anion exchange resin for organic scavenging from surface water. Useful for decolorizing sugar juices and cane syrups, citric acid purification, and capturing metal complexes. The high porosity of the macro-reticular structure makes it more resistant to organic fouling when compared to acrylic gel resins.

Amberjet® 4200 chloride form

Strongly basic (type I) anion exchange resin for water demineralization; useful for removal of iron and zinc from hydrochloric acid, and recovery of silver from photographic effluents.

Amberlyst® A26 hydroxide form

Strongly basic (type I) anion exchange resin used to remove transition metal complexes and mercaptans from hydrocarbons, remove acids from non-polar solvents, and deacidifying phenol-acetone solutions. Its porous structure makes it a good polymeric catalyst in non-aqueous and aqueous media; it has no pH limitations. Strongly basic, macroreticular resin with quaternary ammonium functionality used to catalyze aldol condensation useful in aqueous and non-aqueous media to remove anionic transition metal complexes, mercaptans, and acids from hydrocarbons and other nonpolar solvents.

Ambersep® 900 hydroxide form

Strongly basic (type I) anion exchange resin.

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Amberlite® IRA-400 chloride form					
styrene/divinylbenzene (gel)	600 - 750 µm 20 - 25 mesh	by wetted bed volume 1.4 meq/mL	cross-linkage 8% moisture 40-47%	247669-100G 247669-500G	100 g 500 g
styrene/divinylbenzene (gel)	600 - 750 µm 20 - 25 mesh	by wetted bed volume 1.4 meq/mL	cross-linkage 8% moisture 40-47%	10326	500 g
Amberlite® IRN78 hydroxide form					
styrene-divinylbenzene (gel)	580 - 680 µm	by wetted bed volume ≥1.1 meq/mL	cross-linkage 8% moisture 54-60%	10343-U	500 g
Amberlite® IRA402 chloride form					
styrene-divinylbenzene (gel)	20 - 25 mesh 600 - 750 µm	by wetted bed volume 1.2 meq/mL	cross-linkage 6% moisture 49-60%	06466-250G 06466-1KG	250 g 1 kg
Amberlite® IRA-410 chloride form					
styrene/divinylbenzene (gel)	600 - 750 µm 20 - 25 mesh	by wetted bed volume 1.25 meq/mL	moisture 45-51%	06433-250G 06433-1KG	250 g 1 kg
styrene/divinylbenzene	600 - 750 µm 20 - 25 mesh	by wetted bed volume 1.25 meq/mL	moisture 45-51%	216569-100G 216569-500G	100 g 500 g
styrene/divinylbenzene (gel)	600 - 750 µm 20 - 25 mesh	by wetted bed volume 1.25 meq/mL	moisture 45-51%	10329	500 g
Amberlite® IRA458 chloride form					
acrylic polymer (gel)	16 - 50 mesh	by wetted bed volume 1.25 meq/mL	moisture 57-64%	10330	500 g
Amberlite® IRA-900 chloride form					
styrene-divinylbenzene (macroreticular)	650 - 820 µm	by wetted bed volume 1.0 meq/mL	moisture 58-64%	216585-500G	500 g
Amberlite® IRA910 chloride form					
styrene-divinylbenzene (macroreticular)	530 - 800 µm	by wetted bed volume 1.0 meq/mL	moisture 54-61%	06457-250G 06457-1KG	250 g 1 kg
Amberlite® IRA958 chloride form					
acrylic copolymer (macroreticular)	13 - 45 mesh	by wetted bed volume 0.8 meq/mL	moisture 66-72%	06478-250G	250 g
acrylic copolymer (macroreticular)	16 - 50 mesh	by wetted bed volume 0.8 meq/mL	moisture 66-72%	10337	500 g

Resins & Media

Strong Anion Exchange Media: *Amberlite® Strong Anion Exchange Resins*

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Amberjet® 4200 chloride form					
styrene-divinylbenzene (gel)	600 - 800 µm	by wetted bed volume ≥1.30 meq/mL	-	517976-100G	100 g
styrene-divinylbenzene (gel)	600 - 800 µm	by wetted bed volume ≥1.30 meq/mL	-	436747-250G	250 g
Amberlyst® A26 hydroxide form					
styrene-divinylbenzene (macroreticular)	560 - 700 µm 16 - 45 mesh	by wetted bed volume 0.8 meq/mL	moisture 66-75%	542571-100G 542571-1KG	100 g 1 kg
Ambersep® 900 hydroxide form					
styrene/divinylbenzene	20 - 50 mesh	by wetted bed volume 0.8 meq/mL	moisture 64%	06476-250G 06476-1KG	250 g 1 kg

*Diaion® Strong Anion Exchange Resins***Diaion® HPA25 chloride form**

Strongly basic (type I) anion exchange resin for large organics, demineralization, deashing, etc. This resin is the highest porosity type I base exchanger available; very resistant to organic fouling.

operating pH: 0 - 14

functional group: quaternary alkylamine

Matrix	Particle Size (mesh)	Capacity	Misc. Spec.	Cat. No.	Qty
Diaion® HPA25 chloride form					
styrene-divinylbenzene (highly porous)	30 - 70	by dry weight 2.4 meq/g by wetted bed volume 0.6 meq/mL	moisture ~63%	13491-U	1 kg

Dowex® Marathon™ Strong Anion Exchange Resins

The Dowex® Marathon™ series provides narrower particle size distribution, better efficiency, and improved kinetics when compared to the gaussian Dowex® products.

Dowex® Marathon™ 11 chloride form

Strongly basic (type I) anion exchange resin specifically suited for demineralization of high organic waters, removal of organic material and color bodies, with low silica leakage. This resin meets requirements of FDA Food Additive Regulation 21 CFR 173.25. The Dowex® Marathon™ 11 is a superior resin to the Dowex® 11.

Dowex® Marathon™ A chloride form

Strongly basic (type I) anion exchange resin for demineralization, especially suited for water with high concentration of weak ions (silica, CO₂), as well as organics-laden feed waters. This resin meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Dowex® Marathon™ A hydroxide form

Dowex® Marathon™ A is a high capacity, gel type 1, strong base anion exchange resin of uniform bead size distribution. It is based on a styrenedivinyl benzene copolymer matrix with quaternary ammonium functional groups. Dowex® Marathon™ A resin is specifically designed to

give high throughput and economical operation in both water and non-water applications. It's uniform particle size offers a number of advantages compared to conventional (polydispersed) resins. The small uniform bead size of Dowex® Marathon™ A resin results in rapid exchange kinetics during operation, more complete regeneration of the resin and faster, more thorough rinse following regeneration.

Dowex® Marathon™ MSA chloride form

Strongly basic (type I) anion exchange resin for removal of organic impurities with minimal organic fouling. Also useful for de-ionization, silica removal, and condensate polishing. This resin meets requirements of FDA Food Additive Regulation 21 CFR 173.25. The DowexR MarathonR MSA is a superior resin to the Dowex® MSA-1

Dowex® Marathon™ A2 chloride form

Strongly basic (type II) anion exchange resin well suited for water with high concentration of mineral acids (chlorides, sulfates) and low concentration of silica and CO₂ (<25%). This resin has excellent efficiency for general demineralization, and meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Dowex® Marathon™ 11 chloride form					
styrene-divinylbenzene (gel)	500 - 600 µm 25 - 30 mesh	by wetted bed volume 1.3 meq/mL	moisture 48-58%	44425-250G-F	250 g
Dowex® Marathon™ A, Chloride form					
styrene-divinylbenzene (gel)	525 - 625 µm 24 - 28 mesh	by wetted bed volume 1.3 meq/mL	moisture 50-60%	433942-250G 433942-1KG	250 g 1 kg
Dowex® Marathon™ A, hydroxide form					
styrene-divinylbenzene (gel)	23 - 27 mesh 560 - 660 µm	by wetted bed volume 1.0 meq/mL	moisture 60-72%	13192-U	100 g
styrene-divinylbenzene (gel)	23 - 27 mesh 560 - 660 µm	by wetted bed volume 1.0 meq/mL	moisture 60-72%	13193-U	1 kg
styrene-divinylbenzene (gel)	23 - 27 mesh 560 - 660 µm	by wetted bed volume 1.0 meq/mL	moisture 60-72%	13196-U	5 kg
styrene-divinylbenzene (gel)	23 - 27 mesh 560 - 660 µm	by wetted bed volume 1.0 meq/mL	moisture 60-72%	13197-U	20 kg

Resins & Media

Strong Anion Exchange Media: *Dowex® Marathon™ Strong Anion Exchange Resins*

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Dowex® Marathon™ MSA chloride form					
styrene-divinylbenzene (macro-porous)	560 - 660 µm 23 - 27 mesh	by wetted bed volume 1.0 meq/mL	moisture 60-72%	428760-100G 428760-500G 428760-2.5KG	100 g 500 g 2.5 kg
Dowex® Marathon™ A2 chloride form					
styrene-divinylbenzene (gel)	440 - 560 µm 27 - 34 mesh	by wetted bed volume 1.2 meq/mL	moisture 45-54%	433934-250G 433934-1KG	250 g 1 kg

*Dowex® Strong Anion Exchange Resins***Dowex® 1X2 chloride form**

Strongly basic (type I) anion exchange resin for food & drug processing; meets requirements of FDA Food Additive Regulation 21 CFR 173.25

Dowex® 1X4 chloride form

Strongly basic (type I) anion exchange resin for fine pharmaceuticals; meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Dowex® 1X8 chloride form and formate form

Strongly basic (type I) anion exchange resin for fine chemical processing; meets requirements of FDA Food Additive Regulation 21 CFR 173.25

Dowex® Monosphere® 550A hydroxide form

Strongly basic (type I) anion exchange resin with monodispersed bead size to provide high efficiency and capacity for mixed-bed applications and condensate polishing. This resin meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Dowex® SBR-C chloride form

Strongly basic (type I) anion exchange resin with a particle size distribution suited to deep-bed condensate polishing and mixed-bed applications. This resin is useful for general demineralization and meets the requirements of FDA Food Additive Regulation 21 CFR 173.25.

Dowex® 22 chloride form

Strongly basic (type II) anion exchange resin for deashing and mixed bed polishing of high fructose corn syrups. This polyaromatic resin meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Resins marked "p.a." are purified for analytical use and have been specially cleaned to remove residual metals.

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Dowex® 1X2 chloride form					
styrene-divinylbenzene (gel)	16 - 100 mesh	by dry weight 3.7 meq/g	cross-linkage 2% moisture 70-80%	13367	1 kg
styrene-divinylbenzene (gel)	50 - 100 mesh	by wetted bed volume 0.7 meq/mL	cross-linkage 2% moisture 65-75%	44290-1FT3 44290-100G 44290-500G 44290-2.5KG	1 ft ³ 100 g 500 g 2.5 kg
styrene-divinylbenzene (gel)	100 - 200 mesh	by wetted bed volume 0.7 meq/mL	cross-linkage 2% moisture 70-80%	217387-100G 217387-500G 217387-2.5KG	100 g 500 g 2.5 kg
styrene-divinylbenzene (gel)	200 - 400 mesh	by wetted bed volume 0.7 meq/mL	cross-linkage 2% moisture 70-80%	217395-100G 217395-500G	100 g 500 g
Dowex® 1X4 chloride form					
styrene-divinylbenzene (gel)	20 - 50 mesh	capacity 1.0 meq/mL	cross-linkage 4% moisture >50%	428612-1FT3 428612-100G 428612-500G	1 ft ³ 100 g 500 g
styrene-divinylbenzene (gel)	50 - 100 mesh	capacity 1.0 meq/mL	cross-linkage 4% moisture >50%	44310-100G 44310-500G 44310-5KG	100 g 500 g 5 kg
styrene-divinylbenzene (gel)	100 - 200 mesh	capacity 1.0 meq/mL	cross-linkage 4% moisture 55-63%	428590-100G 428590-500G	100 g 500 g
styrene-divinylbenzene (gel)	200 - 400 mesh	capacity 1.0 meq/mL	cross-linkage 4% moisture 55-63%	428604-100G 428604-500G 428604-5KG	100 g 500 g 5 kg
Dowex® 1X8 chloride form					
styrene-divinylbenzene (gel)	50 - 100 mesh	by wetted bed volume 1.2 meq/mL	cross-linkage 8% moisture 43-48%	217417-100G 217417-500G 217417-2.5KG	100 g 500 g 2.5 kg
styrene-divinylbenzene (gel)	100 - 200 mesh	by wetted bed volume 1.2 meq/mL	cross-linkage 8% moisture 39-45%	217425-100G 217425-500G 217425-2.5KG	100 g 500 g 2.5 kg
styrene-divinylbenzene (gel)	200 - 400 mesh	by wetted bed volume 1.2 meq/mL	cross-linkage 8% moisture 39-45%	44340-100G 44340-500G 44340-2.5KG	100 g 500 g 2.5 kg
styrene-divinylbenzene (gel)	20 - 50 mesh	by wetted bed volume 1.2 meq/mL	cross-linkage 8%	44324-100G	100 g
styrene-divinylbenzene (gel)	200 - 400 mesh	by wetted bed volume 1.2 meq/mL	cross-linkage 8%	44339-100G	100 g

Resins & Media

Strong Anion Exchange Media: *Dowex® Strong Anion Exchange Resins*

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Dowex® 1X8 formate form, 200-400 mesh, 2.5kg					
styrene divinylbenzene (gel)	200 - 400 mesh	-	cross-linkage 8%	13858-U	2.5 kg
Dowex® Monosphere® 550A hydroxide form					
styrene-divinylbenzene (gel)	590 µm, std dev: ±50	by wetted bed volume 1.1 meq/mL	moisture 55-65%	436607-250G	250 g
Dowex® SBR-C Chloride form					
styrene-divinylbenzene (gel)	16 - 45 mesh	by wetted bed volume 1.4 meq/mL	cross-linkage 8%	573701-5KG	5 kg
Dowex® 22 Chloride form					
styrene-divinylbenzene (macro-porous)	16 - 50 mesh	by wetted bed volume 1.2 meq/mL	-	436623-250G	250 g

*Lewatit Strong Anion Exchange Resins***Lewatit MonoPlus M 500 chloride form**

Strongly basic anion exchange resin for use in single and mixed bed operations, with good regeneration efficiency. Mono-dispersed particle size range provides excellent filter bed flow for high utilization and good separation. Provides the filter bed with special properties: high exchange

rate, very high utilization of the total capacity, low amount of washing water needed, almost linear skin-friction gradient for the entire height of bed, very good separation of the components in the mixed-bed filter.; anion exchange resin of gel type; spherical particles of the same diameter (mono-dispersed).

Matrix	Particle Size (µm)	Capacity	Misc. Spec.	Cat. No.	Qty
Lewatit® MonoPlus M 500 chloride form					
styrene-divinylbenzene (gel)	575 , std dev: ±50	-	-	62096-250G-F 62096-1KG-F	250 g 1 kg

Weak Anion Exchange Media

*Amberlite® Weak Anion Exchange Resins***Amberlite® IRA-67 free base**

Weakly basic anion exchange resin with an unusually high capacity for large organics. Common applications include: de-acidification, de-ionization of process liquors, isolation of acidic natural products, purification of novobiacin and cephalosporins, Separation of neutral and acidic amino acids below pH 10, removal of heparinic acid at low pH, concentration of citric acid, and demineralization of cheese whey. Previously known as IRA-68.

Amberlite® IRA7-43 free base

Borate-specific chelating resin for the removal of borate, boric acid, other boron species from water; highly selective so that salts, including bases, do not interfere significantly.

Amberlite® IRA-96 free base

Weakly basic anion exchange resin, useful for deionization, chromate recovery, formaldehyde deacidification, ammonium nitrate removal and recovery. Does NOT meet FDA Food Additive Regulation 21 CFR 173.25.

Amberlyst® A21 free base form

Weakly basic anion exchanger. Known as an acid adsorber. Excellent for removing inorganic and organic acids from solvents, including water, formaldehyde, toluene and ethers.

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Amberlite® IRA-67 free base					
Acrylic (gel)	500 - 750 µm	by wetted bed volume 1.6 meq/mL	moisture ~60%	06411-250G 06411-1KG	250 g 1 kg
Acrylic (gel)	500 - 750 µm	by wetted bed volume 1.6 meq/mL	moisture ~60%	476633-100G 476633-1KG	100 g 1 kg
Acrylic (gel)	500 - 750 µm	by wetted bed volume 1.6 meq/mL	moisture ~60%	10331	500 g
Amberlite® IRA743 free base					
styrene-divinylbenzene (macro-porous)	500 - 700 µm	by wetted bed volume 0.7 meq/mL	moisture 48-54%	216445-250G 216445-1KG	250 g 1 kg
Amberlite® IRA-96 free base					
styrene-divinylbenzene (macro-porous)	20 - 27 mesh 550 - 750 µm	by wetted bed volume 1.25 meq/mL	moisture 57-63%	06441-250G 06441-1KG	250 g 1 kg
Amberlyst® A21 free base					
styrene divinylbenzene (macro-porous)	22 - 30 mesh 490 - 690 µm	by wetted bed volume 1.3 meq/mL	moisture 56-62%	216410-5G 216410-250G 216410-1KG	5 g 250 g 1 kg

Resins & Media

Weak Anion Exchange Media: *Diaion® Weak Anion Exchange Resins*

Diaion® Weak Anion Exchange Resins

Diaion® CRB03 free base

Weakly basic anion exchange resin with high selectivity for borate ion; useful for low levels at high flow rates.

Diaion® WA10 free base

Weakly basic anion exchange resin useful for pretreatment of starch hydrolysates containing high levels of minerals, treatment of fluids containing troublesome foulants, and purification of dextrose, beet sugar solutions, or formaldehyde.

Diaion® WA21J free base

Weakly basic anion exchange resin for the removal of strong mineral acids from water and de-acidification of organic solvents. It handles rigorous industrial applications and meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Diaion® WA30 free base

Weakly basic anion exchange resin that is best in class for high MW organic acids. It also has a strong de-colorization capability. Applications for the resin include: water treatment, pretreatment of corn syrup, beet sugar and dextrose, refining of formalin, glycerine, and enzymes, and as a weak base catalyst. This resin meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Matrix	Particle Size (mesh)	Capacity	Misc. Spec.	Cat. No.	Qty
Diaion® CRB03 free base					
styrene-divinylbenzene (highly porous)	16 - 50	by wetted bed volume 0.95 meq/mL	moisture ≤55%	13959-U	1 kg
Diaion® WA10 free base					
acrylic (gel)	16 - 50	by wetted bed volume 1.2 meq/mL	moisture ~66%	13944-U	1 kg
Diaion® WA21J free base					
styrene-divinylbenzene (highly porous)	16 - 50	by dry weight 5.8 meq/g by wetted bed volume 2.0 meq/mL	moisture ~46%	13895	1 kg
Diaion® WA30 free base					
styrene-divinylbenzene (highly porous)	16 - 50	by dry weight 3.0 meq/g by wetted bed volume 1.5 meq/mL	moisture ~49%	13541	100 g
styrene-divinylbenzene (highly porous)	16 - 50	by dry weight 3.0 meq/g by wetted bed volume 1.5 meq/mL	moisture ~49%	13543	1 kg

Dowex® Weak Anion Exchange Resins

Dowex® 66 free base

Weakly basic anion exchange resin for deashing and mixed bed polishing of high fructose corn syrups. This resin meets requirements of FDA Food Additive Regulation 21 CFR 173.25. This resin has not been specially processed nor cleaned. We suggest that it be subjected to a suitable preliminary elution and wash.

Dowex® Marathon™ WBA free base

Weakly basic anion exchange resin that is well suited for combined use with strong base anion resins for water with high concentration of mineral anions or high organic fouling potential. It is excellent for all demineralization applications, and meets requirements of FDA Food Additive Regulation 21 CFR 173.25. Mono-dispersed beads make this resin superior and more efficient than the Dowex MWA-1.

Dowex® Monosphere® 66 free base

Weakly basic anion exchange resin for deashing and mixed bed polishing of high fructose corn syrups. This resin meets requirements of FDA Food Additive Regulation 21 CFR 173.25. The Dowex Monosphere 66 is a superior resin to the Dowex 66. The Dowex Monosphere series provides narrower particle distribution, better efficiency, and improved kinetics when compared to the gaussian Dowex products.

Dowex® Monosphere® 77 free base

Weakly basic anion exchange resin for deashing and mixed bed polishing of high fructose corn syrups; meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Dowex® 66 free base					
styrene-divinylbenzene (macro-porous)	50 - 125 mesh 300 - 1200 µm	by wetted bed volume 1.35 meq/mL	moisture 40-46%	436674-1FT3 436674-250G 436674-1KG	1 ft ³ 250 g 1 kg
Dowex® Marathon™ WBA free base					
styrene-divinylbenzene (macro-porous)	475 - 575 µm 26 - 32 mesh	by wetted bed volume 1.5 meq/mL	moisture 50-60%	436666-250G	250 g
Dowex® Monosphere® 66 free base					
styrene-divinylbenzene (macro-porous)	25 - 30 mesh 500 - 600 µm	by wetted bed volume 1.35 meq/mL	moisture 40-50%	13705	1 kg
Dowex® Monosphere® 77 free base					
styrene-divinylbenzene (macro-porous)	25 - 32 mesh 475 - 600 µm	by wetted bed volume 1.5 meq/mL	moisture 40-50%	502529D	1 kg

Resins & Media

Weak Anion Exchange Media: *Lewatit Weak Anion Exchange Resins**Lewatit Weak Anion Exchange Resins***Lewatit MP-64 chloride form**

Medium basic anion exchange resin especially suited for the desalting of water used for industrial steam generation and for the treatment of galvanic rinsing water. Can be used as ion exchange resin in all standard processes of water treatment.

Lewatit MonoPlus MP 64 free base

Weakly basic anion exchange resin for demineralization and electroplating rinse water. The mono-dispersed particle size optimizes the kinetics necessary for best operating capacity.

Lewatit MP-62 free base

Weakly basic anion exchange resin suitable for all standard processes of water treatment, and especially suited for the desalting of water used for industrial steam generation.

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Lewatit® MP-64 chloride form					
styrene-divinylbenzene (macro-porous)	300 - 1,250 µm	-	moisture 50-65%	62093-250G	250 g
Lewatit® MonoPlus MP 64 free base					
styrene-divinylbenzene (macro-porous)	590 µm, std dev: ±50	by wetted bed volume 1.3 meq/mL	moisture 61-66%	84186-250G-F	250 g
Lewatit® MP-62 free base					
styrene-divinylbenzene (macro-porous)	300 - 1250 µm	by wetted bed volume 1.8 meq/mL	moisture 50-55%	62088-100G 62088-500G	100 g 500 g

Strong Cation Exchange Media

*Amberlite® Strong Cation Exchangers***Amberjet® 1200 hydrogen form**

Strongly acidic cation exchanger with sulfonic acid functionality, hydrogen form useful in water treatment.

Amberlite® IRN77 hydrogen form

Strongly acidic cation exchange resin for water treatment, RAD waste treatment, decontamination. As Nuclear Grade, a minimum of 99% of the available exchange sites are in the hydrogen form.

Amberlite® IR120 hydrogen form

Strongly acidic cation exchange resin suitable for a wide variety of chemical process applications, removal of amino acids at low pH, USP potassium methods, etc..

Amberlite® CG-120 sodium form

Specially processed grades of Amberlite® IR120 (p.a. is "purified for analytical use", and has been cleaned to remove residual metals).

Amberlite® IR120 sodium form

Strongly acidic cation exchange resin for de-calcification.

Amberlyst® 15 hydrogen form

Strongly acidic cation exchange resin used as a heterogeneous acid catalysis; suitable for non-aqueous catalysis.

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Amberjet® 1200 hydrogen form					
styrene-divinylbenzene (gel)	550 - 650 mesh	by wetted bed volume 1.8 meq/mL	moisture 49-55%	436739-1KG	1 kg
Amberlite® IR120 hydrogen form					
styrene-divinylbenzene (gel)	620 - 830 µm	by wetted bed volume 1.8 meq/mL	cross-linkage 8% moisture 53-58%	10322	500 g
styrene-divinylbenzene (gel)	620 - 830 µm	by wetted bed volume 1.8 meq/mL	cross-linkage 8% moisture 53-58%	06428-1KG 06428-5KG	1 kg 5 kg
Amberlite® IR120 Na+ form					
styrene-divinylbenzene (gel)	16 - 50 mesh	by wetted bed volume 2.0 meq/mL	cross-linkage 8% moisture 45%	224359-250G 224359-1KG	250 g 1 kg
Amberlite® IRN77 hydrogen form					
styrene-divinylbenzene (gel)	600 - 700 µm	by wetted bed volume 1.9 meq/mL	moisture 49-55%	10342	500 g
Amberlite® CG-120 Na+ form					
styrene-divinylbenzene (gel)	100 - 200 mesh	by wetted bed volume 1.9 meq/mL	moisture <20%	06420-250G	250 g
Amberlyst® 15 hydrogen form					
styrene-divinylbenzene (macroreticular)	600 - 850 µm 18 - 23 mesh	by dry weight 4.7 meq/g by wetted bed volume 1.7 meq/mL	moisture 52-57%	216380-25G 216380-500G 216380-2.5KG	25 g 500 g 2.5 kg
styrene-divinylbenzene (macroreticular)	600 - 850 µm 18 - 23 mesh	by dry weight 4.7 meq/g by wetted bed volume 1.7 meq/mL	moisture 52-57%	10389	100 g
styrene-divinylbenzene (macroreticular)	600 - 850 µm 18 - 23 mesh	by dry weight 4.7 meq/g by wetted bed volume 1.7 meq/mL	moisture 52-57%	06423-250G 06423-1KG	250 g 1 kg
styrene-divinylbenzene (macroreticular)	600 - 850 µm 18 - 23 mesh	by dry weight 4.7 meq/g by wetted bed volume 1.7 meq/mL	moisture 52-57%	216399-25G 216399-500G 216399-2.5KG	25 g 500 g 2.5 kg

Resins & Media

Strong Cation Exchange Media: *Diaion*® Strong Cation Exchangers

Diaion® Strong Cation Exchangers

Diaion® PK228L sodium form

Strongly acidic cation exchange resin for de-colorization, softening and de-ionization of water, recovery and separation of metals, refining of chemicals, sugar and dextrose, catalysis, and separation of amino acids. The resin has good stability against organic fouling and oxidation, and meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Matrix	Particle Size (mesh)	Capacity	Misc. Spec.	Cat. No.	Qty
<i>Diaion</i>® PK228L sodium form					
styrene-divinylbenzene (porous)	16 - 50	by wetted bed volume 2.0 meq/mL by dry weight 4.2 meq/g	cross-linkage 14% moisture 37-43%	13563	1 kg

Dowex® Strong Cation Exchange Resins

Dowex® 50WX2 hydrogen form

Strongly acidic cation exchange resin for food and drug processing. Meets requirements of FDA Food Additive Regulation 21 CFR 173.25. This ion-exchange resin has not been specially processed or cleaned. We suggest that it be subjected to a suitable preliminary elution and wash prior to use.

Dowex® 50WX4 hydrogen form

Strongly acidic cation exchange resin that meets requirements of FDA Food Additive Regulation 21 CFR 173.25. This strongly acidic cation exchange resin has not been specially processed nor cleaned. We suggest that it be subjected to a suitable preliminary elution and wash.

Dowex® 50WX8 hydrogen form

Strongly acidic cation exchange resin for fine chemical and pharmaceutical separations; meets requirements of FDA Food Additive Regulation 21 CFR 173.25. This resin has not been specially processed nor cleaned. We suggest that it be subjected to a suitable preliminary elution and wash.

Dowex® G26 hydrogen form

This cation exchange resin is a high performance, uniform particle size, gel resin. It is uniquely suited to the stringent demands of the chemical processing industry due to its high strength, toughness, and oxidative stability. It has excellent crush strength to withstand osmotic shock conditions, low levels of extractables, low color throw and low metals content making it ideal for catalyst applications.

Matrix	Diameter (mesh)	Capacity	Misc. Spec.	Cat. No.	Qty
<i>Dowex</i>® 50WX2 hydrogen form					
styrene-divinylbenzene (gel)	50 - 100	by wetted bed volume 0.6 meq/mL	cross-linkage 2% moisture 74-82%	217441-100G 217441-500G 217441-2.5KG	100 g 500 g 2.5 kg
styrene-divinylbenzene (gel)	100 - 200	by wetted bed volume 0.6 meq/mL	cross-linkage 2% moisture 74-82%	217468-100G 217468-500G 217468-2.5KG	100 g 500 g 2.5 kg
styrene-divinylbenzene (gel)	200 - 400	by wetted bed volume 0.6 meq/mL	cross-linkage 2% moisture 74-82%	217476-100G 217476-500G 217476-2.5KG	100 g 500 g 2.5 kg
<i>Dowex</i>® 50WX4 hydrogen form					
styrene-divinylbenzene (gel)	20 - 50	by wetted bed volume 1.1 meq/mL	cross-linkage 4% moisture 64-72%	428825-500G	500 g
styrene-divinylbenzene (gel)	50 - 100	by wetted bed volume 1.1 meq/mL	cross-linkage 4% moisture 64-72%	428663-100G 428663-500G	100 g 500 g
styrene-divinylbenzene (gel)	100 - 200	by wetted bed volume 1.1 meq/mL	cross-linkage 4% moisture 64-72%	422096-100G 422096-500G 422096-2.5KG	100 g 500 g 2.5 kg
styrene-divinylbenzene (gel)	200 - 400	by wetted bed volume 1.1 meq/mL	cross-linkage 4% moisture 64-72%	217484-100G 217484-500G 217484-2.5KG	100 g 500 g 2.5 kg
<i>Dowex</i>® 50WX8 hydrogen form					
styrene-divinylbenzene (gel)	50 - 100	by wetted bed volume 1.7 meq/mL	cross-linkage 8% moisture 50-58%	217492-100G 217492-500G 217492-2.5KG	100 g 500 g 2.5 kg
styrene-divinylbenzene (gel)	100 - 200	by wetted bed volume 1.7 meq/mL	cross-linkage 8% moisture 50-58%	217506-1FT3 217506-100G 217506-500G 217506-2.5KG	1 ft ³ 100 g 500 g 2.5 kg
styrene-divinylbenzene (gel)	200 - 400	by wetted bed volume 1.7 meq/mL	cross-linkage 8% moisture 50-58%	217514-1FT3 217514-100G 217514-500G 217514-2.5KG	1 ft ³ 100 g 500 g 2.5 kg
<i>Dowex</i>® G26 hydrogen form					
styrene-divinylbenzene (gel)	22 - 25 600 - 700	by wetted bed volume 2.0 meq/mL	moisture 45-52%	573663-100G 573663-500G 573663-5KG	100 g 500 g 5 kg

Resins & Media

Strong Cation Exchange Media: *Dowex® Marathon™ Strong Cation Exchange Resins**Dowex® Marathon™ Strong Cation Exchange Resins***Dowex® Marathon™ C hydrogen form**

Strongly acidic cation exchange resin designed for demineralization. The mono-dispersed particles size range provides superior flow and efficiency. This resin meets requirements of FDA Food Additive Regulation 21 CFR 173.25. This resin has not been specially processed nor cleaned. We suggest that it be subjected to a suitable preliminary elution and wash.

Matrix	Particle Size (µm)	Capacity	Misc. Spec.	Cat. No.	Qty
Dowex® Marathon™ C hydrogen form					
styrene-divinylbenzene (gel)	550 - 650 23 - 27	by wetted bed volume 1.8 meq/mL	moisture 50-56%	433950-1FT3 433950-250G 433950-1KG 433950-2.5KG	1 ft ³ 250 g 1 kg 2.5 kg
Dowex® Marathon™ MSC hydrogen form					
styrene-divinylbenzene (macroreticular)	525 - 625 24 - 29	by wetted bed volume 1.6 meq/mL	moisture 50-56%	428787-100G 428787-500G 428787-2.5KG	100 g 500 g 2.5 kg

Dowex® Monosphere® Strong Cation Exchange Resins

The Dowex® Monosphere® series provides narrower particle distribution, better efficiency, and improved kinetics when compared to the gaussian Dowex® products.

DOWEX MONOSPHERE M-31 hydrogen form

A high performance, uniform particle size strong acid catalyst particularly suited to fixed bed operations running rapid throughput and for all types of TAME production facilities. DOWEX MONOSPHERE M-31 is ideal for older "arco type" MTBE production units, looking for more throughput capacity. Does NOT meet FDA Food Additive Regulation 21 CFR 173.25.

DOWEX Monosphere 650C

A strongly acidic cation exchange resin for mixed-bed applications. Commonly used for condensate polishing and sugar applications. This resin meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

DOWEX Monosphere 650C UPW hydrogen form

A strongly acidic cation exchange resin capable of demineralization for ultrapure water; meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Dowex Monosphere 99Ca/320 calcium form

Chromatographic resin for the separation of sugars, including specialty sugars and sugar alcohols; major industrial use is for separation of fructose from 42% high fructose corn syrup. This strongly acidic cation exchange resin meets the requirements of FDA Food Additive Regulation 21 CFR 173.25.

Matrix	Particle Size (µm)	Capacity	Misc. Spec.	Cat. No.	Qty
Dowex® Monosphere® 650C					
styrene-divinylbenzene (gel)	600 - 700 21 - 25	by wetted bed volume 2.0 meq/mL	cross-linkage 8% moisture 46-51%	436615-250G 436615-1KG	250 g 1 kg
Dowex® Monosphere® 650C UPW hydrogen form					
styrene divinylbenzene (gel)	600 - 700 , std dev: 21 - 25	by wetted bed volume 2.0 meq/mL	cross-linkage 8% moisture 46-51%	13340-U	1 kg

*Dowex® Strong Cation Exchange Resins - Special Grades***Dowex® 50WX2 hydrogen form**

Strongly acidic cation exchange resin for food and drug processing. Meets requirements of FDA Food Additive Regulation 21 CFR 173.25. This ion-exchange resin has not been specially processed or cleaned. We suggest that it be subjected to a suitable preliminary elution and wash prior to use.

Dowex® 50WX8 hydrogen form

Strongly acidic cation exchange resin for fine chemical and pharmaceutical separations; meets requirements of FDA Food Additive Regulation 21 CFR 173.25. This resin has not been specially processed nor cleaned. We suggest that it be subjected to a suitable preliminary elution and wash.

Matrix	Particle Size (mesh)	Capacity	Misc. Spec.	Cat. No.	Qty
Dowex® 50WX2					
styrene divinylbenzene (gel)	200 - 400	by wetted bed volume 0.6 meq/mL	cross-linkage 2% moisture 74-82%	44464-100G	100 g
Dowex® 50W X8					
styrene divinylbenzene (gel)	20 - 50	by wetted bed volume 1.1 meq/mL	cross-linkage 8% moisture 50-58%	44504-100G	100 g
styrene divinylbenzene (gel)	50 - 100	by wetted bed volume 1.1 meq/mL	cross-linkage 8% moisture 50-58%	44509-100G	100 g
styrene divinylbenzene (gel)	200 - 400	by wetted bed volume 1.1 meq/mL	cross-linkage 8% moisture 50-58%	44519-100G	100 g

Resins & Media

Strong Cation Exchange Media: *Lewatit Strong Cation Exchange Resins*

Lewatit Strong Cation Exchange Resins

Lewatit MonoPlus S 100 sodium form

Provides the filter bed with special properties: high exchange rate, very high utilization of the total capacity, low amount of washing water needed, almost linear skin-friction gradient for the entire height of bed, very good separation of the components in the mixed-bed filter.

Lewatit MonoPlus SP 112 sodium form

Strongly acidic cation exchange resin especially suited for purification of condensates, demineralization of water at higher temperature, treatment of galvanic rinsing water, removal of metal ions from process solutions and passivating dips, and for the binding of heavy metals in hydrometallurgy. Uniform particle size (mono-dispersed) provides optimized kinetics and leads to an increased capacity when compared to hetero-dispersed bead size distribution.

Matrix	Uniform Particle Size (µm)	Capacity	Misc. Spec.	Cat. No.	Qty
Lewatit® MonoPlus S 100 sodium form					
styrene-divinylbenzene (gel)	575 , std dev: ±50	by wetted bed volume 2 meq/ mL	moisture 42-48%	03953-500G	500 g
Lewatit® MonoPlus SP 112 Na+ form					
styrene-divinylbenzene (macro-porous)	660 , std dev: ±70	by wetted bed volume 1.7 meq/mL	moisture 53-55%	62102-250G	250 g

Weak Cation Exchange Media

Amberlite Weak Cation Exchangers

Amberlite CG50 (Type I) hydrogen form

Weakly acidic cation exchange resin useful for isolation and purification of cytochrome C, amines, drugs, metal ions, thrombin, and neutralization of solutions. Meets requirements of FDA Food Additive Regulation 21 CFR 173.25.

Amberlite IRC76 hydrogen form

Weakly acidic cation exchange resin for the removal of ions associated with carbonate and bicarbonate alkalinity; also useful for de-ionization and softening.

Amberlite IRC86 hydrogen form

Weakly acidic cation exchange resin useful for metals removal and de-alkalization (high capacity)

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Amberlite® CG50 (Type I) hydrogen form					
methacrylic (macroporous)	75 - 150 µm 100 - 200 mesh	by dry weight 10.0 meq/g	cross-linkage 4% moisture <10%	06435-250G 06435-1KG	250 g 1 kg
Amberlite® IRC86 hydrogen form					
methacrylic (gel)	19 - 26 mesh 580 - 780 µm	by wetted bed volume 4.1 meq/mL	moisture 47-53%	06455-250G	250 g
Amberlite® IRC76 hydrogen form					
methacrylic (macroporous)	20 - 30 mesh 500 - 750 µm	by wetted bed volume 3.9 meq/mL	moisture 52-58%	10340-U	500 g

Diaion® Weak Cation Exchangers

Diaion® WT01S hydrogen form

Weakly acidic cation exchange resin for metal recovery, de-alkalization, iron removal, refining of sugar, purification of antibiotics, pharmaceuticals, and amino acids, etc.; has superior kinetics and mechanical strength.

Matrix	Particle Size (µm)	Capacity	Misc. Spec.	Cat. No.	Qty
Diaion® WT01S hydrogen form					
acrylic polymer (highly porous)	100 - 200	by dry weight 9.0 meq/g by wetted bed volume 3.0 meq/mL	moisture ~50%	13593-U	100 g

Resins & Media

Weak Cation Exchange Media: *Dowex® Weak Cation Exchangers**Dowex® Weak Cation Exchangers***Dowex® MAC-3 hydrogen form**

Weakly acidic cation exchanger for water treatment, de-alkalization, purification of antibiotics, pharmaceuticals and amino acids, etc. The macroporous matrix gives the resin good resistance to osmotic shock, while maintaining a high regeneration efficiency.

Matrix	Particle Size (mesh)	Capacity	Misc. Spec.	Cat. No.	Qty
Dowex® MAC-3 hydrogen form					
acrylic polymer (macroporous)	12 - 50 300 - 1200	by wetted bed volume 3.8 meq/mL	moisture 44-52%	546976-250G 546976-1KG	250 g 1 kg

*Lewatit Weak Cation Exchangers***Lewatit® CNP 105 hydrogen form**

Weakly acidic cation exchange resin especially suited for the purification of antibiotics, alkaloids, peptides, vitamins and as a carrier for enzyme immobilization.

Matrix	Particle Size (µm)	Capacity	Misc. Spec.	Cat. No.	Qty
Lewatit® CNP 105 hydrogen form					
methacrylate polymer (macroporous)	100 - 400	-	-	62080-100G	100 g

Mixed Bed Ion Exchange Media*Amberlite Mixed Bed Ion Exchange Resins***Amberlite IRN150 hydrogen and hydroxide form**

Mixed bed resin for primary water chemistry control in once-through systems. Useful in industrial water treatment where as-supplied resin must have absolute minimum of ionic and non-ionic contamination.

Matrix	Particle Size (µm)	Capacity	Misc. Spec.	Cat. No.	Qty
Amberlite® IRN150 hydrogen and hydroxide form					
styrene/divinylbenzene (gel)	600 - 700 (cation exchanger) 580 - 680 (anion exchanger)	by dry weight 1.9 meq/g by dry weight 1.2 meq/g	cross-linkage 8% moisture 49-55% (cation) moisture 54-60% (anion)	00234-250G 00234-1KG	250 g 1 kg

Dowex® Mixed Bed Ion Exchange Resins

Dowex® Monosphere® MR-450 UPW hydrogen and hydroxide form
Mixed bed ion exchange resin capable of de-ionizing for ultrapure water.

Dowex® Marathon™ MR-3 hydrogen and hydroxide form
Mixed bed ion exchange resin specially processed resin for condensate polishing; best for in-process and column demineralization. The Dowex® Marathon™ MR-3 is a superior resin to the Dowex® MR-3.

Dowex® Retardion 11A8

Chromatographic resin for ion separation. Useful for removal of ionic detergents (e.g., SDS) from protein samples. It is used for the removal of electrolytes from water solutions, and separation of cations from anions. Desalting occurs by SEC-type mechanism, so column use is recommended for best success. The Retardion 11A8 is not a true mixed bed resin, but a resin with mixed functionality. It contains paired anion and cation exchange sites (each exists as the other's counter-ion) that adsorb mobile ions from a bulk stream.

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Dowex® Monosphere® MR-450 UPW hydrogen and hydroxide form					
styrene-divinylbenzene (gel)	540 - 640 µm (anion exchange) 310 - 410 µm (cation exchange)	by wetted bed volume 1.9 meq/mL by wetted bed volume 1.0 meq/mL	moisture 46-53% (cation) moisture 55-65% (anion)	13349-U	1 kg
Dowex® Marathon™ MR-3 hydrogen and hydroxide form					
styrene-divinylbenzene (gel)	710 - 810 µm (cation form) 560 - 660 µm (anion form)	by wetted bed volume 1.9 meq/mL by wetted bed volume 1.0 meq/mL	moisture 60-72% (anion exchanger) moisture 46-51% (cation exchanger)	13686-U	100 g
styrene-divinylbenzene (gel)	710 - 810 µm (cation form) 560 - 660 µm (anion form)	by wetted bed volume 1.9 meq/mL by wetted bed volume 1.0 meq/mL	moisture 60-72% (anion exchanger) moisture 46-51% (cation exchanger)	13687-U	1 kg

Resins & Media

Mixed Bed Ion Exchange Media: *Dowex® Mixed Bed Ion Exchange Resins*

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
styrene-divinylbenzene (gel)	710 - 810 µm (cation form)	by wetted bed volume 1.9 meq/mL	moisture 60-72% (anion exchanger)	428736-100G	100 g
	560 - 660 µm (anion form)	by wetted bed volume 1.0 meq/mL	moisture 46-51% (cation exchanger)	428736-500G	500 g
	20 - 50 mesh			428736-1KG	1 kg
Dowex® Retardion 11A8					
amphoteric styrene-divinylbenzene (gel)	50 - 100 mesh	by wetted bed volume 0.7 meq/mL	moisture 43-48%	428698-100G 428698-500G	100 g 500 g

*TMD-8 Mixed Bed Ion Exchange Resin***TMD-8 hydrogen and hydroxide form**

Mixed bed ion exchanger changes from deep blue to amber when exhausted.

Matrix	Particle Size (mesh)	Capacity	Misc. Spec.	Cat. No.	Qty
TMD-8 hydrogen and hydroxide form					
cross-linked polystyrene (gel)	16 - 40 (wet)	by dry weight 0.80 meq/g	moisture ~55%	M8157-100G M8157-500G M8157-1KG	100 g 500 g 1 kg

Chelating Ion Exchange Media

Amberlite® IRA743 free base

Borate-specific chelating resin for the removal of borate, boric acid, other boron species from water; highly selective so that salts, including bases, do not interfere significantly. Weakly basic anion exchange resin.

functional group: N-methylglucamine (free base form)

Amberlite® IRC748I sodium form

Chelating resin with high affinity for heavy metal cations over alkali or alkaline earth metals; ideal for use in non-aqueous media. Weakly acidic cation exchange resin.

functional group: iminodiacetic acid

operating pH: 1.5 - 14

max. temp.: 70 °C (H+ form)

max. temp.: 90 °C (Na+ form)

Diaion® CR11 sodium form

Chelating resin for metal recovery, wastewater treatment, brine purification, etc. Weakly acidic cation exchange resin.

functional group: iminodiacetic acid

operating pH: 4 - 10

max. temp.: 120 °C

max. temp.: 80 °C

Diaion® CRB03 free base

Weakly basic anion exchange resin with high selectivity for borate ion; useful for low levels at high flow rates.

operating pH: 0 - 14

max. temp.: 60 °C

max. temp.: 79 °C

Dowex® M4195 free base form sulfate

Chelating resin for the removal of cobalt, copper, nickel; metal recovery; mining; general hydrometallurgy.

operating pH: 0 - 7

functional group: bis-picolyamine

max. temp.: 60 °C

Lewatit® MonoPlus TP 214

Chelating resin especially suited for the removal of metals in hydro-metallurgical processes and for the extraction/recycling of mercury and silver.

functional group: thiourea

LOD: 40-50%, 110 °C

Lewatit® TP 207

Chelating resin especially suited for the selective binding of heavy metal cations from weakly acidic to weakly basic solutions. Weakly acidic cation exchanger. Sodium form.

functional group: iminodiacetic acid

LOD: 45-60%, 110 °C

Lewatit® TP 208

Chelating resin especially suited for the selective binding of alkaline earth- and heavy-metal cations. Weakly acidic cation exchange resin. Sodium form.

functional group: iminodiacetic acid

LOD: 50-60%, 110 °C

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Amberlite® IRA743 free base					
styrene-divinylbenzene (macro-porous)	500 - 700 µm	by wetted bed volume 0.7 meq/mL	moisture 48-54%	216445-250G	250 g
				216445-1KG	1 kg
Amberlite® IRC748I sodium form					
styrene divinylbenzene (macro-porous)	500 - 650 µm 23 - 30 mesh	1.35 meq/mL	moisture 60-69%	13296-U	100 g
styrene divinylbenzene (macro-porous)	500 - 650 µm 23 - 30 mesh	1.35 meq/mL	moisture 60-69%	13297-U	1 kg
styrene divinylbenzene (macro-porous)	500 - 650 µm 23 - 30 mesh	1.35 meq/mL	moisture 60-69%	13298-U	2.5 kg
styrene divinylbenzene (macro-porous)	500 - 650 µm 23 - 30 mesh	1.35 meq/mL	moisture 60-69%	13299-U	5 kg

Resins & Media

Chelating Ion Exchange Media

Matrix	Particle Size	Capacity	Misc. Spec.	Cat. No.	Qty
Diaion® CR11 sodium form					
crosslinked polystyrene (highly porous)	16 - 45 mesh	calcium by wetted bed volume 0.35 meq/mL calcium by dry weight 1.2 meq/g	moisture 55-65%	13547	1 kg
Diaion® CRB03 free base					
styrene-divinylbenzene (highly porous)	16 - 50 mesh	by wetted bed volume 0.95 meq/mL	moisture ≤55%	13959-U	1 kg
Dowex® M4195 free base form sulfate					
styrene-divinylbenzene (macro-porous)	20 - 50 mesh	35 g/L	moisture 40-60%	13727-U	100 g
styrene-divinylbenzene (macro-porous)	20 - 50 mesh	35 g/L	moisture 40-60%	13728-U	500 g
styrene-divinylbenzene (macro-porous)	20 - 50 mesh	35 g/L	moisture 40-60%	13729-U	1 kg
Lewatit® MonoPlus TP 214					
styrene-divinylbenzene (macro-porous)	400 - 1250 µm	by wetted bed volume 1.0 meq/mL	moisture 43-48%	62107-100G	100 g
Lewatit® TP 207					
styrene-divinylbenzene (macro-porous)	400 - 1250 µm	by wetted bed volume 2.2 meq/mL	moisture 53-58%	62103-100G 62103-500G	100 g 500 g
Lewatit® TP 208					
styrene-divinylbenzene (macro-porous)	400 - 1250 µm	by wetted bed volume 2.9 meq/mL	moisture 55-60%	62105-100G	100 g

Nuclear Ion Exchange Media

Amberlite IRN77 hydrogen form

Strongly acidic cation exchange resin for water treatment, RAD waste treatment, decontamination. As nuclear grade, a minimum of 99% of the available exchange sites are in the hydrogen form.

operating pH: 0 - 14
max. temp.: 121 °C

Amberlite IRN78 hydroxide form

Strongly basic (type I) anion exchange resin for water treatment, RAD waste, decontamination, etc.; useful for boron thermal regeneration. As a nuclear grade resin, a minimum of 95% of the available exchange sites are in the hydroxide form.

operating pH: 0 - 14
max. temp.: 60 °C

Amberlite IRN150 H+/OH- form

Mixed bed resin for primary water chemistry control in once-through systems. Useful in industrial water treatment where as-supplied resin must have absolute minimum of ionic and non-ionic contamination.

operating pH: 0 - 14
max. temp.: 60 °C
matrix active groups: sulfonic acid and trimethylammonium functional groups
LOD: ~55%, 110 °C

Matrix	Particle Size (µm)	Capacity	Misc. Spec.	Cat. No.	Qty
Amberlite® IRN77 hydrogen form					
styrene-divinylbenzene (gel)	600 - 700	by wetted bed volume 1.9 meq/mL	moisture 49-55%	10342	500 g
Amberlite® IRN78 hydroxide form					
styrene-divinylbenzene (gel)	580 - 680	by wetted bed volume ≥1.1 meq/mL	cross-linkage 8% moisture 54-60%	10343-U	500 g
Amberlite® IRN150 hydrogen and hydroxide form					
styrene/divinylbenzene (gel)	600 - 700 (cation exchanger) 580 - 680 (anion exchanger)	by dry weight 1.9 meq/g by dry weight 1.2 meq/g	cross-linkage 8% moisture 49-55% (cation) moisture 54-60% (anion)	00234-250G 00234-1KG	250 g 1 kg

Resins & Media

TOYOPEARL® Ion Exchange Resins

TOYOPEARL® Ion Exchange Resins

TOYOPEARL® Ion Exchange Media

Toyopearl ion exchange resins feature covalently bonded diethylaminoethyl (DEAE), carboxymethyl (CM), sulfopropyl (SP), or trimethylammonium (QAE and SuperQ) groups attached to large pore size methacrylate particles.

These materials ensure high recovery rates for a wide variety of proteins. In addition, they offer several other advantages:

- Sample capacity up to 2-4 times that of conventional gels
- High mechanical strength - you can use high flow rates
- Isocratic or gradient elution (bed volume will not change)
- Easily sanitized with acid, base, or heat

TOYOPEARL® LABPAK Sampler

▶ LABPAK Anion Exchange Resin Sampler

Try several Toyopearl anion exchange resins to determine which one works best for your particular application.

Kit contains 100 mL of each resin:

- Toyopearl DEAE-650M (40-90 µm, weak anion)
- Toyopearl QAE-550C (50-150 µm, strong anion)
- Toyopearl SuperQ-650M (40-90 µm, strong anion)

Exclusion limits for globular proteins:

QAE-550C: 700 kD

DEAE-650M SuperQ-650M: 5,000 kD

843210 3 × 100 mL

TOYOPEARL® Anion Exchange Media

▶ DEAE-650S, particle size 35 µm

TOYOPEARL® DEAE-650S columns are used as separation media and ion exchange resins.

binding capacity (bovine serum albumin) 30 mg/mL±5 mg/mL
ion exchange capacity 0.10 meq/mL±0.02 meq/mL
matrix methacrylate (35 µm)
operating pH 2 - 10

Ref: 1. Picorel, R, et al, Isolation of CP43 and CP47 photosystem II proximal antenna complexes from plants *Methods Mol. Biol.* **274**, 129-135 (2004)
2. Picorel, R, et al, Isolation and purification of CP43 and CP47 photosystem II proximal antenna complexes from plants *Methods Mol. Biol.* **684**, 105-112 (2011)

807472 250 mL

▶ DEAE-650M, particle size 65 µm

TOYOPEARL® DEAE-650M is used in separation media and ion exchange resins. TOYOPEARL® DEAE-650M has been used in haemophilia studies.

binding capacity (bovine serum albumin) 30 mg/mL±5 mg/mL
ion exchange capacity 0.10 meq/mL±0.02 meq/mL
matrix methacrylate (65 µm)
operating pH 2 - 10

Ref: 1. Iberer, G., et al., Continuous purification of a clotting factor IX concentrate and continuous regeneration by preparative annular chromatography *J. Chromatogr. A* **972**, 115-129 (2002)
2. Foster, P.R., et al., Distribution of a bovine spongiform encephalopathy-derived agent over ion-exchange chromatography used in the preparation of concentrates of fibrinogen and factor VIII *Vox Sang.* **86**, 92-99 (2004)
3. Takanashi, M., et al., Biochemical and genetic characterization of a D(-)-3-hydroxybutyrate dehydrogenase from *Acidovorax* sp. strain SA1 *J. Biosci. Bioeng.* **97**, 78-81 (2004)
4. Machold, C., et al., Matrix assisted refolding of proteins by ion exchange chromatography *J. Biotechnol.* **117**, 83-97 (2005)

807473 250 mL

▶ DEAE-650C, particle size 100 µm

TOYOPEARL® DEAE-650C is used in separation media and ion exchange resins. TOYOPEARL® DEAE-650C has been used in studies to develop supplements for immune enhancement.

binding capacity (bovine serum albumin) 30 mg/mL±5 mg/mL
ion exchange capacity 0.10 meq/mL±0.02 meq/mL
matrix methacrylate (100 µm)
operating pH 2 - 10

Ref: 1. Chun, H., et al, Purification and biological activity of acidic polysaccharide from leaves of *Thymus vulgaris* L. *Biol. Pharm. Bull.* **24**, 941-946 (2001)
2. Chun, H., et al, Biochemical properties of polysaccharides from black pepper *Biol. Pharm. Bull.* **25**, 1203-1208 (2002)
3. Lee, H., et al, Characterization of a keratinolytic metalloprotease from *Bacillus* sp. SCB-3 *Appl. Biochem. Biotechnol.* **97**, 123-133 (2002)

807988 250 mL

▶ QAE-550C, particle size 100 µm

TOYOPEARL® QAE-550C is used in separation media and ion exchange resins.

binding capacity (bovine serum albumin) 70 mg/mL
ion exchange capacity 0.37 meq/mL
matrix methacrylate (100 µm)
operating pH 2 - 10

Ref: 1. Staby, A. and Jensen, I.H., Comparison of chromatographic ion-exchange resins. II. More strong anion-exchange resins *J. Chromatogr. A* **908**, 149-161 (2001)

814026 250 mL

▶ SuperQ-650S, particle size 35 µm

binding capacity 143 meq/mL
ion exchange capacity 0.20-0.30 meq/mL
matrix methacrylate (35 µm)
operating pH 2 - 12

817223 250 mL

▶ SuperQ-650M, particle size 65 µm

binding capacity (bovine serum albumin) 143 mg/mL
ion exchange capacity 0.20-0.30 meq/mL
matrix methacrylate (65 µm)
operating pH 2 - 12

817227 250 mL

TOYOPEARL® Cation Exchange Media

▶ TOYOPEARL® CM-650M

CM-650M, particle size 65 µm

TOYOPEARL® CM-650M is used in separation media and ion exchange resins. TOYOPEARL® CM-650M has been used in cloning studies.

binding capacity (bovine haemoglobin) 50 mg/mL±10 mg/mL
ion exchange capacity 0.10 meq/mL±0.02 meq/mL
matrix methacrylate (65 µm)
operating pH 5 - 10

Ref: 1. Suzuki, K., et al., Purification and cDNA cloning of a cellulase from abalone *Halotis discus hannai* *Eur. J. Biochem.* **270**, 771-778 (2003)
2. Shimizu, E., et al., cDNA cloning of an alginate lyase from abalone, *Halotis discus hannai* *Carbohydr. Res.* **338**, 2841-2852 (2003)
3. Ootsuka, S., et al., Isolation and cloning of an endo-β-1,4-mannanase from Pacific abalone *Halotis discus hannai* *J. Biotechnol.* **125**, 269-280 (2006)

807475 250 mL

▶ SP-550C, particle size 100 µm

TOYOPEARL® SP-550C columns are used in separation media and ion exchange resins.

binding capacity (bovine serum albumin) 111 mg/mL
ion exchange capacity 0.15 meq/mL±0.02 meq/mL
matrix methacrylate (100 µm)
operating pH 3 - 11

Ref: 1. Staby, A., et al., Comparison of chromatographic ion-exchange resins. III. Strong cation-exchange resins *J. Chromatogr. A* **1034**, 85-97 (2004)

814028 250 mL

Resins & Media

TOYOPEARL® Ion Exchange Resins

▶ SP-650M, particle size 65 µm

TOYOPEARL® SP-650M columns are used in separation media and ion exchange resins. TOYOPEARL® SP has been used in studies contributing to the improved healing of wounds on the skin, cornea and gastrointestinal tract.

binding capacity (lysozyme)	55 mg/mL±10 mg/mL
ion exchange capacity	0.15 meq/mL±0.02 meq/mL
matrix	methacrylate (65 µm)
operating pH	3 - 11

Ref: 1. Sharma, K, et al., Recombinant human epidermal growth factor inclusion body solubilization and refolding at large scale using expanded-bed adsorption chromatography from *Escherichia coli* Protein Expr. Purif. **60**, 7-14 (2008)

807997	250 mL
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▶ SP-650C, particle size 65 µm

binding capacity (lysozyme)	55 mg/mL±10 mg/mL
ion exchange capacity	0.15 meq/mL±0.02 meq/mL
matrix	methacrylate (100 µm)
operating pH	3 - 11

807994	250 mL
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Helpful Hints

Numerous Dow, Mitsubishi, and Rohm & Haas resins are available in the Supelco warehouse but not listed here. If a resin you need is not listed here, please contact your local Sigma-Aldrich representative with your requirements.

Hydrophobic Interaction Media

TOYOPEARL® LABPAK Sampler

▶ LABPAK Hydrophobic Interaction Resin Sampler, 65 µm

TOYOPEARL® hydrophobic interaction media are used in separation media and resins. TOYOPEARL® media offer high yield recovery of proteins, using various aqueous eluants.

HIC Media: Butyl-650M, Ether-650M, Phenyl-650M

Ref: 1. Stocchi, V., et al., High resolution of multiple forms of rabbit reticulocyte hexokinase type I by hydrophobic interaction chromatography *J. Chromatogr. A*. **676**, 51-63 (1994)
2. Ceccaroli, P., et al., Separation of hexokinase activity using different hydrophobic interaction supports *J. Chromatogr. B. Biomed. Sci. Appl.* **702**, 41-48 (1997)
3. Jones, T.T. and Fernandez, E.J., Hydrophobic interaction chromatography selectivity changes among three stable proteins: conformation does not play a major role *Biotechnol. Bioeng.* **87**, 288-299 (2004)

843100	3 × 50 mL
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▶ HP Hydrophobic Interaction Resin Sampler, 35 µm

HIC Media: Butyl-650S, Ether-650S, Phenyl-650S

843150	3 × 25 mL
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An alternative to reversed-phase chromatography for exploiting the hydrophobic properties of proteins, hydrophobic interaction chromatography (HIC) employs more polar, less denaturing elution conditions. Consequently, it is popular for protein purification and often used in combination with ion exchange or gel filtration.

Sephacrose® Hydrophobic Interaction Media

Hydrophobic Interaction Chromatography (HIC) is usually done with a fairly high concentration of salt in the loading buffer, with elution by decreasing the concentration of salt. Sephacrose® HIC media are beaded agarose designed for the separation of proteins, especially after concentration by salt precipitation. They have minimal secondary matrix interaction while providing stable ether bonds between the ligands and the agarose.

The percentage of agarose in the beads is related to the application fractionation range, and is a digit in the product name.

4% - Sepharose® 4 Fast Flow & Sepharose® CL-4B

6% - Sepharose® 6 Fast Flow

Stable at pH 3-12.

Particle size distribution is 45-165 µm.

Ligand Density (µmol/mL Dry Gel)

Butyl 4 Fast Flow - 50

Octyl 4 Fast Flow - 5

Octyl CL-4B - 40

Phenyl CL-4B - 40

Phenyl 6 Fast Flow, low sub - 20

Phenyl 6 Fast Flow, high sub - 40

particle size 45-165 µm

Description	Cat. No.	Qty
Butyl-Sepharose® 4 Fast Flow	B9041-50ML	50 mL
Octyl-Sepharose® 4 Fast Flow	O0511-10ML O0511-200ML	10 mL 200 mL
Octyl-Sepharose® CL-4B	O6001-50ML O6001-200ML	50 mL 200 mL
Phenyl-Sepharose 6 Fast Flow, low substitution, extent of labeling: ~20 µmol per mL	P2334-50ML P2334-200ML	50 mL 200 mL
Phenyl-Sepharose 6 Fast Flow, high substitution, extent of labeling: ~40 µmol per mL	P2459-50ML P2459-200ML	50 mL 200 mL
Phenyl-Sepharose CL-4B, extent of labeling: ~40 µmol per mL	P7892-10ML P7892-50ML P7892-200ML	10 mL 50 mL 200 mL

TOYOPEARL® Hydrophobic Interaction Media

TOYOPEARL® HIC resins for hydrophobic interaction chromatography offer these advantages:

- Strong affinity for water-soluble proteins
- High recovery of mass and activity
- High sample capacity: up to 2-4 times that of gel media
- Fluctuating salt concentrations will not change bed volume
- Mechanical stability to 7kg/cm² (7 bar/100psi)
- Stable at wide pH range: 2-12
- Clean in place with 0.5M NaOH
- Autoclavable

TOYOPEARL media offer high yield recovery of proteins, using various aqueous eluants. The exclusion limit of 5x10⁶ Da and large pore size, 1000Å, enables these packings to separate very large proteins by a hydrophobic interaction mechanism, without size exclusion effects. Packed as 100mL bottle.

Description	Particle Size (µm)	Cat. No.	Qty
Butyl-650S	35	807476	100 mL
Butyl-650M	65	807477	100 mL
Butyl-650C	100	807478	100 mL
Ether-650M	100	816173	100 mL
Phenyl-650S	35	814477	100 mL
Phenyl-650M	65	814478	100 mL



Helpful Hints

Numerous Dow, Mitsubishi, and Rohm & Haas resins are available in the Supelco warehouse but not listed here. If a resin you need is not listed here, please contact your local Sigma-Aldrich representative with your requirements.

Resins & Media

Gel Filtration/Size Exclusion Media

Gel Filtration/Size Exclusion Media

In gel filtration chromatography, separation is based on differences in the size and/or shape of the solute molecules which governs their access to the surface area inside the pores of the media particles.

Ultragel

Description	Cat. No.	Qty
-	U8628-250ML	250 mL
-	U8878-250ML	250 mL
-	U8878-1L	1 L
-	U8753-250ML	250 mL
-	U8753-1L	1 L

Avicel

Description	Cat. No.	Qty
-	11365-1KG	1 kg
-	11365-6X1KG	6 × 1 kg

Sephacryl®

Sephacryl® is used in gel filtration chromatography, protein chromatography, and resins and separation media. Sephacryl® has been used to develop a novel high-throughput screening assay for sickle cell disease drug discovery. Sephacryl® has also been used to purify and characterize ovine pancreatic elastase as well as a lysozyme from human urine. Crosslinked allyl dextran/N,N'-methylenebisacrylamide copolymer for gel filtration.

Small particles with narrow size distribution, for more efficient separations and faster flow.

Supplied swollen, suspended in 20% aqueous ethanol.

Autoclavable, stable to 0.2M NaOH.

Description	Cat. No.	Qty
100-HR	S100HR-100ML	100 mL
	S100HR-250ML	250 mL
	S100HR-750ML	750 mL
200-HR	S200HR-100ML	100 mL
	S200HR-250ML	250 mL
	S200HR-750ML	750 mL
300-HR	S300HR-100ML	100 mL
	S300HR-250ML	250 mL
	S300HR-750ML	750 mL
400-HR	S400HR-100ML	100 mL
	S400HR-250ML	250 mL
	S400HR-750ML	750 mL
500-HR	S500HR-100ML	100 mL
	S500HR-250ML	250 mL
	S500HR-750ML	750 mL

Sephadex

Sephadex is a bead-formed gel of cross-linked dextran-epichlorohydrin, used for purifying proteins and peptides by Size Exclusion Chromatography with aqueous solvents. These G-types vary in their degree of swelling and fractionation range, as designated by their G number:

- Sephadex G-10, G-15, G-25 and G-50: Recommended for separations of peptides and other biomolecules.
- Sephadex G-75, G-100: Useful for proteins and other macromolecules.

These products are available in different particle size grades:

- Superfine (20-50 µm): Highest efficiency and operating pressure; also used in thin layer gel filtration
- Fine (20-80 µm): Recommended for lab preparative scale operations
- Medium (50-150 µm): Used for large scale preparative chromatography where a high flow rate at a low pressure is essential
- Coarse (100-300 µm)

Sephadex is provided as a dry powder that must be properly hydrated before use. Swollen beads are autoclavable and stable to 0.2 M NaOH.

Sephadex® G-10

Fractionation Range:

Proteins & peptides <700 Da

Dextrans <700 Da

Swelling:

one gram swells to 2-3 mL

Description	Cat. No.	Qty
Medium	G10120-10G	10 g
	G10120-50G	50 g
	G10120-100G	100 g
	G10120-500G	500 g

Sephadex® G-15

Fractionation Range:

Proteins & peptides <5,000 Da

Dextrans <100-5,000 Da

Swelling:

one gram swells to 2.5-3.5 mL

Description	Cat. No.	Qty
Medium	G15120-10G	10 g
	G15120-50G	50 g
	G15120-100G	100 g
	G15120-500G	500 g

Sephadex® G-25

Fractionation Range:

Globular proteins 1000-5000 Da

Dextrans 100-5000 Da

Swelling:

One gram swells to 4-6 mL gel

Description	Cat. No.	Qty
Coarse	G25300-10G	10 g
	G25300-50G	50 g
	G25300-100G	100 g
	G25300-500G	500 g
Medium	G25150-10G	10 g
	G25150-50G	50 g
	G25150-100G	100 g
	G25150-500G	500 g
Fine	G2580-10G	10 g
	G2580-50G	50 g
	G2580-100G	100 g
	G2580-500G	500 g
Superfine	G2550-10G	10 g
	G2550-50G	50 g
	G2550-100G	100 g

Sephadex® G-50

Sephadex® G-50 is a gel filtration medium used in affinity chromatography, protein chromatography and gel filtration chromatography. Sephadex® G-50 has been used to investigate effects from snake venom, isolate lectins from various species and to demonstrate the positive influence of 20% ethanol on proteinase desorption.

Fractionation Range:

Globular proteins 1500-30,000 Da

Dextrans 500-10,000 Da

Swelling:

one gram swells to 9-11 mL

Resins & Media

Gel Filtration/Size Exclusion Media: *Sephadex*

Description	Cat. No.	Qty
Coarse	G50300-10G	10 g
	G50300-50G	50 g
	G50300-100G	100 g
Medium	G50150-10G	10 g
	G50150-50G	50 g
	G50150-100G	100 g
	G50150-500G	500 g
Fine	G5080-10G	10 g
	G5080-50G	50 g
	G5080-100G	100 g
	G5080-500G	500 g
Superfine	G5050-10G	10 g
	G5050-50G	50 g
	G5050-100G	100 g

Sephadex® G-75

Sephadex® G-75 is a gel filtration media used in gel filtration chromatography and protein chromatography. Sephadex® G-75 has been used to study cystatin of the mammalian brain, suggest candidates for development of novel oral or other anti-infective agents and to purify procoagulant metalloproteinase from rattlesnake venom.

Description	Cat. No.	Qty
Medium	G75120-10G	10 g
	G75120-50G	50 g
	G75120-100G	100 g
	G75120-500G	500 g
Superfine	G7550-10G	10 g
	G7550-50G	50 g
	G7550-100G	100 g

Sephadex® G-100**Fractionation Range:**

Globular proteins 4-150 kD

Dextrans 1-100 kD

Swelling:

one gram swells to 15-20 mL

Description	Cat. No.	Qty
Superfine	G10050-10G	10 g
	G10050-50G	50 g
	G10050-100G	100 g
Medium	G100120-10G	10 g
	G100120-50G	50 g
	G100120-100G	100 g
	G100120-500G	500 g

Sephadex® LH-20**Lipophilic Sephadex®**

Sephadex® LH-20 is used in gel filtration chromatography, protein chromatography, gel filtration media, resins and separation media. Sephadex® LH-20 has been used to study diabetes as well as to determine differences in bioactive polyphenolic content from wild, commercial and noncommercial cultivated blackberry genotypes. Sephadex® LH-20 has also been used to produce the first report on isolation of tryptophan from the aqueous extract of lotus rhizome and demonstration of their antioxidant activities.

storage room temp.
 bead size 25-100 µm
 swelling (water, methanol) 1 g swells to 4 mL
 operating pH range 2 - 13

Ref: 1. Piskornik, Z., and Bandurski, R.S., Purification and Partial Characterization of a Glucan Containing Indole-3-acetic Acid. *Plant Physiol.* **50**, 176-182 (1972)
 2. Brown, J.P., and Dietrich, P.S., Mutagenicity of plant flavonols in the Salmonella/mammalian microsome test: Activation of flavonol glycosides by mixed glycosidases from rat cecal bacteria and other sources. *Mutat. Res.* **66(3)**, 223-240 (1979)
 3. Kundu, S.K., and Roy, S.K., Aminopropyl silica gel as a solid support for preparation of glycolipid immunoabsorbent and purification of antibodies. *J. Lipid Res.* **20**, 825-833 (1979)
 4. Pechinot, D., and Cohen, A., The determination of maternal and foetal rat plasma corticosterone concentration in late pregnancy by competitive protein binding analysis. *J. Steroid Biochem.* **18(5)**, 601-606 (1983)
 5. Tandon, A.K., et al., Estrogen Receptor in Very Small Breast Tumor Specimens: A Modified Charcoal-Gelatin Assay. *Cancer Res.* **46**, 3375-3377 (1986)

6. Kolodziejczyk, P., et al., Enzymatic oxidative activation and transformation of the antitumor agent mitoxantrone. *Free Radic. Biol. Med.* **5(1)**, 13-25 (1988)
 7. Evans, K.M., et al., The source, composition and flux of polycyclic aromatic hydrocarbons in sediments of the river Derwent, Derbyshire, U.K. *Water, Air, Soil Pollut.* **51(1-2)**, 1-12 (1990)
 8. Chen, N.X., et al., Glucocorticoid receptor binding in porcine preadipocytes during development. *J. Anim. Sci.* **73**, 722-727 (1995)
 9. Cahouet, A., et al., Biodistribution of dual radiolabeled lipidic nanocapsules in the rat using scintigraphy and γ counting. *Int. J. Pharm.* **242(1-2)**, 367-371 (2002)
 10. Cai, Y., et al., HPLC Characterization of Betalains from Plants in the $\langle \text{Amaranthaceae} \rangle$. *J. Chromatogr. Sci.* **43(9)**, 454-460 (2005)
 11. Velkov, T., et al., A protocol for the combined sub-fractionation and delipidation of lipid binding proteins using hydrophobic interaction chromatography. *J. Chromatogr. B. Analyt. Technol. Biomed. Life Sci.* **867(2)**, 238-246 (2008)
 12. Borcsa, B., et al., Semisynthesis and pharmacological investigation of lipo-alkaloids prepared from aconitine. *Fitoterapia* **82(3)**, 365-368 (2011)
 13. Cuevas-Rodríguez, E.O., et al., Characterization of anthocyanins and proanthocyanidins in wild and domesticated Mexican blackberries (*Rubus* spp.). *J. Agric. Food Chem.* **58**, 7458-7464 (2010)
 14. Jiang, Y., et al., First isolation of tryptophan from edible lotus (*Nelumbo nucifera* Gaertn) rhizomes and demonstration of its antioxidant effects. *Int. J. Food Sci. Nutr.* **61**, 346-356 (2010)
 15. Sharma, S.B., et al., Antihyperlipidemic effect of active principle isolated from seed of *Eugenia jambolana* on alloxan-induced diabetic rabbits. *J. Med. Food* **14**, 353-359 (2011)

LH20100-50G	50 g
LH20100-100G	100 g
LH20100-6X100G	6 x 100 g
LH20100-500G	500 g

Sepharose®

Sepharose® is a beaded agarose used for fractionating molecules of high molecular weight. The percentage of agarose in the beads is related to the application fractionation range, and is a digit in the product name.

2% - Sepharose 2B & Sepharose CL-2B,
 globular proteins 70×10^3 - 40×10^6

4% - Sepharose 4B & Sepharose CL-4B,
 globular proteins 70×10^3 - 20×10^6

6% - Sepharose 6B & Sepharose CL-6B,
 globular proteins 10×10^3 - 4×10^6

Sepharose CL is a cross-linked derivative of agarose that is more resistant to denaturing conditions, allowing more versatility in the choice of sample buffer and eluent.

Sepharose media should not be exposed to temperatures above 40 °C. Sepharose is stable at pH 4-9. Sepharose CL is stable at pH 3-13. Both media are supplied swollen in 20% ethanol and should be stored at 0-5 °C.

Description	Cat. No.	Qty
Sepharse® 2B	2B300-100ML	100 mL
	2B300-500ML	500 mL
	2B300-1L	1 L
Sepharse® 4B	4B200-100ML	100 mL
	4B200-500ML	500 mL
	4B200-1L	1 L
Sepharse® 6B	6B100-100ML	100 mL
	6B100-500ML	500 mL
	6B100-1L	1 L
Sepharse® CL-2B	CL2B300-100ML	100 mL
	CL2B300-500ML	500 mL
	CL2B300-1L	1 L
Sepharse® CL-4B	CL4B200-100ML	100 mL
	CL4B200-1L	1 L
Sepharse® CL-6B	CL6B200-100ML	100 mL
	CL6B200-500ML	500 mL
	CL6B200-1L	1 L

Resins & Media

Gel Filtration/Size Exclusion Media: *Sephadex*

Superdex®

Superdex® is used for protein chromatography, gel filtration chromatography, gel filtration media, resins and separation media. Superdex® has been used for the purification and characterization of a novel laccase from the edible mushroom *Hericium coralloides*. Superdex® has also been used for the purification and mechanism exploration of a potential human hepatocellular carcinoma inhibitor from *Bauhinia purpurea* L. seeds.

Superdex® prep grade beads are a matrix of dextran and agarose, used for gel filtration separations. Their physical and chemical stability is suitable for applications ranging from lab bench research to industrial processes. Select the media by the globular protein fractionation range best suited for your application.

Superdex® 30 prep grade: <10 kDa

Superdex® 75 prep grade: 3-70 kDa

Superdex® 200 prep grade: 10-600 kDa

Superdex® prep grade media are provided as suspensions in 20% aqueous ethanol.

Description	Cat. No.	Qty
Superdex® 75 Prep Grade	S6657-25ML	25 mL
	S6657-100ML	100 mL
Superdex® 200 Prep Grade	S6782-100ML	100 mL

TOYOPEARL® Gel Filtration Media

Description	Particle Size (µm)	Cat. No.	Qty
HW-40C	50 - 100	807449	500 mL
HW-40F	30 - 60	807448	500 mL
HW-40S	20 - 40	807451	250 mL
HW-50F	30 - 60	807453	500 mL
HW-50S	20 - 40	807455	250 mL
HW-55F	30 - 60	807457	500 mL
HW-55S	20 - 40	807459	250 mL
HW-65F	30 - 60	807465	500 mL
HW-65S	20 - 40	807467	250 mL
HW-75F	30 - 60	807469	500 mL
LABPAK LMW Size Exclusion Resin Sampler	45	843300	3 × 150 mL
LABPAK HMW Size Exclusion Resin Sampler	45	843310	3 × 150 mL

Empty Columns & Accessories

Sigma-Aldrich® Empty Glass Columns

Liquid chromatography columns

All of the columns listed below are constructed of borosilicate glass. Four different fixed bed length configurations are available:

- Luer Lock, non-jacketed: constructed with fixed polypropylene end caps, polyethylene bed supports, and Luer Lock inlet and outlet fittings. The Luer Lock connections on these columns are male. The polyethylene bed support has a nominal pore size of 20 µm.
- Open-ended: constructed with fixed polypropylene ends, without jacket or end fittings. Requires at least one flow adapter (see Accessories)

- PTFE, non-jacketed: constructed with threaded ends. Removable PTFE fittings with shielded O-ring seals, 20 µm polyethylene bed support, and ¼-28 threaded tubing connections provided. Columns come with O-ring seals, bed support and tubing connections.
- PTFE, jacketed: same as above with an acrylic jacket surrounding the column body for temperature control.

Columns come with O-ring seals, bed support and tubing connections. The glass and polypropylene portions of these columns are autoclavable, but the polyethylene bed supports are not autoclavable. This renders sterilization impossible. One can try a 2 N sodium hydroxide wash or methyl/ethyl alcohol washes on the assembled column to try to get as close to sterile as possible. Harsher organic solvents such as chloroform or toluene are not recommended.



Both jacketed and non-jacketed columns shown

I.D. × L (cm)	Bed Volume (mL)	Cat. No.	Qty
Luer Lock, Non-jacketed			
0.7 × 10	4	C3669-1EA	1 ea
		C3669-10EA	10 ea
1.0 × 10	8	C3794-1EA	1 ea
		C3794-10EA	10 ea
1.0 × 20	16	C3919-1EA	1 ea
		C3919-10EA	10 ea
1.5 × 10	18	C4169-1EA	1 ea
		C4169-5EA	5 ea
1.5 × 30	53	C4294-1EA	1 ea
		C4294-5EA	5 ea
2.5 × 10	49	C4669-1EA	1 ea
		C4669-5EA	5 ea
2.5 × 20	98	C4794-1EA	1 ea
		C4794-5EA	5 ea
2.5 × 50	245	C4919-1EA	1 ea
		C4919-3EA	3 ea
PTFE, Non-jacketed			
1.0 × 60	47	C4044-1EA	1 ea
2.5 × 30	147	C4419-1EA	1 ea
2.5 × 60	294	C4544-1EA	1 ea
4.8 × 30	543	C5044-1EA	1 ea
4.8 × 60	1,085	C5169-1EA	1 ea
PTFE, Jacketed			
1.0 × 15	12	C5544-1EA	1 ea
1.0 × 30	24	C5669-1EA	1 ea
2.5 × 15	74	C5794-1EA	1 ea
2.5 × 30	147	C5919-1EA	1 ea
Open-ended			
1.0 × 30	24	C6169-1EA	1 ea
1.5 × 30	53	C6419-1EA	1 ea

Sigma-Aldrich® Glass Column Accessories

LC column replacement bed supports

For use with flow adapter only.

Column I.D. (cm)	Cat. No.	Qty
1.0	B9775-10EA	10 ea
1.5	B9900-10EA	10 ea
2.5	B0151-10EA	10 ea

Sample diffusion discs for LC columns

A 20 µm polyethylene disc sealed to an acrylic ring. Installed on top of column packing in an open-ended column, it protects the packing from disruption.



Description	Cat. No.	Qty
column I.D. 1.0 cm	S7021-1EA	1 ea
column I.D. 1.5 cm	S7146-1EA	1 ea
column I.D. 2.5 cm	S7271-1EA	1 ea

Flow Adapters & Fittings

Flow adapter for Luer lock LC columns

Flow adapters consist of 1/16 in. O.D. FEP tubing, a polyacetal body, a Viton® O-ring seal and a 20 µm porosity HDPE bed support. One replacement bed support is supplied with each flow adapter. One adapter can be combined with a standard Luer Lock, non-jacketed column to make a column with an adjustable bed volume.



Column I.D. (cm)	Cat. No.	Qty
1.0	F8267-1EA	1 ea
1.5	F8392-1EA	1 ea
2.5	F8517-1EA	1 ea

Flow adapter for jacketed LC columns

Each flow adapter is supplied with a 20 µm porosity HDPE bed support, TFE/ polypropylene O-ring seal, stainless steel adjusting rod, PTFE body and 5 feet (1.5 meters) of FEP tubing.

Column I.D. (cm)	Cat. No.	Qty
1.0	F9017-1EA	1 ea
2.5	F9142-1EA	1 ea

Empty Columns & Accessories

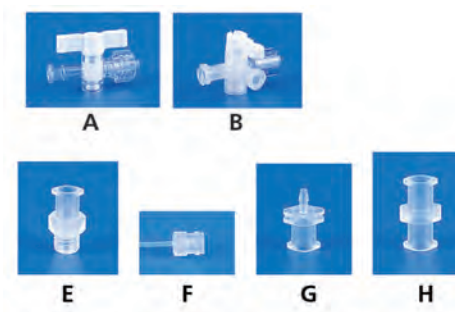
Sigma-Aldrich® Glass Column Accessories

Flow adapter for non-jacketed LC columns

Each flow adapter is supplied with a 20 µm porosity HDPE bed support, TFE/ polypropylene O-ring seal, stainless steel adjusting rod, PTFE body and 5 feet (1.5 meters) of FEP tubing.

Column I.D. (cm)	Cat. No.	Qty
1.0	F8642-1EA	1 ea
2.5	F8767-1EA	1 ea
4.8	F8892-1EA	1 ea

Liquid chromatography column fittings



Description	Cat. No.	Qty
Stopcock, Luer Lock (A)	S7396-10EA	10 ea
Stopcock, 3-way Luer Lock (B)	S7521-10EA	10 ea
Adapter, Luer Lock to 1/4"-28 threads (E)	A7677-10EA	10 ea
Adapter, Luer Lock to 0.038 in. tubing (F)	A7552-5EA	5 ea
Adapter, Luer Lock to 1/16 in. tubing fitting (G)	A7427-10EA	10 ea
Coupler, Luer Lock to Luer Lock (H)	C4681-10EA	10 ea

Reservoirs

Packing reservoirs for non-jacketed LC columns

Supplied complete with all fittings necessary for connection to threaded columns. The top has 1/4"-28 fitting.



Description	Cat. No.	Qty
500 mL, column I.D. 2.5 cm	R6133-1EA	1 ea
2,000 mL, column I.D. 4.8 cm	R6258-1EA	1 ea

Reservoirs for LC columns

Tapered for leak-free seal.
polypropylene

Description	Cat. No.	Qty
capacity 100 mL, column I.D. 0.7-1.5 cm	R5758-12EA	12 ea
capacity 700 mL, column I.D. 2.5 cm	R5883-5EA	5 ea

Empty Columns & Accessories

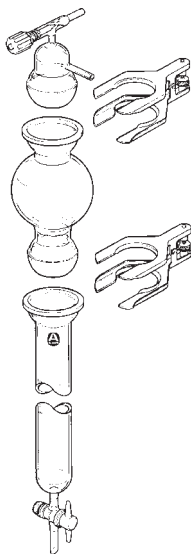
Empty Glass Flash Chromatography Columns

Empty Glass Flash Chromatography Columns

Flash chromatography assembly with standard ball joints

Flash chromatography is useful for rapid, preparative separations with moderate resolutions. As first described in *J. Org. Chem.*, **43**, 2923 (1978), it is commonly performed with silica gel although the use of reversed phase packings has become popular in recent years. For use at <20 psig (1.4 kg/cm²).

Consists of column, flow controller, and pinch clamp. Order solvent reservoir separately.



Capacity (mL)	Column O.D. × L (mm)	SJ Joint	Cat. No.	Qty
Standard column				
100	19 × 813	28/12	Z104094-1EA	1 ea
100	19 × 813	29/15	Z202290-1EA	1 ea
200	25 × 584	50/30	Z104108-1EA	1 ea
200	25 × 584	51/30	Z202339-1EA	1 ea
400	38 × 560	50/30	Z104116-1EA	1 ea
400	38 × 560	51/30	Z202398-1EA	1 ea
600	44 × 572	65/40	Z104124-1EA	1 ea
1,000	57 × 508	75/50	Z104132-1EA	1 ea
2,000	76 × 560	75/50	Z117250-1EA	1 ea
With fritted disc (porosity C)				
100	19 × 813	28/12	Z416878-1EA	1 ea
100	19 × 813	29/15	Z416886-1EA	1 ea
200	25 × 584	50/30	Z416894-1EA	1 ea
200	25 × 584	51/30	Z416908-1EA	1 ea
400	38 × 560	50/30	Z416916-1EA	1 ea
400	38 × 560	51/30	Z416924-1EA	1 ea
600	44 × 572	65/40	Z416932-1EA	1 ea
1,000	57 × 508	75/50	Z416940-1EA	1 ea
2,000	76 × 560	75/50	Z416959-1EA	1 ea

Columns for flash-chromatography assemblies with ball joints

Capacity (mL)	Column O.D. × L (mm)	SJ Joint	Cat. No.	Qty
Standard column				
100	19 × 813	28/12	Z106976-1EA	1 ea
100	19 × 813	29/15	Z202320-1EA	1 ea
200	25 × 584	50/30	Z106984-1EA	1 ea
400	38 × 560	50/30	Z106992-1EA	1 ea
400	38 × 560	51/30	Z202428-1EA	1 ea
600	44 × 572	65/40	Z107018-1EA	1 ea
1,000	57 × 508	75/50	Z107026-1EA	1 ea
2,000	76 × 560	75/50	Z117463-1EA	1 ea
With fritted disc (porosity C)				
100	19 × 813	28/12	Z416770-1EA	1 ea
100	19 × 813	29/15	Z416789-1EA	1 ea
200	25 × 584	50/30	Z416797-1EA	1 ea
200	25 × 584	51/30	Z416800-1EA	1 ea
400	38 × 560	50/30	Z416819-1EA	1 ea
400	38 × 560	51/30	Z416827-1EA	1 ea
600	44 × 572	65/40	Z416835-1EA	1 ea
1,000	57 × 508	75/50	Z416843-1EA	1 ea
2000	76 × 560	75/50	Z416851-1EA	1 ea

Flow controllers for flash-chromatography assemblies with ball joints

SJ Joint	Description	Cat. No.	Qty
28/12	For 28/12 standard ball joint	Z107034-1EA	1 ea
29/15	For 29/15 standard ball joint	Z204005-1EA	1 ea
50/30	For 50/30 standard ball joint	Z107042-1EA	1 ea
51/30	For 51/30 standard ball joint	Z202371-1EA	1 ea
65/40	For 65/40 standard ball joint	Z107069-1EA	1 ea
75/50	For 75/50 standard ball joint	Z107077-1EA	1 ea

Solvent reservoir with ball joints

Requires second pinch clamp.

Capacity (mL)	SJ Joint	Cat. No.	Qty
100	28/12	Z121231-1EA	1 ea
100	29/15	Z202304-1EA	1 ea
250	50/30	Z121258-1EA	1 ea
250	51/30	Z202347-1EA	1 ea
500	50/30	Z121266-1EA	1 ea
500	51/30	Z202401-1EA	1 ea
500	65/40	Z121274-1EA	1 ea
1,000	75/50	Z121282-1EA	1 ea
2,000	75/50	Z121290-1EA	1 ea

Empty Columns & Accessories

Empty Glass Flash Chromatography Columns

Pinch clamps for SJ joints

Use with flash-chromatography ball jointed assemblies and rotary evaporator receiver flasks.

stainless steel



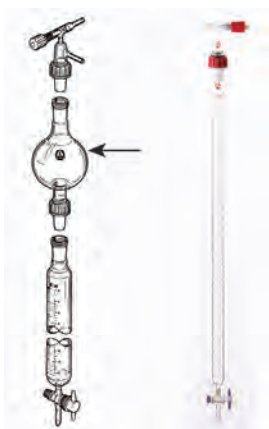
SJ Joint	Cat. No.	Qty
28/12	Z156515-1EA	1 ea
29/15	Z202312-1EA	1 ea
50/30	Z156523-1EA	1 ea
51/30	Z202355-1EA	1 ea
65/40	Z156531-1EA	1 ea
75/50	Z107115-1EA	1 ea

Flash-chromatography assembly with threaded joints

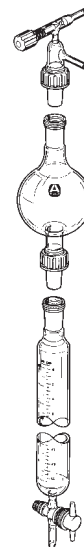
Flash chromatography is useful for rapid, preparative separations with moderate resolutions. As first described in *J. Org. Chem.*, **43**, 2923 (1978), it is commonly performed with silica gel although the use of reversed phase packings has become popular in recent years.

Grease-free design eliminates contamination and frozen joints. Consists of column and flow controller. Order solvent reservoir separately. See the Air-Sensitive section for a description of the threaded joint.

See the Threaded Ground Glass Tutorial to see how threaded joints work.



Arrow indicates optional item



Capacity (mL)	Column O.D. × L (mm)	⌘ Joint	Cat. No.	Qty
Standard column				
100	19 × 813	24/40	Z147354-1EA	1 ea
100	19 × 813	29/32	Z202894-1EA	1 ea
200	25 × 584	24/40	Z147362-1EA	1 ea
200	25 × 584	29/32	Z202908-1EA	1 ea
400	38 × 560	29/32	Z202916-1EA	1 ea
600	44 × 572	24/40	Z147389-1EA	1 ea
600	44 × 572	29/32	Z202924-1EA	1 ea
1,000	57 × 508	45/40	Z202436-1EA	1 ea
2,000	76 × 560	45/40	Z202452-1EA	1 ea
2,000	76 × 560	45/50	Z147400-1EA	1 ea
With fritted disc (porosity C)				
100	19 × 813	24/40	Z416630-1EA	1 ea
100	19 × 813	29/32	Z416703-1EA	1 ea
200	25 × 584	24/40	Z416649-1EA	1 ea
200	25 × 584	29/32	Z416711-1EA	1 ea
400	38 × 560	24/40	Z416657-1EA	1 ea
400	38 × 560	29/32	Z416738-1EA	1 ea
600	44 × 572	24/40	Z416665-1EA	1 ea
600	44 × 572	29/32	Z416746-1EA	1 ea
1,000	57 × 508	45/40	Z416673-1EA	1 ea
1,000	57 × 508	45/50	Z416754-1EA	1 ea
2,000	76 × 560	45/40	Z416681-1EA	1 ea
2,000	76 × 560	45/50	Z416762-1EA	1 ea

Empty Columns & Accessories

Empty Glass Flash Chromatography Columns

Column for flash-chromatography assembly with threaded joints

See the Threaded Ground Glass Tutorial to see how threaded joints work.

Capacity (mL)	Column O.D. × L (mm)	Joint	Cat. No.	Qty
Standard column				
100	19 × 813	24/40	Z147478-1EA	1 ea
100	19 × 813	29/32	Z202975-1EA	1 ea
200	25 × 584	24/40	Z147486-1EA	1 ea
200	25 × 584	29/32	Z202983-1EA	1 ea
400	38 × 560	24/40	Z147494-1EA	1 ea
400	38 × 560	29/32	Z202991-1EA	1 ea
600	44 × 572	24/40	Z147508-1EA	1 ea
600	44 × 572	29/32	Z203009-1EA	1 ea
1,000	57 × 508	45/40	Z202479-1EA	1 ea
1,000	57 × 508	45/50	Z147516-1EA	1 ea
2,000	76 × 560	45/40	Z202495-1EA	1 ea
2,000	76 × 560	45/50	Z147524-1EA	1 ea
With fritted disc (porosity C)				
100	19 × 813	24/40	Z416509-1EA	1 ea
100	19 × 813	29/32	Z416576-1EA	1 ea
200	25 × 584	24/40	Z416517-1EA	1 ea
200	25 × 584	29/32	Z416584-1EA	1 ea
400	38 × 560	24/40	Z416525-1EA	1 ea
400	38 × 560	29/32	Z416592-1EA	1 ea
600	44 × 572	24/40	Z416533-1EA	1 ea
600	44 × 572	29/32	Z416606-1EA	1 ea
1,000	57 × 508	45/40	Z416541-1EA	1 ea
1,000	57 × 508	45/50	Z416614-1EA	1 ea
2,000	76 × 560	45/40	Z416568-1EA	1 ea
2,000	76 × 560	45/50	Z416622-1EA	1 ea

Flow controller for flash-chromatography assembly with threaded joints

See the Threaded Ground Glass Tutorial to see how threaded joints work.

Description	Cat. No.	Qty
Joint: 24/40	Z147532-1EA	1 ea
Joint: 29/32	Z203017-1EA	1 ea
Joint: 45/40	Z202487-1EA	1 ea
Joint: 45/50	Z147540-1EA	1 ea

Screw-cap for flash-chromatography assembly with threaded joints

See the Threaded Ground Glass Tutorial to see how threaded joints work.

Description	Cat. No.	Qty
Joint: 24/40	Z147559-10EA	10 ea
Joint: 29/32	Z203025-10EA	10 ea
Joint: 45/50 fits both joints; Joint: 45/40	Z147567-4EA	4 ea

Viton® O-rings for flash-chromatography assembly with threaded joints

Description	Cat. No.	Qty
Joint: 24/40	Z147575-10EA	10 ea
Joint: 29/32	Z203033-10EA	10 ea
Joint: 45/50 fits both joints; Joint: 45/40	Z147583-6EA	6 ea

Solvent reservoir for threaded ST/NS joints

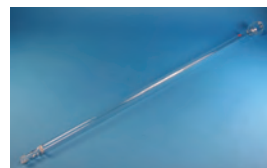
Columns can accommodate any reservoir with same joint size.

Size	Joint	Cat. No.	Qty
capacity 100 mL	24/40	Z147419-1EA	1 ea
capacity 100 mL	29/32	Z202932-1EA	1 ea
capacity 250 mL	29/32	Z202940-1EA	1 ea
H 225 mm capacity 500 mL	24/40	Z147435-1EA	1 ea
capacity 500 mL	29/32	Z202959-1EA	1 ea
capacity 1,000 mL	45/40	Z202444-1EA	1 ea
capacity 1,000 mL	45/50	Z147443-1EA	1 ea
capacity 2,000 mL	45/40	Z202460-1EA	1 ea
capacity 2,000 mL	45/50	Z147451-1EA	1 ea

EZSafe® flash-chromatography column with reservoir

Low pressure (max. 7 psig) medium wall columns with reservoir. Greaseless PTFE insert with GL-45 screw-thread attaches flow control valve to column. Precision all-PTFE valve and drip-tip.

bore size 2 mm



Capacity (mL)	Cat. No.	Qty
Standard column		
100	Z415812-1EA	1 ea
200	Z415820-1EA	1 ea
400	Z415839-1EA	1 ea
600	Z415847-1EA	1 ea
1,000	Z415855-1EA	1 ea
2,000	Z415863-1EA	1 ea
With fritted disc		
100	Z415952-1EA	1 ea
200	Z415960-1EA	1 ea
400	Z415979-1EA	1 ea
600	Z415987-1EA	1 ea
1,000	Z415995-1EA	1 ea
2,000	Z416002-1EA	1 ea

Empty Columns & Accessories

ACE Chromatography Columns

ACE Chromatography Columns

Ace large chromatography column

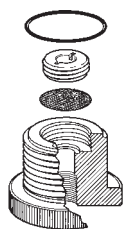
Rugged borosilicate glass column with #50 internal Ace-Threds on ends to which a wide variety of upper and lower adapters can be fitted. Suitable for ion-exchange or activated-carbon work. Order column adapters separately.



I.D. × L (mm)	Capacity (L)	Cat. No.	Qty
50 × 300	0.59	Z180041-1EA	1 ea
50 × 450	0.88	Z180068-1EA	1 ea
50 × 600	1.18	Z180076-1EA	1 ea
50 × 1,200	2.35	Z180084-1EA	1 ea
75 × 300	1.84	Z180092-1EA	1 ea
75 × 600	2.65	Z180106-1EA	1 ea
75 × 1,200	5.30	Z180114-1EA	1 ea
100 × 1,200	9.43	Z180122-1EA	1 ea
150 × 1,200	21.20	Z180149-1EA	1 ea

End-fitting adapter for large columns

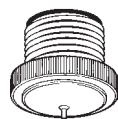
Polypropylene. Connects tubing adapters with NPT threads to column. Supplied with a locking retainer to hold 350 µm support screen (included) firmly in place. All adapters have an AceThread #50 and include one FETFE® O-ring



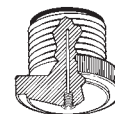
Description	Cat. No.	Qty
NPTF 3/8 in.	Z180157-1EA	1 ea
NPTF 1/2 in.	Z180165-1EA	1 ea

Bottom-drip adapter for large columns

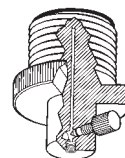
Shallow taper of upper end minimizes mixing below the PE packing support disc (included). All adapters have an Ace Thread #50 and include one FETFE® O-ring.



Luer tip



1/4-28 UNF 2B internal thread

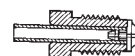
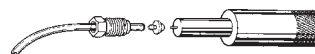


1/4-28 UNF 2B internal thread and flow valve

Description	Cat. No.	Qty
Nylon		
Luer tip, 1 mm bore	Z181692-1EA	1 ea
Luer tip and flow-regulator valve, 0 to 1mm adjustable bore	Z181706-1EA	1 ea
1/4-28 UNF 2B internal thread, for use with tubing connectors	Z181714-1EA	1 ea
1/4-28 UNF 2B internal thread and flow-regulator valve, for use with tubing connectors	Z181722-1EA	1 ea
PTFE		
Luer tip, 1 mm bore	Z180173-1EA	1 ea
Luer tip and flow-regulator valve, 0 to 1mm adjustable bore	Z180181-1EA	1 ea
1/4-28 UNF 2B internal thread, for use with tubing connectors	Z180203-1EA	1 ea
1/4-28 UNF 2B internal thread and flow-regulator valve, for use with tubing connectors	Z180211-1EA	1 ea

Tubing connector for large columns

TFE nut with 1/4-28 UNF 2B male thread connects small I.D. tubing to bottom drip adapter. KEL-F insert mechanically wedges tubing against fitting. For vacuum or pressure applications. Tubing-insertion tool required for assembly. Order nut, insert, and insertion tool separately.



Description	Cat. No.	Qty
Nut, tube I.D. 1.5 mm	Z180319-12EA	12 ea
Nut, tube I.D. 2 mm	Z180327-12EA	12 ea
Insert, tube I.D. 1.5 mm	Z180335-12EA	12 ea
Insert, tube I.D. 2 mm	Z180343-12EA	12 ea
Tubing insertion tool, tube I.D. 1.5 mm	Z180351-1EA	1 ea

Support screen for large columns

▶ polypropylene, 350 µm

Use with column end-fitting adapters. product of Ace Glass 581448

Z204021-12EA	12 ea
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Empty Columns & Accessories

ACE Gravity Columns

ACE Gravity Columns

Ace chromatography column

Has #15 Ace-Thred at top and 2 mm bore, solid-PTFE stopcock-plug (tapered 1:5) at bottom. Supplied with nylon and FETFE® O-ring for connecting 12.5 to 14 mm O.D. tube to column, and with tubing connector.

Note: When using tubing connector, O-ring supplied with bushing is NOT necessary. Fritted disc has 70 to 100 µm porosity, sealed into bottom of column.



Description	Cat. No.	Qty
I.D. 10 mm × L 46 cm	Z137111-1EA	1 ea
I.D. 19 mm × L 61 cm	Z137138-1EA	1 ea
I.D. 25 mm × L 51 cm	Z137146-1EA	1 ea
I.D. 50 mm × L 61 cm	Z137154-1EA	1 ea
I.D. 10 mm × L 46 cm, With fritted disc	Z137162-1EA	1 ea
I.D. 19 mm × L 61 cm, With fritted disc	Z137170-1EA	1 ea
I.D. 25 mm × L 51 cm, With fritted disc	Z137189-1EA	1 ea
I.D. 50 mm × L 61 cm, With fritted disc	Z137197-1EA	1 ea

ACE PTFE tubing connector

Connects ½ in. I.D. tubing to #15 Ace-Thred. Fits Ace chromatography columns.

product of Ace Glass 585307

Z147346-1EA	1 ea
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Michel-Miller Chromatography Columns

Michel-Miller chromatography column

For high-performance, low-pressure liquid chromatography (HPLPLC). Column-end geometries allow sample to be introduced at the inlet as a narrow band and exit without causing extra band broadening or peak distortion. Conical design of three larger columns reduces flow pathlength differences and avoids dead volume that can form with square-end fittings. For use with PTFE couplings, injection port, and end-fitting adapters without O-rings. Intended for operation at elevated pressures and should always be used with the specified plastic safety shields listed. Columns are epoxy-coated to prevent chipping and breakage. Use filter-paper disc to retain packing. Column I.D. is measured at largest diameter; effective length is distance between threads. Made of borosilicate glass. Order column fittings and adapters separately.

L × I.D. (mm)	Shield	Ace-Thred	Max. Pressure (psi)	Cat. No.	Qty
250 × 8	A	#7	300	Z179477-1EA	1 ea
300 × 11	B or BB	#11-11	200	Z247677-1EA	1 ea
300 × 15	E	#15-15	200	Z247685-1EA	1 ea
300 × 21	A, B, or BB	#11	300	Z179485-1EA	1 ea
350 × 40	B or BB	#11	250	Z179493-1EA	1 ea
450 × 15	EE	#15-15	200	Z247693-1EA	1 ea
450 × 25	F or FF	#25-11	250	Z179515-1EA	1 ea
450 × 51	B or BB	#11	200	Z179507-1EA	1 ea
600 × 50	G	#50-11	100	Z179531-1EA	1 ea

Michel-Miller adjustable bed height column

Top fitting can be moved to compensate for changes in bed height from 1 to 6 in. below thread. Loosen bushing to slide end-fitting up and down. End-fitting is all PTFE with a glass disc, porosity 25 to 50 µm. Bottom of column is a #11 Ace-Thred bottom end-fitting. Top fitting has a connection for 2 mm I.D. PTFE tubing and bottom fitting has a ¼ -28 tap for connecting small bore tubing.

Note: 10 mm column is same diameter top to bottom.

Description	Cat. No.	Qty
L 900 mm × I.D. 10 mm	Z217735-1EA	1 ea
L 300 mm × I.D. 25 mm	Z217743-1EA	1 ea
L 600 mm × I.D. 25 mm	Z217751-1EA	1 ea
L 900 mm × I.D. 25 mm	Z217778-1EA	1 ea

Empty Columns & Accessories

Michel-Miller Column Accessories: *Adjustable Bed Height Column Endfittings*

Michel-Miller Column Accessories

Adjustable Bed Height Column Endfittings

Bottom end fitting for Michel-Miller adjustable bed height column

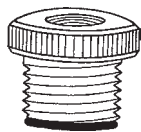
Ace-Thred #11
product of Ace Glass 580114

Z179639-1EA	1 ea
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Adapters

Michel-Miller Swagelok® adapter

Use to make Swagelok tubing connections with Ace threaded glassware. One end is Ace-Thred, other is NPTF. Connects tubing to M-M columns. Adapters with #50 Ace-Thred fit Ace large columns.



NPTF (in.)	Ace-Thred	Cat. No.	Qty
Nylon			
1/8	#7	Z507148-1EA	1 ea
1/8	#11	Z507164-1EA	1 ea
1/8	#15	Z507172-1EA	1 ea
1/8	#25	Z507199-1EA	1 ea
1/4	#15	Z507180-1EA	1 ea
1/4	#25	Z507202-1EA	1 ea
PTFE			
1/16	#7	Z507210-1EA	1 ea
1/16	#11	Z507237-1EA	1 ea
1/16	#25	Z507261-1EA	1 ea
1/16	#25	Z507318-1EA	1 ea
1/8	#7	Z507229-1EA	1 ea
1/8	#11	Z507245-1EA	1 ea
1/8	#15	Z507288-1EA	1 ea
1/8	#25	Z507326-1EA	1 ea
1/4	#15	Z507296-1EA	1 ea
1/4	#25	Z507334-1EA	1 ea
1/4	#50	Z507342-1EA	1 ea

Michel-Miller end-fitting adapter

Use at either end of column. 1/4 -28 female thread at top accepts standard miniature plumbing systems. Male Ace-Thred matches thread size of M-M columns. Bore is 1.5 mm. Use with filter discs to retain column-packing material. Order adapter and filter discs separately.

Description	Cat. No.	Qty
Ace-Thred #7	Z179620-1EA	1 ea
Ace-Thred #15	Z251836-1EA	1 ea
Ace-Thred #25	Z179647-1EA	1 ea
Ace-Thred #50	Z410225-1EA	1 ea

Injection-port adapter

PTFE; allows direct on-column injection at the center of filter disc at top of column without stopping solvent flow. Top thread is 5/16 -24 UNF for use with injection-port cap that holds septum. Side female thread is 1/4 -28 UNF to accommodate tubing adapters or other miniature plumbing systems. Bottom male thread refers to Ace-Thred number on columns. Complete item is supplied with one PTFE-coated silicone-rubber septum. Not suitable for larger columns. Order paper filter discs separately with column end-fitting adapters.

Description	Cat. No.	Qty
Complete, Ace-Thred #11	Z179914-1EA	1 ea
Injection port cap	Z179949-1EA	1 ea
Rubber septa	Z204013-25EA	25 ea

Feed Tube Adapters

Ace-Thred #7 at top with nylon bushing and FETFE O-ring for use with feed tubes listed. Size refers to I.D. of tubing above lower thread and corresponds to M-M column diameter

Description	Cat. No.	Qty
15 mm	Z217948-1EA	1 ea
25 mm	Z217956-1EA	1 ea

Stainless steel tubing adapter

Use with end-fitting adapter to connect tubing to M-M columns. Thread is 1/4-28 to 1.5mm O.D. extension.
product of Ace Glass 580912



Z179965-1EA	1 ea
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Couplings

Michel-Miller column coupling

PTFE with 316 SS Liner connects M-M columns when packing. Makes a leaktight seal without O-rings. Male Ace Thred matches thread size of columns.

Description	Cat. No.	Qty
Ace-Thred #7-7	Z179841-1EA	1 ea
Ace-Thred #11-11	Z179876-1EA	1 ea
Ace-Thred #15-15	Z251852-1EA	1 ea

Michel-Miller column coupling to end fittings

PTFE; for coupling column to end fittings of the same internal diameter. Size refers to inside diameter of threads. Includes two FETFE® O-rings.

Description	Cat. No.	Qty
11 mm	Z217964-1EA	1 ea
15 mm	Z217972-1EA	1 ea
25 mm	Z217980-1EA	1 ea
50 mm	Z217999-1EA	1 ea

Michel-Miller reducing coupling

PTFE with one end threaded for the next smaller diameter.

Description	Cat. No.	Qty
thread 15-11 mm	Z218006-1EA	1 ea
thread 25-15 mm	Z218014-1EA	1 ea
thread 50-25 mm	Z218022-1EA	1 ea

Empty Columns & Accessories

Michel-Miller Column Accessories: *Stoppers & Plugs*

Stoppers & Plugs

Michel-Miller column stopper

PTFE for use at either end of any chromatography column with Ace-Threds. Makes a leak-tight seal without O-rings.

Description	Cat. No.	Qty
Ace-Thred #7	Z179809-1EA	1 ea
Ace-Thred #11	Z179817-1EA	1 ea
Ace-Thred #15	Z251860-1EA	1 ea
Ace-Thred #25	Z179825-1EA	1 ea
Ace-Thred #50	Z179833	

Michel-Miller column plug

Solid plug for use as stopper with Ace-Threds. Seals M-M column ends, Plugs with #50 Ace-Thred fit Ace large columns.



Description	Cat. No.	Qty
Front seal, Nylon, thread 7 mm	Z507024-1EA	1 ea
Front seal, Nylon, thread 11 mm	Z507032-1EA	1 ea
Front seal, Nylon, thread 15 mm	Z507059-1EA	1 ea
Nylon, Front seal, thread 25 mm	Z507067-1EA	1 ea
Front seal, Nylon, thread 50 mm	Z180254-1EA	1 ea
Nylon, Front seal, thread 80 mm	Z507075-1EA	1 ea
Back seal, Nylon, thread 11 mm	Z506966-1EA	1 ea
Back seal, Nylon, thread 15 mm	Z506974-1EA	1 ea
Back seal, Nylon, thread 25 mm	Z506982-1EA	1 ea
Front seal, PTFE, thread 15 mm	Z507105-1EA	1 ea
Front seal, PTFE, thread 25 mm	Z507113-1EA	1 ea

Pre-column for Michel-Miller columns

For the addition of pre-purified sample mixtures to main column. Technique allows silica gel or alumina-packed columns to be reused several times. Suitable for use in final stages of slurry packing; stacks on top of main M-M column using coupling. Connections are Ace Thred #11. product of Ace Glass 579634

L x I.D. 130 mm x 22 mm



Z179558-1EA

1 ea

Filter column for Michel-Miller columns

Assures only clean solvent enters M-M column. Position in-line between pump and column using Ace-Thred #7 end-fitting adapters and 1/4-28 tubing adapters. Connections are Ace-Thred #7. Order adapters and filter material separately.

product of Ace Glass 581323

L x I.D. 85 mm x 8 mm



Z179973-1EA

1 ea

Michel-Miller column filter disc

Use at either end of column. Filter disc sizes 7 and 11 are made from specially pure, very uniform, highly-absorbent paper; larger sizes made from 125 PTFE screen cloth. Order adapter separately.

PTFE

Description	Cat. No.	Qty
Ace-Thred #7	Z179981-100EA	100 ea
Ace-Thred #11	Z180017-100EA	100 ea
Ace-Thred #15	Z251844-1PAK	12 ea

Feed Tube

Permits packing of column without excessive drop impact. Also for introduction of effluent or for pressurized operation. Use with feed tube adapters.

Description	Cat. No.	Qty
L 76 mm, with hose connection	Z217859-1EA	1 ea

Conical addition funnel

For charging columns. Capacity is approximately five times the largest column volume. Size listed refers to I.D. of tubing above thread and corresponds to M-M column diameter.

Description	Cat. No.	Qty
capacity 300 mL	Z217883-1EA	1 ea
capacity 600 mL	Z217891-1EA	1 ea
capacity 3,000 mL	Z217913-1EA	1 ea

Michel-Miller safety shield

Ensures safe operation of M-M columns at pressures to 300 psi. Top thread of column is hung between two-piece aluminum cap; cap is then held by plastic shield. Clamp shield, not column. The 3 mm acrylic wall is not resistant to most solvents.

Size	Cat. No.	Qty
A	Z179566-1EA	1 ea
B	Z179574-1EA	1 ea
BB	Z179582-1EA	1 ea
E	Z247707-1EA	1 ea
F	Z179590-1EA	1 ea
FF	Z179604-1EA	1 ea
G	Z179612-1EA	1 ea

Empty Columns & Accessories

Disposable Columns

Disposable Columns

Mini-Columns

high-density polyethylene filter
polypropylene molded
pore size 45-90 μm

Capacity (mL)	Overall H (in.)	Cat. No.	Qty
0.5	1.9	C2603-200EA	200 ea
5	1.5	C2728-200EA	200 ea

Chromatography columns, general-purpose

For use in general chromatographic work for extraction of components, with special applications in isoenzyme and protein studies, hemoglobin fractionation and desalting.

- Precision molded from premium-grade, chemically inert plastic for organic solvents
- Includes reservoir & end caps
- Polyethylene filter matrix support in medium porosity

polypropylene

Volume (mL)	Overall H (in.)	Cat. No.	Qty
10	5	C2103-200EA	200 ea
13	7	C2353-200EA	200 ea

Omnifit Columns & Accessories



Omnifit® Column Kit

Omnifit glass columns are designed to be packed with resin-based 20-200 μm LC packings, and can be operated at medium pressures.

- 10 mm I.D.: 600 psi (42 bar)
- 15 mm I.D.: 300 psi (20 bar)
- 25 mm I.D.: 150 psi (10 bar)

Each Omnifit column is made from a continuous piece of precision-bore borosilicate glass, with extra-deep threaded ends and strain-free fittings. Scalloped endcaps virtually eliminate rolling and give an improved grip when opening or closing the column. Endpieces are constructed to minimize dead volume and reduce turbulence in solvent flow. A 25 μm polyethylene frit in the endpiece distributes the sample evenly over the surface of the packing bed, reducing sample dispersion before the sample enters the column.

Column Kit: 1 glass column, 2 fixed-length endpieces with Viton O-rings, 2 \times $\frac{1}{4}$ -28 UNF endcaps, 1 Fittings Kit, and 1 Frit Kit. Order adjustable endpiece (flow adapter) separately.

Fittings Kit: 2 m \times $\frac{1}{16}$ in. O.D. PTFE tubing with $\frac{1}{4}$ -28 UNF fitting, 0.5 m \times $\frac{1}{16}$ in. O.D. PTFE tubing with $\frac{1}{4}$ -28 UNF fitting, 2 \times M6 endcaps

Frit Kit: 2 \times 25 μm PTFE frits, 2 each 10 μm PTFE frits and μm PE frits. For aqueous mobile phases. Other diameters available as custom orders.

Bed Volume (mL)	Column L \times I.D. (mm)	Cat. No.	Qty
Omnifit® Column Kit			
5.6	100 \times 10	56001	1 ea
9.5	150 \times 10	56002	1 ea
12	100 \times 15	56005	1 ea
17.4	250 \times 10	56003	1 ea
21	150 \times 15	56006	1 ea
35	100 \times 25	56009-U	1 ea
37.1	500 \times 10	56004	1 ea
39	250 \times 15	56007	1 ea
60	150 \times 25	56010	1 ea
83	500 \times 15	56008-U	1 ea
110	250 \times 25	56011-U	1 ea
240	500 \times 25	56012	1 ea

Omnifit® Glass Column, no hardware

Column L \times I.D. (mm)	Cat. No.	Qty
400 \times 15	56264-U	1 ea
400 \times 10	56263-U	1 ea
400 \times 6.6	56262-U	1 ea
250 \times 6.6	56261-U	1 ea
100 \times 10	56015	1 ea
150 \times 10	56016	1 ea
250 \times 10	56017	1 ea
500 \times 10	56018	1 ea
150 \times 15	56020-U	1 ea
250 \times 15	56021	1 ea
500 \times 15	56022	1 ea
100 \times 25	56023	1 ea
150 \times 25	56024	1 ea
250 \times 25	56025-U	1 ea
500 \times 25	56026	1 ea

Adjustable Column Endpiece (Flow Adapter)

Plunger allows 80 mm of height adjustment, with a fine control that minimizes the risk of disturbance to the packed bed.

8 cm maximum adjustment.

Column I.D. (mm)	Cat. No.	Qty
6.6	56266-U	1 ea
10	56099	1 ea
15	56112-U	1 ea
25	56125	1 ea

Fixed Column Endpiece

Includes Omnifit-style $\frac{1}{4}$ -28 cap fittings w/Viton® O-ring for column to endfitting seal, Viton O-rings for tubing connector, and 0.5 mm bore void-filling PTFE cone.

Column I.D. (mm)	Cat. No.	Qty
6.6	56265-U	1 ea
10	56101	1 ea
15	56114-U	1 ea
25	56127	1 ea

Empty Columns & Accessories

Omnifit Columns & Accessories

Adapters (Omnifit®)

Cap Adapters connect to an Omnifit endfitting.
Threaded Adapters connect to a 1/4-28 female port.

	Cat. No.	Qty
Omnifit® Cap Adapter		
male Luer	56085	1 ea
female Luer	56087	1 ea
Tubing Adapter		
male Luer	56086	1 ea
1/4 in. pipe stem	56091	1 ea

Omnifit® Tube Endfittings

Each endfitting has an internal taper to hold the tubing centrally; includes a lock nut for panel mounting.

Gripper fitting required (purchase separately):

for 1/16 in. O.D. tubing p/n 57417

for 1/8 in. O.D. tubing p/n 57418



	Cat. No.	Qty
Omnifit® Tube Endfittings		
for use with 1/16 in. O.D. tubing, black polypropylene	56058-U	10 ea
for use with 1/16 in. O.D. tubing, orange polypropylene	56061	10 ea
for use with 1/16 in. O.D. tubing, yellow polypropylene	56062-U	10 ea
for use with 1/16 in. O.D. tubing, green polypropylene	56063	10 ea
for use with 1/16 in. O.D. tubing, opaque white Tefzel®	56069	10 ea
for use with 1/8 in. O.D. tubing, opaque white Tefzel®	56081	10 ea

Omnifit® Column Connector

Joins 2 columns of same diameter, 50 psi max.

Column I.D. (mm)	Cat. No.	Qty
10	56100-U	1 ea
15	56113	1 ea
25	56126	1 ea

O-Ring for Omnifit® Column Endpiece

▶ for use with 10mm Bore Columns, Viton®

56274-U 10 ea

▶ for use with 15mm Bore Column, Viton®

56272-U 10 ea

▶ Viton®, for use with 15 mm bore column

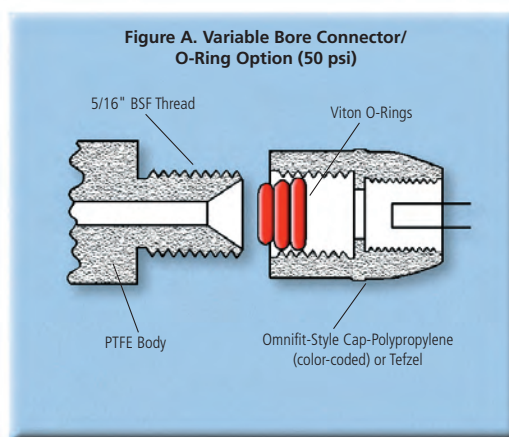
56122 10 ea

Frit for Omnifit® Column Endpiece

For Use With	Pore Size (µm)	Cat. No.	Qty
polyethylene			
6.6mm Bore Columns	25	56269-U	20 ea
10 mm Bore Columns	25	56102	20 ea
15mm Bore Columns	25	56271-U	20 ea
PTFE			
10 mm bore	10	56107	20 ea
10 mm bore	5	56108	20 ea
15 mm bore	10	56120-U	20 ea
15 mm bore	5	56121	20 ea
25 mm bore	25	56129	20 ea
25 mm bore	5	56134	20 ea

Omnifit Accessories

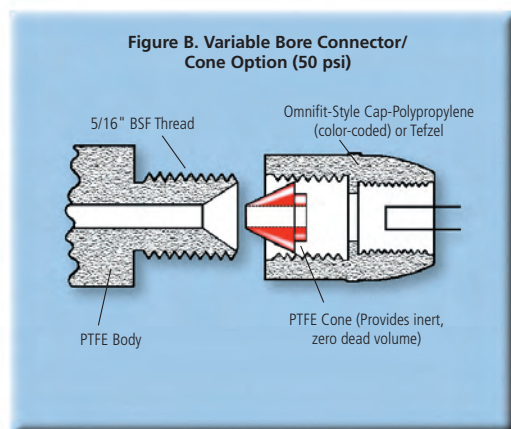
Variable bore connectors offer a choice of two-way, three-way, and multi-port Omnifit connectors. Most of these connectors are also available with valved ports. These fittings offer the unique advantage of producing a very low dead volume connection with tubing of various diameters, through an O-ring compression system (Figure A), a cone over tubing system (Figure B), or a void-filling cone with a standard gripper, Omnifit, or flangeless tube connector on a threaded 1/4-28 fitting. All three options use a 1/4-28 tube endfitting (nut). The PTFE valve and connector bodies have 1.5mm flow passages and are supplied with chemical-resistant Tefzel stems.



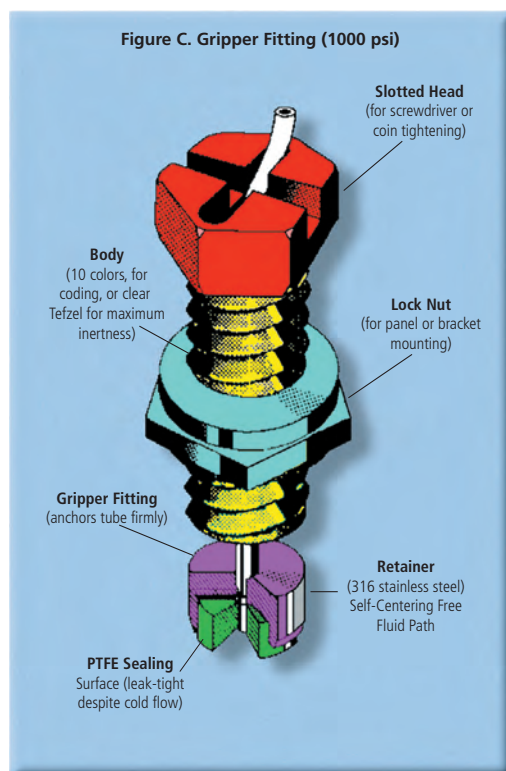
O-ring option: Up to 3 Viton O-rings are compressed into the body which holds the tube tightly and forms the seal. The O-rings allow maximum flexibility, because they seal on rigid wall tubing of 4mm-11mm diameter (standard variable bore). This is particularly advantageous for changing fluid lines of differing dimensions. Viton is inert to most acids but is attacked by aldehydes and ketones. Typical pressure rating: 50psi (3 bar).

Empty Columns & Accessories

Omnifit Columns & Accessories: *Omnifit Accessories*



Cone option: A PTFE cone is matched to the tubing OD. This cone is compressed into the fitting, forming the seal. This option gives an all-PTFE fluid path of very low dead volume. PTFE is resistant to most chemicals, including sulfuric acid, sodium hydroxide, and all organic solvents. Typical pressure rating: 50psi (3 bar).



A **gripper fitting** (Figure C) is a flangeless tube connection that incorporates a PTFE-faced washer pressed into a 316 stainless steel housing. The fitting provides leak-free connection with minimum disturbance to the fluid path, and allows repeated connections/disconnections without deterioration of the sealing face. A gripper fitting will not compress the tubing if overtightened and does not twist the tubing during connection. Pressure rated to 1000psi (68 bar). When using a gripper fitting with an Omnifit-style connector, use a 0.5mm bore cone (Cat. No. 56041) to fill the cone area on the connector.

Gripper Fittings

Gripper Trial Pack includes 2 tube end fittings (nuts), 2 gripper fittings, coupler, 2m PTFE tubing. Gripper fittings are rated to 1000psi.

	Cat. No.	Qty
Gripper fitting		
for use with $\frac{1}{16}$ in. tubing	57417	10 ea
for use with $\frac{1}{8}$ in. tubing	57418	10 ea

Omnifit® Variable Bore Connectors



Left to right: 56138, 56141, 56140-U

	Cat. No.	Qty
Omnifit® Small Bore Connector		
Three-way valve connector	56142	1 ea
Omnifit® Standard Bore Connector		
Three-way "T" Connector	56032	1 ea
Two-way valve connectors	56033	2 ea
Three-way valve connector	56034	1 ea

Standard bore is 1.5 mm and includes $\frac{1}{16}$ in. PTFE cones and O-rings. Small bore is 0.8 mm and include $\frac{1}{32}$ in. PTFE cones.

Tube Couplers (Female Unions)



56051

	Cat. No.	Qty
Tubing Coupler		
union: 1/4-28 female Omnifit, for male nut 1/4-28	56051	10 ea

Empty Columns & Accessories

Omnifit Columns & Accessories: *Omnifit Accessories*

Caps and Cones for Variable Bore Connectors



56035

	Cat. No.	Qty
Omnifit® Cap		
mixed (colors)	56035	10 ea
Omnifit® Tubing Cone		
1/16 in., bore	56037	4 ea
1/8 in., bore	56039-U	4 ea
0.5 mm, bore	56041	4 ea
1.0 mm, bore	56042	4 ea
1.5 mm, bore	56043-U	4 ea
3.0 mm, bore	56046	4 ea
3.5 mm, bore	56047	4 ea
solid (plug)	56049	4 ea

Upchurch Accessories

Super Flangeless Fittings (Upchurch)



Description	Cat. No.	Qty
Super Flangeless Ferrules for 1/8 in. tubing	55009-U	10 ea
Super Flangeless Ferrules for 1/16 in. tubing	55008-U	10 ea
Super Flangeless Frit-In-A-Ferrule, for 1/8 in. tubing	55015-U	10 ea
Super Flangeless Frit-In-A-Ferrule, for 1/16 in. tubing	55014-U	10 ea
Super Flangeless Nut, 1/4-28, for 1/16 in. tubing, 10 pk	55012-U	10 ea

Super Flangeless Fittings are designed to provide significant improvements over standard Flangeless Fittings. The lock ring offers constant, uniform compression on the ferrule while operating as a bearing against the nut. This design allows the nut to spin freely against the ferrule system preventing the tubing from twisting during the tightening process. Super Flangeless Ferrules hold to 7,000 psi. Frit-In-A-Ferrule holds to 1,400 psi (1/8 in.) or 5,000 psi (1/16 in.), and are made of stainless steel. Nut Cat. No. 57653 is required for the 1/8 in. ferrule and Frit-In-A-Ferrule.

Flangeless Fittings (Upchurch)

Compatible with all fittings having 1/4-28 threads. Use in place of any flange-type fitting used with 1/16 in. or 1/8 in. O.D. plastic tubing. Each inert fitting consists of a Delrin® nut and Tefzel ferrule. Use the 1/16 in. fittings to 1000 psi (70 kg/cm²) or the 1/8 in. fittings to 500 psi (35 kg/cm²).



58685

Description	Cat. No.	Qty
Ferrules, 1/4-28 Upchurch for tubing 1/16 in. O.D. (requires Flangeless nut), ferrule only	56700-U	10 ea
Flangeless Fitting, nut and ferrule: 1/4-28 male Upchurch, for tubing 1/16 in. O.D.	58685	5 ea
Tube Fitting, Flangeless, nut and ferrule: 1/4-28 male Upchurch, for tubing 1/8 in. O.D.	58686	5 ea
Upchurch Flangeless Ferrule, ferrule: 1/4-28 UNF, for tubing 1/8 in. O.D. (requires Flangeless nut), ferrule only	56701	10 ea

Upchurch Sealtight™ Fittings



Description	Cat. No.	Qty
Tube Fitting, Sealtight™, Extra-long nut, 10-32, with ferrule	55006-U	10 ea
Tube Fitting, Sealtight™, ferrule pack	55007-U	10 ea
Tube Fitting, Sealtight™, Long nut, M6, with ferrule	55004-U	10 ea
Tube Fitting, Sealtight™, Long nut, 10-32, with ferrule	55003-U	10 ea
Tube Fitting, Sealtight™, Short nut, 10-32, with ferrule	55002-U	10 ea

Upchurch Tubing Adapter

(B) 1/4-28 male
 (A) male Luer (slip-type)
 Tefzel® adapter (one-piece design)
 bore diam. 0.04 in. (1.0 mm)
 thread length x total L 0.47 in. x 1 1/16 in.



(A) left, (B) right

55065-U	1 ea
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Empty Columns & Accessories

Upchurch Accessories

(A) 1/4-28 female

(B) female Luer

Tefzel® adapter (one-piece design)

bore diam. 0.04 in. (1.0 mm)
 thread length x total L 0.41 in. x 0.78 in.



(A) left, (B) right

55066

1 ea

(A) 1/4-28 female

(B) male Luer (lock hub-quick connect)

PEEK adapter (one-piece design)



(A) left, (B) right

55072

1 ea

(A) 10-32 female

(B) male Luer (lock hub-quick connect)

PEEK adapter (one-piece design)



(A) left, (B) right

55073

1 ea

(A) M6 female

(B) male Luer (lock hub-quick connect)

PEEK adapter (one-piece design)



(A) left, (B) right

55074

1 ea

(A) 1/4-28 female

(B) female Luer (lock rim)

red PEEK adapter (one-piece design)



(A) left, (B) right

55075

1 ea

(A) 10-32 female

(B) female Luer (lock rim)

natural PEEK adapter (one-piece design)



(A) left, (B) right

55076

1 ea

(A) M6 female

(B) female Luer (lock rim)

black PEEK adapter (one-piece design)



(A) left, (B) right

55077

1 ea

(B) 10-32 male

(A) female Luer

Tefzel® adapter (one-piece design)



(A) left, (B) right

55082

1 ea

Peek adapter 10-32 TO M6, .020 in. hole**Tubing Adapter**

for chromatography applications

(A) 10-32 female for tubing 1/16 in. O.D. (fingertight fitting included)

(B) M6 female

PEEK adapter

adapter swept volume 0.30 µL
 bore diam. 0.020 in. (0.50 mm)
 max. pressure 1000 psi (69 bar)

55068

1 ea

Tube Fitting, Flangeless

Delrin® nut

Nut includes M6 thread for 1/16 in. O.D. tubing. Requires ferrule Cat. No. 56700-U.



55064

10 ea

► nut and ferrule: 1/4-28 male Upchurch, for tubing 1/8 in. O.D.

Tefzel® ferrule (flangeless)

max. pressure 500 psi (35 bar)

58686

5 ea

Tubing Adapter

for chromatography applications

► M6 female, 10-32 male

PEEK adapter (one-piece design)

adapter swept volume 6.70 µL
 bore diam. 0.030 in. (0.75 mm)
 max. pressure 1000 psi (69 bar)



(A) left, (B) right

55069

1 ea

Empty Columns & Accessories

Upchurch Accessories

Tubing Adapter *(continued)*

- ▶ (A) 10-32 female coned for tubing 1/16 in. O.D. (one-piece fingertight fitting included), (B) 1/4-28 female flat-bottom 1/16 in.

PEEK adapter
bore diam. 0.020 in.



(A) right, (B) left

55070-U 1 ea

- ▶ (A) 1/4-28 female flat-bottom, (B) 10-32 male standard

PEEK adapter (one-piece design)
bore diam. 0.030 in.



(A) left, (B) right

55071 1 ea

- ▶ 1/4 in. pipe stem

56091 1 ea

- ▶ 1/4-28 male UNF, 1/4 in. O.D. tube

CTFE unit
bore 1.5 mm (0.060 in.)

58742 1 ea

- ▶ 1/4-28 male UNF, 1/8 in. tube

stainless steel unit
bore 1.5 mm (0.60 in.)

58743 1 ea

- ▶ 1/4-28 male UNF, female Luer

Female adapter (1/16" I.D.) connects syringe to 1/4"-28 threaded tubing or adapter.

Kel-F™ (CTFE)

product of VICI Valco®, CFLAPFA

58721 1 ea

- ▶ Male Luer Adapter
1/4-28 male UNF, male Luer

Male adapter connects needle or Luer hub to 1/4"-28 threaded tubing or adapter. Order coupling separately.

CTFE

product of VICI Valco®, CMLAKF

58722 1 ea

- ▶ 1/4-28 UNF for tubing 1/16 in. O.D. (flangeless fitting included), 10-32 Valco for tubing 1/16 in. O.D. (ZDV fitting included)

316 stainless steel unit
bore 0.75 mm (0.031 in.)

58744 1 ea

- ▶ (A) 1/4-28 female, (B) M6 female

Tefzel® union



59259-U 1 ea

Female Luer Fitting for 1/8 in. Tubing

21017

20 ea

Flangeless Fittings Kit (Upchurch)

All fittings are 1/4-28 unless otherwise indicated.



Upchurch Flangeless Fittings Kit

Components

- Flangeless ferrules, 1/16 in. 10 ea
- Flangeless ferrules, 1/8 in. 10 ea
- Flangeless nuts, 1/16 in. 10 ea
- Flangeless nuts, 1/8 in. 10 ea
- Unions with fittings, 1/16 in. 2 ea
- Unions with fittings, 1/8 in. 2 ea
- Tee with fittings, 1/16 in. 1 ea
- Tee with fittings, 1/8 in. 1 ea
- Cross with fittings, 1/16 in. 1 ea
- Cross with fittings, 1/8 in. 1 ea
- Unions, metric M6 2 ea
- Unions, standard 1/4-28 2 ea
- Luer fittings, female 2 ea
- Luer fittings, male 2 ea
- Metric adapters, 1/4-28 to M6 2 ea

58630

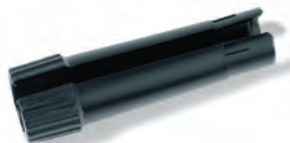
1 ea

Empty Columns & Accessories

Upchurch Accessories

Flangeless Nut Extender Tool (Upchurch)

- Designed for standard head nuts
 - Tightens nut in hard-to-reach places.
- for use with Upchurch Standard Head Nuts



55013-U 1 ea

Male Luer Fitting for 1/4 in. Tubing

24856 10 ea

Male Luer Fitting for 1/8 in. Tubing

21016 20 ea

Male Luer Fitting for 3/16 in. tubing

23364 20 ea

Female Luer Cap**Luer Plugs & Caps**

Use to close Luer port. Polypropylene.

- ▶ **polypropylene, configured for capping luer tips**
- for use with Supelco Visidry Drying Attachment



57098 12 ea

Male Luer Plug

- ▶ **configured for plugging luer holes**

504351 12 ea

Low Pressure Valves**Shutoff Valve, Low Pressure**

- Designed for lower pressure applications
- Biocompatible, all polymer flow path

PEEK or Tefzel valve with 1/4-28 fittings, for pressures up to 1000 psi (70 kg/cm²). Flangeless nuts and ferrules included.



	Cat. No.	Qty
Shutoff Valve, Low Pressure		
natural PEEK, for use with 1/16 in. tubing	505757	1 ea
natural PEEK, for use with 1/8 in. tubing	56704	1 ea
blue Tefzel®, for use with 1/16 in. tubing	505765	1 ea
blue Tefzel®, for use with 1/8 in. tubing	505773	1 ea

Empty Columns & Accessories

Cheminert® Plastic Fittings and Tubing

Cheminert® Plastic Fittings and Tubing

Tube Fitting, Cheminert®

Fittings and washers included.

- Chemically inert
- Zero dead volume, small bore
- Autoclavable
- 500 psi (35 kg/cm³) pressure rating

for use with flanged tubing
stainless steel washer



Description	Cat. No.	Qty
1/4-28 male UNF for tubing 1/16 in. O.D. 1.5mm, (mixed colors)	58705	12 ea
1/4-28 male UNF for tubing 1/8 in. O. D. 3 mm (includes washer), (natural color)	58711	10 ea
1/4-28 male UNF for tubing 1/8 in. O. D. 3 mm, (mixed colors)	58712	12 ea

Kel-F™ Tee Connector

Connects any three pieces of tubing, using 1/4-28 fittings. Flangeless fittings included.

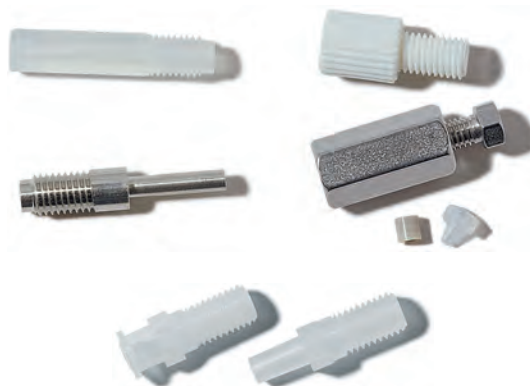


58750-U

Description	Cat. No.	Qty
for use with 1/16 in. tubing (0.25mm bore)	54989	1 ea
for use with 1/8 in. tubing (1.5mm bore)	58750-U	1 ea

Other Fittings

Description	Cat. No.	Qty
Column End Plugs, 1/4-28 male UNF	58745	5 ea
Tubing Adapter, 1/4 in. male NPT, 1/4-28 male Valco	54985-U	1 ea



From top left, counter-clockwise: Cat. No. 58742, 58743, 58721, 58722, and 58744

Tubing Adapter

for chromatography applications

Tubing Adapter	Cat. No.	Qty
1/4 in. male NPT, 1/4-28 male Valco	54985-U	1 ea
M6 female, 10-32 male	55069	1 ea
(A) 10-32 female coned for tubing 1/16 in. O.D. (one-piece fingertight fitting included), (B) 1/4-28 female flat-bottom 1/16 in.	55070-U	1 ea
(A) 1/4-28 female flat-bottom, (B) 10-32 male standard	55071	1 ea
male Luer	56086	1 ea
1/4 in. pipe stem	56091	1 ea
1/4-28 male UNF, 1/4 in. O.D. tube	58742	1 ea
1/4-28 male UNF, 1/8 in. tube	58743	1 ea
1/4-28 male UNF, female Luer	58721	1 ea
1/4-28 male UNF, male Luer	58722	1 ea
1/4-28 UNF for tubing 1/16 in. O.D. (flangeless fitting included), 10-32 Valco for tubing 1/16 in. O.D. (ZDV fitting included)	58744	1 ea
(A) 1/4-28 female, (B) M6 female	59259-U	1 ea

Empty Columns & Accessories

Cheminert® Plastic Fittings and Tubing

Peek adapter 10-32 TO M6, .020 in. hole

Tubing Adapter

for chromatography applications

(A) 10-32 female for tubing $\frac{1}{16}$ in. O.D. (fingertight fitting included)

(B) M6 female

PEEK adapter

bore diam. 0.020 in. (0.50 mm)
 adapter swept volume 0.30 μ L
 max. pressure 1000 psi (69 bar)

55068 1 ea



PTFE Tubing

Economical, flexible PTFE tubing is ideal for use at pressures up to 500 psi (35 kg/cm²). Use in automatic analyzer, postcolumn reaction, preparative scale systems, in-stream sampling devices, and when monitoring physiologically important compounds.

The maximum recommended operating temperature for PTFE is 200 °C, but short term exposure to higher temperatures seldom causes damage.

Length (ft)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
10	$\frac{1}{16}$	0.031	58700-U	1 ea
10	$\frac{1}{16}$	0.023	58701	1 ea
10	$\frac{1}{16}$	0.012	58702	1 ea
10	$\frac{1}{8}$	0.063	58703	1 ea
50	$\frac{1}{16}$	0.031	58696-U	1 ea
50	$\frac{1}{16}$	0.023	58697-U	1 ea
50	$\frac{1}{16}$	0.012	58698-U	1 ea
50	$\frac{1}{8}$	0.063	58699	1 ea

FEP Tubing

For connecting pump to reservoirs. Use $\frac{1}{8}$ in. O.D. \times 0.0625 in. I.D. tubing with most pumps, 0.15 in. O.D. \times 0.118 in. I.D. tubing with Waters pumps. 10 ft./3 m length.

PTFE FEP tubing is ideal for use at pressures up to 500 psi (35 kg/cm²).

max. temp. 50 °C
 max. pressure 500 psi (35 kg)

Length (ft)	O.D. (in.)	I.D. (in.)	Cat. No.	Pkg
10	$\frac{1}{8}$	0.0625	58694-U	1 ea
10	0.15	0.118	58695-U	1 ea

Female Luer Fitting for 1/8 in. Tubing

21017 20 ea

Glass-to-PTFE Connector

► Joins PTFE tubing to glassware without coupling.

Joins PTFE tubing (using $\frac{1}{4}$ -28 threaded fitting) directly to glassware without coupling. Plain end of connector can be fused into glassware by glass blowing. Includes glass-to-PTFE union and flanged glass nipple. 7 mm ($\frac{1}{4}$ in.) O.D. \times 2 mm I.D. \times 3- $\frac{1}{4}$ in. (82 mm) long.

1/4-28 female UNF

acetal (polypropylene) union

glass tube L \times O.D. \times I.D. 3- $\frac{1}{4}$ in. \times $\frac{1}{4}$ in. \times 2 mm

58748 1 ea

Male Luer Fitting for 1/4 in. Tubing

24856 10 ea

Male Luer Fitting for 1/8 in. Tubing

21016 20 ea

Male Luer Fitting for 3/16 in. tubing

23364 20 ea

Empty Columns & Accessories

Tube Flanging

Tube Flanging

Assemble your own plastic tubing system. Our starter kits save you money and provide a variety of the most commonly used fittings. All flanging tools and kits include a tubing holder, 3 interchangeable flanging tips (3 sizes), and a razor blade. Cheminert® tube end fittings can be autoclaved. Both $\frac{1}{8}$ in. and $\frac{1}{16}$ in. fittings have $\frac{1}{4}$ -28 threads



Tube Flanging Starter Kit

Each tube flanging starter kit contains:

- Flanging tool (115 VAC) and accessories
- 20 ft. (6 m) PTFE tubing
- 20 Cheminert® tube end fittings
- 20 Stainless steel washers
- 10 Couplings
- Male Luer adapter
- Female Luer adapter
- Plug
- Glass-to-PTFE connector
- Tee

AC input 110-115 V, 50-60 Hz

Description	Cat. No.	Qty
for use with $\frac{1}{16}$ in. tubing (0.031 in. I.D.)	58754	1 ea
for use with $\frac{1}{8}$ in. tubing (0.063 in. I.D.)	58756-U	1 ea

Flanging Tool

Description	Cat. No.	Qty
115 V, 50-60 Hz	58719	1 ea
220 V50-60 Hz (no CE mark)	58720-U	1 ea

Flanging Tip

Description	Cat. No.	Qty
O.D. 0.028 in., for $\frac{1}{16}$ in. O.D. tubing × 0.010 in. and 0.020 in. I.D. tubing	54991	1 ea
O.D. 0.040 in., for $\frac{1}{16}$ in. O.D. tubing × 0.030 in. I.D. tubing	54992	1 ea

Pre-Packed Columns & Accessories

Rezorian™ and Porozorb Cartridges

Rezorian™ A161 Cartridge

Disposable Rezorian™ A161 Luer lock syringe-tip cartridges offer convenience and expedience for isolating, purifying, and concentrating biomolecules from aqueous samples. Packed with a high performance, macroreticular, hydrophobic adsorbent resin, Rezorian A161 cartridges are specially tailored for biomolecular pharmaceutical separations.

Empty Rezorian tubes are available, and we may custom prepare Rezorian cartridges for your application - please inquire through Technical Service at techservice@sial.com.

matrix styrene-divinylbenzene, spherical, reagent grade
 surface area 800-900 m²/g
 mean particle size 120 μm
 pore diameter 110-175 Å



	Cat. No.	Qty
Rezorian™ A161 Cartridge		
1 mL	57610-U	6 ea
5 mL	57611	6 ea

Pre-Packed Columns & Accessories

Rezorian™ and Porozorb Cartridges

Porozorb™ Cartridge

Analysts processing protein or other biological preparations, sterile pharmaceuticals, foods, or beverages must separate wanted products from unwanted process components.

Porozorb™ cartridges are produced using validated processes, providing sterile, endotoxin-free, ready-to-use adsorbent cartridges that effectively remove detergents (Triton™ X-100, sodium dodecyl sulfate, TWEEN®, etc.) or other nonpolar, hydrophobic materials from such preparations. They are appropriate for analytical scale to process scale purification schemes.

A certificate of analysis accompanies each Porozorb cartridge. Cartridges are tested for sterility and endotoxin by an accredited test lab following modified USP guidelines. The cartridges can be rinsed with cleaning agents (e.g., most weak acids and bases) or autoclaved at 121 °C. The polycarbonate cartridge can accept 50% organic solutions during analysis, but must be stored in aqueous solutions.

Characteristics of Porozorb Cartridges

Packing: Amberlite XAD4, specially cleaned

Mean Particle Size: 500 µm

Cartridge dimensions:

250 mL - 6.55 × 8 cm

1000 mL - 26.2 × 8 cm

4000 mL - 42.04 × 12.71 cm

Nipple Connection: 3/16 in. I.D., 1/4 in. O.D.

Shell: clear polycarbonate

Screens: stainless steel, 50×250 mesh

Gaskets: medical grade

Max. Pressure: 30 psi (2.1 kg/cm²)

Shipped sterile and endotoxin free.

Porozorb cartridges are not for clinical or diagnostic use. Due to shelf life limitations, Porozorb cartridges are made on receipt of an order. Expect 2-4 week delay in shipping times.



Description	Cat. No.	Qty
Porozorb 254, 250 mL	57500	1 ea
Porozorb 1004, 1000 mL	57502	1 ea
Porozorb 4004, 4000 mL	57513-U	1 ea

Ultrafiltration & Ion Exchange Membrane Devices

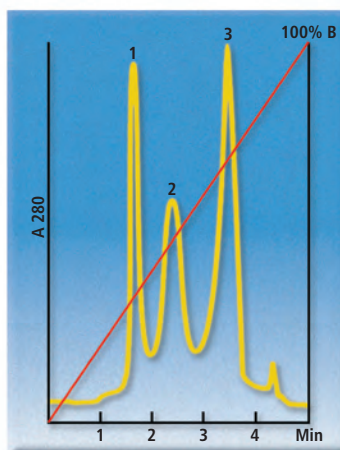
Sartorius/SartoBind

Sartobind® Membrane Adsorber Unit

Ready-to-use Sartobind membrane units are the ultimate for simple, ultra-rapid concentration of proteins from highly dilute solutions, or for separating proteins from a mixture. They feature high binding capacity (~1 mg/cm³), high flow rates (>100 mL/min.), and excellent resolution. Use these units with syringes, peristaltic pumps, or preparative HPLC/FPLC workstations. The disposable 5 cm² units are very useful for rapidly determining buffer conditions for ion exchange separations - simply connect units with different functionalities in series. Female Luer-Lock inlet / Male Luer-Lock outlet design. for ion exchange chromatography of biomolecules



Left: Reusable Model, Right: Disposable Model



1. Transferrin
2. Ovalbumin
3. β-Lactoglobulin-A

Buffer: A = 20 mM Tris, pH 8.5
B = A + 0.4 M KCl
0-100% B as shown

Proteins on a Quaternary Ion Exchange Membrane Unit (Cat. No. Q15F) at a Flow Rate of 50 mL/min.

Description	Cat. No.	Qty
matrix S-type exchanger, surface area 15 cm ²	S15F	2 units
matrix Q-type exchanger, surface area 15 cm ²	Q15F	2 units
matrix Q-type exchanger, surface area 100 cm ²	Q100F	1 unit
matrix DEAE-type exchanger, surface area 100 cm ²	D100F	1 unit
matrix CM-type exchanger, surface area 5 cm ²	CSF	15 units

Related Information

For additional information, request free literature by phone, fax, or visit sigma-aldrich.com/literature.

No.	Title
T111871	Porozorb™ cartridges (purifying biological preparations)
T494015	Rezorian™ cartridges
T394001	Rezorian™ cartridges (concentrating ethidium bromide)
T394022	Rezorian™ cartridges (concentrating ethidium bromide)

Pre-Packed Columns & Accessories

Flash Chromatography

Flash Chromatography

Flash chromatography is useful for rapid, preparative separations with moderate resolution. As first described in *J. Org. Chem.* **43**, 2923 (1978), it is commonly performed with silica gel, although the use of reverse phase packing has become more common in recent years.

VersaPak® Spherical Silica Cartridges for Isco Companion Automated Flash System

VersaPak I-style Cartridges for Isco Companion Flash Systems

The VersaPak I-style cartridges are directly compatible with Isco flash systems, which means they can be used directly in the system without the use of adapters. The cartridge inlet has a female luer lock fitting so it attaches securely to the Isco system. The outlet of the cartridge has a male slip luer fitting so it attaches in the same way as the Isco RediSep cartridges.



Particle Size (µm)	I.D. × L (mm)	Bed Wt. (g)	Cat. No.	Qty
VersaPak® Silica Cartridge				
20 - 45	23 × 53	11	97787-U	20 ea
	23 × 110	22	97788-U	20 ea
	40 × 75	50	97789-U	12 ea
	40 × 150	100	97790-U	6 ea

VersaPak® Spherical Silica Cartridges for Biotage FlashMaster System

Pre-packed SPE tube style flash cartridges compatible with the Biotage FlashMaster system are also available with high efficiency spherical silica.

Particle Size (µm)	Tube Volume (mL)	Bed Wt. (g)	Cat. No.	Qty
VersaPak® Silica Cartridge				
20 - 45	60	10	97785-U	10 ea
	60	20	97783-U	10 ea
	150	50	97786-U	10 ea
	150	70	97784-U	10 ea

SupelFlash Irregular Silica Cartridges for Isco & Analogix Automated Flash Systems

NEW PRODUCTS

Supel Flash cartridges utilize proprietary column packing technology and are packed with high purity silica gel. The column packing process results in a high density, uniform bed insuring the elimination of channeling and an overall efficiency improvement. The Supel Flash cartridge has a female luer lock inlet fitting and a male slip luer outlet fitting making it compatible with Isco and Analogix flash systems.

Features include:

- High efficiency leading to sharper more symmetric peaks
- No fronting, doubling of peaks
- High yield and sample loading capacity
- No compound decomposition
- Reliable, consistent purification performance
- Single-piece cartridge design with Luer-Lok fittings

Supel Flash columns are designed for use in:

- ISCO's CombiFlash, Companion, Retrieve and OptiX systems
- Analogix's SimpliFlash and IntelliFlash

Higher efficiency than standard flash cartridges. The combination of high quality silica gel and stringent packing methodologies result in cartridges with better separation capabilities than competitive flash cartridges.



Particle Size (µm)	I.D. × L (mm)	Bed Wt. (g)	Cat. No.	Qty
Supel™ Flash Cartridge				
40 - 63	16 × 100	4	FCIS1004	20 ea
	23 × 120	12	FCIS1012	20 ea
	25 × 140	25	FCIS1025	15 ea
	30 × 230	40	FCIS1040	15 ea
	37 × 230	80	FCIS1080	12 ea
	40 × 260	120	FCIS1120	10 ea
	65 × 200	240	FCIS1240	4 ea
	65 × 265	330	FCIS1330	4 ea

Pre-Packed Columns & Accessories

Flash Chromatography: *VersaPak® Spherical Silica Cartridges for VersaFlash® System*

VersaPak® Spherical Silica Cartridges for VersaFlash® System

VersaPak® Cartridges

The robust VersaPak® cartridge design eliminates the need for a compression barrel, making cartridge change-out fast and easy. A key feature of the VersaPak cartridge is the symmetric end-fitting design, which allows for fast and easy cartridge change-out, cartridge stacking, and easy sample loading. The VersaPak cartridges utilize spherical silica or C18 bonded silica for improved packing efficiency and higher sample loading capacities. There is no need for a compression apparatus or external compressed gas supply since the cartridges are pre-compressed and securely sealed by the end-fittings. VersaPak cartridges are available in 23, 40, 80 and 110 mm diameter cartridges with lengths of 53 mm, 75 mm, 110mm, 150 mm and 300 mm, leading to sample purification capabilities from less than 1 g to over 130 g.



Particle Size (µm)	I.D. × L (mm)	Bed Wt. (g)	Cat. No.	Qty
VersaPak® Silica Cartridge				
40 - 75	40 × 75	51	97704-U	12 ea
	40 × 150	102	97706-U	6 ea
	40 × 150	102	97707-U	48 ea
	80 × 150	410	97708-U	2 ea
	80 × 150	410	97709-U	12 ea
	80 × 300	820	97711-U	6 ea
20 - 45	23 × 53	11	97757-U	20 ea
	23 × 110	23	97758-U	20 ea
	40 × 150	96	97782-U	6 ea
	80 × 150	385	97763-U	2 ea
	80 × 300	775	97764-U	1 ea
	VersaPak® C18 Cartridge			
40 - 75	80 × 150	515	97702-U	1 ea
	40 × 75	70	97700-U	2 ea
	40 × 150	140	97701-U	1 ea
20 - 45	23 × 110	30	97760-U	2 ea
	23 × 53	15	97759-U	2 ea

VersaPak® Cartridge Adapters

VersaPak® 23mm Cartridge Adapters

Adapters allow the use of the 23 mm VersaPak cartridges in the VersaFlash Station. Adapters are placed on the outlet of the cartridge and help align the cartridge in the VersaFlash Station.

97762-U	2 ea
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VersaFlash® Station



VersaFlash® HTFP Station

The VersaFlash® station secures the VersaPak® cartridges for processing. The unique pre-compressed cartridge design eliminates the need for compression barrels making cartridge change-out fast and easy. Installing, removing, and changing out VersaPak cartridges in the station is fast and easy by simply turning and pulling out the handle. Scale-up to larger cartridges is just as easy by simply loosening the knob on the upper platen and adjusting it to the proper height for the larger or smaller cartridge. Most flash chromatography systems typically limit users to a narrow sample range, requiring additional hardware purchase and laborious change-out in order to work with larger sample sizes.

▶ standard length

for use with cartridges having overall (stacked) length up to 325mm

97732-U	1 ea
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▶ VersaFlash® Station with Extended Rods extended length

for use with cartridges having an overall (stacked) length less than 425mm

97719-U	1 ea
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VersaFlash® Pump

Flash-300 Pump

▶ 120 V / 220 V

flow range 0-250 mL/min

97778-U	1 ea
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Flash Pump Accessories

Description	Cat. No.	Qty
VersaFlash® ¼ in. Corrugated Tubing Kit	97768-U	1 kit
¼ in. Corrugated FEP Tubing, 5 ft	97769-U	1 ea
PP Union ¼ in. to ⅜ in.	97770-U	1 ea
PTFE Compression Nuts, ¼ in., PTFE	97771-U	2 ea

HTFP Pressure Gauge

97726-U	1 ea
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Pre-Packed Columns & Accessories

Flash Chromatography: *VersaFlash® Pump*

VersaFlash® Accessories

Description	Cat. No.	Qty
PEEK Seal Assembly	97748-U	2 ea
Threaded Male Luer 1/4"-28	97744-U	6 ea

VersaFlash® Sample Loading

Sample loading can be quite challenging at times due to the wide range of sample types that can be encountered in flash chromatography. There are multiple ways that a sample can be loaded onto the VersaPak cartridge for separation in the VersaFlash station including:

- Direct injection into the sample injector assembly mounted on top of the VersaFlash station (on-line)
- Direct syringe injection onto the cartridge (off-line)
- Vacuum aspiration onto the cartridge using the VersaVac manifold (off-line)
- Using a valve and loop injector for repetitive volume sample loading (on-line)
- Through the pump loading for dilute samples (on-line - prefiltration is highly recommended)

For detailed instructions on each of these methods please see the VersaFlash HTFP Station Manual, T703012.

VersaVac® Sample Loading Station

The VersaVac® sample loading station is a vacuum manifold designed to aid in the loading of samples onto the VersaPak cartridges. From one to six (40mm) cartridges can be loaded on the VersaVac at one time. standard, 6-port model



97750-U

1 ea

HPFP Sample Injector Assembly

The sample injector assembly is a 3 way valve that allows the simple loading of samples directly onto VersaPak cartridges using a syringe.



97725-U

1 ea

VersaFlash® Solid Sample Cartridge Replacement Parts

Description	Cat. No.	Qty
Frit		
40 mm	97766-U	6 ea
80 mm	97767-U	6 ea

VersaFlash® Cartridge Stacking

VersaFlash® Stacking Assemblies

The cartridge stacking assemblies allow you to connect two cartridges in series to expand the sorbent capacity and/or to mix different cartridge phase chemistries to conduct bimodal separations. The assemblies consist of a stacking connector to connect the fluid flow paths of the two cartridges as well as a sleeve to hold the two cartridges in alignment during operation. The stacking assemblies are available in three sizes: 40 × 40mm, 40 × 80mm or 80 × 80mm.



Description	Cat. No.	Qty
VersaFlash® Cartridge Stacking Assembly, 40/40 mm cartridges	97740-U	1 ea
VersaFlash® Cartridge Stacking Assembly, 40/80 mm cartridges	97741-U	1 ea
VersaFlash® Cartridge Stacking Assembly, 80/80 mm cartridges	97742-U	1 ea
VersaFlash® Cartridge Stacking Assembly, 80/110 mm	97756-U	1 ea
Replacement O-Rings for Cartridge Stacking Connector	97745-U	6 ea

VersaFlash® Accessories

VersaFlash® Solvent Flush Connector

The solvent flush connector is used to flush solvents out of the VersaFlash station or when changing from one solvent to another without a VersaPak cartridge in the VersaFlash station.



97743-U

1 ea

Bulk Flash Resins & Media

Sigma-Aldrich offers a wide variety of bulk resins & media for column and flash chromatography including spherical and irregular silica gels in both bare and bonded/modified phases. For a complete selection of our resins and media please see the Resins & Media section.



TLC & ACCESSORIES

Thin Layer Chromatography	2	Bulk TLC Adsorbents	13
HPTLC Plates	2	Bulk Silica for TLC with Fluorescence	13
Standard Analytical TLC Plates	4	Bulk Silica for TLC without Fluorescence	13
TLC Plates - Glass Support	4	Bulk Cellulose for TLC	13
TLC Plates - Aluminum Foil Support	7	Bulk Polyamide for TLC	13
TLC Plates - Polyester (PET) Support	8	Bulk FLORISIL for TLC	13
Prep TLC Plates	8	Sequential Spraying Makes Drug and Lipid Detection Simpler	14
TLC Accessories	9	TLC Sprayers	14
TLC Dessicating Cabinets	9	TLC Reagents	16
TLC Developing Tanks & Chambers	9		
Spectroline UV Viewing Cabinets	10		
UV Lamps & Accessories	10		
TLC Plate Racks	11		
Adsorbent Scrapers	12		
Cutting Tools	12		
Syringes & Pipettes	12		
Other TLC Accessories	12		

Thin Layer Chromatography

Thin Layer Chromatography

Ensure Selection, Quality and Performance

Brands

We offer our own high quality brand of TLC plates as well as brand name TLC plates from Merck* and Analtech to meet our customers' needs for brand name, quality and price.

Plate Types

We have a range of high performance TLC (HPTLC) plates as well as an extensive offering of standard analytical and preparative TLC plates.

Supports

Three different types of supports (or backings) are available to meet your individual application requirements.

- Glass
- Aluminum Foil
- Plastic (Polyester – PET)

Adsorbent Layers/Matrices

Our glass, aluminum foil and PET (polyester) TLC plates are available coated with a variety of matrices and are available with and without fluorescent indicator.

Available matrices include:

- Silica gel (unmodified, modified/bonded, chiral and high purity) – most common TLC sorbent. Eluents used are similar to those used for normal phase HPLC. Does not have the catalytic properties of alumina.
- Aluminum oxide – exhibits selectivity similar to, although slightly different than, silica. Second most common TLC sorbent.
- Cellulose – available as either microcrystalline or fibrous cellulose. Spots are generally more compact when separated on layers of microcrystalline cellulose than when separated on layers of fibrous cellulose.
- Polyamide – exhibits low diffusivity, allowing for tightly confined sample spots with maximum intensity. Corrosive visualization reagents are not recommended.

Binders

Plates are available with polymeric (organic) and inorganic binders as well as without binders. Binders do not generally impact the adsorptive properties of the matrix, instead they impact the adherence of the adsorbent layer to the backing.

Available binders:

- Polymeric (organic) binders - Plates with adsorbent layers containing polymeric binders are generally most rugged, making sample handling and application easier. They also permit the use of higher water content in the developing solvent. They are generally recommended for all TLC applications except for those that use charring for visualization.
- Inorganic binder - Plates with adsorbent layers containing inorganic binders are not as rugged as those with organic binders but are generally more rugged than plates without a binder or with a gypsum binder. They are the most water resistant and are often used for preparative TLC plates because they are soft, allowing for spots containing the target molecule to be easily scraped off the support for elution and recovery. Plates with inorganic binder are recommended for applications requiring charring for visualization, or when developing or visualization reagents interact with an organic binder.
- Gypsum or no binder - Plates with adsorbent layers that do not contain a binder or that use a gypsum binder are generally least rugged and fracture easily. They are not recommended for use with developing solvents containing more than 20% water. Like plates with inorganic layers, they allow spots containing target molecules to be easily scraped off the support for elution and recovery and are recommended for applications requiring charring for visualization.

Plate Dimensions

Choose from a comprehensive variety of plate dimensions:

- Larger plates (such as 20 cm x 20 cm plates) are often less costly as they can be cut into smaller sizes as needed.
- Pre-scoring (available on some of our glass plates) makes cutting glass plates easier and safer as they can be easily snapped into smaller dimensions.
- Aluminum and plastic (PET)-backed plates are easy to cut to desired dimensions with a pair of scissors.
- Smaller, pre-cut plates are also available and offer the advantages of convenience and ease of use that may make them the more practical choice in labs where productivity rather than per plate cost is the major driver.

HPTLC Plates

Achieve Faster Separations and Increased Sensitivity

Much like HPLC grew out of improvements in column chromatography, HPTLC grew out of improvements in the quality of sorbents, consistency of plate manufacture, techniques and equipment for sample and detection reagent application, and a generally greater understanding of chromatographic theory. HPTLC (high performance TLC) plates are characterized by smaller particles ($\leq 10 \mu\text{m}$), thinner layers ($\leq 150 \mu\text{m}$) and smaller plates ($\leq 10 \text{cm}$ developing distance). In addition, the particle size distribution of the sorbent is typically narrower than for standard TLC layers. The thinner layers allow for faster solvent migration. Sample volumes for HPTLC are generally less than one microliter. The smooth surface of HPTLC plates reduces noise when performing densitometric quantitation, increasing sensitivity.

HPTLC plates offer users the following advantages over conventional TLC:

- Better resolving power per unit distance
- Faster development times
- Lower sample diffusion
- Reduced solvent consumption

Like our standard analytical TLC plates, our HPTLC plates are available coated with a variety of matrices, with and without indicators.

HPTLC Plates

Silica Gel Matrix on Glass for HPTLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 10 × 10 cm (scored)					
Yes	150	Inorganic	Analtech	Z265330-1PAK	25 ea
L × W 10 × 10 cm					
No	150	Organic	Analtech	Z265292-1PAK	25 ea
No	150	Inorganic	Analtech	Z265314-1PAK	25 ea
Yes	150	Organic	Analtech	Z265306-1PAK	25 ea
Yes	150	Inorganic	Analtech	Z265322-1PAK	25 ea

C18-Silica Gel Matrix on Glass for HPTLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 10 × 10 cm					
No	150	Organic	Analtech	Z265365-1PAK	25 ea
Yes	150	Organic	Analtech	Z265373-1PAK	25 ea
L × W 10 × 10 cm (50% silanized)					
Yes	200	Organic	Analtech	Z265411-1PAK	25 ea
L × W 10 × 10 cm (high % carbon)					
No	150	Organic	Sigma-Aldrich	Z122750	25 ea

C8-Silica Gel Matrix on Glass for HPTLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 10 × 10 cm					
Yes	150	Organic	Analtech	Z265403-1PAK	25 ea

Amino-Silica Gel Matrix on Glass for HPTLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 10 × 10 cm					
Yes	150	Organic	Analtech	Z265349-1PAK	25 ea

Cyano-Silica Gel Matrix on Glass for HPTLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 10 × 10 cm					
Yes	150	None	Analtech	Z265357-1PAK	25 ea

Fibrous Cellulose Matrix on Glass for HPTLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 10 × 20 cm					
No	100	Proprietary	Sigma-Aldrich	95412-50EA	50 ea
L × W 20 × 20 cm					
Yes	100	Proprietary	Sigma-Aldrich	73128-25EA	25 ea

Nano Silica Gel Matrix on Aluminum Foil for HPTLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 20 × 20 cm					
Yes	150	Organic	Sigma-Aldrich	60761-25EA	25 ea

HPTLC Plates

Fibrous Cellulose Matrix on Aluminum Foil for HPTLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 10 × 20 cm					
Yes	100	Proprietary	-	22185-20EA-F	20 ea
L × W 20 × 20 cm					
No	100	Proprietary	Sigma-Aldrich	95413-25EA	25 ea

Cellulose Matrix on Polyester (PET) for HPTLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 20 × 20 cm					
No	100	None	Sigma-Aldrich	Z122866-25EA	25 ea
L × W 20 × 20 cm (PEI cellulose)					
Yes	100	Polymeric	Sigma-Aldrich	Z122882-25EA	25 ea
L × W 20 × 20 cm (microcrystalline cellulose)					
Yes	100	Proprietary	Sigma-Aldrich	95725-25EA	25 ea

Polyamide 6 Matrix on Polyester (PET) for HPTLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 20 × 20 cm					
No	100	Proprietary	-	17288-25EA	25 ea
Yes	100	Proprietary	Sigma-Aldrich	17289-25EA	25 ea

Standard Analytical TLC Plates

Develop the Method and Verify Results

Thin Layer Chromatography can be used for both qualitative and quantitative analysis. Standard analytical TLC plates typically have adsorbent layers that are nominally between 200 and 250 microns in thickness. Our standard TLC plates are available coated with a variety of matrices, with and without indicators.

TLC Plates - Glass Support

Glass is the most common plate backing because it is rigid, transparent and chemically resistant to all mobile phases and visualization methods, most notably to charring with corrosive agents. Glass plates are also reusable; an important consideration for analysts who make their own plates. For *in situ* densitometric quantification, the use of highly uniform pre-coated layers on glass is virtually mandatory for adequate reproducibility and accuracy. Scored glass plates are also available that can be easily snapped into smaller, more convenient sizes to accommodate fewer samples or smaller developing tanks.

High Purity Silica Gel Matrix on Glass

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 5 × 10 cm					
No	250	Gypsum/polymeric	Sigma-Aldrich	60762-50EA	50 ea
Yes	250	Gypsum/polymeric	-	60763-50EA	50 ea
L × W 20 × 20 cm (w/ concentration zone)					
Yes	250	Gypsum/polymeric	Sigma-Aldrich	60768-25EA	25 ea
L × W 20 × 20 cm (recommended for aflatoxin separation)					
Yes	250	Gypsum/polymeric	Sigma-Aldrich	08572-25EA-F	25 ea

Silica Gel Matrix on Glass w/o Fluorescent Indicator

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 5 × 20 cm					
No	250	Polymeric	Sigma-Aldrich	Z122688-100EA	100 ea
No	250	Inorganic	Analtech	Z265608-1PAK	25 ea
No	250	Organic	Analtech	Z265535-1PAK	25 ea
L × W 10 × 10 cm					
No	200	Organic	Sigma-Aldrich	09918-25EA	25 ea

Standard Analytical TLC Plates

TLC Plates - Glass Support

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 10 × 20 cm					
No	250	Polymeric	Sigma-Aldrich	Z185310-50EA	50 ea
No	250	Organic	Merck	Z292966-1PAK	50 ea
No	250	Inorganic	Analtech	Z265586-1PAK	25 ea
No	250	Organic	Analtech	Z265519-1PAK	25 ea
L × W 10 × 20 cm (impregnated with caffeine for PAH analytics (DIN 38407, part 7))					
No	200	Proprietary	Sigma-Aldrich	60796-50EA	50 ea
L × W 20 × 20 cm					
No	250	Polymeric	Sigma-Aldrich	99570-25EA 99570-1EA	25 ea 25 ea
No	250	Organic	Merck	Z292974-1PAK	25 ea
No	250	Inorganic	Analtech	Z265551-1PAK	25 ea
No	250	Organic	Analtech	Z265497-1PAK	25 ea

Silica Gel Matrix on Glass with Fluorescent Indicator

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 2.5 × 7.5 cm					
Yes	250	Organic	Merck	Z292982-1PAK	100 ea
L × W 5 × 10 cm					
Yes	250	Organic	Merck	Z292990-1PAK	200 ea
L × W 5 × 20 cm					
Yes	250	Inorganic	Analtech	Z265616-1PAK	25 ea
Yes	250	Organic	Merck	Z293008-1PAK	100 ea
Yes	250	Polymeric	Sigma-Aldrich	99569-100EA	100 ea
Yes	250	Polymeric	Sigma-Aldrich	Z122696-100EA	100 ea
Yes	250	Organic	Analtech	Z265543-1PAK	25 ea
L × W 10 × 10 cm					
Yes	250	Polymeric	Sigma-Aldrich	99573-1EA 99573-25EA	25 ea 25 ea
Yes	200	Organic	Sigma-Aldrich	09916-1SET 09916-25EA	1 ea 25 ea
L × W 10 × 20 cm (scored)					
Yes	250	Inorganic	Analtech	Z274283-1PAK	25 ea
L × W 10 × 20 cm					
Yes	250	Organic	Analtech	Z265527-1PAK	25 ea
Yes	200	Organic	Sigma-Aldrich	09922-50EA	50 ea
Yes	250	Polymeric	Sigma-Aldrich	99876-50EA 99876-1EA	50 ea 50 ea
Yes	250	Organic	Merck	Z293016-1PAK	50 ea
L × W 10 × 20 cm (w/ concentration zone)					
Yes	250	Proprietary	Sigma-Aldrich	60767-50EA	50 ea
L × W 20 × 20 cm					
Yes	250	Inorganic	Analtech	Z265578-1PAK	25 ea
Yes	250	Organic	Analtech	Z265500-1PAK	25 ea
Yes	250	Organic	Merck	Z293024-1PAK	25 ea
Yes	250	Polymeric	Sigma-Aldrich	99571-25EA	25 ea
Yes	250	Polymeric	Sigma-Aldrich	Z122726-25EA	25 ea

C18-Silica Gel Matrix on Glass w/o Fluorescent Indicator

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 5 × 20 cm					
No	250	Inorganic	Analtech	Z265470-1PAK	25 ea
L × W 10 × 20 cm					
No	250	Inorganic	Analtech	Z265454-1PAK	25 ea
L × W 20 × 20 cm (scored)					
No	250	Inorganic	Analtech	Z500666-1PAK	25 ea
L × W 20 × 20 cm					
No	250	Inorganic	Analtech	Z265438-1PAK	25 ea

Standard Analytical TLC Plates

TLC Plates - Glass Support

C18-Silica Gel Matrix on Glass with Fluorescent Indicator

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L x W 5 x 20 cm					
Yes	250	None	Analtech	Z265489-1PAK	25 ea
L x W 10 x 10 cm					
Yes	250	Organic	Sigma-Aldrich	99575-25EA	25 ea
L x W 10 x 20 cm (scored)					
Yes	250	None	Analtech	Z500992-1PAK	25 ea
L x W 10 x 20 cm					
Yes	250	None	Analtech	Z265462-1PAK	25 ea
L x W 10 x 20 cm (w/ low %C)					
Yes	250	Polymeric	Sigma-Aldrich	Z292923-1PAK	50 ea
L x W 20 x 20 cm (scored)					
Yes	250	None	Analtech	Z500887-1PAK	25 ea
L x W 20 x 20 cm					
Yes	250	None	Analtech	Z265446-1PAK	25 ea
Yes	250	Organic	Merck	Z293032-1PAK	25 ea

Chiral Silica Gel Matrix on Glass

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L x W 5 x 20 cm					
Yes	250	Organic	-	99697-50EA	50 ea
L x W 10 x 20 cm					
No	250	Polymeric	Sigma-Aldrich	Z148687-4EA Z148687-25EA	4 ea 25 ea
L x W 20 x 20 cm					
No	250	Polymeric	Sigma-Aldrich	Z148717-25EA	25 ea

Fibrous Cellulose Matrix on Glass

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L x W 10 x 20 cm					
No	250	Proprietary	Sigma-Aldrich	Z122815-50EA	50 ea
Yes	250	Proprietary	-	Z122823-50EA	50 ea
L x W 20 x 20 cm					
No	250	Proprietary	Sigma-Aldrich	Z122831-25EA	25 ea
Yes	250	Proprietary	Sigma-Aldrich	Z122858-25EA	25 ea

Microcrystalline Cellulose Matrix on Glass

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L x W 5 x 20 cm					
Yes	250	None	Analtech	Z265799-1PAK	25 ea
L x W 20 x 20 cm (scored)					
Yes	250	None	Analtech	Z513083-1PAK	25 ea
L x W 20 x 20 cm					
No	250	None	Analtech	Z265764-1PAK	25 ea
Yes	250	None	Analtech	Z265772-1PAK	25 ea

Aluminum Oxide Matrix on Glass

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L x W 5 x 20 cm					
No	250	Inorganic	Analtech	Z265659-1PAK	25 ea
Yes	250	Inorganic	Analtech	Z265667-1PAK	25 ea
L x W 10 x 20 cm (scored)					
Yes	250	Inorganic	Analtech	Z500550-1PAK	25 ea

Standard Analytical TLC Plates

TLC Plates - Glass Support

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 20 × 20 cm					
No	250	Inorganic	Analtech	Z265632-1PAK	25 ea
Yes	250	Inorganic	Analtech	Z265640-1PAK	25 ea
No	250	Organic	Sigma-Aldrich	02665-25EA	25 ea
Yes	250	Organic	Sigma-Aldrich	90066-25EA	25 ea

TLC Plates - Aluminum Foil Support

Plates that employ aluminum foil backing are easy to handle, lightweight and flexible. They can be easily cut to desired dimensions with scissors or stored in laboratory notebooks. They have high solvent resistance and good heat stability. A strong adsorbent layer adherence also makes them a good choice for use with eluents containing high concentrations of water. However, unlike glass backing, aluminum foil backing is not reusable and aluminum backed plates are not as chemically resistant as glass to reagents such as mineral acids and concentrated ammonia.

High Performance Silica on Aluminum Foil

- Outstanding wettability (even for 100 % aqueous visualisation reagents)
- Easy and precise cutting (no flaking of silica)
- Excellent separation efficiency and reproducibility from batch to batch

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 4 × 8 cm					
Yes	200	Polymeric	Sigma-Aldrich	49859-50EA	50 ea
L × W 5 × 7.5 cm					
Yes	200	Polymeric	Sigma-Aldrich	52038-20EA	20 ea
No	200	Polymeric	Sigma-Aldrich	55811-20EA	20 ea
L × W 5 × 10 cm					
Yes	200	Polymeric	Sigma-Aldrich	23478-50EA	50 ea
No	200	Polymeric	Sigma-Aldrich	75196-50EA	50 ea
L × W 5 × 20 cm					
Yes	200	Polymeric	Sigma-Aldrich	12606-50EA	50 ea
No	200	Polymeric	Sigma-Aldrich	92572-50EA	50 ea
L × W 20 × 20 cm					
Yes	200	Polymeric	Sigma-Aldrich	56524-25EA	25 ea
No	200	Polymeric	Sigma-Aldrich	53356-25EA	25 ea

Silica Gel Matrix on Aluminum Foil

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 4 × 8 cm					
Yes	200	Polymeric	Sigma-Aldrich	70643-50EA	50 ea
L × W 5 × 10 cm					
Yes	200	Polymeric	Sigma-Aldrich	Z193275-1PAK	50 ea
No	200	Polymeric	Sigma-Aldrich	70644-50EA	50 ea
Yes	200	Polymeric	Sigma-Aldrich	91835-50EA	50 ea
L × W 10 × 20 cm					
Yes	200	Polymeric	Sigma-Aldrich	60800-20EA	20 ea
No	200	Polymeric	Sigma-Aldrich	02599-20EA	20 ea
L × W 20 × 20 cm					
Yes	200	Polymeric	Sigma-Aldrich	60778-25EA	25 ea
No	200	Polymeric	Sigma-Aldrich	60805-25EA	25 ea
Yes	200	Polymeric	Sigma-Aldrich	Z193291-1PAK	25 ea

Aluminum Oxide on Aluminum Foil

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L × W 20 × 20 cm					
Yes	200	Organic	Sigma-Aldrich	06408-25EA	25 ea

Standard Analytical TLC Plates

TLC Plates - Polyester (PET) Support

TLC Plates - Polyester (PET) Support

Plates that utilize PET (polyethylene terephthalate) are easy to handle, lightweight and flexible. Developed PET-plates can be stored in laboratory notebooks for documentation or cut into strips; options that are not possible with glass plates. However, their flexibility can cause the sorbent layer to break and care must be taken not to allow them to curl during drying and activation processes. However, unlike glass backing, PET backing is not reusable and because PET backed plates have lower heat stability, charring must be done at lower temperatures.

High Purity Silica Gel Matrix on Polyester (PET)

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L x W 20 x 20 cm					
Yes	250	Gypsum/polymeric	Sigma-Aldrich	Z122807-25EA	25 ea

Silica Gel Matrix on Polyester (PET)

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L x W 4 x 8 cm					
Yes	250	Proprietary	-	89070-50EA	50 ea
L x W 20 x 20 cm					
Yes	200	Proprietary	Sigma-Aldrich	99577-25EA	25 ea
No	250	Polymeric	Sigma-Aldrich	Z122777-25EA	25 ea
Yes	200	Polymeric	Sigma-Aldrich	Z122785-25EA	25 ea

Aluminum Oxide Matrix on Polyester (PET)

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L x W 4 x 8 cm					
Yes	200	Organic	-	89071-50EA	50 ea
L x W 20 x 20 cm					
No	200	Organic	Sigma-Aldrich	Z234206-1PAK	25 ea
Yes	200	Organic	Sigma-Aldrich	Z234214-1PAK	25 ea

Prep TLC Plates

Isolate and Recover Your Compound

Preparative TLC is used to purify and isolate a particular substance by separating it from contaminants. Preparative TLC plates have adsorbent layers that are greater than 500 microns in thickness allowing them to be used for the separation of larger quantities of material. When a binder is required, the softer inorganic binders are often used so the sample bands can be more easily removed. Our glass plates for Preparative TLC are available coated with both unmodified and bonded silica matrices and are available with and without fluorescent indicator.

Silica Gel Matrix on Glass for Prep TLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L x W 20 x 20 cm					
No	500	Inorganic	Analtech	Z512990-1PAK	25 ea
Yes	500	Inorganic	Analtech	Z513032-1PAK	25 ea
No	1,000	Inorganic	Analtech	Z265810-1PAK	25 ea
Yes	1,000	Inorganic	Analtech	Z265829-1PAK	25 ea
No	1,500	Inorganic	Analtech	Z513016-1PAK	25 ea
Yes	1,500	Inorganic	Analtech	Z513040-1PAK	25 ea
No	2000	Inorganic	Analtech	Z513024-1PAK	25 ea
Yes	2,000	Inorganic	Analtech	Z513059-1PAK	25 ea

C18-Silica Gel Matrix on Glass for Prep TLC

Fluorescent Indicator	Layer Thickness (µm)	Binder	Brand	Cat. No.	Qty
L x W 20 x 20 cm					
Yes	1,000	Inorganic	Analtech	Z272426-1PAK	25 ea

TLC Accessories

TLC Desiccating Cabinets

TLC Accessories

TLC Desiccating Cabinets

TLC desiccating cabinet

- provides complete visibility of stored TLC plates under desiccating conditions

Acrylic cabinet provides complete visibility of stored TLC plates under desiccating conditions. Stores up to 24 (20 × 20 cm) plates. Plates should be oven dried before storage for optimal results.



Z266086-1EA

1 ea

TLC Developing Tanks & Chambers

Aldrich® rectangular TLC developing tanks, complete



Tank L × H × W (cm)	Cat. No.	Qty
7.5 × 15.5 × 8.0	Z204226-1EA	1 ea
12.1 × 10.8 × 8.3	Z146226-1EA	1 ea
17.5 × 6.2 × 6.8	Z204196-1EA	1 ea
17.5 × 11.0 × 6.2	Z204188-1EA	1 ea
17.5 × 16.0 × 6.2	Z204161-1EA	1 ea
17.5 × 16.0 × 8.2	Z204153-1EA	1 ea
27.0 × 26.5 × 7.0	Z126195-1EA	1 ea

Latch-lid™ TLC developing chambers

Latch-Lid™ units have a unique stainless steel latching device that holds the lid and tank firmly in place. This permits complete saturation of the chamber with solvent vapor for uniform development of chromatograms. Glass tank features flat ground tops, inner and outer rims beveled for safety, and flat ground bottoms for stability. Accessorize with multi-plate TLC racks for simultaneous development of up to six TLC plates.

Racks not included.



Description	Cat. No.	Qty
For use with 10 cm × 10 cm plates	Z266019-1EA	1 ea
For use with 20 cm × 20 cm plates	Z266000-1EA	1 ea

Aldrich® TLC developing tank - cylindrical

Can be used as a staining chamber. Made of glass with lid. Compact size offers good plate visibility and minimal solvent use.



Description	Cat. No.	Qty
glass tank, O.D. 6.5 cm × H 10.5 cm	Z243906-1EA	1 ea
	Z243906-6X1EA	6 × 1 ea
glass tank, O.D. 6.5 cm × H 21.0 cm	Z243914-1EA	1 ea
	Z243914-3EA	3 ea
tank lid	Z407259-1EA	1 ea

Pyrex® rectangular chromatography jar

Corning® 6944

Ground to the close tolerances needed for tight cover fit. Jar edges are ground flat within 0.25mm. Covers are not supplied. Do not use heat, pressure or vacuum applications.



Description	Cat. No.	Qty
L 181 mm × W 238 mm × H 324 mm	CLS694411L-1EA	1 ea
L 137 mm × W 162 mm × H 267 mm	CLS69444L-6EA	6 ea

TLC Accessories

TLC Developing Tanks & Chambers

Aldrich® TLC development chamber

Novel horizontal chambers¹ permit the rapid screening of column chromatography fractions. Designed for economy and use in student laboratories. Use with 25 × 70 mm flexible plastic or glass TLC plates that may be spotted with up to 10 fractions 7 mm apart along the long edge of the plate. Uses only 2 mL solvent with elution complete in about 45 sec (using 20% EtOAc/hexanes as eluant). Greater resolution may be achieved by extending elution time. Borosilicate glass.

Performance features:

Rapid analysis; highly efficient use of TLC plate; tube wall provides a straight base for even solvent flow; very little solvent required.



Lit. cited: 1. Levine, S. G., *J. Chem. Educ.* 73, 77 (1996)

► Single slot chamber, L 95.9 mm × O.D. 25.4 mm

Z278629-1EA	1 ea
Z278629-10EA	10 ea

Spectroline UV Viewing Cabinets

Spectroline® CM UV-viewing cabinet

Portable, lightweight aluminum minicabinets with 4 and 6 W removable lamps that may be used for hand-held applications. Lamps provide long- and shortwave irradiation for viewing TLC plates, and for UV fluorescence or absorption demonstrations. Cabinets have a flexible, contoured viewer for built-in UV-absorbing window, easy-access felt curtains, and removable bottoms for placement over transilluminators for greater intensity and contrast. CE compliant, UL listed, and meets OSHA requirements.

CM-24: cabinet with removable, combination UV light source (365nm/254nm); 4-watt tubes

CM-26: cabinet with removable, combination UV light source (365nm/254nm); 6-watt tubes

W × L × H 9 in. × 12 in. × 6½ in.
CSA approved Yes

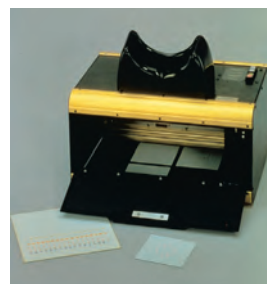


Description	Cat. No.	Qty
Cabinet CM-24, 115 V, 60 Hz	Z169382-1EA	1 ea
Cabinet CM-24, 230 V50 Hz, European 2-pin plug	Z169390-1EA	1 ea
Cabinet CM-26, 115 V, 60 Hz	Z169439-1EA	1 ea
Cabinet CM-26, 230 V50 Hz, European 2-pin plug	Z169447-1EA	1 ea

Spectroline® CX™ UV-viewing cabinet

Vinyl-clad aluminum cabinets have separate short- and longwave UV light sources with specular reflectors for maximum intensity and fluorescent contrast. Includes three 8 W light tubes; short- and longwave, and white light for visible illumination. Cabinets have a flexible, contoured eyepiece for UV-absorbing window, color-coded power buttons, push-button wavelength selection, and removable bottom panels for use with transilluminators. UL listed and meets OSHA requirements.

W × L × H 12 in. × 16 in. × 9 in.



Cabinet CX-20

Description	Cat. No.	Qty
Cabinet CX-20, 115 V, 60 Hz	Z169498-1EA	1 ea
Cabinet CX-20, 230 V50 Hz	Z169528-1EA	1 ea

Spectroline® CX™ UV-viewing cabinet replacement parts

See Replacement parts for E-Series lamps for:

Longwave UV light tube, Z16,954-4

Shortwave UV light tube, Z16,955-2

Shortwave Filter assembly, Z16,968-4

Description	Cat. No.	Qty
8 W, white light	Z169560-1EA	1 ea
Longwave	Z169579-1EA	1 ea

UV Lamps & Accessories

Spectroline® battery-operated UV lamp

- 4 W longwave bulb
- Requires 4 AA batteries (not included)

size 6¼ in. × 2 in. × 1 in.



Description	Cat. No.	Qty
Model UV-4B	Z284661-1EA	1 ea
Replacement 4 W longwave bulb	Z284688-1EA	1 ea

TLC Accessories

UV Lamps & Accessories

Spectroline® E-Series UV lamp

May be used alone (hand-held) or in viewing cabinets. Lamps have one longwave (365 nm) and one shortwave (254 nm) tube, 230 V.



Description	Cat. No.	Qty
4 W, 115 V	Z169595-1EA	1 ea
6 W, 115 V	Z169617-1EA	1 ea
8 W, 115 V	Z169633-1EA	1 ea
4 W, 230 V	Z169609-1EA	1 ea
6 W, 230 V	Z169625-1EA	1 ea
8 W, 230 V	Z169641-1EA	1 ea

Replacement Parts for E-Series Lamps

Description	Cat. No.	Qty
Filter, long/shortwave, 6 W	Z169471-1EA	1 ea
Filter, long/shortwave, 8 W	Z169684-1EA	1 ea
longwave, 6 W	Z169455-1EA	1 ea
longwave, 8 W	Z169544-1EA	1 ea
shortwave, 4 W	Z169412-1EA	1 ea
shortwave, 6 W	Z169463-1EA	1 ea
longwave, 4 W	Z169404-1EA	1 ea
shortwave, 8 W	Z169552-1EA	1 ea

TLC Plate Racks

Aluminum multi-plate racks

For use with Latch-Lid™ developing chambers.

Description	Cat. No.	Qty
For use with 10 cm × 10 cm plates	Z266043-1EA	1 ea
For use with 20 cm × 20 cm plates	Z266035-1EA	1 ea

PTFE multi-plate racks

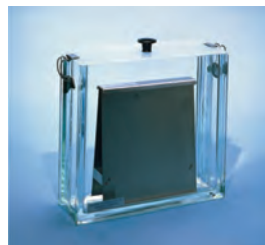
For use with Latch-Lid™ developing chamber. Can accommodate up to six TLC plates.

Description	Cat. No.	Qty
For use with 10 cm × 10 cm plates	Z266078-1EA	1 ea
For use with 20 cm × 20 cm plates	Z266051-1EA	1 ea

TLC plate rack

Holds two 20 × 20 cm, 10 × 20 cm, or 5 × 20 cm TLC plates in a standard glass developing chamber.

stainless steel rack



Z266027-1EA	1 ea
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TLC plate storage racks

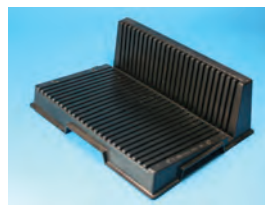
Used to carry and store TLC plates without damage to media. Racked plates may be air or oven dried. Holds up to 10 standard plates in either a vertical or horizontal position. Racks are stainless steel with a carrying handle.

stainless steel (20 gauge)

Description	Cat. No.	Qty
Rack for 10 cm × 10 cm plates	Z266108-1EA	1 ea
Rack for 20 cm × 20 cm plates	Z266094-1EA	1 ea

TLC plate holder

Horizontal and vertical grooves hold 25 TLC plates of any size in an upright position. Lightweight body resistant to usual TLC solvents and chemicals. Great for desiccator storage of plates.



Z265284-1EA	1 ea
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TLC Accessories

Adsorbent Scrapers

Adsorbent Scrapers

Adsorbent scrapers

Ideal flat 13 mm steel blade tapered to a sharp edge for rapid removal of adsorbent from TLC plates. Aluminum handle; replaceable blade.



Z265268-1EA	1 ea
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Adsorbent scraper blades

► Replacement blades

Z265276-1PAK	5 ea
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Cutting Tools

Scoring Tool

► for cutting glass plates, tungsten carbide tip

Good for cutting glass plates. Tungsten carbide tip.

Z3746	1 ea
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Diamond glass cutter

► nickel plated

Scores/breaks single or double-strength glass. Nickel-plated brass cutter with wooden handle.



Z169064-1EA	1 ea
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Syringes & Pipettes

Hamilton® TLC syringes

PTFE coats the final $\frac{3}{4}$ in. of this 2 in. (51 mm) long cemented needle. This allows for more reproducible sample spotting on TLC plates.

needle L 51 mm (2 in.)
coated tip



Description	Cat. No.	Qty
volume 10 μ L, needle size 26s ga, needle type fixed	Z264385-1EA	1 ea
volume 25 μ L, needle size 22s ga, needle type fixed	Z264393-1EA	1 ea
volume 50 μ L, size, needle size 22 ga, needle type fixed	Z264407-1EA	1 ea
volume 100 μ L, needle size 22 ga, needle type fixed	Z264415-1EA	1 ea

Kimble® microcapillary pipettes

Disposable pipettes are calibrated —to contain. Pipettes are 5 in. long and made of soda lime glass. The different sizes are color-coded. Each cylinder pack comes with one pipette device. Capillary action draws the fluid into the tube. To dispense, simply cover the hole on the rubber bulb and squeeze.



Description	Cat. No.	Qty
capacity 5 μ L \pm 1.0%	Z543241-1PAK	250 ea
capacity 10 μ L \pm 0.5%	Z543268-1PAK	250 ea
capacity 20 μ L \pm 0.5%	Z543276-1PAK	250 ea
capacity 25 μ L \pm 0.5%	Z543284-1PAK	250 ea
capacity 50 μ L \pm 0.5%	Z543292-1PAK	250 ea
capacity 100 μ L \pm 0.5%	Z543306-1PAK	250 ea

Other TLC Accessories

TLC saturation pads

Placement of pads with solvent in the development chamber helps to assure rapid and uniform saturation of the atmosphere with solvent vapor. Pads improve reproducibility and reduce "edge effects".



Description	Cat. No.	Qty
10 cm \times 10 cm	Z265241-1PAK	100 ea
10 cm \times 20 cm	Z265233-1PAK	100 ea
20 cm \times 20 cm	Z265225-1PAK	100 ea

TLC Accessories

Other TLC Accessories

Bulk TLC Adsorbents

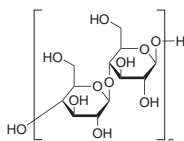
Bulk Silica for TLC with Fluorescence

Grade	Brand	Particle Size	Pore Size (Å)	Pore Volume (cm ³ /g)	Surface Area (m ² /g)	Cat. No.	Qty
for thin layer chromatography high-purity grade (Merck Grade 7749)	Merck™	particle size 5 - 40 μm	60	-	-	346446-1KG	1 kg
for thin layer chromatography high-purity grade	Sigma-Aldrich	particle size 2 - 25 μm	60	0.75	~500	288586-1KG	1 kg
for thin layer chromatography high-purity grade	Sigma-Aldrich	particle size <20 μm particle size >632 mesh	60	0.8	500	60765-250G 60765-1KG	250 g 1 kg

Bulk Silica for TLC without Fluorescence

Grade	Brand	Particle Size	Pore Size (Å)	Pore Volume (cm ³ /g)	Surface Area (m ² /g)	Cat. No.	Qty
for thin layer chromatography high-purity grade	Sigma-Aldrich	particle size 5 - 25 μm	60	0.75	~500	288519-250G	250 g
for thin layer chromatography high-purity grade	Sigma-Aldrich	particle size 2 - 25 μm	60	0.75	~500	288500-1KG	1 kg
for thin layer chromatography high-purity grade	Sigma-Aldrich	particle size 40 μm particle size >400 mesh	60	0.7-0.85	470-530	60770-1KG	1 kg
for thin layer chromatography high-purity grade	Sigma-Aldrich	particle size <20 μm particle size >632 mesh	60	0.7-0.85	500	60760-1KG	1 kg

Bulk Cellulose for TLC



High purity cellulose powders for partition chromatography.
LOD ≤5%

▶ DS-0, powder, for thin layer chromatography

microcrystalline cellulose for all types of separation chromatography and thin layer electrophoresis

ign. residue ≤0.1%

22197-250G-F 250 g

▶ DFS-0, microcrystalline, for thin layer chromatography

09906-1KG 1 kg

Bulk Polyamide for TLC

Polyamide with Fluorescence

▶ for thin layer chromatography, 6 DF, with fluorescent indicator 254 nm
bulk density 0.25 g/mL
02593-250G 250 g

Bulk FLORISIL for TLC

Florisil® TLC

Silica without Fluorescence



▶ Magnesium silicate for thin layer chromatography

46387-500G-F 500 g

Sequential Spraying Makes Drug and Lipid Detection

Sequential Spraying Makes Drug and Lipid Detection Simpler



Drugs such as amphetamines, phenothiazines, and methaqualone can be sequentially detected on a single plate. After removing the plate from the tank, it is dried (5 min, 110 °C), cooled and sprayed with fluorescamine (Cat. No.34653). After 5-10 minutes, amphetamines will exhibit bright green fluorescence under long-wave UV. The plate is subsequently warmed to 110 °C for 1-2 min causing phenothiazines to develop color and tranquilizers to exhibit fluorescence under long-wave UV. Finally, the plate is sprayed with neutral iodoplatinate (Cat. No. 34651) allowing the detection of methaqualone and hydrolyzed methaqualone.

Amphetamines and alkaloids can likewise be sequentially detected on one plate. After removing the plate from the tank, it is dried (5 min, 110 °C), cooled and examined under long-wave UV for quinine, quinine metabolites, and demerol. The plate is next sprayed with ninhydrin (Cat. No. N0757), heated at 90 °C for 10 min and sprayed heavily with diphenyl-carbazone for an intense response from amphetamines and methamphetamines. The plate is then sprayed with acidic iodoplatinate (Cat. No. I0256), which causes alkaloids to appear as spots of various colors. (To aid in identifying specific compounds, certain colors can be changed or intensified by overspraying the plate with Dragendorff's reagent (Cat. No. D7518)). Finally, the plate is sprayed with ammoniacal silver nitrate and heated (10 min, 110 °C), to allow for the detection of morphine.

Ninhydrin and Phospray, can be applied sequentially to visualize separated lipids. After the plate has been allowed to dry, it is sprayed with ninhydrin and gently warmed. Amino containing compounds (phosphatidyl ethanolamine, etc.) will appear as pink spots. (These spots can be marked to avoid confusion in the next step.) The plate is next cooled to room temperature and sprayed with Phospray to reveal phosphorus-containing compounds (phosphatidyl choline, phosphatidyl ethanolamine etc.).

Spray Reagents

Description	Cat. No.	Qty
Phospray	33047-U	200 mL
Fluorescamine	34653	100 mL
Bromothymol Blue	34656	200 mL
Dragendorff reagent, for TLC derivatization	44578-100ML-F	100 mL

Iodoplatinate spray reagent

For use in the detection of alkaloids, amines and organic nitrogen compounds.
0.15% potassium chloroplatinate and 3% potassium iodide in dilute hydrochloric acid

[I9157-100ML](#) 100 mL

Molybdenum Blue spray reagent

For use in the detection of phospholipids and related compounds.
1.3% molybdenum oxide in 4.2 M sulfuric acid
Molybdenum Blue reagent

[M1942-100ML](#) 100 mL

Ninhydrin Fixer Spray Reagent

Acidified ethanol containing 1% (v/v) saturated cupric nitrate.
Fixative for ninhydrin chromatograms.

store at: 2-8°C

[N1411-100ML](#) 100 mL

Ninhydrin Spray Reagent

Detects amino acids, amines and amino sugars.
Contains 0.2% ninhydrin in ethanol.

store at: 2-8°C

[N1286-100ML](#) 100 mL

Phosphomolybdic acid solution

Molybdophosphoric acid
[12026-57-2] MDL MFCD00011341 $H_3[P(Mo_3O_{10})_4]$ 12MoO₃ • H₃PO₄
H₃Mo₁₂O₄₀P FW 1825.25

► spray reagent, 10% in ethanol

10% Phosphomolybdic acid in ethanol

For the detection of lipids, steroids, lactones, keto acids, hydroxy acids, unsaturated fatty acids, and phenolic compounds.

store at: 2-8°C

[P4869-100ML](#) 100 mL

TLC Sprayers

Aldrich® chromatography sprayer

Provide a fine, uniform spray that is optimized for the development of TLC plates. Also suited for use in electrophoresis.

- Adjustable spray pattern using thumb on vent hole
- Greaseless, screw-threaded joint will not seize; a simple turn of the threaded cap pulls joint apart safely
- Threaded SafetyBarbs® prevent accidental breakage during tubing installation or removal
- Uses low-pressure gas or air

See the Threaded Ground Glass Tutorial to see how threaded joints work.



Description	Cat. No.	Qty
10 mL	Z529710-1EA	1 ea
50 mL	Z529729-1EA	1 ea
125 mL	Z529737-1EA	1 ea
250 mL	Z529745-1EA	1 ea

TLC Sprayers

Aldrich® flask-type sprayer

Connect using the barb end to a low-pressure gas or air source of <5 psi. By positioning your thumb over the vent hole you can control the spray pattern.



Description	Cat. No.	Qty
75 mL	Z190373-1EA	1 ea
250 mL	Z129178-1EA	1 ea
Replacement flask, 75 mL	Z190381-1EA	1 ea
Replacement flask, 250 mL	Z129186-1EA	1 ea
Replacement Head only	Z190403-1EA	1 ea

Bottle-type sprayer

▶ capacity 240 mL



Z126306-1SET	1 ea
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Nalgene® aerosol spray bottle

▶ capacity 180 mL

Reusable HDPE bottle with PP cap uses air pressure to propel contents from container. Bottle is filled and pressurized manually. Just pump the cap to charge the system. Two nozzles are included with each bottle to adjust spray from a fine mist to a heavy stream. Net fill 100 mL bottle.



Z279250-1PAK	4 ea
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Preval spray unit

Compact, well-designed spray canister delivers fine mist with CFC-free propellant. Permits control of reagent delivery, for even coverage and minimal waste. Gas canister serves as handle; cap fits standard 38-400 thread reagent bottles. Kit includes one propellant canister and one 6-ounce glass bottle.



Z365556-1KT	1 ea
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Replacement sprayer head for Bottle and Tube-type sprayers

The cap and O-ring are not supplied with the replacement head. See the Threaded Ground Glass Tutorial to see how threaded joints work.

Z407267-1EA	1 ea
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Sigma TLC spray box

Completely disposable. Contains knock out vents for better ventilation. Easy to assemble. Compatible with most Sigma sprays.

size ~14 in. x 14 in. x 14 in.



S1509-5EA	5 ea
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Tube-type sprayer

▶ capacity 50 mL

Tube has hexfoot stand and sprayer head.



Z126292-1SET	1 ea
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TLC Reagents

TLC Reagents

Spray reagents allow visualization of the colorless components on a TLC plate. These reagents are mixtures of chemicals that, when sprayed on the plate and allowed to react, will cause colorless compounds to change to colored compounds for easy detection. A spray (visualization) reagent shows selectivity for a specific functional group or compound type.

CAS No.	Compound	Cat. No.	Qty
-	Aerosol® 22	A9753-100ML A9753-500ML	100 mL 500 mL
7371-55-3	Aluminum chloride - ethanol solution, ~11% in ethanol/water, for TLC derivatization	28672-100ML-F	100 mL
83-07-8	4-Aminoantipyrine, for spectrophotometric det. of H ₂ O ₂ and phenols, ≥98.0%	06800-25G 06800-100G 06800-500G	25 g 100 g 500 g
524-95-8	2-Aminoethyl diphenylborinate, for TLC derivatization, ≥97.0%	42810-5G 42810-25G	5 g 25 g
12135-76-1	Ammonium sulfide solution, purum, ~21% in H ₂ O (RT)	09981-100ML 09981-500ML	100 mL 500 mL
50930-79-5	Aniline phthalate solution, ~0.1 M in butanol/water, for TLC derivatization	08545-100ML-F	100 mL
-	Antimony(III) chloride reagent (free of CHCl ₃), for thin layer chromatography, ~30% Sb basis	21623-100ML	100 mL
106-51-4	<i>p</i> -Benzoquinone, for spectrophotometric det. of amines, ≥99.5% (HPLC)	12309-25G 12309-100G	25 g 100 g
366-18-7	2,2'-Bipyridyl, redox indicator, for spectrophotometric det. of Fe, ≥99.0%	14454-5G 14454-25G 14454-100G	5 g 25 g 100 g
366-18-7	2,2'-Bipyridyl, purum, ≥98.0% (NT)	14453-25G 14453-100G	25 g 100 g
7477-67-0	Bispyrazolone, for TLC derivatization, for the det. of cyanide, ≥98.0%	15156-5G	5 g
76-60-8	Bromocresol Green solution, indicator, ready-to-use	02559-500ML	500 mL
128-08-5	<i>N</i> -Bromosuccinimide, <i>ReagentPlus</i> ®, 99%	B81255-5G B81255-100G B81255-250G B81255-500G B81255-1KG	5 g 100 g 250 g 500 g 1 kg
7080-50-4	Chloramine T trihydrate, purum p.a., for the detection of halogens and bromate, ≥98.0% (RT)	23270-50G 23270-250G 23270-1KG	50 g 250 g 1 kg
10199-89-0	4-Chloro-7-nitrobenzofurazan, suitable for fluorescence, BioReagent, ≥97.0% (HPLC)	25455-1G 25455-5G 25455-25G	1 g 5 g 25 g
7790-94-5	Chlorosulfonic acid, purum, ≥98.0% (T)	26388-100ML 26388-500ML 26388-1L	100 mL 500 mL 1 L
6046-93-1	Copper(II) acetate monohydrate, puriss. p.a., ≥99.0% (RT)	61148-100G 61148-500G	100 g 500 g
10031-43-3	Copper(II) nitrate trihydrate, puriss. p.a., 99-104%	61194-100G 61194-500G	100 g 500 g
7758-99-8	Copper(II) sulfate pentahydrate, puriss. p.a., ACS reagent, reag. ISO, reag. Ph. Eur., 99-102%	31293-100G 31293-500G 31293-1KG 31293-6X1KG 31293-50KG-H	100 g 500 g 1 kg 6 × 1 kg 50 kg
605-65-2	Dansyl chloride, BioReagent, suitable for fluorescence, ≥99.0% (HPLC)	39220-1G-F 39220-5G-F 39220-50G-F	1 g 5 g 50 g
86516-36-1	1-Dansylpiperazine, for HPLC derivatization, ≥99.0%	39367-100MG-F 39367-500MG-F	100 mg 500 mg
119-90-4	<i>o</i> -Dianisidine, for spectrophotometric det. of Au, NO ₂ ⁻ , Ce(IV), for the detection of Au, Co, Cu, SCN ⁻ , V, ≥97.0%	33430-10G 33430-50G	10 g 50 g
76-54-0	2',7'-Dichlorofluorescein solution, indicator, ready-to-use	02591-500ML	500 mL
101-38-2	2,6-Dichloroquinone-4-chloroimide, for spectrophotometric det. of vitamin B ₆ , ≥99.0%	35620-10G 35620-50G	10 g 50 g
304671-58-7	2,2-Dihydroxy-5-methoxy-1,3-indandione hydrate	341002-500MG	500 mg
100-10-7	4-(Dimethylamino)benzaldehyde, for the determination of hydroxyproline, ≥99.0% (HPLC)	39070-50G 39070-250G	50 g 250 g
100-10-7	4-(Dimethylamino)benzaldehyde solution, 10 g/L in isopropanol, for TLC derivatization	02560-500ML	500 mL
536-17-4	5-(4-Dimethylaminobenzylidene)rhodanine, for TLC derivatization, ≥98.0%	39090-10G	10 g
95-45-4	Dimethylglyoxime, puriss. p.a., ACS reagent, for the detection of Ni, ≥99.0% (TLC)	40390-25G 40390-100G 40390-500G	25 g 100 g 500 g
95-45-4	Dimethylglyoxime, puriss. p.a., ACS reagent, reag. Ph. Eur., ≥99% (gravimetric)	33133-25G 33133-100G	25 g 100 g
119-26-6	2,4-Dinitrophenylhydrazine hydrochloric acid solution, ~0.005 M in ethanol, for thin layer chromatography	18189-100ML-F	100 mL

TLC Reagents

CAS No.	Compound	Cat. No.	Qty
122-39-4	Diphenylamine, puriss. p.a., redox indicator, ACS reagent, reag. Ph. Eur., ≥98% (GC)	33149-100G-R	100 g
39775-75-2	Dragendorff reagent, for TLC derivatization	44578-100ML-F	100 mL
64071-86-9	Fast Black K salt, Standard Fluka	44760	
14263-94-6	Fast Blue B Salt, Dye content: ~95%	D9805-10G	10 g
		D9805-100G	100 g
1343-88-0	Florisil® TLC, for thin layer chromatography	35483-1KG	1 kg
-	Fluorescamine	34653	100 mL
32382-27-7	Fluorescein mercuric acetate, for the determination of disulfide groups, ~90% (UV)	46980-5G-F	5 g
68611-47-2	Fluorescence indicator green 254 nm, for thin layer chromatography	02554-50G	50 g
		02554-250G	250 g
7553-56-2	Iodine, ACS reagent, ≥99.8%, solid	207772-5G	5 g
		207772-100G	100 g
		207772-500G	500 g
		207772-6X500G	6 × 500 g
		207772-1KG	1 kg
		207772-2.5KG	2.5 kg
		207772-12KG	12 kg
7705-08-0	Iron(III) chloride, anhydrous, ≥98%	12321-100G	100 g
		12321-1KG	1 kg
		12321-2.5KG	2.5 kg
7705-08-0	Iron(III) chloride, reagent grade, 97%	157740-5G	5 g
		157740-100G	100 g
		157740-1KG	1 kg
		157740-6X1KG	6 × 1 kg
		157740-2.5KG	2.5 kg
		157740-20KG	20 kg
51404-69-4	Lead(II) acetate basic, anhydrous, ACS reagent, for sugar analysis according to Horne, ≥33.0% basic Pb (as PbO) basis, ≥75.0% total Pb (as PbO) basis	32306-1KG	1 kg
		32306-6X1KG	6 × 1 kg
		32306-5KG	5 kg
		32306-4X5KG	4 × 5 kg
		32306-25KG-H	25 kg
13446-34-9	Manganese(II) chloride tetrahydrate, 99.99% trace metals basis	203734-5G	5 g
		203734-25G	25 g
		203734-100G	100 g
7487-94-7	Mercury(II) chloride, puriss. p.a., ACS reagent, reag. ISO, ≥99.5% (calc. to the dried substance)	31005-100G	100 g
		31005-500G	500 g
		31005-6X500G	6 × 500 g
50632-57-0	2-Methoxy-2,4-diphenyl-3(2H)-furanone, suitable for fluorescence, ≥98.0% (HPLC)	64958-25MG	25 mg
		64958-100MG	100 mg
38894-11-0	3-Methyl-2-benzothiazolinone hydrazone hydrochloride monohydrate, ≥99.0% (HPLC)	65875-2.5G	2.5 g
		65875-10G	10 g
		65875-50G	50 g
-	Millon's reagent, purum p.a., for the detection of tyrosine	69820-50ML	50 mL
		69820-250ML	250 mL
-	Molybdenum Blue spray reagent	M1942-100ML	100 mL
654055-01-3	Morin hydrate, for microscopy (Fl), for the determination of Al, Be, Zn, Ga, In, Sc, water 1 mol/mol	69870-5G	5 g
		69870-10G	10 g
		69870-50G	50 g
1465-25-4	N-(1-Naphthyl)ethylenediamine dihydrochloride monomethanolate, for spectrophotometric det. of nitrate and nitrite, ≥99.0%	70720-25G	25 g
		70720-100G	100 g
485-47-2	Ninhydrin, ACS reagent	151173-10G	10 g
		151173-25G	25 g
		151173-100G	100 g
-	Ninhydrin reagent according to Stahl, for thin layer chromatography	17975-100ML	100 mL
-	Ninhydrin Spray Reagent	N1286-100ML	100 mL
7697-37-2	Nitric acid, puriss. p.a., ACS reagent, fuming, ≥99.5%	78005-500ML-F	500 mL
1083-48-3	4-(4-Nitrobenzyl)pyridine, for TLC derivatization, for spectrophotometric det. of phosphorus-containing pesticides	73210-5G	5 g
		73210-25G	25 g
		73210-250G	250 g
6153-39-5	Orcinol monohydrate, colorimetric detection reagent	O1875-5G	5 g
		O1875-10G	10 g
		O1875-100G	100 g
7647-10-1	Palladium(II) chloride, anhydrous, 60% Pd basis	76050-1G	1 g
		76050-5G	5 g
		76050-25G	25 g
12026-57-2	Phosphomolybdic acid solution, ready-to-use spray and plunge reagent, for chromatography	02553-100ML	100 mL
		02553-500ML	500 mL
12026-57-2	Phosphomolybdic acid solution, spray reagent, 10% in ethanol	P4869-100ML	100 mL
12501-23-4	Phosphotungstic acid hydrate, for microscopy	79690-25G	25 g
		79690-100G	100 g
		79690-500G	500 g
-	Phospray	33047-U	200 mL

TLC Reagents

CAS No.	Compound	Cat. No.	Qty
643-79-8	Phthalaldehyde, for fluorescence, ≥99.0% (HPLC)	79760-1G	1 g
		79760-5G	5 g
		79760-6X5G	6 × 5 g
		79760-50G	50 g
2508-19-2	Picrylsulfonic acid solution, ~1 M in H ₂ O	92823-10ML	10 mL
		92823-50ML	50 mL
25910-85-4	Pinacryptol yellow, for photographic purposes	80540-1G	1 g
7758-02-3	Potassium bromide, puriss. p.a., ACS reagent, ≥99.5% (AT)	60093-250G-F	250 g
		60093-1KG-F	1 kg
7778-50-9	Potassium dichromate, puriss. p.a., ACS reagent, reag. ISO, reag. Ph. Eur., ≥99.8%	31255-250G	250 g
		31255-1KG	1 kg
		31255-50KG-H	50 kg
16921-30-5	Potassium hexachloroplatinate(IV), puriss., ~40% Pt basis	60260-5G-F	5 g
16921-30-5	Potassium hexachloroplatinate(IV), ≥99.9% trace metals basis	520861-1G	1 g
		520861-5G	5 g
		520861-25G	25 g
7681-11-0	Potassium iodide, BioUltra, ≥99.5% (AT)	60399-100G-F	100 g
		60399-500G-F	500 g
115-41-3	Pyrocatechol Violet, indicator for metal titration	32672-1G	1 g
		32672-5G	5 g
81-88-9	Rhodamine B, for fluorescence	83689-1G	1 g
81-88-9	Rhodamine B solution, 0.2% in isopropanol, for TLC derivatization	02558-100ML	100 mL
7761-88-8	Silver nitrate, puriss. p.a., ≥99.5% (AT)	85228-50G	50 g
		85228-100G	100 g
		85228-250G	250 g
9005-25-8	Starch, from potato, acc. to Zulkowsky (starch, treated with glycerol at 190°C)	85642-25G	25 g
		85642-100G	100 g
121-57-3	Sulfanilic acid, puriss. p.a., ≥99.0% (T)	86090-5G	5 g
		86090-100G	100 g
		86090-500G	500 g
7664-93-9	Sulfuric acid solution, 49-51%, for HPLC	84733-100ML	100 mL
		84733-500ML	500 mL
670-54-2	Tetracyanoethylene, 98%	T8809-5G	5 g
		T8809-25G	25 g
10025-69-1	Tin(II) chloride dihydrate, reagent grade, 98%	208035-100G	100 g
		208035-250G	250 g
		208035-500G	500 g
		208035-2.5KG	2.5 kg
6192-52-5	<i>p</i> -Toluenesulfonic acid monohydrate, <i>ReagentPlus</i> ®, 98.5%	T35920-5G	5 g
		T35920-100G	100 g
		T35920-500G	500 g
		T35920-3KG	3 kg
		T35920-15KG	15 kg
121-44-8	Triethylamine, ≥99.5%	471283-100ML	100 mL
		471283-500ML	500 mL
		471283-6X500ML	6 × 500 mL
		471283-2L	2 L
		471283-4L	4 L
		471283-4X4L	4 × 4 L
		471283-18L	18 L
118-12-7	1,3,3-Trimethyl-2-methyleneindoline, liquid, for paper chromatography, ≥96.0%	92550-100ML	100 mL
298-96-4	2,3,5-Triphenyltetrazolium chloride, ≥99.0% (AT)	93140-10G	10 g
		93140-50G	50 g
6159-44-0	Uranyl acetate dihydrate, puriss. p.a., ACS reagent, ≥98.0% (T)	73943-5G	5 g
		73943-25G	25 g
7646-85-7	Zinc chloride, puriss. p.a., ACS reagent, reag. ISO, reag. Ph. Eur., ≥98%	31650-100G	100 g
		31650-250G	250 g
		31650-6X250G	6 × 250 g
		31650-1KG	1 kg
		31650-6X1KG	6 × 1 kg
		31650-50KG	50 kg
7646-85-7	Zinc chloride solution, 1.0 M in diethyl ether	276839-100ML	100 mL
		276839-800ML	800 mL



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Neats and Single-component Solutions

Neats and Single-component Solutions

Sigma-Aldrich offers an extensive line of Fluka and Supelco brand neats and single-component solutions for a variety of applications that include, but are not limited to, environmental, food and beverage, forensics, petrochemical and pharmaceutical analyses. Most of these chemicals are 99% pure. Listed below is just a sampling of the many reference materials available. Please visit sigmaaldrich.com/standards to view our complete product line.

Some of these products are classified as hazardous under European Union (EU) legislation. The Risk and Safety (R and S) phrases are listed in the Risk and Safety section at the front of the catalog.

Note: Due to the growing importance of pesticide residue analyses, our neat and single-component solution pesticide standards have their own section within the Environmental standards chapter of this catalog.

Description	Concentration		Cat. No.	Qty
<i>cis</i> -8,11,14-Eicosatrienoic acid methyl ester solution	~0.1 g/mL in ethanol	-	00813-1ML-F	1 mL
Acenaphthene	-	-	48500-U	5000 mg
Acenaphthene-d ₁₀ solution	2000 µg/mL in methanol	-	48093	1 mL
Acenaphthene-d ₁₀ solution	2000 µg/mL in methylene chloride	-	48417	1 mL
Acenaphthylene	-	-	48566	100 mg
Acepromazine-d ₆ hydrochloride	-	-	32836-10MG	10 mg
Acetaldehyde-2,4-DNPH solution	1000 µg/mL in acetonitrile (as aldehyde equivalent)	-	47340-U	1 mL
Acetaldehyde-2,4-DNPH solution	1000 µg/mL in acetonitrile (aldehyde, equivalent)	-	4M7340-U	5 × 1 mL
Acetoin	-	-	40127-U	1000 mg
Acetone	-	-	90872-5ML-F 90872-10ML-F	5 mL 10 mL
Acetone solution	2000 µg/mL in methanol: water (9:1)	-	48358	1 mL
Acetophenone	-	-	42163-1ML-F 42163-5ML-F	1 mL 5 mL
N ⁸ -Acetylspermidine dihydrochloride	-	-	A3658-100MG	100 mg
Acrolein	-		4S8501 48501	100 mg 5 g
Acrolein	-	-	5S06230	1 g
Acrylonitrile solution	5000 µg/mL in methanol	-	40003	1 mL
Albendazole	-	-	A4673-10G	10 g
Ambroxol hydrochloride	-	-	A9797-5G	5 g
4-Aminoazobenzene	-	-	46130-250MG-R	250 mg
<i>o</i> -Aminoazotoluene	-	-	31629-250MG	250 mg
1-Aminohydantoin hydrochloride	-	-	33655-100MG-R	100 mg
1-Amino-2,4-imidazolidinedione- ¹³ C ₃	-	-	34006-10MG-R	10 mg
Amoxicillin trihydrate	-	-	31586-250MG	250 mg
AMOZ	-	-	33349-50MG-R	50 mg
AMOZ-d ₅	-	-	33881-10MG-R	10 mg
Ampicillin trihydrate	-	-	31591-250MG	250 mg
<i>tert</i> -Amyl methyl ether solution	2000 µg/mL in methanol	-	506737	1 mL
5- α -Androstane solution	2000 µg/mL in methylene chloride	-	48168	1 mL
4-Androstene-3,17-dione	-	-	46033-250MG	250 mg
<i>N</i>				
Androsterone	-	-	31579-250MG	250 mg
Anhydrotetracycline hydrochloride	-	-	37919-100MG-R	100 mg
Aniline	-	-	51788-1ML-F 51788-5ML-F	1 mL 5 mL
Aniline solution	2000 µg/mL in methanol	-	48030-U	1 kit
<i>p</i> -Anisaldehyde	-	-	97063-1ML-F 97063-5ML-F	1 mL 5 mL
Anisole	-	-	96109-5ML-F 96109-10ML-F	5 mL 10 mL
Anthracene	-	-	31581-250MG	250 mg
Anthracene	-	-	48567	5000 mg
Anthracene solution	200 µg/mL in methanol	-	48647	1 mL
Anthracene-d ₁₀	-	-	442456	100 mg
Anthracene-d ₁₀ solution	2000 µg/mL in methylene chloride	-	48863	1 mL
Antipyrine	-	-	A5882-25G A5882-100G A5882-500G	25 g 100 g 500 g
AOZ	-	-	33347-50MG-R	50 mg
AOZ-d ₄	-	-	33880-10MG-R	10 mg
L-Arginine hydrochloride solution	100 mM amino acid in 0.1 M HCl	-	08163-5ML-F	5 mL

Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
Atenolol-d ₇	-	-	06613-2MG	2 mg
Azaperone	-	-	34223-100MG	100 mg
Aztreonam	-	-	A6848-50MG	50 mg
BDE No 99 solution	50 µg/mL in isooctane	-	33676-1ML	1 mL
Beclomethasone dipropionate	-	-	B3022-250MG B3022-1G B3022-5G	250 mg 1 g 5 g
Behenic acid	-	-	11909-100MG 11909-5G	100 mg 5 g
Benzaldehyde	-	-	09143-5ML-F 09143-25ML-F	5 mL 25 mL
Benzaldehyde-2,4-DNPH solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	-	47343	1 mL
Benz[<i>a</i>]anthracene	-	-	48563	100 mg
Benz[<i>a</i>]anthracene-d ₁₂	-	-	442468	10 mg
Benz[<i>a</i>]anthracene-d ₁₂ solution	2000 µg/mL in methylene chloride	-	48789	1 mL
Benzbromarone	-	-	B5774-1G	1 g
Benzene	-	-	12540-5ML-F 12540-50ML-F	5 mL 50 mL
Benzene	-	-	48503	5000 mg
Benzene solution	200 µg/mL in methanol	-	CRM48617	
Benzene solution	5000 µg/mL in methanol	-	40004	1 mL
Benzene-d ₆ solution	2000 µg/mL in methanol	-	48940-U	1 mL
Benzidine solution	5000 µg/mL in methanol	-	40005	1 mL
Benzo[<i>b</i>]fluoranthene	-	-	48490	50 mg
Benzo[<i>b</i>]fluoranthene solution	200 µg/mL in methanol	-	48637	1 mL
Benzo[<i>j</i>]fluoranthene solution	2000 µg/mL in methylene chloride	-	502332	1 mL
Benzo[<i>k</i>]fluoranthene	-	-	48492	50 mg
Benzo[<i>k</i>]fluoranthene solution	200 µg/mL in methylene chloride	-	48668	1 mL
Benzo[<i>k</i>]fluoranthene solution	1000 µg/mL in acetone	-	40073	1 mL
Benzoic acid solution	2000 µg/mL in methylene chloride	-	47508-U	1 mL
Benzo[<i>ghi</i>]perylene	-	-	48491	25 mg
Benzo[<i>ghi</i>]perylene solution	200 µg/mL in methylene chloride	-	48667	1 mL
Benzophenone	-	-	442842	500 mg
Benzo[<i>a</i>]pyrene	-	-	48564	100 mg
Benzo[<i>a</i>]pyrene solution	200 µg/mL in methylene chloride	-	48665	1 mL
Benzo[<i>a</i>]pyrene solution	1000 µg/mL in acetone	-	40071	1 mL
Benzo[<i>a</i>]pyrene-d ₁₂	-	-	442847	10 mg
Benzo[<i>e</i>]pyrene	-	-	442475	25 mg
Benzoylcegonine tetrahydrate	-	-	B4147-10MG B4147-25MG B4147-100MG	10 mg 25 mg 100 mg
Yes/N				
Benzyl alcohol	-	-	08421-5ML-F 08421-25ML-F	5 mL 25 mL
Benzyl alcohol	-	-	442481	1000 mg
Benzyl butyl phthalate	-	-	36927-250MG	250 mg
Benzyl butyl phthalate	-	-	442503	1000 mg
Betamethasone	-	-	34166-100MG	100 mg
Bis-(2-chloroisopropyl) ether	-	-	48498	100 mg
Bis(2-ethylhexyl) phthalate solution	5000 µg/mL in methanol	-	40064	1 mL
Bis(2-ethylhexyl) phthalate solution	2000 µg/mL in methanol	-	47994	1 mL
Bisphenol A-d ₁₆	-	-	442876	50 mg
Boldine	-	-	B3916-1G B3916-5G	1 g 5 g
Brombuterol hydrochloride	-	-	94972-10MG	10 mg
Bromochloromethane	-	-	442498	500 mg
2-Bromo-1-chloropropane solution	2000 µg/mL in methanol	-	48088	1 mL
Bromodichloroacetic acid	-	-	442499	100 mg
Bromodichloroacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	-	47278	1 mL
Bromodichloromethane	-	-	48540-U	1000 mg
Bromodichloromethane solution	200 µg/mL in methanol	-	48615	1 mL
Bromodichloromethane solution	5000 µg/mL in methanol	-	40046	1 mL
2-Bromoethanol solution	2000 µg/mL in toluene	-	48874	1 mL
1-Bromo-4-fluorobenzene	-	-	442404	1000 mg
1-Bromo-4-fluorobenzene solution	1000 µg/mL in methanol	-	47937	1 mL

Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
1-Bromo-4-fluorobenzene solution	2000 µg/mL in methanol	-	48083	1 mL
1-Bromo-4-fluorobenzene solution	25,000 µg/mL in methanol	-	48800	1 mL
Bromoform solution	5000 µg/mL in methanol	-	40212	1 mL
Bromomethane solution	200 µg/mL in methanol	-	48624	1 mL
2-Bromopropionic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	-	47645	1 mL
Bupivacaine hydrochloride monohydrate	-	-	B5274-1G B5274-5G B5274-15G	1 g 5 g 15 g
Busulfan	-	-	B2635-10G B2635-25G	10 g 25 g
2,3-Butanedione	-	-	11038-1ML-F 11038-5ML-F	1 mL 5 mL
<i>tert</i> -Butanol	-	-	50621-1ML-F 50621-5ML-F	1 mL 5 mL
1-Butanol	-	-	19422-5ML	5 mL
2-Butanol	-	-	96870-1ML-F 96870-10ML-F	1 mL 10 mL
2-Butanone	2000 µg/mL in methanol: water (9:1)	-	48877	1 mL
2-Butanone	-	-	02469-5ML	5 mL
Butoxamine hydrochloride	-	-	B1385-50MG B1385-500MG	50 mg 500 mg
<i>n</i> -Butyl acetate	-	-	442666-U	1000 mg
<i>tert</i> -Butyl ethyl ether	-	-	442795	1000 mg
<i>tert</i> -Butyl methyl ether	-	-	08603-5ML-F	5 mL
Butyraldehyde-2,4-DNPH solution	1000 µg/mL in acetonitrile (as aldehyde equivalent)	-	47345-U	1 mL
Caffeine solution	1.0 mg/mL±5 % in methanol	-	C6035-1ML	1 mL
Caffeine-sodium benzoate	50:50 (wt:wt mixture)	-	C4144-100G	100 g
Camphene	-	-	442505	1000 mg
Carazolol	-	-	53787-10MG	10 mg
Carbamazepine 10,11-epoxide	-	-	C4206-5MG C4206-25MG	5 mg 25 mg
Carbon disulfide solution	5000 µg/mL in methanol	-	40363	1 mL
Carbon tetrachloride	-	-	02671-1ML 02671-5ML	1 mL 5 mL
Carbon tetrachloride	-	-	48505	1000 mg
Carprofen	-	-	33975-100MG-R	100 mg
Cefadroxil	-	-	C7020-1G C7020-5G	1 g 5 g
Cefalexin	-	-	33989-100MG-R	100 mg
Cefalonium hydrate	-	-	32904-100MG	100 mg
Cefapirin sodium	-	-	43989-100MG	100 mg
Cefoperazone dihydrate	-	-	32426-100MG	100 mg
Cefoxitin sodium salt	-	-	C4786-250MG C4786-1G C4786-5G	250 mg 1 g 5 g
Cefquinome sulfate	-	-	32472-100MG	100 mg
Ceftiofur	-	-	34001-100MG-R	100 mg
Ceftiofur hydrochloride	-	-	32422-100MG	100 mg
Cefuroxime	-	-	34218-100MG	100 mg
Cefuroxime sodium salt	-	-	C4417-1G C4417-5G	1 g 5 g
Chloral hydrate solution	1000 µg/mL in acetonitrile	-	47335-U	1 mL
Chloramphenicol	-	-	31667-250MG	250 mg
Chloramphenicol	-	-	442513	1000 mg
<i>D,L-threo</i> -Chloramphenicol- <i>d</i> ₅	-	-	41724-1MG	1 mg
α -Chlordane	-	-	442449	10 mg
Chloroacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	-	47654-U	1 mL
Chlorobenzene	-	-	08650-5ML-F 08650-25ML-F	5 mL 25 mL
Chlorobenzene solution	5000 µg/mL in methanol	-	40006	1 mL
Chlorobenzene- <i>d</i> ₅	-	-	442517	500 mg
Chlorobenzene- <i>d</i> ₅ solution	2000 µg/mL in methanol	-	48086	1 mL
2-Chloro-2-deoxy- β -D-glucose	-	-	C203-10MG	10 mg
Chlorodibromoacetic acid	-	-	442519	100 mg
Chloroethane solution	200 µg/mL in methanol	-	48626	1 mL
Chloroethane solution	1000 µg/mL in methanol	-	40015	1 mL

Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
2-Chloroethanol solution	2000 µg/mL in methanol	-	48085	1 mL
2-Chloroethyl vinyl ether solution	200 µg/mL in methanol	-	48672	1 mL
2-Chloroethyl vinyl ether solution	5000 µg/mL in methanol	-	40017	1 mL
2-Chloroethyl vinyl ether solution	2000 µg/mL in methanol	-	861206	1 mL
1-Chloro-2-fluorobenzene solution	2000 µg/mL in methanol	-	48369	1 mL
Chloroform	-	-	02487-5ML	5 mL
Chloroform	-	-	48520-U	1000 mg
Chloroform solution	200 µg/mL in methanol	-	48603	1 mL
Chloroform solution	5000 µg/mL in methanol	-	40021	1 mL
Chloromethane solution	200 µg/mL in methanol	-	48622	1 mL
4-Chloro-3-methylphenol	-	-	48519	5000 mg
1-Chlorooctadecane	10000 µg/mL in methylene chloride	-	47584-U	1 mL
Chloropicrin	-	-	442521	100 mg
2-Chloropropane	-	-	02489-5ML	5 mL
Chlortetracycline hydrochloride	-	-	46133-250MG-R	250 mg
Chrysene	-	-	35754-100MG	100 mg
Chrysene	-	-	48565-U	100 mg
Chrysene-d ₁₂	-	-	442523	25 mg
Chrysene-d ₁₂ solution	2000 µg/mL in methylene chloride	-	48416	1 mL
Ciclopirox olamine	-	-	C0415-1G C0415-5G	1 g 5 g
Cimaterol	-	-	32568-10MG	10 mg
Cimbuterol	-	-	32576-10MG	10 mg
Ciprofloxacin	-	-	33434-100MG-R	100 mg
Ciprofloxacin-d ₈ hydrochloride hydrate	-	-	32982-10MG	10 mg
Citicoline sodium salt hydrate	-	-	34015-100MG-R	100 mg
Clenbuterol-d ₃ hydrochloride	-	-	54969-10MG	10 mg
Clenpenterol hydrochloride	-	-	32825-10MG	10 mg
Clenproperol	-	-	32827-10MG	10 mg
Clobetasol propionate	-	-	C8037-100MG C8037-1G	100 mg 1 g
Clomiphene citrate salt	-	-	C6272-1G C6272-10G	1 g 10 g
Clopidol	-	-	33988-100MG-R	100 mg
Cocaine hydrochloride solution N	1.0 mg/mL±5 % in methanol	-	C1528-1ML	1 mL
Codeine YesN	-	-	C5901-50MG	50 mg
Conjugated (9Z,11E)-Linoleic acid	-	-	16413-50MG	50 mg
Conjugated (9E,11E)-Linoleic acid	-	-	90983-20MG	20 mg
Conjugated (10E,12Z)-Linoleic acid	-	-	92321-50MG	50 mg
m-Cresol	-	-	65996-1ML-F 65996-5ML-F	1 mL 5 mL
Cumene	-	-	28220-5ML 28220-25ML	5 mL 25 mL
Cyanoguanidine	-	-	41924-50MG	50 mg
Cyclohexane	-	-	28920-5ML 28920-10ML	5 mL 10 mL
Cyclosporin A	-	-	32425-100MG	100 mg
p-Cymene	-	-	30039-5ML	5 mL
L-Cystine hydrochloride solution	10 mM amino acid in 0.1 M HCl	-	57579-5ML-F	5 mL
Danofloxacin	-	-	33700-100MG-R	100 mg
Decafluorobiphenyl solution	2000 µg/mL in methylene chloride	-	48792	1 mL
Decafluorotriphenylphosphine solution	25,000 µg/mL in methylene chloride	-	48724-U	1 mL
Decane	-	-	30540-5ML 30540-25ML	5 mL 25 mL
Decane	-	-	442669	1000 mg
Decanoic acid	-	-	21409-5G	5 g
Decoquinat	-	-	33823-100MG	100 mg
2'-Deoxycytidine hydrochloride	-	-	D8006-1G D8006-10G	1 g 10 g
4-Deoxyribose hydrochloride	-	-	D0501-500MG D0501-1G	500 mg 1 g

Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
Desmethyldiazepam	-	-	D7282-5MG D7282-10MG D7282-25MG	5 mg 10 mg 25 mg
<i>N</i>				
Dexamethasone	-	-	46165-250MG	250 mg
DFTPP solution	1000 µg/mL in acetone	-	47941	1 mL
2,4-Diaminoanisole	-	-	32831-100MG	100 mg
Diaveridine	-	-	D9516-250MG	250 mg
Dibenz[<i>a,h</i>]anthracene	-	-	48574	100 mg
Dibromoacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	-	47660-U	1 mL
Dibromoacetonitrile	-	-	442552	1000 mg
Dibromochloroacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	-	47277	1 mL
Dibromochloromethane	-	-	48542	1000 mg
Dibromochloromethane solution	200 µg/mL in methanol	-	48608	1 mL
Dibromochloromethane solution	5000 µg/mL in methanol	-	40200-U	1 mL
1,2-Dibromo-3-chloropropane solution	200 µg/mL in methanol	-	48338	1 mL
4,4'-Dibromooctafluorobiphenyl solution	2000 µg/mL in methylene chloride	-	48791	1 mL
2,3-Dibromopropionic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	-	47789	1 mL
Dibucaine hydrochloride	-	-	D0638-1G D0638-5G D0638-25G	1 g 5 g 25 g
3,5-Di- <i>tert</i> -butyl-4-hydroxytoluene	-	-	442377	1000 mg
Di- <i>n</i> -butyl phthalate solution	5000 µg/mL in methanol	-	40066	1 mL
Dichloroacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	-	47657-U	1 mL
Dichloroacetonitrile	-	-	442560	1000 mg
1,2-Dichlorobenzene- <i>d</i> ₄ solution	2000 µg/mL in methanol	-	48952-U	1 mL
1,4-Dichlorobenzene solution	5000 µg/mL in methanol	-	40025	1 mL
1,4-Dichlorobenzene- <i>d</i> ₄ solution	2000 µg/mL in methanol	-	48049	1 mL
3,3'-Dichlorobenzidine	-	-	48525	100 mg
3,3'-Dichlorobenzidine solution	5000 µg/mL in methanol	-	40026	1 mL
1,1-Dichloroethane	-	-	36967-250MG 36967-1G	250 mg 1 g
1,1-Dichloroethane	-	-	48512	500 mg
1,1-Dichloroethane solution	5000 µg/mL in methanol	-	40012	1 mL
1,2-Dichloroethane	-	-	02562-1ML 02562-5ML	1 mL 5 mL
1,2-Dichloroethane	-	-	48509	500 mg
1,2-Dichloroethane solution	200 µg/mL in methanol	-	48613	1 mL
1,2-Dichloroethane- <i>d</i> ₄	-	-	442228	1000 mg
1,2-Dichloroethane- <i>d</i> ₄ solution	2000 µg/mL in methanol	-	48941	1 mL
1,1-Dichloroethene solution	1000 µg/mL in methanol	-	40027	1 mL
<i>cis</i> -1,2-Dichloroethene	-	-	48597	1000 mg
<i>trans</i> -1,2-Dichloroethene	-	-	48527	5000 mg
1,1-Dichloroethylene	-	-	02574-1ML 02574-5ML	1 mL 5 mL
Dichloromethane	-	-	02575-5ML	5 mL
Dichloromethane solution	200 µg/mL in methanol	-	48600	1 mL
Dichloromethane solution	5000 µg/mL in methanol	-	40042	1 mL
1,1-Dichloropropene	5000 µg/mL in methanol	-	41166	1 mL
1,3-Dichloropropene	-	-	48530-U	2000 mg
<i>cis</i> -1,3-Dichloropropene	-	-	47755 47755-500MG	100 mg 500 mg
<i>trans</i> -1,3-Dichloropropene	-	-	47793 47793-500MG	100 mg 500 mg
Diclazuril	-	-	34057-100MG-R	100 mg
Diethanolamine	-	-	16957-1ML-F 16957-5ML-F	1 mL 5 mL
1,4-Diethylbenzene	-	-	32018-5ML	5 mL
Diethylene glycol	-	-	03128-5ML-F	5 mL
Diethylene glycol dimethyl ether	-	-	04143-1ML-F 04143-5ML-F	1 mL 5 mL
Diethyl ether	-	-	91238-1ML-F 91238-10ML-F	1 mL 10 mL
Di(2-ethylhexyl)adipate solution	2000 µg/mL in methanol	-	47995-U	1 mL
Diethyl phthalate	-	-	53008-5ML-F	5 mL

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Description	Concentration		Cat. No.	Qty
Difloxacin hydrochloride	-	-	33984-100MG-R	100 mg
1,4-Difluorobenzene	-	-	442249	1000 mg
1,4-Difluorobenzene solution	2000 µg/mL in methanol	-	48944	1 mL
Digoxigenin	-	-	D9026-25MG D9026-100MG D9026-500MG	25 mg 100 mg 500 mg
Digoxin	-	-	D6003-100MG D6003-1G D6003-5G	100 mg 1 g 5 g
Dihydroartemisinin	-	-	D7439-50MG	50 mg
3,5-Dihydroxyhydrocinnamic acid	-	-	56452-10MG	10 mg
Diisopropyl ether	-	-	95251-1ML-F 95251-5ML-F 95251-10ML-F	1 mL 5 mL 10 mL
Dimethoate	-	-	442567	100 mg
1,2-Dimethoxyethane	-	-	72405-1ML-F 72405-5ML-F	1 mL 5 mL
<i>N,N</i> -Dimethylacetamide	-	-	72336-1ML-F 72336-5ML-F	1 mL 5 mL
2,4-Dimethylaniline	-	-	442315	1000 mg
2,6-Dimethylaniline	-	-	442327	1000 mg
7,12-Dimethylbenz[<i>a</i>]anthracene	-	-	442425	100 mg
2,2-Dimethylbutane	-	-	39730-5ML 39730-10ML	5 mL 10 mL
2,3-Dimethylbutane	-	-	39760-5ML 39760-10ML	5 mL 10 mL
<i>N,N</i> -Dimethylformamide	-	-	72438-5ML-F	5 mL
4-(3,6-Dimethyl-3-heptyl)phenol-ring- ¹³ C ₆ solution	1 µg/mL in acetone	-	33575-10ML	10 mL
4-(3,6-Dimethyl-3-heptyl)phenol-ring- ¹³ C ₆ solution	10 µg/mL in acetone	-	33574-1ML	1 mL
4-(3,6-Dimethyl-3-heptyl)phenol-ring- ¹³ C ₆ solution	100 µg/mL in acetone	-	32471-1ML	1 mL
4-(3,6-Dimethyl-3-heptyl)phenol-diethoxylate-ring- ¹³ C ₆ solution	10 µg/mL in acetone	-	33207-1ML	1 mL
4-(3,6-Dimethyl-3-heptyl)phenol monoethoxylate-ring- ¹³ C ₆ solution	10 µg/mL in acetone	-	33572-1ML	1 mL
3,4-Dimethylhexane	-	-	40512-1ML-F	1 mL
2,3-Dimethylpentane	-	-	41085-5ML	5 mL
2,4-Dimethylpentane	-	-	41090-5ML	5 mL
Dimethyl phthalate solution	5000 µg/mL in methanol	-	40069	1 mL
Dimethyl sulfoxide	-	-	94563-1ML-F 94563-10ML-F	1 mL 10 mL
Diminazene aceturate	-	-	D7770-1G	1 g
2,4-Dinitrophenol solution	5000 µg/mL in methanol	-	40057	1 mL
Di- <i>n</i> -octyl phthalate	-	-	31301-250MG	250 mg
Di- <i>n</i> -octyl phthalate	-	-	48560-U	5000 mg
1,4-Dioxane	-	-	76887-5ML-F 76887-10ML-F	5 mL 10 mL
1,4-Dioxane solution	2000 µg/mL in methanol	-	CRM48367	1 mL
Dipentyl phthalate	-	-	442867	1000 mg
1,2-Diphenylhydrazine	-	-	442232-U	100 mg
all- <i>cis</i> -4,7,10,13,16,19-Docosahexaenoic acid methyl ester	-	-	05832-100MG	100 mg
all- <i>cis</i> -4,7,10,13,16,19-Docosahexaenoic acid methyl ester solution	~100 mg/mL in ethanol	-	08947-2ML-F	2 mL
Docosane	-	-	43942-1G 43942-5G	1 g 5 g
all- <i>cis</i> -4,7,10,13,16-Docosapentaenoic acid	-	-	18566-10MG	10 mg
<i>cis</i> -4,10,13,16-Docosatetraenoic acid methyl ester solution	5% in ethanol	-	04872-1ML	1 mL
Dodecane	-	-	44010-5ML 44010-25ML	5 mL 25 mL
Dodecane	-	-	442671	1000 mg
Dodecanoic acid	-	-	61609-5G	5 g
Doramectin	-	-	33993-100MG-R	100 mg
Dotriacontane	-	-	44253-1G	1 g

Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
Doxycycline hyclate	-	-	33429-100MG-R 33429-25G	100 mg 25 g
Eicosane	-	-	44818-1G 44818-5G	1 g 5 g
<i>cis</i> -5,8,11,14,17-Eicosapentaenoic acid	-	-	44864-100MG 44864-500MG	100 mg 500 mg
1-Eicosene	-	-	442265	1000 mg
<i>cis</i> -11-Eicosenoic acid	-	-	44878-100MG	100 mg
<i>trans</i> -11-Eicosenoic acid	-	-	10823-50MG	50 mg
5-Eicosylresorcinol	-	-	53503-10MG	10 mg
Elaidic acid	-	-	45089-1G 45089-5G	1 g 5 g
Enoxacin	-	-	E3764-500MG E3764-1G E3764-5G	500 mg 1 g 5 g
Enrofloxacin	-	-	33699-100MG-R	100 mg
Enrofloxacin-d ₅ hydrochloride	-	-	32983-10MG	10 mg
4-Epianhydrotetracycline hydrochloride	-	-	37921-100MG-R	100 mg
4-Epitetracycline hydrochloride	-	-	37918-100MG-R	100 mg
Eprinomectin	-	-	32526-100MG	100 mg
Erythromycin A enol ether	-	-	05238-5MG	5 mg
Estradiol-d ₃	-	-	442878	25 mg
Ethanol	-	-	02483-1ML 02483-5ML	1 mL 5 mL
Ethanol solution	2000 µg/mL in methanol	-	48075	1 mL
2-Ethoxyethanol	-	-	79109-1ML-F 79109-5ML-F	1 mL 5 mL
4-Ethoxymethylene-2-phenyl-2-oxazolin-5-one	-	-	E0753-1G E0753-5G E0753-10G	1 g 5 g 10 g
Ethyl acetate solution	2000 µg/mL in methanol	-	47947	1 mL
Ethyl 3-aminobenzoate methanesulfonate salt	-	-	A5040-25G A5040-100G A5040-250G	25 g 100 g 250 g
Ethylbenzene	-	-	03079-5ML 03079-10ML	5 mL 10 mL
Ethylbenzene-d ₁₀ solution	2000 µg/mL in methanol	-	48942	1 mL
Ethylene glycol	-	-	85978-5ML-F 85978-10ML-F	5 mL 10 mL
Ethylene oxide solution	50 mg/mL in methanol	-	48838	1 mL
Ethylene oxide solution	50 mg/mL in methylene chloride	-	48891	1 mL
Ethylene oxide solution	2000 µg/mL in methylene chloride	-	47949	1 mL
Ethylene oxide solution	500 µg/mL in DMSO	-	44609-U	1 mL
Ethyl ether solution	2000 µg/mL in methanol	-	47948	1 mL
Ethylhydrocupreine hydrochloride	-	-	E9876-100MG E9876-1G E9876-5G	100 mg 1 g 5 g
3-(<i>N</i> -Ethyl-3-methylanilino)-2-hydroxypropanesulfonic acid sodium salt	-	-	E8631-1G E8631-5G	1 g 5 g
Everolimus	-	-	07741-10MG-F	10 mg
Florfenicol	-	-	F1427-500MG	500 mg
Florfenicol amine	-	-	32492-10MG	10 mg
Flubendazol	-	-	34091-100MG	100 mg
Flufenamic acid	-	-	F9005-10G F9005-50G	10 g 50 g
Flunixin	-	-	33586-100MG	100 mg
Fluocinolone acetonide	-	-	F8880-100MG F8880-1G	100 mg 1 g
Fluoranthene	-	-	48535	5000 mg
Fluoranthene-d ₁₀	-	-	442843	50 mg
Fluorene	-	-	48568	5000 mg
Fluorene-d ₁₀	-	-	442848	50 mg
Fluorobenzene	-	-	47321	1000 mg
Fluorobenzene solution	1000 µg/mL in methanol	-	47895	1 mL
Fluorobenzene solution	2000 µg/mL in methanol	-	48943	1 mL
2-Fluorobiphenyl solution	2000 µg/mL in methylene chloride	-	48722-U	1 mL
2-Fluoronaphthalene	-	-	442349	100 mg

Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
Fluoxetine hydrochloride	-	-	34012-10MG-R	10 mg
Folinic acid calcium salt hydrate	-	-	F7878-100MG F7878-500MG F7878-1G	100 mg 500 mg 1 g
Formaldehyde solution	~37 wt. % in H ₂ O	-	47083-U	1 mL
Formaldehyde-2,4-DNPH Solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	-	CRM47177	1 pkg
Formaldehyde-2,4-DNPH Solution	100 µg/mL in acetonitrile	-	CRM4M7177	1 pkg
Fosfomycin sodium	-	-	34089-100MG	100 mg
Freon® 113 solution	1000 µg/mL in methanol	-	48411	1 mL
Freon® 113 solution	2000 µg/mL in methanol	SES	47944	1 mL
Freon® Mix	10,000 µg/mL each component in ethyl acetate	-	48420-U	1 mL
D-(-)-Fructose	-	-	F2793-500MG	500 mg
Galactinol dihydrate	-	-	79544-10MG 79544-50MG	10 mg 50 mg
Gentamicin sulfate salt hydrate	-	-	46305-250MG	250 mg
Ginkgolide A from <i>Ginkgo biloba</i> leaves	-	-	G4028-50MG	50 mg
Glycine hydrochloride solution	100 mM amino acid in 0.1 M HCl	-	55097-5ML-F	5 mL
(±)-Gossypol-acetic acid	-	-	G4382-250MG G4382-1G	250 mg 1 g
Halofuginone hydrobromide	-	-	32481-10MG	10 mg
Heneicosane	-	-	51523-1G 51523-5G	1 g 5 g
Heneicosanoic acid	-	-	H5149-100MG H5149-1G	100 mg 1 g
5-Heneicosylresorcinol	-	-	50851-10MG	10 mg
Hentriacontane	-	-	51529-250MG 51529-1G	250 mg 1 g
Heptacosane	-	-	51559-250MG 51559-1G	250 mg 1 g
Heptadecane	-	-	51578-1ML 51578-SML	1 mL 5 mL
5-Heptadecylresorcinol	-	-	97001-10MG	10 mg
Heptane	-	-	51730-5ML 51730-50ML	5 mL 50 mL
Heptatriacontane	-	-	51848-1G	1 g
1-Heptene	-	-	51856-5ML	5 mL
Heroin	-	-	H159-25MG	25 mg
YesN				
Heroin hydrochloride monohydrate	-	-	67357-10MG	10 mg
YesN				
Hesperetin	-	-	H4125-1G H4125-10G	1 g 10 g
Hexachlorobenzene	-	-	48508	1000 mg
Hexachlorobenzene solution	1000 µg/mL in acetone	-	40008	1 mL
Hexachlorobutadiene solution	5000 µg/mL in methanol	-	40050-U	1 mL
Hexachlorocyclopentadiene solution	5000 µg/mL in methanol	-	40051	1 mL
Hexachloroethane solution	5000 µg/mL in methanol	-	40011	1 mL
Hexachlorophene solution	5000 µg/mL in methanol	-	40323	1 mL
Hexacosane	-	-	52183-250MG 52183-1G	250 mg 1 g
Hexadecane	-	-	52209-5ML 52209-25ML	5 mL 25 mL
Hexadecane	-	-	442679	1000 mg
1-Hexadecene	-	-	52276-5ML	5 mL
Hexane	-	-	52750-10ML 52750-50ML	10 mL 50 mL
Hexanoic acid	-	-	21529-5ML	5 mL
1-Hexanol	-	-	73117-1ML-F 73117-5ML-F	1 mL 5 mL
2-Hexanone	-	-	02473-5ML	5 mL
2-Hexanone	-	-	47733-U	5 mL
Hexatriacontane	-	-	52919-1G	1 g
1-Hexene	-	-	52930-5ML 52930-10ML 52930-50ML	5 mL 10 mL 50 mL
Hexyl acetate	-	-	25539-1ML 25539-5ML	1 mL 5 mL
L-Histidine hydrochloride solution	100 mM amino acid in 0.1 M HCl	-	43011-5ML-F	5 mL

Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
HMMNI	-	-	34003-10MG-R 34003-250MG-R	10 mg 250 mg
Hydrocortisone 21-hemisuccinate	-	-	H2882-1G	1 g
Hydroxocobalamin hydrochloride	-	-	H7126-100MG H7126-1G	100 mg 1 g
20 α -Hydroxycholesterol	-	-	H6378-5MG	5 mg
4'-Hydroxydiclofenac	-	-	32412-10MG	10 mg
5-Hydroxyflunixin	-	-	32463-10MG	10 mg
2-Hydroxyibuprofen	-	-	32451-10MG	10 mg
<i>p</i> -Hydroxymethamphetamine N	-	-	H9645-25MG	25 mg
4-Hydroxytamoxifen	-	-	T176-10MG T176-50MG	10 mg 50 mg
Ibuprofen sodium salt	-	-	I1892-100G I1892-500G	100 g 500 g
Ibuprofen-d ₃	-	-	55264-50MG	50 mg
Imidocarb dipropionate	-	-	33441-50MG	50 mg
Indeno[1,2,3- <i>cd</i>]pyrene	-	-	48499	10 mg
Indeno[1,2,3- <i>cd</i>]pyrene solution	200 μ g/mL in methanol	-	48669	1 mL
Iprnidazole-OH	-	-	34004-10MG-R 34004-100MG-R	10 mg 100 mg
Isoniazid	-	-	I3377-5G I3377-50G I3377-250G	5 g 50 g 250 g
Isoprene	-	-	59240-1ML-F 59240-10ML-F	1 mL 10 mL
4,4'-Isopropylidenediphenol	-	-	442840	500 mg
Isovaleraldehyde-2,4-DNPH solution	1000 μ g/mL in acetonitrile (as aldehyde equivalent)	-	47179	1 mL
<i>N</i> -(β -Ketocaproyl)-DL-homoserine lactone	-	-	K3255-25MG K3255-50MG	25 mg 50 mg
α -Ketoglutaric acid disodium salt hydrate	-	-	K3752-5G K3752-100G K3752-1KG	5 g 100 g 1 kg
Lasalocid A sodium salt solution	100 ng/ μ L in acetonitrile	-	33339-2ML	2 mL
Levamisol hydrochloride	-	-	31742-250MG	250 mg
Lidocaine <i>N</i> -ethyl bromide	-	-	L5783-50MG L5783-250MG	50 mg 250 mg
Lincomycin hydrochloride monohydrate	-	-	31727-250MG	250 mg
Linoleic acid	-	-	62230-5ML-F 62230-25ML-F	5 mL 25 mL
Linolelaic acid solution	~250 mg/mL in ethanol	-	55769-1ML	1 mL
Linolenic acid	-	-	62160-1ML 62160-5ML	1 mL 5 mL
γ -Linolenic acid	-	-	62174-100MG-F 62174-500MG-F	100 mg 500 mg
Lipoic acid, reduced	-	-	T8260-25MG T8260-100MG T8260-1G	25 mg 100 mg 1 g
Lithium 3,5-diiodosalicylate	-	-	D3635-1G D3635-5G D3635-25G	1 g 5 g 25 g
Losartan potassium	-	-	61188-100MG	100 mg
L-Lysine hydrochloride solution	100 mM amino acid in 0.1 M HCl	-	44208-5ML-F	5 mL
Mabuterol hydrochloride	-	-	32573-10MG	10 mg
Maduramicin ammonium	-	-	34069-100MG	100 mg
Mapenterol hydrochloride	-	-	49358-5MG	5 mg
Marbofloxacin	-	-	34039-100MG-R	100 mg
Mebendazole	-	-	M2523-25G	25 g
Mebendazole	-	-	46404-250MG	250 mg
Mecillinam	-	-	33447-100MG	100 mg
Megestrol acetate	-	-	M0513-1G M0513-5G	1 g 5 g
Melamine- ¹³ C ₃	-	-	32666-10MG	10 mg
Melengestrol acetate	-	-	33998-100MG-R	100 mg
Meropenem trihydrate	-	-	32460-25MG	25 mg
Mesitylene	-	-	63908-5ML	5 mL
Metformin hydrochloride	-	-	04635-500MG	500 mg

Neats and Single-component Solutions

Description	Concentration	Cat. No.	Qty
Methacrylonitrile	-	442640	1000 mg
Methacycline hydrochloride	-	37906-100MG-R	100 mg
Methanol	-	82762-1ML-F 82762-10ML-F	1 mL 10 mL
Methimazole	-	M8506-25G M8506-100G	25 g 100 g
(+)-3-Methoxymorphinan hydrochloride	-	M187-25MG M187-100MG	25 mg 100 mg
Yes/N			
8-Methoxypsoralen	-	M3501-1G M3501-5G	1 g 5 g
Methyl acetate	-	45997-1ML-F 45997-5ML-F	1 mL 5 mL
Methyl acrylate	-	76778-1ML-F 76778-5ML-F	1 mL 5 mL
2-(Methylamino)propiofenone hydrochloride solution	1.0 mg/mL±5 % in methanol	M8536-1ML	1 mL
N			
Methyl arachidate	-	10941-1G 10941-5G	1 g 5 g
Methyl behenate	-	11940-1G 11940-5G	1 g 5 g
Methyl benzoate	-	18344-1ML-F 18344-5ML-F	1 mL 5 mL
2-Methylbutane	-	59060-5ML 59060-10ML	5 mL 10 mL
3-Methylbutanol	-	59092-1ML 59092-5ML	1 mL 5 mL
2-Methyl-2-butene	-	66050-5ML 66050-10ML 66050-50ML	5 mL 10 mL 50 mL
Methyl <i>tert</i> -butyl ether	-	48027	1000 mg
Methyl <i>tert</i> -butyl ether solution	2000 µg/mL in methanol	CRM48483	1 pkg
Methyl butyrate	-	19358-1ML 19358-5ML	1 mL 5 mL
3-Methylcholanthrene	-	442388	50 mg
Methylcyclopentane	-	66490-10ML 66490-50ML	10 mL 50 mL
Methyl decanoate	-	21479-1ML 21479-5ML	1 mL 5 mL
Methyl all- <i>cis</i> -7,10,13,16,19-docosapentaenoate	-	17269-50MG	50 mg
Methyl <i>cis</i> -13-docosenoate	-	45659-1ML-F 45659-5ML-F	1 mL 5 mL
Methyl dodecanoate	-	61689-5ML	5 mL
Methyl <i>cis,cis</i> -11,14-eicosadienoate	-	17272-100MG	100 mg
Methyl all- <i>cis</i> -5,8,11,14,17-eicosapentaenoate	-	17266-100MG	100 mg
Methyl <i>cis</i> -11-eicosenoate	-	17263-100MG	100 mg
Methyl elaidate	-	45119-1ML 45119-5ML	1 mL 5 mL
Methyl formate	-	06547-5ML	5 mL
Methyl heneicosanoate	-	51535-1G	1 g
Methyl heptadecanoate	-	51633-1G 51633-5G	1 g 5 g
Methyl heptadecanoate-d ₃₃	-	00889-50MG	50 mg
Methyl heptanoate	-	75218-1ML 75218-5ML	1 mL 5 mL
Methyl hexacosanoate	-	52203-100MG	100 mg
Methyl hexanoate	-	21599-1ML-F 21599-5ML-F	1 mL 5 mL
3-Methylhistamine dihydrochloride	-	M7780-50MG	50 mg
2-Methyl-4-isothiazolin-3-one	-	73569-1G	1 g
Methyl isovalerate	-	36492-1ML	1 mL
Methyl linoleate	-	62280-5ML	5 mL
Methyl linolealdate	-	62155-100MG	100 mg
Methyl linolenate	-	62200-1ML 62200-5ML	1 mL 5 mL
Methyl γ-linolenate solution	~250 mg/mL in ethanol	00238-1ML-F	1 mL

Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
Methyl methacrylate solution	1000 µg/mL in methanol	-	40439	1 mL
Methyl myristate	-	-	70129-1ML 70129-5ML	1 mL 5 mL
Methyl myristelaidate	-	-	70055-100MG	100 mg
Methyl myristoleate	-	-	70121-100MG	100 mg
1-Methylnaphthalene	-	-	442430	500 mg
1-Methylnaphthalene solution	2000 µg/mL in methanol	-	48162	1 mL
2-Methylnaphthalene solution	1000 µg/mL in methanol	-	44637-U	1 mL
1-Methylnicotinamide chloride	-	-	M4627-1G	1 g
4-(Methylnitrosoamino)-1-(3-pyridinyl)-1-butanone	-	-	78013-10MG	10 mg
Methyl nonadecanoate	-	-	74208-1G 74208-5G	1 g 5 g
Methyl nonanoate	-	-	76368-1ML 76368-5ML	1 mL 5 mL
Methyl octacosanoate	-	-	74701-250MG 74701-1G	250 mg 1 g
Methyl cis-11-octadecenoate	-	-	17264-100MG	100 mg
Methyl octanoate	-	-	21719-5ML-F	5 mL
Methyl oleate	-	-	75160-1ML 75160-5ML	1 mL 5 mL
Methyl palmitate	-	-	76159-1G 76159-5G	1 g 5 g
Methyl palmitoleate	-	-	76176-1G	1 g
Methyl pentacosanoate	-	-	76497-100MG	100 mg
Methyl pentadecanoate	-	-	76560-1ML 76560-5ML 76560-25ML	1 mL 5 mL 25 mL
2-Methylpentane	-	-	68310-5ML 68310-50ML	5 mL 50 mL
3-Methylpentane	-	-	68320-5ML 68320-50ML	5 mL 50 mL
4-Methyl-2-pentanone	-	-	02474-5ML	5 mL
2-Methyl-1-pentene	-	-	68450-5ML 68450-25ML	5 mL 25 mL
2-Methylphenol solution	5000 µg/mL in methanol	-	40250-U	1 mL
3-Methylphenol	-	-	442391	1000 mg
3-Methylphenol	5000 µg/mL in methanol	-	40251-U	1 mL
4-Methylphenol solution	5000 µg/mL in methanol	-	40252-U	1 mL
2-Methyl-1-propanol	-	-	82059-1ML-F 82059-5ML-F 82059-10ML-F	1 mL 5 mL 10 mL
Methyl propionate	-	-	81988-1ML	1 mL
1-Methyl-2-pyrrolidinone	-	-	78769-5ML-F 78769-10ML-F	5 mL 10 mL
3-Methyl-2-quinoxalinecarboxylic acid	-	-	32862-50MG	50 mg
Methyl ricinoleate	-	-	83916-100MG	100 mg
Methyl salicylate	-	-	76631-1ML-F 76631-5ML-F	1 mL 5 mL
Methyl stearate	-	-	85769-1G 85769-5G	1 g 5 g
Methyl tetracosanoate	-	-	87115-250MG 87115-1G	250 mg 1 g
Methyl cis-15-tetracosenoate	-	-	17265-100MG	100 mg
Methyl tricosanoate	-	-	91478-250MG 91478-1G	250 mg 1 g
Methyl tridecanoate	-	-	91558-5ML	5 mL
Methyl undecanoate	-	-	94118-1ML 94118-5ML	1 mL 5 mL
Methyl valerate	-	-	94560-1ML 94560-5ML	1 mL 5 mL
Metronidazole	-	-	M3761-5G M3761-25G M3761-100G	5 g 25 g 100 g
Metronidazole	-	-	46461-250MG	250 mg

Neats and Single-component Solutions

Description	Concentration	Cat. No.	Qty
Metronidazole-OH	-	34007-10MG-R	10 mg
Microcystin-LR solution	10 µg/mL in methanol	33893-1ML-R	1 mL
Microcystin-RR solution	10 µg/mL in methanol	33577-1ML	1 mL
Microcystin RR-YR-LR solution	5 µg/mL in methanol (each)	33578-1ML	1 mL
Microcystin-YR solution	10 µg/mL in methanol	33576-1ML	1 mL
Mineral oil standard mixture Type A and B for EN 14039 and ISO 16703	~8 mg/mL in heptane (exact content on the label)	69246-10ML-F	10 mL
Mineral oil type A	-	91975-10ML-F	10 mL
Mineral oil type B	-	78473-10ML-F	10 mL
Moxalactam sodium salt	-	M8158-1G M8158-5G	1 g 5 g
Moxidectin	-	33746-25MG	25 mg
Moxifloxacin hydrochloride	-	32477-50MG	50 mg
Nadolol	-	N1892-1G N1892-5G	1 g 5 g
Naphthalene	-	48546	5000 mg
Naphthalene solution	200 µg/mL in methanol	CRM48641	1 pkg
Naphthalene solution	5000 µg/mL in methanol	40053	1 mL
Naphthalene-d ₈	-	442716	250 mg
Naphthalene-d ₈ solution	2000 µg/mL in methylene chloride	48715-U	1 mL
Natamycin	-	32417-50MG	50 mg
Neobietic acid	-	72066-50MG	50 mg
Nervonic acid	-	87117-100MG	100 mg
(-)-Nicotine solution	1.0 mg/mL 1.0 mg/mL±5 % in methanol	N5511-1ML	1 mL
4-Nitrophenol	-	48549	5000 mg
4-Nitrophenol solution	5000 µg/mL in methanol	40056	1 mL
4-Nitroquinoline N-oxide	-	442683	1000 mg
N-Nitrosodi-n-butylamine	-	442685	100 mg
N-Nitrosodi-n-butylamine solution	2000 µg/mL in methylene chloride	48320-U	1 mL
N-Nitrosodiethylamine	-	442687	1000 mg
N-Nitrosodiethylamine solution	5000 µg/mL in methanol	40334	1 mL
N-Nitrosodimethylamine	-	48552	100 mg
N-Nitrosodimethylamine solution	200 µg/mL in methanol	48670	1 mL
N-Nitrosodimethylamine solution	5000 µg/mL in methanol	40059	1 mL
N-Nitrosodiphenylamine solution	5000 µg/mL in methanol	40060	1 mL
N-Nitrosodiphenylamine solution	5000 µg/mL in methanol	46702-U	1 mL
N-Nitrosodi-n-propylamine	-	48554	100 mg
N-Nitrosodi-n-propylamine solution	5000 µg/mL in methanol	40061	1 mL
N-Nitrosomorpholine solution	5000 µg/mL in methanol	40485	1 mL
1-Nitrosopiperidine solution	5000 µg/mL in methanol	40458	1 mL
trans-Nonachlor	-	442811	25 mg
Nonacosane	-	74156-250MG 74156-1G	250 mg 1 g
Nonadecane	-	74158-1G 74158-5G	1 g 5 g
Nonadecanoic acid	-	72332-1G-F 72332-5G-F	1 g 5 g
5-Nonadecylresorcinol	-	57981-10MG	10 mg
Nonanal	-	442719	1000 mg
Nonane	-	74250-50ML	50 mL
Nonane	-	442694	1000 mg
4-Nonylphenol	-	442873	100 mg
Nonylphenol monoethoxylate solution	50 µg/mL in acetone	32894-1ML	1 mL
Nordoxepin hydrochloride	-	N0392-25MG	25 mg
Norfloxacin	-	N9890-1G N9890-5G	1 g 5 g
Norfloxacin	-	33899-100MG-R	100 mg
Norfloxacin-d ₅	-	34058-10MG-R	10 mg
o(-)-Norgestrel	-	N2260-100MG N2260-1G	100 mg 1 g

Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
Noscapine hydrochloride hydrate	-	-	N9007-5G N9007-25G	5 g 25 g
2-NP-AHD	-	-	33870-10MG-R	10 mg
2-NP-AMOZ	-	-	33869-10MG-R	10 mg
2-NP-AMOZ-d ₅	-	-	34009-10MG-R	10 mg
2-NP-AOZ	-	-	33868-10MG-R	10 mg
Nystose	-	-	56218-25MG 56218-100MG	25 mg 100 mg
Octachloronaphthalene	-	-	442725	20 mg
Octacosane	-	-	74684-250MG 74684-1G	250 mg 1 g
Octadecane	-	-	74691-1G 74691-5G	1 g 5 g
Octane	-	-	74820-5ML 74820-50ML	5 mL 50 mL
Octanoic acid	-	-	21639-5ML	5 mL
1-Octanol	-	-	95446-1ML-F 95446-5ML-F	1 mL 5 mL
Octatetracontane	-	-	74892-100MG	100 mg
4-Octylphenol	-	-	442850	500 mg
4-tert-Octylphenol	-	-	442858	500 mg
4-tert-Octylphenol-ring- ¹³ C ₆ solution	10 µg/mL in acetone	-	33565-1ML	1 mL
4-tert-Octylphenol diethoxylate solution	10 µg/mL in acetone solution	-	32886-1ML	1 mL
4-tert-Octylphenol-diethoxylate-ring- ¹³ C ₆ solution	10 µg/mL in acetone ¹³ C ₆ solution	-	33229-1ML	1 mL
4-tert-Octylphenol monoethoxylate solution	10 µg/mL in acetone solution	-	32882-1ML	1 mL
4-tert-Octylphenol-monoethoxylate-ring- ¹³ C ₆ solution	10 µg/mL in acetone ring- ¹³ C ₆ solution	-	33563-1ML	1 mL
Oleic acid	-	-	75090-5ML 75090-25ML	5 mL 25 mL
Oxfendazole	-	-	34176-100MG	100 mg
Oxibendazole	-	-	32924-100MG	100 mg
Oxycodone hydrochloride Yes/N	-	-	O1378-500MG	500 mg
Oxytetracycline hydrochloride	-	-	46598-250MG	250 mg
Palmitic acid	-	-	76119-5G	5 g
Palmitoleic acid	-	-	76169-1G	1 g
D-Pantethine	-	-	P2125-1G P2125-5G	1 g 5 g
PCB No 138	-	-	35494-10MG	10 mg
Pefabloc® SC	-	-	76307-100MG 76307-500MG 76307-1G	100 mg 500 mg 1 g
Penicillin G potassium salt	-	-	46609-250MG	250 mg
Penicillin V potassium salt	-	-	46616-250MG	250 mg
Pentachloronitrobenzene solution	5000 µg/mL in methanol	-	40156	1 mL
Pentachlorophenol	-	-	48555-U	5000 mg
Pentachlorophenol solution	500 µg/mL in methanol	-	48692	1 mL
Pentachlorophenol solution	5000 µg/mL in methanol	-	40062	1 mL
Pentacontane	-	-	442743	250 mg
Pentacosane	-	-	76493-250MG 76493-1G	250 mg 1 g
Pentadecane	-	-	76509-5ML 76509-25ML	5 mL 25 mL
Pentadecanoic acid	-	-	91446-5G	5 g
5-Pentadecylresorcinol	-	-	91822-10MG	10 mg
Pentane	-	-	76870-10ML 76870-50ML	10 mL 50 mL
1-Pentanol	-	-	77597-1ML-F 77597-5ML-F 77597-10ML-F	1 mL 5 mL 10 mL
Pentatriacontane	-	-	76968-250MG	250 mg

Neats and Single-component Solutions

Description	Concentration	Cat. No.	Qty
1-Pentene	-	- 76969-5ML 76969-50ML	5 mL 50 mL
Perfluorotributylamine (PFTBA)	-	- 442747-U	1000 mg
Perylene solution	2000 µg/mL in methylene chloride	- 48079	1 mL
Perylene-d ₁₂	-	- 442750	25 mg
Perylene-d ₁₂ solution	2000 µg/mL in methylene chloride	- 48081	1 mL
Phenanthrene	-	- 48569	5000 mg
Phenanthrene solution	5000 µg/mL in methanol	- 40079	1 mL
Phenanthrene-d ₁₀	-	- 442753	100 mg
Phenanthrene-d ₁₀ solution	2000 µg/mL in methanol	- 48094	1 mL
Phenanthrene-d ₁₀ solution	2000 µg/mL in methylene chloride	- 48710-U	1 mL
Phenformin hydrochloride	-	- P7045-1G P7045-10G	1 g 10 g
Phenol solution	500 µg/mL in methanol	- 48688	1 mL
Phenol solution	5000 µg/mL in methanol	- 40063	1 mL
2-Phenoxyethanol	-	- 56753-1ML-F 56753-5ML-F	1 mL 5 mL
p-Phenylenediamine solution	2000 µg/mL in methylene chloride	- 48298	1 mL
Phytane	-	- 80165-25MG 80165-50MG	25 mg 50 mg
Pinocebrin	-	- P5239-50MG	50 mg
Piperazine hexahydrate	-	- P7003-200G P7003-1KG	200 g 1 kg
Polymyxin B solution	1 mg/mL in H ₂ O	- 81271-10ML	10 mL
Proadifen hydrochloride	-	- P1061-100MG P1061-500MG	100 mg 500 mg
Probucol	-	- P9672-1G P9672-50G	1 g 50 g
1,2-Propanediol	-	- 12279-1ML-F 12279-5ML-F	1 mL 5 mL
1-Propanol	-	- 96566-5ML-F 96566-10ML-F	5 mL 10 mL
2-Propanol	-	- 91237-1ML-F 91237-5ML-F 91237-10ML-F	1 mL 5 mL 10 mL
Propionic acid	-	- 94425-1ML-F 94425-5ML-F	1 mL 5 mL
(±)-Propylene oxide	-	- 56671-1ML-F 56671-5ML-F	1 mL 5 mL
Pseudoerythromycin A enol ether	-	- 38874-5MG	5 mg
Pyrene	-	- 48570	5000 mg
Pyrene-d ₁₀	-	- 442846	25 mg
Pyridine	-	- 02486-1ML	1 mL
Pyridine solution	2000 µg/mL in methanol	- 48305-U	1 mL
Pyridoxamine dihydrochloride	-	- P9380-1G P9380-5G P9380-25G	1 g 5 g 25 g
Pyrimethamine	-	- 46706-250MG	250 mg
Pyriproxifen	-	- 34174-100MG	100 mg
Quinaldine	-	- Q2125-500ML Q2125-1L	500 mL 1 L
Ractopamine hydrochloride	-	- 34198-100MG	100 mg
Rapamycin	-	- 37094-10MG	10 mg
Resveratrol	-	- 34092-100MG	100 mg
Robenidine hydrochloride	-	- 33979-100MG-R	100 mg
Salbutamol	-	- 46725-100MG	100 mg
Salinomycin monosodium salt hydrate	-	- 46729-100MG	100 mg
Sarafloxacin hydrochloride trihydrate	-	- 33497-100MG-R	100 mg
SCA- ¹³ C- ¹⁵ N ₂ hydrochloride	-	- 33882-10MG-R	10 mg
Selamectin	-	- 32476-10MG	10 mg
Semicarbazide hydrochloride	-	- 33656-100MG-R	100 mg
β-Sitosterol	-	- S5753-500G	500 g
Sodium 4-hydroxybenzoate	-	- H3766-25G H3766-100G	25 g 100 g


Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
Sodium 2-mercaptoethanesulfonate	-	-	M1511-5G M1511-10G M1511-25G	5 g 10 g 25 g
Squalene	-	-	442785	1000 mg
Starch from corn	-	-	S5296-5G	5 g
Stearic acid	-	-	85679-500MG 85679-5G	500 mg 5 g
Stearyl stearate	-	-	46408-100MG	100 mg
Styrene	-	-	47745-U	1 kit
Styrene solution	200 µg/mL in methanol	-	48347	1 mL
Styrene solution	5000 µg/mL in methanol	-	40257-U	1 mL
Sucrose	-	-	S1174-500MG	500 mg
Sulfachloropyridazine	-	-	46778-250MG	250 mg
Sulfadiazine	-	-	35033-100MG	100 mg
Sulfadiazine sodium salt	-	-	S6387-25G S6387-100G	25 g 100 g
Sulfadimethoxine	-	-	S7007-10G S7007-25G S7007-100G	10 g 25 g 100 g
Sulfadimethoxine	-	-	46794-250MG	250 mg
Sulfaethoxypyridazine	-	-	02743-50MG	50 mg
Sulfamerazine	-	-	46826-250MG	250 mg
Sulfamethazine	-	-	46802-250MG	250 mg
Sulfamethazine-(phenyl- ¹³ C ₆) hemihydrate	-	-	32519-10MG	10 mg
Sulfamethizole	-	-	S5632-10G S5632-25G	10 g 25 g
Sulfamethoxazole	-	-	S7507-10G S7507-100G	10 g 100 g
Sulfamethoxazole	-	-	31737-250MG	250 mg
Sulfamethoxazole-(phenyl- ¹³ C ₆)	-	-	32514-10MG	10 mg
Sulfamethoxypyridazine	-	-	S7257-5G S7257-25G	5 g 25 g
Sulfapyridine	-	-	S6252-25G S6252-100G	25 g 100 g
Sulfasalazine	-	-	S0883-10G S0883-50G S0883-100G	10 g 50 g 100 g
Sulfathiazole	-	-	S9876-100G S9876-250G	100 g 250 g
(±)-Sulfinpyrazone	-	-	S9509-5G	5 g
Tea extract from black tea	-	-	T5550-1MG T5550-10MG	1 mg 10 mg
Temozolomide	-	-	76899-10MG	10 mg
<i>o</i> -Terphenyl solution	10000 µg/mL in methylene chloride	-	47580-U	1 mL
<i>p</i> -Terphenyl-d ₁₄ solution	2000 µg/mL in methylene chloride	-	48418	1 mL
Testosterone solution	1.0 mg/mL±2 % in 1,2-dimethoxyethane	-	T5411-1ML	1 mL
<i>N</i> -Testosterone-d ₃	-	-	T2655-10MG	10 mg
<i>N</i> -Testosterone-d ₃ solution	100 µg/mL in 1,2-dimethoxyethane	-	T5536-1ML	1 mL
2,3,7,8-Tetrachlorodibenzo- <i>p</i> -dioxin solution	10 µg/mL in toluene	-	48599	1 mL
Tetrachloroethylene	-	-	02666-1ML 02666-5ML	1 mL 5 mL
Tetrachloroethylene solution	200 µg/mL in methanol	-	48609	1 mL
Tetrachloroethylene solution	5000 µg/mL in methanol	-	40083	1 mL
2,3,4,5-Tetrachlorophenol	-	-	442281	100 mg
2,3,4,6-Tetrachlorophenol	-	-	442282	100 mg
2,3,4,6-Tetrachlorophenol solution	5000 µg/mL in methanol	-	48264	1 mL
2,3,5,6-Tetrachlorophenol	-	-	442284	50 mg
Tetracontane	-	-	87086-250MG 87086-1G	250 mg 1 g
Tetracontane	-	-	442706	500 mg

Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
Tetracosane	-	-	87089-1G	1 g
			87089-5G	5 g
Tetracycline hydrochloride	-	-	31741-250MG	250 mg
Tetradecane	-	-	87139-5ML	5 mL
			87139-25ML	25 mL
Tetrahydrofuran	-	-	78445-5ML-F	5 mL
Tetrapentacontane	-	-	87992-500MG	500 mg
Tetratetracontane	-	-	88144-250MG	250 mg
Tetratriacontane	-	-	88152-250MG	250 mg
			88152-1G	1 g
Tetratriacontane	-	-	442710	1000 mg
Theaflavin	-	-	55016-1MG	1 mg
Theaflavin 3,3'-digallate	-	-	92223-1MG	1 mg
Theaflavin monogallate	-	-	53963-1MG	1 mg
Thymol	-	-	72477-500MG-F	500 mg
Tiamulin	-	-	34044-100MG-R	100 mg
Tiamulin fumarate	-	-	46959-100MG-R	100 mg
			46959-10G-R	10 g
Ticlopidine hydrochloride	-	-	T6654-1G	1 g
			T6654-5G	5 g
			T6654-25G	25 g
Tilimosin	-	-	33864-100MG-R	100 mg
Tinidazole	-	-	32553-10MG	10 mg
Tolbutamide	-	-	T0891-25G	25 g
			T0891-100G	100 g
			T0891-500G	500 g
Toltrazuril sulfone	-	-	33816-10MG	10 mg
Toluene	-	-	89680-5ML	5 mL
			89680-25ML	25 mL
Toluene solution	200 µg/mL in methanol	-	48620	1 mL
Toluene solution	5000 µg/mL in methanol	-	40084	1 mL
Toluene-d ₈	-	-	442809	1000 mg
Toluene-d ₈ solution	2000 µg/mL in methanol	-	48593	1 mL
Transformer oil (PCB free)	-	-	46956	10 × 5 mL
Triacontane	-	-	90270-250MG	250 mg
			90270-1G	1 g
Triamcinolone acetonide	-	-	T6501-250MG	250 mg
			T6501-1G	1 g
			T6501-5G	5 g
Trichloroacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	-	47658-U	1 mL
1,1,1-Trichloroethane	-	-	48848-U	250 mg
1,1,1-Trichloroethane solution	200 µg/mL in methanol	-	48614	1 mL
1,1,1-Trichloroethane solution	5000 µg/mL in methanol	-	40010-U	1 mL
1,1,2-Trichloroethane	-	-	48513	5000 mg
Trichloroethylene	-	-	46267-5ML-R	5 mL
Trichloroethylene solution	5000 µg/mL in methanol	-	40085	1 mL
Trichlorofluoromethane	-	-	48541	5000 mg
2,4,6-Trichlorophenol solution	5000 µg/mL in methanol	-	40019	1 mL
3,4,5-Trichlorophenol	-	-	442373	25 mg
1,2,3-Trichloropropane	-	-	47794	1000 mg
1,2,3-Trichloropropane solution	200 µg/mL in methanol	-	48355	1 mL
1,2,3-Trichloropropane solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	-	47669-U	1 mL
2,4,5-Trichlorotoluene	-	-	442302	250 mg
Triclabendazole	-	-	32802-100MG	100 mg
Tricosane	-	-	91447-1G	1 g
			91447-5G	5 g
5-Tricosylresorcinol	-	-	03422-10MG	10 mg
Tridecane	-	-	91490-5ML	5 mL
			91490-50ML	50 mL
Tridecanoic acid	-	-	91988-5G	5 g
Trifluoroacetic acid	-	-	74564-1ML-F	1 mL
			74564-5ML-F	5 mL
			74564-10ML-F	10 mL
α,α,α-Trifluorotoluene solution	2000 µg/mL in methanol	-	48389	1 mL

Neats and Single-component Solutions

Description	Concentration		Cat. No.	Qty
Trigonelline hydrochloride	-	-	T5509-1G T5509-5G T5509-10G	1 g 5 g 10 g
Trimethoprim	-	-	46984-250MG	250 mg
1,2,3-Trimethylbenzene	-	-	45935-250MG	250 mg
1,2,4-Trimethylbenzene	-	-	47324	1000 mg
1,2,4-Trimethylbenzene solution	5000 µg/mL in methanol	-	41107	1 mL
1,3,5-Trimethylbenzene	-	-	442236	1000 mg
2,2,4-Trimethylpentane	-	-	59030-5ML 59030-10ML 59030-50ML	5 mL 10 mL 50 mL
Triphenyl phosphate	-	-	442829	1000 mg
Triphenyl phosphate solution	500 µg/mL in methyl <i>tert</i> -butyl ether	-	48064	1 mL
Tris(2,3-dibromopropyl) phosphate	-	-	442833	1000 mg
Tritriacontane	-	-	93435-250MG	250 mg
Tulobuterol hydrochloride	-	-	53541-10MG	10 mg
Tylosin tartrate	-	-	33847-250MG	250 mg
Undecane	-	-	94000-5ML 94000-25ML	5 mL 25 mL
Undecane	-	-	442714	1000 mg
Undecanoic acid	-	-	89764-1G-F	1 g
Valeraldehyde-2,4-dinitrophenylhydrazone solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	-	47185-U	1 mL
Valnemulin	-	-	32971-25MG	25 mg
Vedaprofen	-	-	32533-10MG	10 mg
Verbasco	-	-	56217-5MG	5 mg
Vinyl acetate	-		458486 48486	100 mg 1 g
Vinyl acetate solution	5000 µg/mL in acetonitrile	-	40327	1 mL
Vinyl chloride solution	200 µg/mL in methanol	-	48625	1 mL
Vinyl chloride solution	2000 µg/mL in methanol	-	500976	1 mL
4-Vinyl-1-cyclohexene	-	-	94950-5ML 94950-25ML	5 mL 25 mL
Vitexin	-	-	49513-10MG-F	10 mg
Warfarin™	-	-	A2250-10G	10 g
XTT sodium salt	-	-	X4251-100MG X4251-500MG	100 mg 500 mg
<i>o</i> -Xylene	-	-	95660-5ML 95660-10ML 95660-50ML	5 mL 10 mL 50 mL
<i>o</i> -Xylene solution	5000 µg/mL in methanol	-	40201	1 mL
<i>m</i> -Xylene	-	-	95670-5ML 95670-50ML	5 mL 50 mL
<i>m</i> -Xylene solution	5000 µg/mL in methanol	-	40202	1 mL
<i>p</i> -Xylene	-	-	95680-5ML 95680-50ML	5 mL 50 mL
<i>p</i> -Xylene solution	5000 µg/mL in methanol	-	40203	1 mL

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Air Monitoring Standards

NIOSH and OSHA Methods for Workplace Atmospheres

Air Monitoring Standards

NIOSH and OSHA Methods for Workplace Atmospheres

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NIOSH 2001/OSHA 32: Analysis of Cresol in Indoor Air

Description	Concentration	Cat. No.	Qty
standard type calibration			
2-Methylphenol solution	5000 µg/mL in methanol	40250-U	1 mL
3-Methylphenol	5000 µg/mL in methanol	40251-U	1 mL
4-Methylphenol solution	5000 µg/mL in methanol	40252-U	1 mL

NIOSH 2005: Analysis of Nitrobenzenes in Indoor Air

Description	Concentration	Cat. No.	Qty
standard type calibration			
Nitrobenzene solution	5000 µg/mL in methanol	40054	1 mL

NIOSH 2501/OSHA 52: Analysis of Acrolein in Indoor Air

CAS No.	Compound	Cat. No.	Qty
107-02-8	Acrolein	458501 48501	100 mg 5 g

NIOSH 2541/OSHA 52: Analysis of Formaldehyde in Indoor Air

Description	Concentration	Cat. No.	Qty
standard type calibration			
Formaldehyde Oxazolidine solution	2000 µg/mL in toluene	48414	1 mL

NIOSH 5503: Analysis of PCBs in Indoor Air

Description	Concentration	Cat. No.	Qty
standard type calibration			
Aroclor Mix 1	200 µg/mL each component in methanol <i>Aroclor 1016</i> <i>Aroclor 1232</i>	48861 <i>Aroclor 1248</i> <i>Aroclor 1260</i>	1 mL
Aroclor Mix 2	200 µg/mL each component in methanol <i>Aroclor 1221</i> <i>Aroclor 1242</i>	48862 <i>Aroclor 1254</i>	1 mL

NIOSH 5506, 5515: Analysis of PAHs in Indoor Air

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 610 Polynuclear Aromatic Hydrocarbons Mixture	in methanol: methylene chloride (1:1) <i>Acenaphthene, 1000 µg/mL</i> <i>Acenaphthylene, 2000 µg/mL</i> <i>Anthracene, 100 µg/mL</i> <i>Benz[a]anthracene, 100 µg/mL</i> <i>Benzo[b]fluoranthene, 200 µg/mL</i> <i>Benzo[k]fluoranthene, 100 µg/mL</i> <i>Benzo[ghi]perylene, 200 µg/mL</i> <i>Benzo[a]pyrene, 100 µg/mL</i>	48743 458743 <i>Chrysene, 100 µg/mL</i> <i>Dibenz[a,h]anthracene, 200 µg/mL</i> <i>Fluoranthene, 200 µg/mL</i> <i>Fluorene, 200 µg/mL</i> <i>Indeno[1,2,3-cd]pyrene, 100 µg/mL</i> <i>Naphthalene, 1000 µg/mL</i> <i>Phenanthrene, 100 µg/mL</i> <i>Pyrene, 100 µg/mL</i>	1 mL 1 mL

Air Monitoring Standards

NIOSH and OSHA Methods for Workplace Atmospheres

NIOSH 5519: Analysis of Endrin in Indoor Air

CAS No.	Compound	Cat. No.	Qty
72-20-8	Endrin, analytical standard	49032	100 mg

OSHA 80: Analysis of Methylene Chloride in Indoor Air

CAS No.	Compound	Cat. No.	Qty
75-09-2	Dichloromethane, analytical standard, stabilized	48538	5000 mg

OSHA 32: Analysis of Phenol in Indoor Air

Description	Concentration	Cat. No.	Qty
standard type calibration			
Phenol solution	500 µg/mL in methanol	48688	1 mL
standard type calibration			
Phenol solution	5000 µg/mL in methanol	40063	1 mL

OSHA 51: Analysis of Vinyl Acetate in Indoor Air

CAS No.	Compound	Cat. No.	Qty
108-05-4	Vinyl acetate	458486 48486	100 mg 1 g

OSHA 42, OSHA 47: Analysis of Isocyanates in Indoor Air

Description	Concentration	Cat. No.	Qty
standard type calibration			
<i>N,N'</i> -(2-Methyl-1,3-phenylene)bis(4-(2-pyridinyl)-1-piperazinecarboxamide) (derivative of 2,6-TDIP)	1000 µg/mL in DMSO	48144	1 mL
<i>N,N'</i> -(4-Methyl-1,3-phenylene)bis(4-(2-pyridinyl)-1-piperazinecarboxamide) (derivative of 2,4-TDIP)	1000 µg/mL in DMSO	48145	1 mL
<i>N,N'</i> -1,6-Hexanediybis(4-(2-pyridinyl)-1-piperazinecarboxamide) solution (derivative of 1,6-HDIP)	1000 µg/mL in DMSO	48146	1 mL
<i>N,N'</i> -(Methylenediphenylene)bis(4-(2-pyridinyl)-1-piperazinecarboxamide) (derivative of 4,4'-MDIP)	1000 µg/mL in DMSO	48147	1 mL

American Society for Testing and Materials (ASTM) Methods

The following standards are for use with methods developed under ASTM Committee D-22, described in the Annual Book of ASTM Methods, Volume 11.03, Atmospheric Analysis, Occupational Health and Safety. The standards are quantitative formulations for use as chromatographic calibration or spiking solutions. Products include a Certificate of Analysis describing lot-specific production and analytical information. Free data packets are available for most of these products. Data packets contain weight, purity and testing data for raw materials and final production. Documentation requests may be made by e-mail to techservice@sial.com.

ASTM® D4861 Method Description: Analysis of PCBS in Air

Description	Concentration	Cat. No.	Qty
standard type calibration			
Aroclor Mix 1	200 µg/mL each component in methanol <i>Aroclor 1016</i> <i>Aroclor 1232</i>	48861	1 mL
		<i>Aroclor 1248</i> <i>Aroclor 1260</i>	
Aroclor Mix 2	200 µg/mL each component in methanol <i>Aroclor 1221</i> <i>Aroclor 1242</i>	48862	1 mL
		<i>Aroclor 1254</i>	

Air Monitoring Standards

American Society for Testing and Materials (ASTM) Methods

ASTM® D4947 Method Description: Analysis of Chlordane and Heptachlor in Air

Description	Concentration	Cat. No.	Qty
standard type calibration			
Chlordane (mixture of isomers)	200 µg/mL in isooctane	47554-U 48984	1 mL 10 mL
Heptachlor solution	200 µg/mL in isooctane	48964	10 mL

ASTM® D5197 Method Description: Analysis of Aldehydes in Air

Description	Concentration	Cat. No.	Qty
standard type calibration			
TO11/IP-6A Aldehyde/Ketone-DNPH Mix	15 µg/mL each component in acetonitrile (aldehyde equivalent)	47285-U	1 mL
	<i>Acetaldehyde-2,4-dinitrophenylhydrazone</i> <i>Acetone-2,4-dinitrophenylhydrazone</i> <i>Acrolein-2,4-dinitrophenylhydrazone</i> <i>Benzaldehyde-2,4-dinitrophenylhydrazone</i> <i>Butyraldehyde-2,4-dinitrophenylhydrazone</i> <i>Crotonaldehyde-2,4-dinitrophenylhydrazone</i> <i>2,5-Dimethylbenzaldehyde 2,4-dinitrophenylhydrazone</i> <i>Formaldehyde-2,4-dinitrophenylhydrazone</i>	<i>Hexanal 2,4-dinitrophenylhydrazone</i> <i>Hexaldehyde-2,4-dinitrophenylhydrazone</i> <i>Isovaleraldehyde 2,4-dinitrophenylhydrazone</i> <i>Propionaldehyde-2,4-dinitrophenylhydrazone</i> <i>o-Tolualdehyde 2,4-dinitrophenylhydrazone</i> <i>m-Tolualdehyde 2,4-dinitrophenylhydrazone</i> <i>Valeraldehyde-2,4-dinitrophenylhydrazone</i> <i>p-Tolualdehyde 2,4-dinitrophenylhydrazone</i>	

ASTM® D5578 Method Description: Analysis of Ethylene Oxide in Air

Description	Concentration	Cat. No.	Qty
standard type calibration			
2-Bromoethanol solution	2000 µg/mL in toluene	48874	1 mL

ASTM® D5836 Method Description: Standard Test Method for Determination of 2,4-TDI and 2,6-TDI in Workplace Atmospheres

Description	Concentration	Cat. No.	Qty
standard type calibration			
<i>N,N'</i> -(2-Methyl-1,3-phenylene)bis(4-(2-pyridinyl)-1-piperazinecarboxamide) (derivative of 2,6-TDIP)	1000 µg/mL in DMSO	48144	1 mL
<i>N,N'</i> -(4-Methyl-1,3-phenylene)bis(4-(2-pyridinyl)-1-piperazinecarboxamide) (derivative of 2,4-TDIP)	1000 µg/mL in DMSO	48145	1 mL
<i>N,N'</i> -1,6-Hexanediybis(4-(2-pyridinyl)-1-piperazinecarboxamide) solution (derivative of 1,6-HDIP)	1000 µg/mL in DMSO	48146	1 mL
<i>N,N'</i> -(Methylenediphenylene)bis(4-(2-pyridinyl)-1-piperazinecarboxamide) (derivative of 4,4'-MDIP)	1000 µg/mL in DMSO	48147	1 mL

California Air Resources Board (CARB) Methods

Analysis of Carbonyls in Ambient Air

California Air Resources Board (CARB) – Our quantitative formulations were developed to support the analysis of aldehydes in ambient air by CARB Method 1004. Analysis is of the dinitrophenylhydrazine (DNPH) derivatives by HPLC-UV.

Concentrations stated are of the equivalent carbonyl before derivatization, except where noted. The Certificate of Analysis accompanying these products states both DNPH derivatized and non-derivatized concentrations.

Description	Concentration	Cat. No.	Qty
standard type calibration			
CARB Carbonyl-DNPH Mix 1	in acetonitrile (varied, aldehyde & ketone equivalents)	47649-U	1 mL
	<i>Acetaldehyde-2,4-dinitrophenylhydrazone, 1000 µg/mL</i> <i>Acetone-2,4-dinitrophenylhydrazone, 500 µg/mL</i> <i>Acrolein-2,4-dinitrophenylhydrazone, 500 µg/mL</i> <i>Benzaldehyde-2,4-dinitrophenylhydrazone, 500 µg/mL</i>	<i>Butyraldehyde-2,4-dinitrophenylhydrazone, 500 µg/mL</i> <i>Formaldehyde-2,4-dinitrophenylhydrazone, 1500 µg/mL</i> <i>Propionaldehyde-2,4-dinitrophenylhydrazone, 500 µg/mL</i>	

Air Monitoring Standards

California Air Resources Board (CARB) Methods: *Analysis of Carbonyls in Ambient Air*

Description	Concentration	Cat. No.	Qty
CARB Method 1004 DNPH Mix 1	3 µg/mL in acetonitrile (aldehyde & ketone equivalents) Acetaldehyde-2,4-dinitrophenylhydrazone Acetone-2,4-dinitrophenylhydrazone Acrolein-2,4-dinitrophenylhydrazone Benzaldehyde-2,4-dinitrophenylhydrazone 2-Butanone-2,4-dinitrophenylhydrazone Butyraldehyde-2,4-dinitrophenylhydrazone Crotonaldehyde-2,4-dinitrophenylhydrazone	47650-U Formaldehyde-2,4-dinitrophenylhydrazone Hexaldehyde-2,4-dinitrophenylhydrazone Methacrolein-2,4-dinitrophenylhydrazone Propionaldehyde-2,4-dinitrophenylhydrazone m-Tolualdehyde 2,4-dinitrophenylhydrazone Valeraldehyde-2,4-dinitrophenylhydrazone	1 mL
CARB Method 1004 DNPH Mix 2	30 µg/mL in acetonitrile (aldehyde & ketone equivalents) Acetaldehyde-2,4-dinitrophenylhydrazone Acetone-2,4-dinitrophenylhydrazone Acrolein-2,4-dinitrophenylhydrazone Benzaldehyde-2,4-dinitrophenylhydrazone 2-Butanone-2,4-dinitrophenylhydrazone Butyraldehyde-2,4-dinitrophenylhydrazone Crotonaldehyde-2,4-dinitrophenylhydrazone	47651-U Formaldehyde-2,4-dinitrophenylhydrazone Hexaldehyde-2,4-dinitrophenylhydrazone Hexanal 2,4-dinitrophenylhydrazone Propionaldehyde-2,4-dinitrophenylhydrazone m-Tolualdehyde 2,4-dinitrophenylhydrazone Valeraldehyde-2,4-dinitrophenylhydrazone	1 mL

Analysis of Automobile Exhaust

The following standards were developed in response to European requests for working and calibration check standards for ambient air analysis of carbonyl emissions from auto exhaust. Methods for this analysis are equivalent to CARB 1004. Concentrations stated are of the equivalent carbonyl before derivatization. The Certificate of Analysis accompanying these products states both DNPH derivatized and non-derivatized concentrations.

Description	Concentration	Cat. No.	Qty
standard type calibration			
Carbonyl-DNPH Mix 1	20 µg/mL in acetonitrile (except where indicated; aldehyde & ketone equivalents) Acetaldehyde-2,4-dinitrophenylhydrazone Acetone-2,4-dinitrophenylhydrazone Acrolein-2,4-dinitrophenylhydrazone Benzaldehyde-2,4-dinitrophenylhydrazone 2-Butanone-2,4-dinitrophenylhydrazone Butyraldehyde-2,4-dinitrophenylhydrazone Crotonaldehyde-2,4-dinitrophenylhydrazone	47672-U Formaldehyde-2,4-dinitrophenylhydrazone, 40 µg/mL Hexaldehyde-2,4-dinitrophenylhydrazone Methacrolein-2,4-dinitrophenylhydrazone Propionaldehyde-2,4-dinitrophenylhydrazone p-Tolualdehyde 2,4-dinitrophenylhydrazone Valeraldehyde-2,4-dinitrophenylhydrazone	1 mL
Carbonyl-DNPH Mix 2	2 µg/mL in acetonitrile (except where indicated; aldehyde & ketone equivalents) Acetaldehyde-2,4-dinitrophenylhydrazone Acetone-2,4-dinitrophenylhydrazone Acrolein-2,4-dinitrophenylhydrazone Benzaldehyde-2,4-dinitrophenylhydrazone 2-Butanone-2,4-dinitrophenylhydrazone Butyraldehyde-2,4-dinitrophenylhydrazone Crotonaldehyde-2,4-dinitrophenylhydrazone	47671-U Cyclohexanone 2,4-dinitrophenylhydrazone, 5 µg/mL Formaldehyde-2,4-dinitrophenylhydrazone, 4 µg/ mL Hexaldehyde-2,4-dinitrophenylhydrazone Methacrolein-2,4-dinitrophenylhydrazone Propionaldehyde-2,4-dinitrophenylhydrazone p-Tolualdehyde 2,4-dinitrophenylhydrazone Valeraldehyde-2,4-dinitrophenylhydrazone	1 mL

DNPH Carbonyl Derivatives

These solutions of DNPH derivatives are designed as quantitative calibration mixtures where a multi-component solution is not suitable. Packaged in an amber glass ampule.

Description	Concentration	Cat. No.	Qty
standard type calibration			
Acetaldehyde-2,4-dinitrophenylhydrazone solution	1000 µg/mL in acetonitrile (as aldehyde equivalent)	47340-U 4M7340-U	1 mL 5 × 1 mL
Acetaldehyde-2,4-DNPH	-	442434	100 mg
Acetone-2,4-DNPH	-	442436	50 mg
Acetone 2,4-DNPH solution	1000 µg/mL in acetonitrile (as ketone equivalent)	47341 4M7341	1 mL 5 × 1 mL
Acrolein-2,4-DNPH	-	442441	25 mg
Acrolein-2,4-DNPH solution	1000 µg/mL in acetonitrile (as aldehyde equivalent)	47342	1 mL
Benzaldehyde-2,4-DNPH	-	442469	100 mg
Benzaldehyde-2,4-DNPH solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	47343	1 mL
2-Butanone-2,4-dinitrophenylhydrazone	-	442339	100 mg
2-Butanone-2,4-DNPH solution	100 µg/mL in acetonitrile (as ketone equivalent)	47344	1 mL
2-(4-tert-Butylbenzyl)propionaldehyde	-	95338-10MG-F	10 mg
Butyraldehyde-2,4-DNPH	-	442504	100 mg
Butyraldehyde-2,4-DNPH solution	1000 µg/mL in acetonitrile (as aldehyde equivalent)	47345-U	1 mL
Crotonaldehyde-2,4-DNPH	-	442529	100 mg
Crotonaldehyde-2,4-DNPH solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	47175-U	1 mL
Cyclohexanone-2,4-DNPH	-	442533	100 mg
Cyclohexanone-2,4-DNPH solution	500 µg/mL in acetonitrile (as ketone equivalent)	47673-U	1 mL

Air Monitoring Standards

DNPH Carbonyl Derivatives

Description	Concentration	Cat. No.	Qty
Decanal 2,4-dinitrophenylhydrazone	-	33852-100MG	100 mg
2,5-Dimethylbenzaldehyde-2,4-DNPH	-	442321-U	100 mg
Formaldehyde-2,4-DNPH	-	442597	100 mg
Formaldehyde-2,4-DNPH Solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	CRM47177	1 pkg
Formaldehyde-2,4-DNPH Solution	100 µg/mL in acetonitrile	CRM4M7177	1 pkg
Glutaraldehyde-2,4-DNPH solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	47564-U	1 mL
Heptanal 2,4-dinitrophenylhydrazone	-	33848-100MG	100 mg
Hexaldehyde-2,4-DNPH	-	442614	100 mg
Hexaldehyde-2,4-DNPH solution	1000 µg/mL in acetonitrile (as aldehyde equivalent)	47178-U	1 mL
Isobutyraldehyde-2,4-DNPH solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	47886	1 mL
Isovaleraldehyde-2,4-DNPH solution	1000 µg/mL in acetonitrile (as aldehyde equivalent)	47179	1 mL
Methacrolein-2,4-DNPH	-	442639	100 mg
Methacrolein-2,4-DNPH solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	47180-U	1 mL
Nonanal 2,4-dinitrophenylhydrazone	-	33851-100MG	100 mg
Octanal 2,4-dinitrophenylhydrazone	-	33849-100MG	100 mg
o-Phthaldialdehyde-(DNPH) ₂ solution	10 µg/mL in acetonitrile: DMSO (7:3) (as aldehyde equivalent)	47032-U	3 × 2 mL
Propionaldehyde-2,4-DNPH	-	442768	100 mg
Propionaldehyde-2,4-DNPH solution	1000 µg/mL in acetonitrile (as aldehyde equivalent)	47181	1 mL
Pyridine-4-Aldehyde-DNPH Solution	1 mM in acetonitrile: DMSO, 4:1 (as aldehyde equivalent)	40081-U	3 × 2 mL
Pyridine-2-Aldehyde-DNPH Standard	in acetonitrile (aldehyde, equivalent)	40117-U	3 × 2 mL
Succinaldehydic acid 2,4-dinitrophenylhydrazone	-	32876-50MG	50 mg
o-Tolualdehyde-2,4-DNPH	-	442722	100 mg
o-Tolualdehyde-2,4-DNPH solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	47182	1 mL
m-Tolualdehyde-2,4-DNPH solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	47183	1 mL
p-Tolualdehyde-2,4-DNPH	(aldehyde, equivalent)	442735	100 mg
p-Tolualdehyde-2,4-DNPH solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	47184-U	1 mL
Valeraldehyde-2,4-DNPH	-	442834	100 mg
Valeraldehyde-2,4-dinitrophenylhydrazone solution	100 µg/mL in acetonitrile (as aldehyde equivalent)	47185-U	1 mL

DAIH Carbonyl Derivatives

These 2-diphenylacetyl-1,3-indanion-1-hydrazone (DAIH) derivatives are an excellent choice for preparing calibration standards for use when monitoring the presence of aldehydes and ketones by HPLC, using a fluorescence detector.

CAS No.	Compound	Cat. No.	Qty
101228-21-1	Acetaldehyde, DAIH derivative, analytical standard	14423-50MG	50 mg
6287-79-2	Acetone, DAIH derivative, analytical standard	02819-50MG	50 mg
101611-80-7	Acrolein, DAIH derivative, analytical standard	13173-50MG	50 mg
103480-19-9	Crotonaldehyde, DAIH derivative, analytical standard	55556-50MG	50 mg
108041-11-8	Cyclohexanone, DAIH derivative, analytical standard	91547-50MG	50 mg
1119449-21-6	Formaldehyde, DAIH derivative, analytical standard	06947-50MG	50 mg
1119449-20-5	Propionaldehyde, DAIH derivative, analytical standard	51299-50MG	50 mg

Oxime Carbonyl Derivatives

Oxime derivatives are formed by reacting carbonyls with O-(2,3,4,5,6-pentafluorobenzyl)hydroxylamine (PFBHA). The resulting compounds provide a much more stable carbonyl derivative than DNPH for working at high temperatures. These derivatives are appropriate for applications using gas chromatography.

CAS No.	Compound	Cat. No.	Qty
899828-53-6	Acetone O-pentafluorophenylmethyl-oxime, analytical standard	44114-10MG 44114-50MG	10 mg 50 mg
932710-55-9	Acrolein O-pentafluorophenylmethyl-oxime, analytical standard	65819-10MG	10 mg
86356-73-2	Formaldehyde O-pentafluorophenylmethyl-oxime, analytical standard	41558-10MG	10 mg
932710-48-0	Glutaraldehyde bis-(O-pentafluorophenylmethyloxime), analytical standard	03718-10MG 03718-50MG	10 mg 50 mg
932710-53-7	Propionaldehyde O-pentafluorophenylmethyl-oxime, analytical standard	43508-10MG	10 mg

Air Monitoring Standards

Isocyanate Monomer DBA Derivatives

Isocyanate Monomer DBA Derivatives

We are pleased to introduce a new line of di-n-butylamine(DBA) and d₉-DBA derivatized isocyanate LC-MS calibration standards to complement our new ASSET™ EZ-4 NCO Dry sampler. A Certificate of Analysis is provided with each standard. Please visit our web site for future updates to this new line of standards in the coming months.

To learn more about our new ASSET™ EZ-4 NCO Dry sampler, please see the Air Monitoring section of this catalog.

Description	Concentration	Cat. No.	Qty
standard type calibration			
d ₉ -DBA Isocyanate Internal Standard Mix	in acetonitrile: methanol (99:1) (varied conc.) <i>Isocyanic acid-di-n-butylamine-d₉</i> (ICA-DBA-d ₉), 1 µg/mL <i>Ethyl isocyanate-di-n-butylamine-d₉</i> (EIC-DBA-d ₉), 1 µg/mL <i>Hexamethylene diisocyanate-2(di-n-butylamine-d₉)</i> (HDI-2(DBA-d ₉)), 1 µg/mL <i>Isophorone diisocyanate-2(di-n-butylamine-d₉) isomer 1</i> (IPDI-2(DBA-d ₉)), 1 µg/mL <i>Isophorone diisocyanate-2(di-n-butylamine-d₉) isomer 2</i> (IPDI-2(DBA-d ₉)), .28 µg/mL <i>4,4'-Methylenediphenyl diisocyanate-2(di-n-butylamine-d₉)</i> (4,4'-MDI-2(DBA-d ₉)), 1 µg/mL	40142-U	6 × 1 mL
DBA Isocyanate Mix	in acetonitrile: methanol (99:1) (varied conc.) <i>Isocyanic acid-di-n-butylamine</i> (ICA-DBA), 1 µg/mL <i>Ethyl isocyanate-di-n-butylamine</i> (EIC-DBA), 1 µg/mL <i>Hexamethylene diisocyanate-2(di-n-butylamine)</i> (HDI-2(DBA)), 1 µg/mL <i>Isophorone isocyanate-2(di-n-butylamine) isomer 1</i> (IPDI-2(DBA)), 1 µg/mL <i>Isophorone isocyanate-2(di-n-butylamine) isomer 2</i> (IPDI-2(DBA)), .4 µg/mL <i>4,4'-Methylenediphenyl diisocyanate-2(di-n-butylamine)</i> (4,4'-MDI-2(DBA)), 1 µg/mL	40141-U	6 × 1 mL
DBA Isocyanate Standards Kit	in acetonitrile: methanol (99:1) (varied conc.) <i>DBA Isocyanate Mix</i> (Supelco 40141-U)	40143-U	1 kit
		<i>d₉-DBA Isocyanate Internal Standard Mix</i> (Supelco 40142-U)	

Multi-purpose Solutions

The following standards are suitable for use with a wide range of chromatographic air sample determinations. The standards are quantitative formulations. Products include a Certificate of Analysis describing lot-specific production and analytical information.

Description	Concentration	Cat. No.	Qty
standard type calibration			
Freon® 113 solution	2000 µg/mL in methanol	47944	1 mL
Freon® 113 solution	1000 µg/mL in methanol	48411	1 mL
Freon® 123 solution	1000 µg/mL in methanol	48412	1 mL
2-Butanone	2000 µg/mL in methanol: water (9:1)	48877	1 mL
Ethylene oxide solution	50 mg/mL in methylene chloride	48891	1 mL
Ethylene oxide solution	50 mg/mL in methanol	48838	1 mL
Ethylene oxide solution	2000 µg/mL in methylene chloride	47949	1 mL
Formaldehyde Oxazolidine solution	2000 µg/mL in toluene	48414	1 mL
Freon® Mix	10,000 µg/mL each component in ethyl acetate <i>Chlorodifluoromethane</i> <i>Dichlorodifluoromethane</i> <i>Dichlorofluoromethane</i>	48420-U	1 mL
		<i>1,2-Dichlorotetrafluoroethane</i> <i>Trichlorofluoromethane</i>	

Air Monitoring Standards

Japanese Indoor Air Methods

Japanese Indoor Air Methods

Use these mixtures to monitor indoor air for the presence of volatile organics compounds (VOCs). The mixtures are gravimetrically prepared and quantitatively analyzed by GC. A certificate of analysis accompanies each standard.

Description	Concentration	Cat. No.	Qty
standard type calibration			
Indoor Air Standard, 50 Component	1000 µg/mL each component in methanol: water (97:3)	49149-U	1 mL
	<i>Acetone</i> <i>Benzene</i> <i>Bromodichloromethane</i> <i>Butyl acetate</i> <i>1-Butanol</i> <i>2-Butanone</i> <i>Chloroform</i> <i>Dibromochloromethane</i> <i>Decane</i> <i>Decanal</i> <i>1,4-Dichlorobenzene</i> <i>1,2-Dichloroethane</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i> <i>2,4-Dimethylpentane</i> <i>Dodecane</i> <i>Ethylbenzene</i> <i>Ethanol</i> <i>Ethyl acetate</i> <i>2-Ethyltoluene</i> <i>3-Ethyltoluene</i> <i>4-Ethyltoluene</i> <i>Heptane</i> <i>Hexane</i> <i>Hexadecane</i>	<i>(R)-(+)-Limonene</i> <i>Mesitylene</i> <i>4-Methyl-2-pentanone</i> <i>Nonanal</i> <i>Nonane</i> <i>Octane</i> <i>Pentadecane</i> <i>(1S)-(-)-alpha-Pinene</i> <i>(-)-beta-Pinene</i> <i>1-Propanol</i> <i>2-Propanol</i> <i>Styrene</i> <i>Tetrachloroethylene</i> <i>Tetradecane</i> <i>Durene</i> <i>Toluene</i> <i>Trichloroethylene</i> <i>Tridecane</i> <i>1,2,3-Trimethylbenzene</i> <i>1,2,4-Trimethylbenzene</i> <i>2,2,4-Trimethylpentane</i> <i>Undecane</i> <i>o-Xylene</i> <i>m-Xylene</i> <i>p-Xylene</i>	
standard type yes (calibration)			
Indoor Air Standard, 50 Component	100 µg/mL in methanol: water (19:1)	49148-U 4M9148-U	1 mL 3 × 1 mL
	<i>Acetone</i> <i>Benzene</i> <i>Bromodichloromethane</i> <i>Butyl acetate</i> <i>1-Butanol</i> <i>2-Butanone</i> <i>Chloroform</i> <i>Dibromochloromethane</i> <i>Decane</i> <i>Decanal</i> <i>1,4-Dichlorobenzene</i> <i>1,2-Dichloroethane</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i> <i>2,4-Dimethylpentane</i> <i>Dodecane</i> <i>Ethylbenzene</i> <i>Ethanol</i> <i>Ethyl acetate</i> <i>2-Ethyltoluene</i> <i>3-Ethyltoluene</i> <i>4-Ethyltoluene</i> <i>Heptane</i> <i>Hexane</i> <i>Hexadecane</i>	<i>(R)-(+)-Limonene</i> <i>Mesitylene</i> <i>4-Methyl-2-pentanone</i> <i>Nonanal</i> <i>Nonane</i> <i>Octane</i> <i>Pentadecane</i> <i>(1S)-(-)-alpha-Pinene</i> <i>beta-Pinene</i> <i>1-Propanol</i> <i>2-Propanol</i> <i>Styrene</i> <i>Tetrachloroethylene</i> <i>Tetradecane</i> <i>Durene</i> <i>Toluene</i> <i>Trichloroethylene</i> <i>Tridecane</i> <i>1,2,3-Trimethylbenzene</i> <i>1,2,4-Trimethylbenzene</i> <i>2,2,4-Trimethylpentane</i> <i>Undecane</i> <i>o-Xylene</i> <i>m-Xylene</i> <i>p-Xylene</i>	

Air Monitoring Standards

U.S. EPA Indoor Air Pollutant Methods: *Compendium of Methods for the Determination of Air*

U.S. EPA Indoor Air Pollutant Methods

Compendium of Methods for the Determination of Air

The following standards are for use with EPA document number EPA/600/4-90/010. The standards are quantitative formulations for use as chromatographic calibration or spiking solutions. Products include a Certificate of Analysis describing lot-specific production and analytical information. Free data packets are available for these products. Documentation requests should be made by e-mail to techservice@sial.com.


IP1 : Analysis of Volatile Organics (BP 80-200C) in Indoor Air by GC-MS

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA TO-1 Toxic Organic Mix 1A	2 mg/mL each component in methanol Benzene Cumene Ethylbenzene Heptane 1-Heptene	48896	1 mL
	Toluene o-Xylene m-Xylene p-Xylene		
EPA TO-1 Toxic Organic Mix 1B	2 mg/mL each component in methanol Acrylonitrile Allyl chloride Bromobenzene Bromoform Carbon tetrachloride Chlorobenzene Chloroform	48897	1 mL
	1,2-Dibromoethane 1,2-Dichloroethane 1,2-Dichloropropane 1,3-Dichloropropane Tetrachloroethylene 1,1,1-Trichloroethane Trichloroethylene		

IP6: Analysis of Aldehydes and Ketones in Indoor Air by HPLC/UV

Description	Concentration	Cat. No.	Qty
standard type calibration			
TO11/IP-6A Aldehyde/Ketone-DNPH Mix	15 µg/mL each component in acetonitrile (aldehyde equivalent) Acetaldehyde-2,4-dinitrophenylhydrazone Acetone-2,4-dinitrophenylhydrazone Acrolein-2,4-dinitrophenylhydrazone Benzaldehyde-2,4-dinitrophenylhydrazone Butyraldehyde-2,4-dinitrophenylhydrazone Crotonaldehyde-2,4-dinitrophenylhydrazone 2,5-Dimethylbenzaldehyde 2,4-dinitrophenylhydrazone Formaldehyde-2,4-dinitrophenylhydrazone	47285-U	1 mL
	Hexanal 2,4-dinitrophenylhydrazone Hexaldehyde-2,4-dinitrophenylhydrazone Isovaleraldehyde 2,4-dinitrophenylhydrazone Propionaldehyde-2,4-dinitrophenylhydrazone o-Tolualdehyde 2,4-dinitrophenylhydrazone m-Tolualdehyde 2,4-dinitrophenylhydrazone Valeraldehyde-2,4-dinitrophenylhydrazone p-Tolualdehyde 2,4-dinitrophenylhydrazone		
Aldehyde/ketone-DNPH TO11/IP-6A Mix	15 µg/mL each component in acetonitrile (aldehyde equivalent) Acetaldehyde-2,4-dinitrophenylhydrazone Acetone-2,4-dinitrophenylhydrazone Acrolein-2,4-dinitrophenylhydrazone Benzaldehyde-2,4-dinitrophenylhydrazone Butyraldehyde-2,4-dinitrophenylhydrazone Crotonaldehyde-2,4-dinitrophenylhydrazone 2,5-Dimethylbenzaldehyde 2,4-dinitrophenylhydrazone Formaldehyde-2,4-dinitrophenylhydrazone	4M7285-U	3 × 1 mL
	Hexaldehyde-2,4-dinitrophenylhydrazone Isovaleraldehyde 2,4-dinitrophenylhydrazone Propionaldehyde-2,4-dinitrophenylhydrazone o-Tolualdehyde 2,4-dinitrophenylhydrazone m-Tolualdehyde 2,4-dinitrophenylhydrazone p-Tolualdehyde 2,4-dinitrophenylhydrazone Valeraldehyde-2,4-dinitrophenylhydrazone		

IP7: Analysis of Polynuclear Aromatic Hydrocarbons in Indoor Air by HPLC/UV

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 610 Polynuclear Aromatic Hydrocarbons Mixture	in methanol: methylene chloride (1:1) Acenaphthene, 1000 µg/mL Acenaphthylene, 2000 µg/mL Anthracene, 100 µg/mL Benz[a]anthracene, 100 µg/mL Benzo[b]fluoranthene, 200 µg/mL Benzo[k]fluoranthene, 100 µg/mL Benzo[ghi]perylene, 200 µg/mL Benzo[a]pyrene, 100 µg/mL	 48743 4S8743	1 mL 1 mL
	Chrysene, 100 µg/mL Dibenz[a,h]anthracene, 200 µg/mL Fluoranthene, 200 µg/mL Fluorene, 200 µg/mL Indeno[1,2,3-cd]pyrene, 100 µg/mL Naphthalene, 1000 µg/mL Phenanthrene, 100 µg/mL Pyrene, 100 µg/mL		

Air Monitoring Standards

U.S. EPA Indoor Air Pollutant Methods: *Compendium of Methods for the Determination of Air*

IP8: Analysis of Organochlorine Pesticides in Indoor Air by GC-ECD

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA Pesticide Mix	in methanol: methylene chloride (98:2) (varied) Aldrin, 10 µg/mL α-BHC β-BHC Lindane, 10 µg/mL δ-BHC 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane, 60 µg/mL 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane, 20 µg/mL 4,4'-DDT, 60 µg/mL	48858-U Dieldrin, 20 µg/mL α-Endosulfan, 20 µg/mL β-Endosulfan, 20 µg/mL Endosulfan sulfate, 60 µg/mL Endrin, 20 µg/mL Endrin aldehyde, 60 µg/mL Heptachlor, 10 µg/mL Heptachlor exo-epoxide, 10 µg/mL	1 mL

U.S. EPA Toxic Organic Air Monitoring Methods

Toxic Organic (TO) Compounds in Air

TO-1: Volatile Organic Compounds by Capillary GC-MS

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA TO-1 Toxic Organic Mix 1A	2 mg/mL each component in methanol Benzene Cumene Ethylbenzene Heptane 1-Heptene	48896 Toluene o-Xylene m-Xylene p-Xylene	1 mL
EPA TO-1 Toxic Organic Mix 1B	2 mg/mL each component in methanol Acrylonitrile Allyl chloride Bromobenzene Bromoform Carbon tetrachloride Chlorobenzene Chloroform	48897 1,2-Dibromoethane 1,2-Dichloroethane 1,2-Dichloropropane 1,3-Dichloropropane Tetrachloroethylene 1,1,1-Trichloroethane Trichloroethylene	1 mL

TO-2: Volatile Organic Compounds by Capillary GC-MS

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA Toxic Organic Mix 2A	2 mg/mL each component in methanol Dichloromethane Vinyl chloride	48898 1,1-Dichloroethylene	1 mL

TO-4/TO-10: Organochlorine Pesticides by Capillary GC-MD (Multiple Detectors)

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA Pesticide Mix	in methanol: methylene chloride (98:2) (varied) Aldrin, 10 µg/mL α-BHC β-BHC Lindane, 10 µg/mL δ-BHC 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane, 60 µg/mL 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane, 20 µg/mL 4,4'-DDT, 60 µg/mL	48858-U Dieldrin, 20 µg/mL α-Endosulfan, 20 µg/mL β-Endosulfan, 20 µg/mL Endosulfan sulfate, 60 µg/mL Endrin, 20 µg/mL Endrin aldehyde, 60 µg/mL Heptachlor, 10 µg/mL Heptachlor exo-epoxide, 10 µg/mL	1 mL

Air Monitoring Standards

U.S. EPA Toxic Organic Air Monitoring Methods: *Toxic Organic (TO) Compounds in Air*

TO-5/TO-11: Aldehydes and Ketones by HPLC-UV

Description	Concentration	Cat. No.	Qty
standard type calibration			
TO11/IP-6A Aldehyde/Ketone-DNPH Mix	15 µg/mL each component in acetonitrile (aldehyde equivalent)	47285-U	1 mL
	<i>Acetaldehyde-2,4-dinitrophenylhydrazone</i> <i>Acetone-2,4-dinitrophenylhydrazone</i> <i>Acrolein-2,4-dinitrophenylhydrazone</i> <i>Benzaldehyde-2,4-dinitrophenylhydrazone</i> <i>Butyraldehyde-2,4-dinitrophenylhydrazone</i> <i>Crotonaldehyde-2,4-dinitrophenylhydrazone</i> <i>2,5-Dimethylbenzaldehyde 2,4-dinitrophenylhydrazone</i> <i>Formaldehyde-2,4-dinitrophenylhydrazone</i>	<i>Hexanal 2,4-dinitrophenylhydrazone</i> <i>Hexaldehyde-2,4-dinitrophenylhydrazone</i> <i>Isovaleraldehyde 2,4-dinitrophenylhydrazone</i> <i>Propionaldehyde-2,4-dinitrophenylhydrazone</i> <i>o-Tolualdehyde 2,4-dinitrophenylhydrazone</i> <i>m-Tolualdehyde 2,4-dinitrophenylhydrazone</i> <i>Valeraldehyde-2,4-dinitrophenylhydrazone</i> <i>p-Tolualdehyde 2,4-dinitrophenylhydrazone</i>	

TO-7: N-Nitrosodimethylamine by Capillary GC-MS

Description	Concentration	Cat. No.	Qty
standard type calibration			
N-Nitrosodimethylamine	-	48552	100 mg
N-Nitrosodimethylamine solution	200 µg/mL in methanol	48670	1 mL
N-Nitrosodimethylamine solution	5000 µg/mL in methanol	40059	1 mL

TO-8: Cresol and Phenol by HPLC-UV-EC-FI

Description	Concentration	Cat. No.	Qty
standard type calibration			
2-Methylphenol solution	5000 µg/mL in methanol	40250-U	1 mL
3-Methylphenol	5000 µg/mL in methanol	40251-U	1 mL
4-Methylphenol solution	5000 µg/mL in methanol	40252-U	1 mL
Phenol solution	5000 µg/mL in methanol	40063	1 mL

TO-11 Aldehydes/ketones by HPLC-UV

Description	Concentration	Cat. No.	Qty
EPA TO-11A Six Component Carbonyl-DNPH Mix	15 µg/mL each component in acetonitrile (as aldehyde & ketone equivalents)	48149-U	1 mL
	<i>Acetaldehyde-2,4-dinitrophenylhydrazone</i> <i>Acetone-2,4-dinitrophenylhydrazone</i> <i>Acrolein-2,4-dinitrophenylhydrazone</i>	<i>Crotonaldehyde-2,4-dinitrophenylhydrazone</i> <i>Formaldehyde-2,4-dinitrophenylhydrazone</i> <i>Propionaldehyde-2,4-dinitrophenylhydrazone</i>	
Aldehyde/ketone-DNPH TO11/IP-6A Mix	15 µg/mL each component in acetonitrile (aldehyde, equivalent)	47285-U 4M7285-U	1 mL 3 × 1 mL
	<i>Acetaldehyde-2,4-dinitrophenylhydrazone</i> <i>Acetone-2,4-dinitrophenylhydrazone</i> <i>Acrolein-2,4-dinitrophenylhydrazone</i> <i>Benzaldehyde-2,4-dinitrophenylhydrazone</i> <i>Butyraldehyde-2,4-dinitrophenylhydrazone</i> <i>Crotonaldehyde-2,4-dinitrophenylhydrazone</i> <i>2,5-Dimethylbenzaldehyde 2,4-dinitrophenylhydrazone</i> <i>Formaldehyde-2,4-dinitrophenylhydrazone</i>	<i>Hexaldehyde-2,4-dinitrophenylhydrazone</i> <i>Isovaleraldehyde 2,4-dinitrophenylhydrazone</i> <i>Propionaldehyde-2,4-dinitrophenylhydrazone</i> <i>o-Tolualdehyde 2,4-dinitrophenylhydrazone</i> <i>m-Tolualdehyde 2,4-dinitrophenylhydrazone</i> <i>p-Tolualdehyde 2,4-dinitrophenylhydrazone</i> <i>Valeraldehyde-2,4-dinitrophenylhydrazone</i>	

TO-13: Polynuclear Aromatic Hydrocarbons by Capillary GC-MS

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA TCL PAH Mix	in acetonitrile: methanol (9:1) (varied)	49156	1 mL
	<i>Acenaphthene, 1000 µg/mL</i> <i>Acenaphthylene, 500 µg/mL</i> <i>Anthracene, 20 µg/mL</i> <i>Benz[a]anthracene, 50 µg/mL</i> <i>Benzo[b]fluoranthene, 20 µg/mL</i> <i>Benzo[k]fluoranthene, 20 µg/mL</i> <i>Benzo[ghi]perylene, 80 µg/mL</i> <i>Benzo[a]pyrene, 50 µg/mL</i>	<i>Chrysene, 50 µg/mL</i> <i>Dibenz[a,h]anthracene, 200 µg/mL</i> <i>Fluoranthene, 50 µg/mL</i> <i>Fluorene, 100 µg/mL</i> <i>Indeno[1,2,3-cd]pyrene, 50 µg/mL</i> <i>Naphthalene, 500 µg/mL</i> <i>Phenanthrene, 40 µg/mL</i> <i>Pyrene, 100 µg/mL</i>	

Air Monitoring Standards

U.S. EPA Toxic Organic Air Monitoring Methods: *TO-14 Air Monitoring Gas Standards**TO-14 Air Monitoring Gas Standards*

Air Liquide America Speciality Gases Toxic-Organic (TO)-14 gas calibration standards provide reliable, accurate instrument calibration when measuring volatile and semivolatile organic compounds (VOCs) in ambient air. These standards meet the requirements of U.S. Environmental Protection Agency's Method TO-14, "Determination of VOCs in Ambient Air Using Specially Prepared Canisters with Subsequent Analysis by gas Chromatography".

The gas blends are packaged in SCOTTY 110 L high pressure, transportable, laboratory-size cylinders. Where available, the components in TO-14 gas calibration blends are traceable to NIST reference mixtures (NIST SRM 1804). All are certified for superior stability and accuracy. A certificate of accuracy is supplied with each gas cylinder purchase. Additional copies of these certificates can be obtained at www.scottycerts.com.

Shelf life: 1 year from date of manufacture.

Scotty 110 L Gas Cylinder Specifications (pi-marked*)

Contents: 110 Liters (3.9cf)

Pressure: 1800 psig (124 bar)

Outlet Fitting: CGA 180

Weight: 2.2lbs/1kg

Dimensions: 3.25 inches D x 11.625 inches H (82.6mm x 295.3mm)

U.S. D.O.T.

Specs: 3AL2216

*Pi-marked cylinders comply with the requirements of the Transportable Equipment Directive (TPED) for movement in the EU.

Description	Concentration	Cat. No.	Qty
EPA TO-14 Calibration Mix 1 (39 components)	100 ppb each component in nitrogen	41900-U	110 L
	<i>Benzene</i> <i>Bromomethane</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>Chloroethane</i> <i>Chloroform</i> <i>Chloromethane</i> <i>1,2-Dibromoethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Dichlorodifluoromethane</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i> <i>1,1-Dichloroethylene</i> <i>cis-1,2-Dichloroethylene</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i>	<i>1,2-Dichlorotetrafluoroethane</i> <i>Ethylbenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Styrene</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>Toluene</i> <i>1,2,4-Trichlorobenzene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i> <i>Trichlorofluoromethane</i> <i>1,1,2-Trichloro-1,2,2-trifluoroethane</i> <i>1,2,4-Trimethylbenzene</i> <i>1,3,5-Trimethylbenzene (Supelco 47281)</i> <i>Vinyl chloride</i> <i>o-Xylene</i> <i>m-Xylene</i> <i>p-Xylene</i>	
EPA TO-14 Calibration Mix 1 (39 components)	1 ppm in nitrogen	509981	110 L
	<i>Benzene</i> <i>Bromomethane</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>Chloroethane</i> <i>Chloroform</i> <i>Chloromethane</i> <i>1,2-Dibromoethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Dichlorodifluoromethane</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i> <i>1,1-Dichloroethylene</i> <i>cis-1,2-Dichloroethylene</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i>	<i>1,2-Dichlorotetrafluoroethane</i> <i>Ethylbenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Styrene</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>Toluene</i> <i>1,2,4-Trichlorobenzene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i> <i>Trichlorofluoromethane</i> <i>1,1,2-Trichloro-1,2,2-trifluoroethane</i> <i>1,2,4-Trimethylbenzene</i> <i>1,3,5-Trimethylbenzene (Supelco 47281)</i> <i>Vinyl chloride</i> <i>o-Xylene</i> <i>m-Xylene</i> <i>p-Xylene</i>	
EPA TO-14A Aromatic Subset Mix	100 ppb in nitrogen	41901	110 L
	<i>Benzene</i> <i>Chlorobenzene</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Ethylbenzene</i> <i>Styrene</i>	<i>Toluene</i> <i>1,2,4-Trichlorobenzene</i> <i>1,2,4-Trimethylbenzene</i> <i>Mesitylene</i> <i>o-Xylene</i> <i>m-Xylene</i> <i>p-Xylene</i>	
EPA TO-14A CFC/HCFC Subset Mix	100 ppb in nitrogen	41903	110 L
	<i>1,2-Dichlorotetrafluoroethane</i> <i>Trichlorofluoromethane</i>	<i>1,1,2-Trichloro-1,2,2-trifluoroethane</i> <i>Halocarbon 12</i>	
EPA TO-14A Reactive Subset Mix	100 ppb in nitrogen	41911	110 L
	<i>Allyl chloride</i> <i>1,3-Butadiene</i>	<i>4-Ethyltoluene</i>	

Air Monitoring Standards

U.S. EPA Toxic Organic Air Monitoring Methods: *TO-14 Air Monitoring Gas Standards*

Description	Concentration		Cat. No.	Qty	
EPA TO-14A Chlorinated Hydrocarbon Subset Mix	100 ppb in nitrogen	Carbon tetrachloride Chloroethane Chloroform Chloromethane 1,1-Dichloroethane 1,2-Dichloroethane 1,1-Dichloroethylene cis-1,2-Dichloroethylene Dichloromethane 1,2-Dichloropropane	cis-1,3-Dichloropropene trans-1,3-Dichloropropene Hexachloro-1,3-butadiene 1,1,2,2-Tetrachloroethane Tetrachloroethylene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethylene Vinyl chloride	41902	110 L
EPA TO-14A GC-MS Tuning Standard	2 ppm bromofluorobenzene in nitrogen		41913	110 L	
JHAP-9 Mix	100 ppb in nitrogen	Acrylonitrile Benzene 1,3-Butadiene Chloroform 1,2-Dichloroethane	Dichloromethane Tetrachloroethylene Trichloroethylene Vinyl chloride	507970	110 L
JHAP-43 Mix	1 ppm in nitrogen	Acrylonitrile Allyl chloride Benzene Bromomethane 1,3-Butadiene Carbon tetrachloride Chlorobenzene Chloroethane Chloroform Chloromethane 1,2-Dibromoethane 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene Dichlorodifluoromethane 1,1-Dichloroethane 1,2-Dichloroethane 1,1-Dichloroethylene cis-1,2-Dichloroethylene Dichloromethane 1,2-Dichloropropane cis-1,3-Dichloropropene	trans-1,3-Dichloropropene 1,2-Dichlorotetrafluoroethane Ethylbenzene 4-Ethyltoluene Hexachloro-1,3-butadiene Styrene 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,2,4-Trichlorobenzene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethylene Trichlorofluoromethane 1,1,2-Trichloro-1,2,2-trifluoroethane 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene (Supelco 47281) Vinyl chloride o-Xylene m-Xylene p-Xylene	500429	110 L
JHAP-43 Mix	100 ppb in nitrogen	Acrylonitrile Allyl chloride Benzene Bromomethane 1,3-Butadiene Carbon tetrachloride Chlorobenzene Chloroethane Chloroform Chloromethane 1,2-Dibromoethane 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene Dichlorodifluoromethane 1,1-Dichloroethane 1,2-Dichloroethane 1,1-Dichloroethylene cis-1,2-Dichloroethylene Dichloromethane 1,2-Dichloropropane cis-1,3-Dichloropropene	trans-1,3-Dichloropropene 1,2-Dichlorotetrafluoroethane Ethylbenzene 4-Ethyltoluene Hexachloro-1,3-butadiene Styrene 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,2,4-Trichlorobenzene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethylene Trichlorofluoromethane 1,1,2-Trichloro-1,2,2-trifluoroethane 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene (Supelco 47281) Vinyl chloride o-Xylene m-Xylene p-Xylene	500011	110 L
BTEX Mix in nitrogen	10 ppm each component in nitrogen	Benzene Ethylbenzene Toluene	o-Xylene m-Xylene p-Xylene	501883	48 L

Air Monitoring Standards

U.S. EPA Toxic Organic Air Monitoring Methods: SCOTTY® 110 Accessories

SCOTTY® 110 Accessories

Pressure Regulator for Use with TO-14/15 Cylinders



	Cat. No.	Qty
Model 226 Pressure Regulator with gauge, single-stage	41910-U	1 ea

Model 6 SCOTTY® Regulator for SCOTTY 104 Cylinders

- Stainless steel body with 316 L stainless steel/Elgiloy diaphragm
- PCTFE seat and PTFE seals
- Supply pressure gauge 0-3000 psig
- Delivery pressure range 0-100 psig
- CGA 110/180 connector
- Regulator supplied with 1/8 inch tube connector or syringe adapter



Description	Cat. No.	Qty
with connector	509965	1 ea
with syringe adapter	501115	1 ea

Stand for SCOTTY® 110 HP Cylinder

Ensures your SCOTTY 110 cylinder will be stable on a bench-top or other flat surface. This product will hold cylinders with a 3¼" diameter.



41909	1 ea
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Air Monitoring Standards

U.S. EPA Toxic Organic Air Monitoring Methods: *TO-15/17 Air Monitoring Gas Standards*

TO-15/17 Air Monitoring Gas Standards

Air Liquide America Speciality Gases Toxic Organic (TO) calibration gas mixtures are an excellent choice for use in monitoring ppb and ppm levels of toxic volatiles and semi-volatiles in air in accordance with U.S. Environmental Protection Agency's TO-15/17 and Photochemical Assessment Monitoring Systems (PAMS) methodologies, and other related government regulations. Each gas mixture is produced individually and gravimetrically using NIST traceable weights. The content of each TO-15/17 and PAMS cylinder is then verified by gas chromatography before it leaves the facility. The test findings are provided on the certificate of accuracy shipped with each cylinder. Additional copies can be obtained at www.scottycerts.com.

TO-15/17 and PAMS gas calibration mixtures are offered in a lightweight Scotty 110L Extra-Life transportable aluminum cylinder. These cylinders feature Air Liquide America Speciality Gases' exclusive Aculife™ cylinder treatment process for guaranteed mixture stability.

These toxic organic gas calibration mixtures also feature:

- Guaranteed 12 month shelf life at 1ppm and 6 month shelf life at 100ppb
- Guaranteed stability of all components at 1ppm including carbon disulfide, ethanol, and benzyl chloride
- Guaranteed stability of all components at 100ppb with carbon disulfide, ethanol, 2-propanol, and benzyl chloride having a $\pm 25\%$ blend tolerance and analytical accuracy
- Available to be manufactured in different lots to meet secondary source requirements
- Guaranteed $\pm 10\%$ analytical accuracy (except as noted below)
- $\pm 10\%$ blend tolerance (except as noted below)

Scotty 110 L Gas Cylinder Specifications (pi-marked*)

Contents: 110 Liters (3.9cf)

Pressure: 1800 psig (124 bar)

Outlet Fitting: CGA 180

Weight: 2.2lbs/1kg

Dimensions: 3.25 inches D x 11.625 inches H (82.6mm x 295.3mm)

U.S. D.O.T.

Specs: 3AL2216

*Pi-marked cylinders comply with the requirements of the Transportable Pressure Equipment Directive (TPED) for movement within the EU.

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA TO-15/17 Calibration mix	100 ppb each component in nitrogen	41974-U	110 L
	Acetone	1,4-Dioxane	
	Benzene	Ethanol	
	Benzyl chloride	Ethyl acetate	
	Bromodichloromethane	Ethylbenzene	
	Bromoform	4-Ethyltoluene	
	Bromomethane	Heptane	
	1,3-Butadiene	Hexachloro-1,3-butadiene	
	2-Butanone	Hexane	
	Carbon disulfide	2-Hexanone	
	Carbon tetrachloride	4-Methyl-2-pentanone	
	Chlorobenzene	Mesitylene	
	Chloroethane	tert-Butyl methyl ether	
	Chloroform	2-Propanol	
	Chloromethane	Propylene	
	Cyclohexane	Styrene	
	Dibromochloromethane	1,1,2,2-Tetrachloroethane	
	1,2-Dibromoethane	Tetrachloroethylene	
	1,2-Dichlorobenzene	Tetrahydrofuran	
	1,3-Dichlorobenzene	Toluene	
	1,4-Dichlorobenzene	1,2,4-Trichlorobenzene	
	Dichlorodifluoromethane	Trichlorofluoromethane	
	1,1-Dichloroethane	1,1,1-Trichloroethane	
	1,2-Dichloroethane	1,1,2-Trichloroethane	
	1,1-Dichloroethylene	Trichloroethylene	
	cis-1,2-Dichloroethylene	1,1,2-Trichloro-1,2,2-trifluoroethane	
	trans-1,2-Dichloroethylene	1,2,4-Trimethylbenzene	
	Dichloromethane	Vinyl acetate	
	1,2-Dichloropropane	Vinyl chloride	
	cis-1,3-Dichloropropene	m-Xylene	
	trans-1,3-Dichloropropene	o-Xylene	
	1,2-Dichlorotetrafluoroethane	p-Xylene	

Air Monitoring Standards

U.S. EPA Toxic Organic Air Monitoring Methods: *TO-15/17 Air Monitoring Gas Standards*

Description	Concentration	Cat. No.	Qty	
EPA TO-15/17 Calibration mix	1 ppm in nitrogen Acetone Benzene Benzyl chloride Bromofom Bromomethane Bromodichloromethane 1,3-Butadiene 2-Butanone Carbon disulfide Carbon tetrachloride Chlorobenzene Chloroethane Chloroform Cyclohexane Chloromethane Dibromochloromethane 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 1,1-Dichloroethane 1,2-Dichloroethane 1,1-Dichloroethylene cis-1,2-Dichloroethylene trans-1,2-Dichloroethylene 1,2-Dichloropropane cis-1,3-Dichloropropene trans-1,3-Dichloropropene 1,4-Dioxane Ethanol Ethyl acetate Ethylbenzene	1,2-Dibromoethane 4-Ethyltoluene Trichlorofluoromethane Dichlorodifluoromethane 1,1,2-Trichloro-1,2,2-trifluoroethane 1,2-Dichlorotetrafluoroethane Heptane Hexachloro-1,3-butadiene Hexane 2-Hexanone 4-Methyl-2-pentanone Dichloromethane tert-Butyl methyl ether 2-Propanol Propylene Styrene 1,1,2,2-Tetrachloroethane Tetrachloroethylene Tetrahydrofuran Toluene 1,1,1-Trichloroethane 1,1,1-Trichloroethane Trichloroethylene 1,2,4-Trichlorobenzene 1,2,4-Trimethylbenzene Mesitylene Vinyl acetate Vinyl chloride m-Xylene o-Xylene p-Xylene	41973-U	110 L
EPA TO-15/17 Calibration mix	1 ppm each component in nitrogen Acetone Allyl chloride Benzyl chloride Bromodichloromethane Bromofom 1,3-Butadiene 2-Butanone Carbon disulfide Cyclohexane Dibromochloromethane 1,4-Dioxane Ethyl acetate 4-Ethyltoluene	Heptane Hexane 2-Hexanone 4-Methyl-2-pentanone tert-Butyl methyl ether 2-Propanol Propylene Tetrahydrofuran trans-1,2-Dichloroethylene 2,2,4-Trimethylpentane Vinyl acetate Vinyl bromide	41978-U	110 L
EPA TO-15/17 Calibration mix	100 ppb each component in nitrogen Acetone Allyl chloride Benzyl chloride Bromodichloromethane Bromofom 1,3-Butadiene 2-Butanone Carbon disulfide Cyclohexane Dibromochloromethane 1,4-Dioxane Ethyl acetate 4-Ethyltoluene	Heptane Hexane 2-Hexanone 4-Methyl-2-pentanone tert-Butyl methyl ether 2-Propanol Propylene Tetrahydrofuran trans-1,2-Dichloroethylene 2,2,4-Trimethylpentane Vinyl acetate Vinyl bromide	41979-U	110 L
Massachusetts APH Mix	in nitrogen (varied) Benzene, 310 ppb 1,3-Butadiene, 450 ppb Butylcyclohexane, 170 ppb tert-Butyl methyl ether, 270 ppb Cumene, 200 ppb Cyclohexane, 290 ppb Decane, 170 ppb 2,3-Dimethylheptane, 190 ppb 2,3-Dimethylpentane, 240 ppb Dodecane, 140 ppb Ethylbenzene, 230 ppb Heptane, 240 ppb Hexane, 280 ppb	Isopentane, 330 ppb p-Cymene 1-Methyl-3-ethylbenzene, 200 ppb Naphthalene, 190 ppb Nonane, 190 ppb Octane, 210 ppb Toluene, 260 ppb 1,2,3-Trimethylbenzene, 200 ppb 1,3,5-Trimethylbenzene, 200 ppb Undecane, 150 ppb m-Xylene, 230 ppb o-Xylene, 230 ppb p-Xylene, 230 ppb	41982-U	110 L

Air Monitoring Standards

U.S. EPA Toxic Organic Air Monitoring Methods: *TO-15/17 Air Monitoring Gas Standards*

Description	Concentration	Cat. No.	Qty
Ozone precursor / PAMS mix	x ppb in nitrogen (varied) Acetylene, 40 ppb Benzene, 30 ppb Butane, 40 ppb 1-Butene, 30 ppb cis-2-Butene, 35 ppb trans-2-Butene, 25 ppb Cyclohexane, 40 ppb Cyclopentane, 20 ppm Decane, 30 ppb 1,3-Diethylbenzene, 40 ppb 1,4-Diethylbenzene, 25 ppb 2,2-Dimethylbutane, 40 ppb 2,3-Dimethylbutane, 50 ppb 2,3-Dimethylpentane, 50 ppb 2,4-Dimethylpentane, 40 ppb Dodecane, 40 ppb Ethane, 25 ppb Ethylbenzene, 25 ppb Ethylene, 20 ppb 3-Ethyltoluene, 25 ppb 2-Ethyltoluene, 40 ppb 4-Ethyltoluene, 40 ppb Heptane, 25 ppb Hexane, 30 ppb 1-Hexene, 60 ppb 2-Methylpropane, 25 ppb 2-Methylbutane, 40 ppb Isoprene, 40 ppb	41977-U Cumene, 40 ppb Methylcyclohexane, 30 ppb Methylcyclopentane, 25 ppb 2-Methylheptane, 25 ppb 3-Methylheptane, 25 ppb 2-Methylhexane, 25 ppb 3-Methylhexane, 25 ppb 2-Methylpentane, 20 ppb 3-Methylpentane, 40 ppb Nonane, 25 ppb Octane, 30 ppb Pentane, 25 ppb 1-Pentene, 25 ppb cis-2-Pentene, 35 ppb trans-2-Pentene, 25 ppb Propane, 40 ppb Propylbenzene, 30 ppb Propylene, 25 ppb Styrene, 40 ppb Toluene, 40 ppb 1,2,3-Trimethylbenzene, 25 ppb 1,2,4-Trimethylbenzene, 40 ppb Mesitylene, 25 ppb 2,2,4-Trimethylpentane, 30 ppb 2,3,4-Trimethylpentane, 25 ppb Undecane, 30 ppb Xylenes, 40 ppb o-Xylene, 25 ppb	110 L
Ozone precursor / PAMS mix	1 ppm each component in nitrogen Acetylene Benzene Butane 1-Butene cis-2-Butene trans-2-Butene Cyclohexane Cyclopentane Decane 1,3-Diethylbenzene 1,4-Diethylbenzene 2,2-Dimethylbutane 2,3-Dimethylbutane 2,3-Dimethylpentane 2,4-Dimethylpentane Dodecane Ethane Ethylbenzene Ethylene 3-Ethyltoluene 2-Ethyltoluene 4-Ethyltoluene Heptane Hexane 1-Hexene 2-Methylpropane 2-Methylbutane Isoprene	41976-U Cumene Methylcyclohexane Methylcyclopentane 2-Methylheptane 3-Methylheptane 2-Methylhexane 3-Methylhexane 2-Methylpentane 3-Methylpentane Nonane Octane Pentane 1-Pentene cis-2-Pentene trans-2-Pentene Propane Propylbenzene Propylene Styrene Toluene 1,2,3-Trimethylbenzene 1,2,4-Trimethylbenzene Mesitylene 2,2,4-Trimethylpentane 2,3,4-Trimethylpentane Undecane Xylenes o-Xylene	110 L
Ozone Precursor / PAMS Mix	100 ppb each component in nitrogen Acetylene Benzene Butane 1-Butene cis-2-Butene trans-2-Butene Cumene Cyclohexane Cyclopentane Decane 1,3-Diethylbenzene 1,4-Diethylbenzene 2,2-Dimethylbutane 2,3-Dimethylbutane 2,3-Dimethylpentane 2,4-Dimethylpentane Dodecane Ethane Ethylbenzene Ethylene 3-Ethyltoluene 2-Ethyltoluene 4-Ethyltoluene Heptane Hexane 1-Hexene Isoprene Mesitylene	41975-U 2-Methylpropane 2-Methylbutane Methylcyclohexane Methylcyclopentane 2-Methylheptane 3-Methylheptane 2-Methylhexane 3-Methylhexane 2-Methylpentane 3-Methylpentane Nonane Octane Pentane 1-Pentene cis-2-Pentene trans-2-Pentene Propane Propylbenzene Propylene Styrene Toluene 1,2,3-Trimethylbenzene 1,2,4-Trimethylbenzene 2,2,4-Trimethylpentane 2,3,4-Trimethylpentane Undecane m-Xylene, p-Xylene (50:50) o-Xylene	110 L

Air Monitoring Standards

Gas Calibration Standards: *Air Liquide/Scotty® Gas Products*

Gas Calibration Standards

Air Liquide/Scotty® Gas Products

We offer an expanded line of pure gases and gas mixtures manufactured for Supelco by Air Liquide America Specialty Gases. Supelco warrants that the Air Liquide calibration gas products listed below meet the analytical specifications for the period of time stated on the cylinder and/or the Certificate of Analysis.

Supelco attempts to provide a product with at least 4 months of usable shelf life from date of purchase.

Note: Scotty 14 L and 48 L gas standard cylinders do not conform to the standards and regulations of the European Union (EU).

Specifications

SCOTTY 4 Liters

Contents: 4 liters, Pressure: 120 psig, Outlet Fitting: Aerosol-type push button with applicator tube, Weight: ~100 g, Dimensions: 2.5 x 8 in., D.O.T. Specs: 2Q

SCOTTY 14 Liters

Contents: 14 liters, Pressure: 240 psig, Outlet Fitting: CGA-160-1/8 in. NPT F, Weight: 1.5 lb, Dimensions: 3 x 11 in., D.O.T. Specs: 4B240

SCOTTY 48 Liters

Contents: 48 liters, Pressure: 300 psig, Outlet Fitting: CGA-165, Weight: 1.75 lb, Dimensions: 4 x 16.25 in., D.O.T. Specs: 39 NRC

SCOTTY 110 Liters

Contents: 110 liters, Pressure: 1800 psig, Outlet Fitting: CGA-180, Weight: 2.2 lbs, Dimensions: 3.25 x 11.625 in., D.O.T. Specs: 3AL2216

Pure Gases

Description	Cat. No.	Qty
Air, Zero (THC <1ppm)	501212 501220 501239	4 L 14 L 48 L
Argon (99.995%)	501247 501255	4 L 14 L
Carbon dioxide (99.8%)	23402 501298	14 L 48 L
Ethylene (99.5%), analytical standard	25881-U	14 L
Hydrogen (99.99%), analytical standard	300100	14 L
Methane (99.0%), 99.0%, analytical standard	22562	14 L
Nitrogen (99.99%)	25877-U 25879-U 25882-U	4 L 14 L 48 L
Oxygen (99.6%), 99.6%, analytical standard	300500-U	1 ea

Two-Component Mixtures

Description	Cat. No.	Qty
Benzene in air, 1 ppm, analytical standard	303402-U	48 L
Benzene in air, 100 ppm, analytical standard	303404	48 L
1,3-Butadiene in nitrogen, 10 ppm	303405 303406	14 L 48 L
Carbon dioxide in helium, 100 ppm, analytical standard	308200	14 L
Carbon dioxide in nitrogen	308300 501301	14 L 48 L
Carbon dioxide in nitrogen	501336 501344	14 L 48 L
Chlorine in nitrogen, 10 ppm, analytical standard	501352	104 L
Ethylene in air, 10 ppm, analytical standard	501379	14 L
Ethylene in helium, 100 ppm, analytical standard	22572	14 L
Hydrogen in helium, 100 ppm, analytical standard	301200	14 L
Hydrogen in nitrogen, 100 ppm, analytical standard	301300	14 L
Hydrogen in nitrogen, 1%	501417 501425	14 L 48 L
Methane in helium, 100 ppm	501441 307200 501468	4 L 14 L 48 L
Methane in nitrogen, 100 ppm, analytical standard	307300-U	14 L
Methane in nitrogen, 1%	501476 23443	4 L 14 L
Nitrogen in helium, 100 ppm, analytical standard	303200	14 L
Nitrous oxide in nitrogen, 1 ppm	501514 501522	14 L 48 L
Nitrous oxide in nitrogen, 10 ppm, analytical standard	25883-U	48 L
Oxygen in helium, 100 ppm, analytical standard	305200	14 L
Oxygen in helium, 1%, analytical standard	25878-U	4 L
Oxygen in nitrogen, 1%, analytical standard	25880-U	14 L
Oxygen in nitrogen, 2 %, 2%	501549 501557	14 L 48 L
Oxygen in nitrogen, 6 %, 6%	501565 501573	4 L 14 L
Vinyl chloride in nitrogen , 1 ppm	22554 501603	14 L 48 L
Vinyl chloride in nitrogen , 10 ppm, analytical standard	22553	14 L
Vinyl chloride in nitrogen , 50 ppm, analytical standard	22555-U	14 L
Vinyl chloride in nitrogen , 100 ppm, analytical standard	22552	14 L
Vinyl chloride in nitrogen , 1000 ppm, analytical standard	22556	14 L
1,1,1-Trichloroethane in nitrogen, 10 ppm, analytical standard	303408	48 L
Trichloroethylene in nitrogen, 10 ppm	303400 303401	14 L 48 L

Air Monitoring Standards

Gas Calibration Standards: *Air Liquide/Scotty® Gas Products*

Three-Component Mixtures

Description	Cat. No.	Qty
Carbon Dioxide (1%) and Oxygen (20%) in Nitrogen	23441 501638	14 L 48 L

Multi-Component Mixtures

Description	Cat. No.	Qty
C ₂ -C ₄ Alkynes, 15 ppm each component in nitrogen, analytical standard	22508	4 L
BTEX Mix in nitrogen, 10 ppm each component in nitrogen	501883 25884-U	48 L 74 L
Branched paraffins, 15 ppm each component in nitrogen, analytical standard	23445	14 L
n-Butane, iso-butane, cis-2-butene, trans-2-butene, 1-butene, iso-butylene, 1,3-butadiene, and ethyl acetylene, 15 ppm each component in nitrogen	22567 23471	4 L 48 L
Carbon Monoxide, Carbon Dioxide, Hydrogen and Oxygen	23438 501654	14 L 48 L
Carbon Monoxide, Carbon Dioxide, Hydrogen, Methane and Oxygen	501670 22561 23463	4 L 14 L 48 L
Carbon Monoxide, Carbon Dioxide, Methane, Ethane, Ethylene and Acetylene, 1% each component in nitrogen	501662 23462	4 L 48 L
Carbon Monoxide (5%), Carbon Dioxide (5%), Nitrogen (5%), Oxygen (5%), Methane (4%) and Hydrogen (4%), 4-5 % (w/w) each component in helium, analytical standard	501697	14 L
Carbon Monoxide (7%), Carbon Dioxide (15%), Oxygen (4%), and Methane (4.5%), in nitrogen	501743 501751	14 L 48 L
Carbon Monoxide (7%), Carbon Dioxide (15%), and Oxygen (5%), in nitrogen, analytical standard	23442	14 L
Methane, Ethane, Ethylene, Acetylene, Propane, Propylene, Propyne, and n-Butane, 15 ppm each component in nitrogen	22566 23470-U	4 L 48 L
C ₁ -C ₆ n-Paraffins, 15 ppm each component in nitrogen	501778 23444 501786	4 L 14 L 48 L
C ₁ -C ₆ n-Paraffins, 100 ppm each component in nitrogen	501840 330300 501859	4 L 14 L 48 L
C ₁ -C ₆ n-Paraffins, 100 ppm each component in helium	501794 330200 501808	4 L 14 L 48 L
C ₁ -C ₆ n-Paraffins, 1000 ppm each component in helium	501816 501824 501832	4 L 14 L 48 L
C ₂ -C ₆ Olefins, 100 ppm each component in helium	332200 501867	14 L 48 L
C ₂ -C ₆ Olefins, 100 ppm each component in nitrogen	332300-U 501875	14 L 48 L

Natural Gas Reference Standards

Prepared gravimetrically with weights traceable to the National Institute of Standards and Technology, then verified by analysis. Supplied in 14 L SCOTTY 14 cylinders. Shelf life: 1 year.

Ordering information provided below.
not available in EU

Component (Mole Percent)	GPA Standard	Calorimetric Standard	High Ethane Standard	Helium-enriched Standard
Helium	0.50			2.00
Nitrogen	5.00	2.50	9.00	1.60
Carbon dioxide	1.00	3.00	0.50	0.20
Methane	70.50	88.73	64.00	88.90
Ethane	9.00	3.50	12.50	3.00
Propane	6.00	1.00	7.00	1.70
Isobutane	3.00	0.40	3.00	1.00
n-Butane	3.00	0.40	3.00	1.00
Isopentane	1.00	0.15	0.50	0.30
n-Pentane	1.00	0.15	0.50	0.30
Neopentane		0.10		
n-Hexane		0.05		
n-Heptane		0.02		
BTU	1298	1028	1500	1083
Qty	785 g	790 g	763 g	774 g

Description	Cat. No.	Qty
Calorimetric Natural Gas Reference Standard, analytical standard	303101	14 L
GPA Natural Gas Reference Standard, volume 14 L, analytical standard	303100-U	14 L
High Ethane Natural Gas Reference Standard, part volume 14 L, analytical standard	303102	14 L
Helium Enriched Natural Gas Reference Standard, part volume 14 L, analytical standard	303103	14 L

Air Monitoring Standards

Gas Calibration Standards: *Air Liquide/Scotty® Gas Accessories*

Air Liquide/Scotty® Gas Accessories

Regulators for Scott Gas Standards

Designed for noncorrosive service. Gauge displays remaining cylinder pressure, regulator adjusts delivery pressure

- Brass body with acetal resin bonnet/Viton diaphragm
- Tamper resistant locking control knob
- Inlet connection ¼ inch AN flare (CGA-165 or CGA-160)
- Maximum inlet pressure 300 psig
- Delivery pressure range 1-60 psig, can be preset
- Miniature
- Cat. No. 25885-U fits the 74 L Scotty 48-EL (Cat. No. 25884-U)



Top: 507911(CGA-160), Bottom: 501395 (CGA-165)

Description	Cat. No.	Qty
Model 226 Single-Stage Regulator, CGA-170, (for SCOTTY® 74L cylinder)	25885-U	1 ea
Model 24 Single-Stage Regulator, for use with CGA-165 (for SCOTTY 48 cylinder)	501395	1 ea
Model 24 Single-Stage Regulator, for use with CGA-160 (for SCOTTY 14 cylinder)	507911	1 ea

Syringe Adapter for SCOTTY® 14 and 48 Cylinders

Withdraw calibration gas into a syringe, through a silicone rubber septum. A vent at the septum permits purging prior to filling the syringe. Constructed of chromium-plated brass. Maximum pressure 240psi (16.9kg/cm2). ⅛ in. NPT male fitting.



Description	Cat. No.	Qty
Syringe Adaptor	609010	1 ea
Syringe Adapter Replacement Septa	608010	10 ea

Miniature Regulator with Gauge

Reliable pressure regulation to 1 psig (0.07 kg/cm²), indicated on a 0-60 psi (4.2 kg/cm²) gauge. Easily connects to SCOTTY 14 cylinders with the ⅛-inch NPT connector provided. You can also attach the syringe adapter (Cat. No. 609010) to the regulator for low pressure sample removal. Aluminum body with acetyl resin bonnet. Maximum inlet pressure: 400 psi (28.1 kg/cm²).



513010

1 ea

Stand for SCOTTY® 110 HP Cylinder

Ensures your SCOTTY 110 cylinder will be stable on a bench-top or other flat surface. This product will hold cylinders with a 3¼" diameter.



41909

1 ea

Stand for SCOTTY® 48 Cylinder

Stabilizes your cylinder on a benchtop or other flat surface. This item will hold cylinders with a four-inch diameter.



500410

1 ea

Environmental Standards

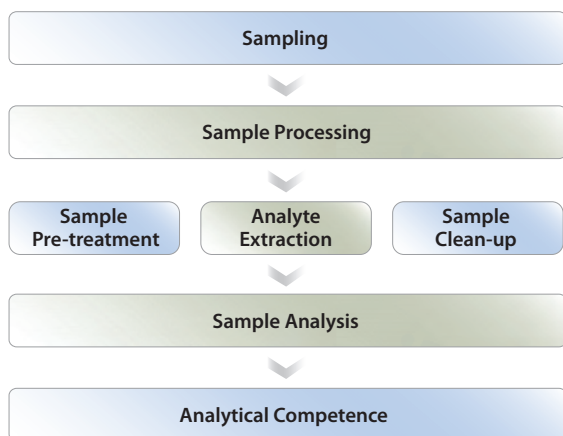
Proficiency Testing

Environmental Standards

Proficiency Testing

ENSURE ACCURACY AND PRECISION

Ensuring your laboratory's results are accurate and precise is critical in a competitive market. The analytical competence of a laboratory is guaranteed in the form of accreditation from an approved body. An essential part of the process is the participation in proficiency testing, usually in the form of the analysis of Certified Reference Materials (CRM) or Proficiency Testing (PT) Samples.



PROFICIENCY TESTING FROM SIGMA-ALDRICH RTC

Sigma-Aldrich RTC has been producing environmental laboratory testing programs, also known as Performance Evaluation (PE) for more than 20 years. More than 20,000 certified PT samples a year are sent to over 2500 labs worldwide.

Our environmental laboratory proficiency testing programs are accredited by ACLASS to ISO/IEC 17043:2010, Certificate No. AP-1469 and recognized by all accreditation bodies worldwide, and cover the following areas of testing:

- Waste Water (including surface, borehole, discharge and sea waters (WP))
- Drinking Water (WS)
- Contaminated Land (LPTP/UST)
- Air Quality and Emissions (AIR)

Sigma-Aldrich RTC is an approved TNI PT Provider

THE RTC ADVANTAGE

Water:

- **Matrix Modifiers** - Specific water matrix modifiers are available for hard, waste and sea water to stimulate real water samples
- **Choice of Formats** - Most RTC water PT samples are available as concentrates or ready-to-use volumes
- **Water PT** (duplicate samples - concentrates only) - One sample can be used for analysis, the other retained for QC purposes using the study data values.

Solids:

RTC Soil PT samples behave as real samples; and, unless there is no alternative, are not simply spikes added to a blank soil.

Supply:

- **CRMs Match PT Samples** - For every PT sample, a CRM is available.
- **Quick-Turn Studies** - If you are a registered PT studies end user, Quick-Turn studies are available at no additional cost, alongside regularly scheduled distributions.

Reporting:

- **Flexible Reporting** - Multiple Methods, analysts or equipment can be reported for the same analyte at no extra charge.
- **Third Party Reporting** - Evaluation reports can be sent to an authorized third party at no additional cost.
- **On Line Reporting** - Results can be uploaded and all PT documents viewed and downloaded through our secure website.
- **Certificates of Excellence & Proficiency** - Issued to laboratories that demonstrate excellence throughout the year.

Overview of Proficiency Testing Products

	Metals & Inorganics	Organics	Gases	Physical Properties
Drinking Water (WS)	✓	✓		✓
WP		✓		✓
Soils & Solid Waste	✓	✓		
Air	✓	✓	✓	
Micro		✓		



Air PTs

Values of analytes vary lot-to-lot.

FOR PT ORDERS: visit www.sigmaaldrich.com/pt or contact your local office.

Description	Cat. No.	Pkg
Sulfur Dioxide in Impinger Solution	PEA1900-20ML	20 mL
Ammonia in Impinger Solution	PEA1901-20ML	20 mL
Fluoride in Impinger Solution	PEA1902-20ML	20 mL
Sulfuric Acid in Impinger Solution	PEA1903-20ML	20 mL
Nitrogen Oxide in Impinger Solution	PEA1904-20ML	20 mL
Hydrogen Halides/Halogens in Impinger Solution	PEA1905-20ML	20 mL
Particulate Matter in Impinger Solution	PEA1906-250ML	250 mL
Particulate Matter on Filter Paper	PEA1907-1EA	1 ea
Metals on Filter Paper	PEA1910-1EA	1 ea
Anions on Filter Paper	PEA1911-1EA	1 ea
Mercury on Filter Paper	PEA1912-1EA	1 ea
Lead on Filter Paper	PEA1913-1EA	1 ea

Environmental Standards

Proficiency Testing

Description	Cat. No.	Pkg
Metals in Impinger Solution	PEA1915-250ML	250 mL
Mercury in Impinger Solution	PEA1916-20ML	20 mL
Lead in Impinger Solution	PEA1917-250ML	250 mL
Chromium (VI) in Impinger Solution	PEA1918-20ML	20 mL
Semivolatiles on PUF	PEA1921-1EA	1 ea
PCBs on PUF	PEA1922-1EA	1 ea
Aldehydes/Ketones on Sorbent	PEA1923-1EA	1 ea
Pesticides on PUF	PEA1924-1EA	1 ea
PAHs on PUF	PEA1926-1EA	1 ea
Volatiles in Gas Cylinder	PEA1930	
Volatiles on Sorbent	PEA1931-1EA	1 ea

Drinking Water PTs

Also referred to as Potable Water or Water Supply samples. These samples are produced to TNI FoPT criteria in lower ranges that mimic the levels that are common to drinking water samples.

FOR PT ORDERS: visit www.sigmaaldrich.com/pt or contact your local Sigma-Aldrich office.

Description	Cat. No.	Pkg
Acidity - WS	PE1319-20ML	20 mL
Adipate/Phthalate - WS	PE1596-2ML	2 mL
Alcohols in Water - WS	PE1312-2ML	2 mL
Ammonia - WS	PE1593-2ML	2 mL
Anionic Surfactant - MBAS - WS	PE1337-20ML	20 mL
Anions - Whole Volume - WS	PE3364-500ML	500 mL
Anions - WS	PE1364-20ML	20 mL
Asbestos - WS	PE1399-2ML	2 mL
Bromate and Bromide - WS	PE1361-2ML	2 mL
Carbamate Pesticides - WS	PE1507-2ML	2 mL
Chlorate and Chlorite - WS	PE1372-2ML	2 mL
Chlordane (Total) - WS	PE1326-2ML	2 mL
Chlorine(Combined and Total) - WS	PE1415-2ML	2 mL
Chromium VI - Whole Volume - WS	PE3453-500ML	500 mL
Chromium VI - WS	PE1453-20ML	20 mL
Color - WS	PE1401-20ML	20 mL
Corrosivity/Sodium - Whole Volume - WS	PE3381-500ML	500 mL
Corrosivity/Sodium - WS	PE1304-1KT	1 kit
Cyanide - Whole Volume - WS	PE3573-500ML	500 mL
Cyanide, Total - WS	PE1496-2ML	2 mL
Demand (Low Level) - WS	PE1388-20ML	20 mL
Dioxin in Water - WS	PE1373-2ML	2 mL
Dissolved Oxygen - WS	PE1549-2ML	2 mL
EDB/DBCP - WS	PE1484-2ML	2 mL
Endothal -WS	PE1587-2ML	2 mL
Gasoline Additives - WS	PE1466-2ML	2 mL
Kjeldahl Nitrogen, Total (TKN) - WS	PE1575-2ML	2 mL
MBAS - Whole Volume - WS	PE3337-500ML	500 mL
Methyl Mercury in Water	PE1100-1.5ML	1.5 mL
Mercury(Low Level) - Whole Volume - WS	PE3432-500ML	500 mL
Methanol in Water - PT	PE1543-2ML	2 mL
Non Ionic Surfactants in water - PT	PE1197-20ML	20 mL
Oil and Grease - WS	PE1404-2ML	2 mL
Organic Disinfection By-Products - WS	PE1425-2ML	2 mL
Organochlorine Pesticides Ampule 1 - WS	PE1595-2ML	2 mL
Organochlorine Pesticides Ampule 2 - WS	PE1550-2ML	2 mL
Organonitrogen Pesticides - WS	PE1400-2ML	2 mL
Organophosphorus Pesticides (Low Level) - PT	PE1377-2ML	2 mL
PCB's - WS	PE1579-2ML	2 mL
Perchlorate - WS	PE1351-2ML	2 mL
pH - WS	PE1368-20ML	20 mL
	PE1368-100ML	100 mL
	PE1368-250ML	250 mL
Phenolics, Total - WS	PE1329-2ML	2 mL
Phthalates - PT	PE1412-2ML	2 mL

Environmental Standards

Proficiency Testing

Drinking Water PTs (continued)

Description	Cat. No.	Pkg
PNA's - WS	PE1301-2ML	2 mL
Pyrethroids in Ground Water - WS	PE1317-2ML	2 mL
Regulated VOC's Ampule 1 - WS	PE1469-2ML	2 mL
Regulated VOC's Ampule 2 - WS	PE1546-2ML	2 mL
Residual Free Chlorine (RFC) - WS	PE1450-2ML	2 mL
Residue - WS	PE1490-500ML	500 mL
Silica - WS	PE1350-20ML	20 mL
Solvents in Water - PT	PE1461-2ML	2 mL
TOC - Whole Volume- WS	PE3308-500ML	500 mL
Total Cyanide - WS	PE1573-2ML	2 mL
Total Organic Carbon (TOC) - WS	PE1308-20ML	20 mL
Total Petroleum Hydrocarbons (TPH) - WS	PE1452-2ML	2 mL
Toxaphene (Total) - WS	PE1544-2ML	2 mL
Trace Metals 1 - WS	PE1488-20ML	20 mL
Trace Metals 2 - WS	PE1458-20ML	20 mL
Trace Metals 3 - WS	PE1448-20ML	20 mL
Trihalomethanes - WS	PE1456-2ML	2 mL
Turbidity - Whole Volume - WS	PE3342-500ML	500 mL
Turbidity - WS	PE1342-2ML	2 mL
Uranium - WS	PE1548-20ML	20 mL
UV 254 - WS	PE1506-20ML	20 mL
UV254 - Whole Volume - WS	PE3506-500ML	500 mL

Drinking Water Microbiology PTs

This proficiency testing sample is produced in accordance with ISO/IEC 17043:2010. All information regarding the use of this material can be found in the reporting packet supplied for each sample.

FOR PT ORDERS: visit www.sigmaaldrich.com/pt or contact your local Sigma-Aldrich office.

Description	Cat. No.	Pkg
Clostridium perfringens in Water	MIC020-2EA	2 ea
E. coli in Drinking and Surface Water PT- Quantitative - WS	MIC007-2EA	2 ea
Fungi and Yeast PT- WS	MIC015-2EA	2 ea
Legionella in Water PT - WP	MIC004-2EA	2 ea
Pseudomonas aeruginosa PT - WS	MIC008-2EA	2 ea
Salmonella PT for Drinking/Surface Water - WS	MIC006-2EA	2 ea
Standard Plate Count PT - WS	MIC002-2EA	2 ea
Streptococcus/Enterococcus PT- Drinking & Surface Water	MIC011-2EA	2 ea
WS-Enterococci PT-Sample (1-10)	MIC016-10EA	10 ea
WS-Microbiological PT - Sample (1-10)	MIC001-10EA	10 ea

Soil PTs

We are the world leader in the manufacturing of real world soil and sediment PT products. Our products have real world natural matrices in which selected analytes have been fortified to give analytical profiles that meet the needs of your laboratory.

FOR PT ORDERS: visit www.sigmaaldrich.com/pt or contact your local Sigma-Aldrich office.

Description	Cat. No.	Pkg
Anions in Soil - PT	SPE013-30G	30 g
BNAs in Soil - PT	SPE003-40G	40 g
BTEX/MTBE in Soil - PT	SPE025-30G	30 g
BTEX/MTBE in Water - PT	PE1642-2ML	2 mL
Carbamates in Soil - PT	SPE030-50G	50 g
Chlordane in Soil - PT	SPE027-50G	50 g
Chlorinated Pesticides in Soil - PT	SPE009-50G	50 g
Chromium VI in Soil - PT	SPE012-30G	30 g
Corrosivity - PT	SPE023-100G	100 g
Cyanide in Soil - PT	SPE011-3ML	3 mL
	SPE011-100G	100 g

Environmental Standards

Proficiency Testing

Description	Cat. No.	Pkg
Diesel in Soil - PT	SPE007-100G	100 g
Diesel in Water - PT	PE1708-2ML	2 mL
Dioxin and Furans in Soil - PT	SPE016-10G	10 g
Dioxins and Furans in Tissue - PT	SPE016TIS-10G	10 g
Dioxins/Furans in Sea Water Mussel - PT	SPE016MUS-10G	10 g
Dioxins/Furans in Shrimp - PT	SPE083-10G	10 g
Flash Point - PT	SPE029-4X25ML	4 × 25 mL
Fluoride/Chloride in Oil - PT	SPE061-100G	100 g
Free Liquids in Paint - PT	SPE075-100ML	100 mL
Gasoline in Soil - PT	SPE008-30G	30 g
Gasoline in Water - PT	PE1798-2ML	2 mL
Herbicides in Soil - PT	SPE004-50G	50 g
Lead in Powdered Paint - PT	SPE074-50G	50 g
Metals in Oil - PT	SPE060-25G	25 g
Metals in Sewage Sludge - PT	SPE001S-50G	50 g
Methyl Mercury in Sediment - PT	SPE1238-50G	50 g
Nitrosamines/Nitroaromatics - PT	SPE022-30G	30 g
Nutrients in Soil - PT	SPE014-100G	100 g
Oil and Grease in Soil - PT	SPE037-100G	100 g
Organic Lead in Soil (Sample 1) - PT	SPE001PB1-1.5ML	1.5 mL
Organic Lead in Soil (Sample 2) - PT	SPE001PB2-1.5ML	1.5 mL
Organophosphorus Pesticides - PT	SPE021-50G	50 g
Organo-Tin in Soil - PT	SPE073-30G	30 g
Oxidizer Screen - PT	SPE067-100G	100 g
PAHs by HPLC - PT	SPE017-40G	40 g
PBDE/PCBs in Sediment - PT	SPE072-50G	50 g
PCB Congeners in Fish Tissue - PT	SPE068TIS-30G	30 g
PCB Congeners in Sea Water Mussel - PT	SPE068MUS-30G	30 g
PCB Congeners in Shrimp - PT	SPE087-30G	30 g
PCB Congeners in Soil - PT	SPE068-50G	50 g
PCBs in Soil - PT	SPE010-50G	50 g
PCBs in Transformer Oil - WP	PE1275-2ML	2 mL
Phenolics in Soil (TOX) - PT	SPE038-100G	100 g
Phenols - PT	SPE018-40G	40 g
Reactivity - PT	SPE024-30G	30 g
Solvent Screen - PT	SPE070-20ML	20 mL
Specific Gravity - PT	SPE066-100ML	100 mL
Sulfide in Soil - PT	SPE102-30G	30 g
TCLP - VOA - PT	SPE076-2ML	2 mL
TCLP Metals in Soil - PT	SPE005-225G	225 g
TCLP Semi-VOAs - PT	SPE015-225G	225 g
Metals in Soil - PT	SPE001-50G	50 g
Toxaphene in Soil - PT	SPE028-50G	50 g
TPH in Soil - PT	SPE026-100G	100 g
TPH in Water	PE1800-2ML	2 mL
TPH in Water (high level)	PE1619-2ML	2 mL
TPH in Water (low level)	PE1799-2ML	2 mL
TRPH IR Screen Soil - PT	SPE019-100G	100 g
Uranium in Soil - PT	SPE071-30G	30 g
VOAS in Soil - Low Level - PT	SPE002L-30G	30 g
VOAs in Soil - Medium Level - PT	SPE002H-25G	25 g
E. coli PT- Sludge	MIC014-2EA	2 ea
E. coli Quantitative PT- Soil	MIC009-2EA	2 ea
Salmonella PT- Sludge	MIC013-2EA	2 ea

Environmental Standards

Proficiency Testing

State Specific PTs

This proficiency testing sample is produced in accordance with ISO/IEC 17043:2010. All information regarding the use of this material can be found in the reporting packet supplied for each sample.

FOR PT ORDERS: visit www.sigmaaldrich.com/pt or contact your local Sigma-Aldrich office.

Values of analytes vary lot to lot.

Description	Cat. No.	Pkg
Gasoline in Water - AK - PT	PE1817-2ML	2 mL
Diesel in Water - AK - PT	PE1779-2ML	2 mL
Gasoline in Soil - AK - PT	SPE008AK-25G	25 g
BTEX/MTBE in Soil - PT	SPE025AK-25G	25 g
RRO in Soil - PT	SPE026AK-100G	100 g
Diesel in Soil - AK PT - PT	SPE007AK-100G	100 g
BTEX in Water - AK - PT	PE1608-2ML	2 mL
NJDEP EPH in Soil - PT	SPE026NJ-100G	100 g
NJDEP EPH in Water	PE1658-2ML	2 mL
Diesel in Water-WA - PT	PE1756-2ML	2 mL
Diesel in Soil-WA - PT	SPE007WA-100G	100 g
Diesel in Water-MA - PT	PE1849-2ML	2 mL
Diesel in Soil by MA Methods - PT	SPE007MA-40G	40 g
Gasoline in Soil by MA Method VPH - PT	SPE008MA-30G	30 g
Gasoline in Water-MA - PT	PE1679-2ML	2 mL
Gasoline in Soil by WI Method - PT	SPE008WI-25G	25 g
Diesel in Soil- WI - PT	SPE007WI-100G	100 g
BTEX/MTBE in Soil - PT	SPE025WI-25G	25 g
TCLP Metals CA-WET in Soil - PT	SPE006-225G	225 g
Gasoline in Water-WA - PT	PE1863-2ML	2 mL
Gasoline in Soil-WA - PT	SPE008WA-30G	30 g

Waste Water PTs

Also referred to as Non-Potable water or Water Pollution samples. These samples are produced to TNI FoPT criteria in higher ranges that mimic the levels that are common to waste. Values vary lot to lot.

For PT ORDERS Visit www.sigmaaldrich.com/PT or contact your local Sigma-Aldrich office.

Description	Cat. No.	Pkg
Acid Compounds - WP	PE1274-2ML	2 mL
Acidity - Whole Volume - WP	PE3269-500ML	500 mL
Acidity - WP	PE1269-20ML	20 mL
Alkalinity - WP	PE1076-20ML	20 mL
Amenable Cyanide - Whole Volume - WP	PE3147-500ML	500 mL
Anionic Surfactants (MBAS) - WP	PE1144-20ML	20 mL
Anions - Whole Volume - WP	PE3060-500ML	500 mL
Anions - WP	PE1060-20ML	20 mL
Asbestos - WP	PE1046-2ML	2 mL
Base/Neutrals Compounds 2B - WP	PE1171-2ML	2 mL
Boron (Colorimetric Method) - WP	PE1066-20ML	20 mL
Bromide - WP	PE1188-20ML	20 mL
BTEX/MTBE in Water - PT	PE1642-2ML	2 mL
Carbamates in Water - WP	PE1006-2ML	2 mL
Chlordane (Total) - WP	PE1092-2ML	2 mL
Chromium VI - Whole Volume - WP	PE3088-500ML	500 mL
Chromium VI - WP	PE1088-20ML	20 mL
Chromium VI in Seawater - Whole Volume - WP	PE3015-500ML	500 mL
Color - Whole Volume - WP	PE3126-100ML	100 mL
Color - WP	PE1126-20ML	20 mL
Complex Nutrients - Whole Volume - WP	PE3051-500ML	500 mL
Complex Nutrients - WP	PE1051-2ML	2 mL
Complex Nutrients in Seawater - Whole Volume - WP	PE3145-500ML	500 mL
Cyanide - Whole Volume - WP	PE3054-500ML	500 mL
Cyanide Amenable to Chlorination - WP	PE1147-2ML	2 mL
Demand - Whole Volume - WP	PE3130-500ML	500 mL
Demand - WP	PE1130-20ML	20 mL

Environmental Standards

Proficiency Testing

Description	Cat. No.	Pkg
Diesel in Water - PT	PE1708-2ML	2 mL
Dioxins and Furans in water by 8280 - PT	PE1102-2ML	2 mL
Dioxins in Water - WP	PE1295-2ML	2 mL
Dissolved Oxygen - WP	PE1077-2ML	2 mL
Ferrous Iron in Water - WP	PE1104-20ML	20 mL
Oxidation - Reduction - WP	PE1183-30ML PE1183-1.2G	30 mL 1.2 g
Fluoride in Water - PT	PE3162-500ML	500 mL
Formaldehyde in Water - PT	PE1380-20ML	20 mL
Gasoline in Water - PT	PE1798-2ML	2 mL
Herbicides - WP	PE1124-2ML	2 mL
Iodate in Water - PT	PE1243-20ML	20 mL
Iodide in Water - WP	PE1047-20ML	20 mL
Low Level Pesticides 1 - PT	PE1321-2ML	2 mL
Low Level Pesticides 2 - PT	PE1491-2ML	2 mL
MBAS - Whole Volume - WP	PE3144-500ML	500 mL
Mercury - Whole Volume - WP	PE3129-500ML	500 mL
Mercury - WP	PE1129-20ML	20 mL
Minerals - WP	PE1041-1KT	1 kit
Mercury (Low Level) - WP	PE1205-20ML	20 mL
Methanol in Water - PT	PE1543-2ML	2 mL
Minerals - Whole Volume - WP	PE3041-500ML	500 mL
Minerals in Seawater - Whole Volume - WP	PE3136-500ML	500 mL
Nitrite - WP	PE1153-2ML	2 mL
Nitrosamines/Nitroaromatics - WP	PE1040-2ML	2 mL
Non Ionic Surfactants in water - PT	PE1197-20ML	20 mL
Oil and Grease - WP	PE1083-2ML	2 mL
Oil and Grease - Whole Volume - WP	PE3083-250ML	250 mL
Organophosphorus Pesticides - WI - WP	PE1118-2ML	2 mL
Organotins in Water - WP	PE1566-2ML	2 mL
Oxidation - Reduction - WP	PE1263-30ML	30 mL
PAHs - WP	PE1173-2ML	2 mL
PAHs (Low Level) - WP	PE1223-2ML	2 mL
PBDE's in water - PT	PE1398-2ML	2 mL
PCB Congeners in Water - WP	PE1116-2ML	2 mL
PCBs in Transformer Oil - WP	PE1275-2ML	2 mL
PCBs in Water - WP	PE1033-2ML	2 mL
Perchlorate - WP	PE1178-2ML	2 mL
Pesticides 1 - WP	PE1280-2ML	2 mL
Pesticides 2 - WP	PE1201-2ML	2 mL
pH in Water- WP	PE1210-20ML PE1210-100ML PE1210-250ML	20 mL 100 mL 250 mL
Phenol - Whole Volume - WP	PE3134-500ML	500 mL
Pyrethroids in Waste Water - WP	PE1122-2ML	2 mL
Residue - WP	PE1050-1.5G	1.5 g
Residue - WP	PE3050-500ML	500 mL
Residue/pH - Whole Volume - WP	PE3119-500ML	500 mL
Fixed Solids and Bicarbonate - WP	PE1090-500ML PE1090-1.2G	500 mL 1.2 g
Settleable Solids/Volatile Residue - Whole Volume - WP	PE3192-1L	1 L
Settleable Solids - WP	PE1194-1.2G	1.2 g
Silica - Whole Volume - WP	PE3078-500ML	500 mL
Silica - WP	PE1078-20ML	20 mL
Silica in Seawater - Whole Volume - WP	PE3111-500ML	500 mL

Environmental Standards

Proficiency Testing

Waste Water PTs (continued)

Description	Cat. No.	Pkg
Simple Nutrients - Whole Volume - WP	PE3198-500ML	500 mL
Simple Nutrients - WP	PE1195-20ML	20 mL
Simple Nutrients in Seawater - Whole Volume - WP	PE3179-500ML	500 mL
Solvents in Water - PT	PE1461-2ML	2 mL
Sulfide - Whole Volume - WP	PE3034-500ML	500 mL
Sulfide (Total and Soluble) - WP	PE1034-20ML	20 mL
Sulfide in Seawater - Whole Volume - WP	PE3276-500ML	500 mL
Sulfur in Water - WP	PE1285-20ML	20 mL
Surfactants - Cationic - WP	PE1097-20ML	20 mL
Tannin and Lignin - Whole Volume - WP	PE3073-500ML	500 mL
Tannin and Lignin - WP	PE1073-20ML	20 mL
Thiocyanate in Water - WP	PE1149-2ML	2 mL
Titanium and Tin - WP	PE1194-1EA PE1154-20ML	1 ea 20 mL
Total Cyanide - WP	PE1054-2ML	2 mL
Total Organic Halides (TOX) - WP	PE1070-2ML	2 mL
Total Phenolics - WP	PE1134-2ML	2 mL
Total Recoverable Petroleum Hydrocarbons - WP	PE1272-2ML	2 mL
Total Residual Chlorine - WP	PE1065-2ML	2 mL
Total Residual Chlorine (Low Level) - WP	PE1152-2ML	2 mL
Toxaphene - WP	PE1094-2ML	2 mL
TPH by FTIR - PT	PE1262-2ML	2 mL
TPH in Water	PE1800-2ML	2 mL
Trace Metals 1 - Whole Volume - WP	PE3132-500ML	500 mL
Trace Metals 1 - WP	PE1132-20ML	20 mL
Trace Metals 1 in Seawater - Whole Volume - WP	PE3163-500ML	500 mL
Trace Metals 2 - Whole Volume - WP	PE3053-500ML	500 mL
Trace Metals 2 - WP	PE1052-20ML	20 mL
Trace Metals 2 in Seawater - Whole Volume - WP	PE3189-500ML	500 mL
Triazine Pesticides - WP	PE1212-2ML	2 mL
Trichlorobenzenes in Water - WP	PE1322-2ML	2 mL
TSS/pH (whole volume) in Seawater - WS	PE1031-500ML	500 mL
Turbidity - Whole Volume - WP	PE3081-500ML	500 mL
Turbidity - WP	PE1081-20ML	20 mL
Uranium - WP	PE1209-20ML	20 mL
Volatile Organic Compounds 1 - WP	PE1250-2ML	2 mL
Volatile Organic Compounds 2 - WP	PE1251-2ML	2 mL
Volatile Residue - WP	PE1091-1.2G	1.2 g
Volatile Residue/Fixed Solids - WP	PE1282-1.2G	1.2 g
Volatiles Nontraditional - WP	PE1284-2ML	2 mL

Waste Water Microbiology PTs

Description	Cat. No.	Pkg
E. coli in Water PT- Quantitative WP	MIC003-2EA	2 ea
Legionella in Water PT - WP	MIC004-2EA	2 ea
Total and Fecal Streptococcus/Enterococcus PT - WP	MIC005-2EA	2 ea
Standard Plate Count PT- WP	MIC012-2EA	2 ea
Listeria PT - WP	MIC019-2EA	2 ea

Environmental Standards

Drinking Water Methods

Drinking Water Methods

These analytical reference standards are specifically designed for monitoring organic chemicals on the National Primary Drinking Water List in raw source water, finished drinking water, and drinking water at all stages of treatment, per methods developed by the US EPA Environmental Monitoring Systems Laboratory in Cincinnati, Ohio (EMSL-CL), under authority of the Safe Drinking Water Act (SDWA).

Safe Drinking Water Act (SDWA) - 500 Series Methods

The National Primary Drinking Water Regulations (NPDWR) and National Secondary Drinking Water Regulations (NSDWR) establish maximum contaminant levels in drinking water for organic compounds. US EPA 500 Series methods are analytical methods for identifying and quantifying volatile organic compounds (VOCs), pesticides, synthetic organic compounds (SOCs), and trihalomethane disinfection byproducts (THMs) in drinking water. These methods call for gas chromatography with a selective detector, gas chromatography/mass spectrometry or high performance liquid chromatography. Copies of these methods may be obtained by visiting epa.gov.

Compound Classification	U.S. EPA Method No.
Carbamates	531.1
Carbonyls	556
Chloracetanilide/Acetamide Herbicide Degradates	535.00
Chlorinated Acids	515.30
Chlorinated Disinfection Byproducts & Solvents	551, 551.10
Chlorinated Pesticides	508, 508.1, 508A
Diquat & Paraquat	549.2
Ethylene dibromide/Dibromochloropropane	504
General Purpose Organics	525, 525.1, 525.2
Glyphosate	547
Haloacetic Acids and Dalapon	552, 552.1, 552.2
Nitrogen & Phosphorous-Containing Pesticides	507
Nitrosamines	521
Organohalide Pesticides & PCBs	505
Phthalate and Adipate Esters	506
Polycyclic Aromatic Hydrocarbons	550, 550.1
2,3,7,8-Tetrachlorodibenzo-p-dioxin	513
Trihalomethanes	501.1, 501.2, 501.3
Volatile Aromatic & Unsaturated Organics	503.1
Volatile Halogenated Organics	502.1, 502.2
Volatile Organics	524.1, 524.2

Method 501.1, 501.2, 501.3

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 501/601 Trihalomethanes Calibration Mix	100 µg/mL each component in methanol	47904	1 mL
	<i>Bromodichloromethane</i> <i>Bromoform</i>	<i>Chloroform</i> <i>Dibromochloromethane</i>	
EPA 501/601 Trihalomethanes Calibration Mix	200 µg/mL each component in methanol	458746 48746	1 mL 1 mL
	<i>Bromodichloromethane</i> <i>Bromoform</i>	<i>Chloroform</i> <i>Dibromochloromethane</i>	
EPA 501/601 Trihalomethanes Calibration Mix	2000 µg/mL each component in methanol	48140-U 4M8140-U	1 mL 5 × 1 mL
	<i>Bromodichloromethane</i> <i>Bromoform</i>	<i>Chloroform</i> <i>Dibromochloromethane</i>	
standard type internal			
Fluorobenzene solution	2000 µg/mL in methanol	48943	1 mL
standard type surrogate			
1-Bromo-4-fluorobenzene solution	2000 µg/mL in methanol	48083	1 mL

Environmental Standards

Drinking Water Methods: *Safe Drinking Water Act (SDWA) - 500 Series Methods*

Method 502.1, 502.2

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 502/524 Volatiles Organic Calibration Mix A (without gases)	200 µg/mL each component in methanol	47933	1 mL
	<i>Benzene</i> <i>Bromobenzene</i> <i>Bromochloromethane</i> <i>Bromodichloromethane</i> <i>Butylbenzene</i> <i>Butylbenzene</i> <i>sec-Butylbenzene</i> <i>tert-Butylbenzene</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>Chloroform</i> <i>2-Chlorotoluene</i> <i>4-Chlorotoluene</i> <i>Dibromochloromethane</i> <i>1,2-Dibromo-3-chloropropane</i> <i>1,2-Dibromoethane</i> <i>Dibromomethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i> <i>1,1-Dichloroethylene</i> <i>cis-1,2-Dichloroethylene</i> <i>trans-1,2-Dichloroethylene</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i>	<i>1,3-Dichloropropane</i> <i>2,2-Dichloropropane</i> <i>1,1-Dichloro-1-propene</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i> <i>Ethylbenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>o-Xylene</i> <i>p-Isopropyltoluene</i> <i>Naphthalene</i> <i>Propylbenzene</i> <i>Styrene</i> <i>1,1,1,2-Tetrachloroethane</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>Toluene</i> <i>1,2,3-Trichlorobenzene</i> <i>1,2,4-Trichlorobenzene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i> <i>1,2,3-Trichloropropane</i> <i>1,2,4-Trimethylbenzene</i> <i>1,3,5-Trimethylbenzene</i> <i>m-Xylene</i> <i>o-Xylene</i> <i>p-Xylene</i>	
EPA 502/524 Volatiles Organic Calibration Mix A (without gases)	2000 µg/mL each component in methanol	502111 5S02111	1 mL 1 mL
	<i>Benzene</i> <i>Bromobenzene</i> <i>Bromochloromethane</i> <i>Bromodichloromethane</i> <i>Bromoform</i> <i>Butylbenzene</i> <i>sec-Butylbenzene</i> <i>tert-Butylbenzene</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>Chloroform</i> <i>2-Chlorotoluene</i> <i>4-Chlorotoluene</i> <i>Dibromochloromethane</i> <i>1,2-Dibromo-3-chloropropane</i> <i>1,2-Dibromoethane</i> <i>Dibromomethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i> <i>1,1-Dichloroethylene</i> <i>cis-1,2-Dichloroethylene</i> <i>trans-1,2-Dichloroethylene</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i>	<i>1,3-Dichloropropane</i> <i>2,2-Dichloropropane</i> <i>1,1-Dichloro-1-propene</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i> <i>Ethylbenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Isopropylbenzene</i> <i>p-Isopropyltoluene</i> <i>Naphthalene</i> <i>Propylbenzene</i> <i>Styrene</i> <i>1,1,1,2-Tetrachloroethane</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>Toluene</i> <i>1,2,3-Trichlorobenzene</i> <i>1,2,4-Trichlorobenzene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i> <i>1,2,3-Trichloropropane</i> <i>1,2,4-Trimethylbenzene</i> <i>1,3,5-Trimethylbenzene</i> <i>o-Xylene</i> <i>m-Xylene</i> <i>p-Xylene</i>	
EPA VOC Mix 1	2000 µg/mL each component in methanol	48775 4S8775	1 mL 1 mL
	<i>sec-Butylbenzene</i> <i>tert-Butylbenzene</i> <i>Chlorobenzene</i> <i>2-Chlorotoluene</i> <i>4-Chlorotoluene</i> <i>1,2-Dichlorobenzene</i>	<i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Isopropylbenzene</i> <i>Propylbenzene</i> <i>o-Xylene</i> <i>p-Xylene</i>	
EPA VOC Mix 2	2000 µg/mL each component in methanol	4S8777 48777	1 mL 1 mL
	<i>Benzene</i> <i>Bromobenzene</i> <i>Butylbenzene</i> <i>Ethylbenzene</i> <i>p-Isopropyltoluene</i> <i>Naphthalene</i> <i>Styrene</i>	<i>Toluene</i> <i>1,2,3-Trichlorobenzene</i> <i>1,2,4-Trichlorobenzene</i> <i>1,2,4-Trimethylbenzene</i> <i>1,3,5-Trimethylbenzene</i> <i>m-Xylene</i>	

Environmental Standards

Drinking Water Methods: Safe Drinking Water Act (SDWA) - 500 Series Methods

Description	Concentration	Cat. No.	Qty
EPA VOC Mix 3	2000 µg/mL each component in methanol	458779 48779	1 mL 1 mL
	1,2-Dibromo-3-chloropropane 1,2-Dibromoethane 1,2-Dichloroethane 1,2-Dichloropropane 1,3-Dichloropropane 1,1-Dichloro-1-propene cis-1,3-Dichloropropene	trans-1,3-Dichloropropene Hexachloro-1,3-butadiene 1,1,1,2-Tetrachloroethane 1,1,2,2-Tetrachloroethane 1,1,2-Trichloroethane Trichloroethylene 1,2,3-Trichloropropane	
EPA VOC Mix 4	2000 µg/mL each component in methanol	458786 48786	1 mL 1 mL
	Bromochloromethane Bromoform Carbon tetrachloride Chloroform Dibromomethane	1,1-Dichloroethane 2,2-Dichloropropane Tetrachloroethylene 1,1,1-Trichloroethane	
EPA VOC Mix 5	2000 µg/mL each component in methanol	458797 48797	1 mL 1 mL
	Bromodichloromethane Dibromochloromethane 1,1-Dichloroethylene	cis-1,2-Dichloroethylene trans-1,2-Dichloroethylene Dichloromethane	
EPA VOC Mix 6	2000 µg/mL each component in methanol	458799 48799-U	1.5 mL 1.5 mL
	Bromomethane Chloroethane Chloromethane	Dichlorodifluoromethane Trichlorofluoromethane Vinyl chloride	
EPA VOC Calibration Standards Kit	-	48804 458804	1 kit 1 kit
	EPA Volatile Organic Compounds Mix 1 (48775), 1 mL EPA Volatile Organic Compounds Mix 2 (48777), 1 mL EPA Volatile Organic Compounds Mix 3 (48779), 1 mL	EPA Volatile Organic Compounds Mix 4 (48786), 1 mL EPA Volatile Organic Compounds Mix 5 (48797), 1 mL EPA Volatile Organic Compounds Mix 6 (48799- U), 1.5 mL	
EPA VOC Mix 7	2000 µg/mL each component in methanol	458802 48802-U	1 mL 1 mL
	Benzene Bromodichloromethane Bromoform Carbon tetrachloride Chloroform Dibromochloromethane	1,4-Dichlorobenzene 1,2-Dichloroethane 1,1-Dichloroethylene 1,1,1-Trichloroethane Trichloroethylene Vinyl chloride	
EPA VOC Mix 8	2000 µg/mL each component in methanol	48803	1 mL
	Chlorobenzene 1,2-Dichlorobenzene cis-1,2-Dichloroethylene trans-1,2-Dichloroethylene 1,2-Dichloropropane Ethylbenzene	Styrene Tetrachloroethylene Toluene o-Xylene p-Xylene	
EPA Phase V Volatile Organic Compounds Mix 9	2000 µg/mL each component in methanol	47399	1 mL
	Dichloromethane 1,2,4-Trichlorobenzene	1,1,2-Trichloroethane	
standard type internal			
1-Chloro-2-fluorobenzene solution	2000 µg/mL in methanol	48369	1 mL
2-Bromo-1-chloropropane solution	20,000 µg/mL in methanol	48713	1 mL
EPA 502 Internal Standard Mix	2000 µg/L each component in methanol	48950-U	1 mL
	2-Bromo-1-chloropropane	Fluorobenzene	

Method 503.1

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA VOC Mix 2	2000 µg/mL each component in methanol	458777 48777	1 mL 1 mL
	Benzene Bromobenzene Butylbenzene Ethylbenzene p-Isopropyltoluene Naphthalene Styrene	Toluene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene m-Xylene	

Environmental Standards

Drinking Water Methods: *Safe Drinking Water Act (SDWA) - 500 Series Methods*

Method 503.1 (continued)

Description	Concentration	Cat. No.	Qty
EPA 503.1 Volatiles Mix	2000 µg/mL each component in methanol <i>Hexachloro-1,3-butadiene</i> <i>Tetrachloroethylene</i>	48237	1 mL
	<i>Trichloroethylene</i>		
EPA VOC Mix 1	2000 µg/mL each component in methanol <i>sec-Butylbenzene</i> <i>tert-Butylbenzene</i> <i>Chlorobenzene</i> <i>2-Chlorotoluene</i> <i>4-Chlorotoluene</i> <i>1,2-Dichlorobenzene</i>	48775 458775	1 mL 1 mL
	<i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Isopropylbenzene</i> <i>Propylbenzene</i> <i>o-Xylene</i> <i>p-Xylene</i>		
standard type internal/surrogate			
α,α-Trifluorotoluene solution	2000 µg/mL in methanol	48389	1 mL

Method 504

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 504.1 Calibration Solution	2000 µg/mL each component in methanol <i>1,2-Dibromo-3-chloropropane</i> <i>1,2-Dibromoethane</i>	49119-U	1 mL
	<i>1,2,3-Trichloropropane</i>		

Method 505

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 505/525 Pesticides Mix A	500 µg/mL each component in acetone <i>Alachlor</i> <i>Aldrin</i> <i>Dieldrin</i>	47725-U	1 mL
	<i>Lindane</i> <i>Simazine</i>		
EPA 505/525 Update Pesticides Mix A	500 µg/mL each component in acetone <i>Alachlor</i> <i>Aldrin</i> <i>Lindane</i> <i>Dieldrin</i>	47727-U	1 mL
	<i>cis-Nonachlor</i> <i>trans-Nonachlor</i> <i>Simazine</i>		
EPA 505/525 Pesticides Mix B	500 µg/mL each component in acetone <i>Atrazine</i> <i>Endrin</i> <i>Heptachlor</i> <i>Heptachlor exo-epoxide</i>	47726-U	1 mL
	<i>Hexachlorobenzene</i> <i>Hexachlorocyclopentadiene</i> <i>Methoxychlor</i>		
EPA 505/525 Update Pesticides Mix B	500 µg/mL each component in acetone <i>Atrazine</i> <i>α-Chlordane</i> <i>γ-Chlordane</i> <i>Endrin</i> <i>Heptachlor</i>	47728-U	1 mL
	<i>Heptachlor exo-epoxide</i> <i>Hexachlorobenzene</i> <i>Hexachlorocyclopentadiene</i> <i>Methoxychlor</i>		
Aroclor 1016 solution	200 µg/mL in methanol	48701	1 mL
Aroclor 1221 solution	200 µg/mL in methanol	48705	1 mL
Aroclor 1232 solution	200 µg/mL in methanol	48702	1 mL
Aroclor 1242 solution	200 µg/mL in methanol	48706	1 mL
Aroclor 1248 solution	200 µg/mL in methanol	48703	1 mL
Aroclor 1254 solution	200 µg/mL in methanol	48707	1 mL
Aroclor 1260 solution	200 µg/mL in methanol	48704	1 mL
PCB Kit 3	200 µg/mL each component in methanol <i>Aroclor 1016 solution (Supelco 48701), 1 mL</i> <i>Aroclor 1221 solution (Supelco 48705), 1 mL</i> <i>Aroclor 1232 solution (Supelco 48702), 1 mL</i> <i>Aroclor 1242 solution (Supelco 48706), 1 mL</i>	48825	1 kit
	<i>Aroclor 1248 solution (Supelco 48703), 1 mL</i> <i>Aroclor 1254 solution (Supelco 48707), 1 mL</i> <i>Aroclor 1260 solution (Supelco 48704), 1 mL</i>		
Chlordane (mixture of isomers)	5000 µg/mL in methanol	40089	1 mL
α-Chlordane solution	100 µg/mL in hexane	48192	1 mL
γ-Chlordane solution	100 µg/mL in hexane	48193	1 mL
Toxaphene solution	5000 µg/mL in methanol	40111	1 mL

Environmental Standards

Drinking Water Methods: Safe Drinking Water Act (SDWA) - 500 Series Methods

Method 506

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 506 Phthalate Mix (7 component)	1000 µg/mL each component in isooctane <i>Benzyl butyl phthalate</i> <i>Bis(2-ethylhexyl) adipate</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>Dibutyl phthalate</i>	40077-U <i>Diethyl phthalate</i> <i>Dimethyl phthalate</i> <i>Dioctyl phthalate</i>	1 mL
EPA 506 Phthalate Esters Mix 1	500 µg/mL each component in methanol <i>Benzyl butyl phthalate</i> <i>Bis(2-ethylhexyl) adipate</i> <i>Bis(2-ethylhexyl) phthalate</i>	48223 <i>Dibutyl phthalate</i> <i>Diethyl phthalate</i> <i>Dimethyl phthalate</i>	1 mL
EPA Phthalate Esters Mix	2000 µg/mL each component in methanol <i>Bis(2-ethylhexyl) phthalate</i> <i>Benzyl butyl phthalate</i> <i>Dibutyl phthalate</i>	48805-U <i>Di-n-octyl phthalate</i> <i>Diethyl phthalate</i> <i>Dimethyl phthalate</i>	1 mL
Bis(2-ethylhexyl) phthalate solution	2000 µg/mL in methanol	47994	1 mL
Di(2-ethylhexyl)adipate solution	2000 µg/mL in methanol	47995-U	1 mL

Method 507

Calibration standards for this method may be obtained through our Custom Standards department.

Description	Concentration	Cat. No.	Qty
standard type internal			
Triphenyl phosphate solution	500 µg/mL in methyl <i>tert</i> -butyl ether	48064	1 mL
standard type surrogate			
1,3-Dimethyl-2-nitrobenzene solution	250 µg/mL in methyl <i>tert</i> -butyl ether	48063	1 mL

Method 508, 508.1, 508A

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA Appendix IX Organochlorine Pesticides Mix	2000 µg/mL each component in hexane: toluene (1:1) <i>Aldrin</i> <i>α-BHC</i> <i>β-BHC</i> <i>Lindane</i> <i>δ-BHC</i> <i>4,4'-DDD solution</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene</i> <i>4,4'-DDT</i> <i>Dieldrin</i>	46960-U <i>α-Endosulfan</i> <i>β-Endosulfan</i> <i>Endosulfan sulfate</i> <i>Endrin</i> <i>Endrin aldehyde</i> <i>Heptachlor</i> <i>Heptachlor exo-epoxide</i> <i>Methoxychlor</i>	1 mL
EPA 508/508.1 Pesticide Mix	1000 µg/mL each component in methyl <i>tert</i> -butyl ether <i>α-Chlordane</i> <i>γ-Chlordane</i> <i>Chlorobenzilate</i> <i>Chloroneb</i> <i>Chlorothalonil</i> <i>Chlorthal-dimethyl</i>	502197 <i>Etridiazole</i> <i>Hexachlorobenzene</i> <i>cis-Permethrin</i> <i>trans-Permethrin</i> <i>Propachlor</i> <i>Trifluralin</i>	1 mL
EPA 508.1 Herbicides Mix	1000 µg/mL each component in acetone <i>Alachlor</i> <i>Atrazine</i> <i>Butachlor</i>	502154 <i>Hexachlorocyclopentadiene</i> <i>Metolachlor</i> <i>Simazine</i>	1 mL
Aroclor 1016 solution	200 µg/mL in methanol	48701	1 mL
Aroclor 1221 solution	200 µg/mL in methanol	48705	1 mL
Aroclor 1232 solution	200 µg/mL in methanol	48702	1 mL
Aroclor 1242 solution	200 µg/mL in methanol	48706	1 mL
Aroclor 1248 solution	200 µg/mL in methanol	48703	1 mL
Aroclor 1254 solution	200 µg/mL in methanol	48707	1 mL
Aroclor 1260 solution	200 µg/mL in methanol	48704	1 mL

Environmental Standards

Drinking Water Methods: Safe Drinking Water Act (SDWA) - 500 Series Methods

Method 508, 508.1, 508A (continued)

Description	Concentration	Cat. No.	Qty
PCB Kit 3	200 µg/mL each component in methanol <i>Aroclor 1016 solution (Supelco 48701), 1 mL</i> <i>Aroclor 1221 solution (Supelco 48705), 1 mL</i> <i>Aroclor 1232 solution (Supelco 48702), 1 mL</i> <i>Aroclor 1242 solution (Supelco 48706), 1 mL</i> <i>Aroclor 1248 solution (Supelco 48703), 1 mL</i> <i>Aroclor 1254 solution (Supelco 48707), 1 mL</i> <i>Aroclor 1260 solution (Supelco 48704), 1 mL</i>	48825	1 kit
Biphenyl	-	442487	1000 mg
Biphenyl solution	2000 µg/mL in methanol	48161	1 mL
Chlordane (mixture of isomers)	5000 µg/mL in methanol	40089	1 mL
α-Chlordane solution	100 µg/mL in hexane	48192	1 mL
γ-Chlordane solution	100 µg/mL in hexane	48193	1 mL
Cyanazine solution	2000 µg/mL in methanol	48592	1 mL
Hexachlorocyclopentadiene solution	5000 µg/mL in methanol	40051	1 mL
Toxaphene solution	5000 µg/mL in methanol	40111	1 mL
standard type internal			
Pentachloronitrobenzene solution	5000 µg/mL in methanol	40156	1 mL
standard type internal/surrogate			
4,4'-Dibromobiphenyl solution	2000 µg/mL in methylene chloride	48790-U	1 mL
standard type surrogate			
4,4'-Dichlorobiphenyl solution	500 µg/mL in isooctane	48260-U	1 mL
standard type degradation check mix			
DDT-Endrin Mix	500 µg/mL each component in methanol <i>4,4'-DDT</i> <i>Endrin</i>	48282	1 mL
standard type performance			
EPA 508.1 Instrument Check Mix	in methyl <i>tert</i> -butyl ether (varied) <i>δ-BHC, 40 µg/mL</i> <i>Chlorothalonil, 50 µg/mL</i> <i>Chlorpyrifos, 2 µg/mL</i> <i>DCPA (dacthal), 500 µg/mL</i>	507989	1 mL

Method 513

Description	Concentration	Cat. No.	Qty
standard type calibration			
2,3,7,8-Tetrachlorodibenzo- <i>p</i> -dioxin solution	10 µg/mL in toluene	48599	1 mL

Method 515.3

Description	Concentration	Cat. No.	Qty
standard type internal/surrogate			
4,4'-Dibromooctafluorobiphenyl solution	250 µg/mL in acetone	47644-U	1 mL
4,4'-Dibromooctafluorobiphenyl solution	2000 µg/mL in methylene chloride	48791	1 mL

Method 521

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 521 Nitrosamine Mix	2000 µg/mL each component in methylene chloride <i>N-Nitrosodimethylamine</i> <i>N-Nitrosodibutylamine</i> <i>N-Nitrosodi-n-propylamine</i> <i>N-Nitrosomethylethylamine</i> <i>N-Nitrosodiethylamine</i> <i>1-Nitrosopyrrolidine</i> <i>1-Nitrosopiperidine</i>	40035-U	1 mL

Environmental Standards

Drinking Water Methods: Safe Drinking Water Act (SDWA) - 500 Series Methods

Method 524.1, 524.2

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 502/524.2 VOC Mix	200 µg/mL each component in methanol Benzene Bromobenzene Bromochloromethane Bromodichloromethane Bromoform Bromomethane Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon tetrachloride Chlorobenzene Chloroethane Chloroform Chloromethane 2-Chlorotoluene 4-Chlorotoluene Dibromochloromethane 1,2-Dibromo-3-chloropropane 1,2-Dibromoethane Dibromomethane 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene Dichlorodifluoromethane 1,1-Dichloroethane 1,2-Dichloroethane 1,1-Dichloroethylene cis-1,2-Dichloroethylene trans-1,2-Dichloroethylene Dichloromethane	47932	1 mL
	1,2-Dichloropropane 1,3-Dichloropropane 2,2-Dichloropropane 1,1-Dichloro-1-propene cis-1,3-Dichloropropene trans-1,3-Dichloropropene Ethylbenzene Hexachloro-1,3-butadiene Isopropylbenzene p-Isopropyltoluene Naphthalene Propylbenzene Styrene 1,1,1,2-Tetrachloroethane 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethylene Trichlorofluoromethane 1,2,3-Trichloropropane 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene Vinyl chloride o-Xylene m-Xylene p-Xylene		
EPA 524.2 Rev 4 Update Ketones Mix	200 µg/mL each component in methanol: water (9:1) Acetone 2-Butanone 1,1-Dichloro-2-propanone	47573-U	1 mL
		2-Hexanone 4-Methyl-2-pentanone	
EPA 524.2 Rev 4 Update Ketones Mix	2000 µg/mL in methanol: water (9:1) Acetone 2-Butanone 1,1-Dichloro-2-propanone	47428-U 457428-U	1 mL 1 mL
		2-Hexanone 4-Methyl-2-pentanone	
EPA 524 Rev 4 Update Mix	200 µg/mL each component in methanol Acrylonitrile Allyl chloride tert-Butyl methyl ether Carbon disulfide Chloroacetonitrile 1-Chlorobutane trans-1,4-Dichloro-2-butene Diethyl ether Ethyl methacrylate	506524	1 mL
		Hexachloroethane Methacrylonitrile Methyl acrylate Methyl methacrylate Nitrobenzene 2-Nitropropane Pentachloroethane Propionitrile Tetrahydrofuran	
EPA 524.2 Rev 4 Update Mix	2000 µg/mL in methanol Acrylonitrile Allyl chloride tert-Butyl methyl ether Carbon disulfide Chloroacetonitrile 1-Chlorobutane trans-1,4-Dichloro-2-butene Diethyl ether Ethyl methacrylate	47427-U	1 mL
		Hexachloroethane Methacrylonitrile Methyl acrylate Methyl methacrylate Nitrobenzene 2-Nitropropane Pentachloroethane Propionitrile Tetrahydrofuran	
EPA 524 Revision 4 Calibration Kit	- EPA 524 Rev 4 Update Mix (506524), 1 mL EPA 524.2 VOC Mix (47932), 1 mL	47438-U	4 × 1 mL
		Iodomethane solution (47406), 1 mL EPA 524.2 Rev 4 Update Ketones Mix (47573-U), 1 mL	

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Drinking Water Methods: *Safe Drinking Water Act (SDWA) - 500 Series Methods*

Method 524.1, 524.2 (continued)

Description	Concentration	Cat. No.	Qty
EPA 502/524 Volatiles Organic Calibration Mix A (without gases)	2000 µg/mL each component in methanol	502111 5S02111	1 mL 1 mL
	<i>Benzene</i> <i>Bromobenzene</i> <i>Bromochloromethane</i> <i>Bromodichloromethane</i> <i>Bromoform</i> <i>Butylbenzene</i> <i>sec-Butylbenzene</i> <i>tert-Butylbenzene</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>Chloroform</i> <i>2-Chlorotoluene</i> <i>4-Chlorotoluene</i> <i>Dibromochloromethane</i> <i>1,2-Dibromo-3-chloropropane</i> <i>1,2-Dibromoethane</i> <i>Dibromomethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i> <i>1,1-Dichloroethylene</i> <i>cis-1,2-Dichloroethylene</i> <i>trans-1,2-Dichloroethylene</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i>	<i>1,3-Dichloropropane</i> <i>2,2-Dichloropropane</i> <i>1,1-Dichloro-1-propene</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i> <i>Ethylbenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Isopropylbenzene</i> <i>p-Isopropyltoluene</i> <i>Naphthalene</i> <i>Propylbenzene</i> <i>Styrene</i> <i>1,1,1,2-Tetrachloroethane</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>Toluene</i> <i>1,2,3-Trichlorobenzene</i> <i>1,2,4-Trichlorobenzene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i> <i>1,2,3-Trichloropropane</i> <i>1,2,4-Trimethylbenzene</i> <i>1,3,5-Trimethylbenzene</i> <i>o-Xylene</i> <i>m-Xylene</i> <i>p-Xylene</i>	
EPA 502/524 Volatiles Organic Calibration Mix A (without gases)	200 µg/mL each component in methanol	47933	1 mL
	<i>Benzene</i> <i>Bromobenzene</i> <i>Bromochloromethane</i> <i>Bromodichloromethane</i> <i>Butylbenzene</i> <i>Butylbenzene</i> <i>sec-Butylbenzene</i> <i>tert-Butylbenzene</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>Chloroform</i> <i>2-Chlorotoluene</i> <i>4-Chlorotoluene</i> <i>Dibromochloromethane</i> <i>1,2-Dibromo-3-chloropropane</i> <i>1,2-Dibromoethane</i> <i>Dibromomethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i> <i>1,1-Dichloroethylene</i> <i>cis-1,2-Dichloroethylene</i> <i>trans-1,2-Dichloroethylene</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i>	<i>1,3-Dichloropropane</i> <i>2,2-Dichloropropane</i> <i>1,1-Dichloro-1-propene</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i> <i>Ethylbenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>o-Xylene</i> <i>p-Isopropyltoluene</i> <i>Naphthalene</i> <i>Propylbenzene</i> <i>Styrene</i> <i>1,1,1,2-Tetrachloroethane</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>Toluene</i> <i>1,2,3-Trichlorobenzene</i> <i>1,2,4-Trichlorobenzene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i> <i>1,2,3-Trichloropropane</i> <i>1,2,4-Trimethylbenzene</i> <i>1,3,5-Trimethylbenzene</i> <i>m-Xylene</i> <i>o-Xylene</i> <i>p-Xylene</i>	
EPA 524 VOC Mix B	200 µg/mL each component in methanol	47934	1 mL
	<i>Bromomethane</i> <i>Chloroethane</i> <i>Chloromethane</i>	<i>Dichlorodifluoromethane</i> <i>Trichlorofluoromethane</i> <i>Vinyl chloride</i>	
EPA 524 Calibration Standards Kit	-	47936	1 kit
	<i>EPA 524 Volatile Organic Compounds Mix A (47933), 1 mL</i>	<i>EPA 524 Volatile Organic Compounds Mix B (47934), 1 mL</i>	
EPA VOC Mix 1	2000 µg/mL each component in methanol	48775 4S8775	1 mL 1 mL
	<i>sec-Butylbenzene</i> <i>tert-Butylbenzene</i> <i>Chlorobenzene</i> <i>2-Chlorotoluene</i> <i>4-Chlorotoluene</i> <i>1,2-Dichlorobenzene</i>	<i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Isopropylbenzene</i> <i>Propylbenzene</i> <i>o-Xylene</i> <i>p-Xylene</i>	
EPA VOC Mix 2	2000 µg/mL each component in methanol	4S8777 48777	1 mL 1 mL
	<i>Benzene</i> <i>Bromobenzene</i> <i>Butylbenzene</i> <i>Ethylbenzene</i> <i>p-Isopropyltoluene</i> <i>Naphthalene</i> <i>Styrene</i>	<i>Toluene</i> <i>1,2,3-Trichlorobenzene</i> <i>1,2,4-Trichlorobenzene</i> <i>1,2,4-Trimethylbenzene</i> <i>1,3,5-Trimethylbenzene</i> <i>m-Xylene</i>	

Environmental Standards

Drinking Water Methods: Safe Drinking Water Act (SDWA) - 500 Series Methods

Description	Concentration	Cat. No.	Qty
EPA VOC Mix 3	2000 µg/mL each component in methanol	458779 48779	1 mL 1 mL
	<i>1,2-Dibromo-3-chloropropane</i> <i>1,2-Dibromoethane</i> <i>1,2-Dichloroethane</i> <i>1,2-Dichloropropane</i> <i>1,3-Dichloropropane</i> <i>1,1-Dichloro-1-propene</i> <i>cis-1,3-Dichloropropene</i>	<i>trans-1,3-Dichloropropene</i> <i>Hexachloro-1,3-butadiene</i> <i>1,1,1,2-Tetrachloroethane</i> <i>1,1,2,2-Tetrachloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i> <i>1,2,3-Trichloropropane</i>	
EPA VOC Mix 4	2000 µg/mL each component in methanol	458786 48786	1 mL 1 mL
	<i>Bromochloromethane</i> <i>Bromoform</i> <i>Carbon tetrachloride</i> <i>Chloroform</i> <i>Dibromomethane</i>	<i>1,1-Dichloroethane</i> <i>2,2-Dichloropropane</i> <i>Tetrachloroethylene</i> <i>1,1,1-Trichloroethane</i>	
EPA VOC Mix 5	2000 µg/mL each component in methanol	458797 48797	1 mL 1 mL
	<i>Bromodichloromethane</i> <i>Dibromochloromethane</i> <i>1,1-Dichloroethylene</i>	<i>cis-1,2-Dichloroethylene</i> <i>trans-1,2-Dichloroethylene</i> <i>Dichloromethane</i>	
EPA VOC Mix 6	2000 µg/mL each component in methanol	458799 48799-U	1.5 mL 1.5 mL
	<i>Bromomethane</i> <i>Chloroethane</i> <i>Chloromethane</i>	<i>Dichlorodifluoromethane</i> <i>Trichlorofluoromethane</i> <i>Vinyl chloride</i>	
EPA VOC Calibration Standards Kit	-	48804 458804	1 kit 1 kit
	<i>EPA Volatile Organic Compounds Mix 1 (48775), 1 mL</i> <i>EPA Volatile Organic Compounds Mix 2 (48777), 1 mL</i> <i>EPA Volatile Organic Compounds Mix 3 (48779), 1 mL</i>	<i>EPA Volatile Organic Compounds Mix 4 (48786), 1 mL</i> <i>EPA Volatile Organic Compounds Mix 5 (48797), 1 mL</i> <i>EPA Volatile Organic Compounds Mix 6 (48799-U), 1.5 mL</i>	
524.2 Add-On Mix	in methanol (varied)	861314 8561314	1 mL 1 mL
	<i>Acrylonitrile, 20000 µg/mL</i> <i>Allyl chloride, 2000 µg/mL</i> <i>Carbon disulfide, 2000 µg/mL</i> <i>Chloroacetone, 20000 µg/mL</i> <i>1-Chlorobutane, 2000 µg/mL</i> <i>trans-1,4-Dichloro-2-butene, 2000 µg/mL</i> <i>Diethyl ether, 2000 µg/mL</i> <i>Ethyl methacrylate, 2000 µg/mL</i> <i>Hexachloroethane, 2000 µg/mL</i>	<i>Methacrylonitrile, 2000 µg/mL</i> <i>Methyl acrylate, 2000 µg/mL</i> <i>Methyl methacrylate, 2000 µg/mL</i> <i>Nitrobenzene, 20000 µg/mL</i> <i>2-Nitropropane, 20000 µg/mL</i> <i>Pentachloroethane, 2000 µg/mL</i> <i>Propionitrile, 20000 µg/mL</i> <i>Tetrahydrofuran, 2000 µg/mL</i>	
Discretionary Aromatic Volatiles Mix	50 µg/mL each component in methanol	47273	1 mL
	<i>Butylbenzene</i> <i>sec-Butylbenzene</i> <i>tert-Butylbenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Isopropylbenzene</i> <i>p-Isopropyltoluene</i>	<i>Naphthalene</i> <i>Propylbenzene</i> <i>1,2,3-Trichlorobenzene</i> <i>1,2,4-Trichlorobenzene</i> <i>1,2,4-Trimethylbenzene</i> <i>1,3,5-Trimethylbenzene</i>	
Volatile Organic Contaminants Mix 1	50 µg/mL each component in methanol	47274	1 mL
	<i>Bromobenzene</i> <i>4-Chlorotoluene</i> <i>1,2-Dibromo-3-chloropropane</i> <i>1,2-Dibromoethane</i> <i>Dibromomethane</i>	<i>2,2-Dichloropropane</i> <i>1,1-Dichloro-1-propene</i> <i>Styrene</i> <i>p-Xylene</i>	
Volatile Organic Contaminants Mix 2	50 µg/mL each component in methanol	47275	1 mL
	<i>Bromochloromethane</i> <i>2-Chlorotoluene</i> <i>cis-1,2-Dichloroethylene</i> <i>1,3-Dichloropropane</i>	<i>1,1,1,2-Tetrachloroethane</i> <i>1,2,3-Trichloropropane</i> <i>o-Xylene</i>	
standard type internal			
Fluorobenzene solution	2000 µg/mL in methanol	48943	1 mL
EPA 524 Internal Standard Mix	2000 µg/mL each component in methanol	48948	1 mL
	<i>1,2-Dichlorobenzene-d₄</i> <i>Fluorobenzene</i>		
standard type surrogate			
EPA 524 Surrogate Standard Mix	2000 µg/mL each component in methanol	48466	1 mL
	<i>1-Bromo-4-fluorobenzene</i> <i>1,2-Dichlorobenzene-d₄</i>		
1-Bromo-4-fluorobenzene solution	2000 µg/mL in methanol	48083	1 mL
1,2-Dichlorobenzene-d ₄ solution	2000 µg/mL in methanol	48952-U	1 mL

Environmental Standards

Drinking Water Methods: *Safe Drinking Water Act (SDWA) - 500 Series Methods*

Method 524.1, 524.2 (continued)

Description	Concentration	Cat. No.	Qty
standard type fortification			
EPA 524.2 Fortification Solution	2000 µg/mL each component in methanol 4-Bromofluorobenzene 1,2-Dichlorobenzene-d ₄	47358-U	1 mL
	Fluorobenzene		

Method 525, 525.1, 525.2

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 525 Semivolatiles Calibration Mix without Pesticides	1000 µg/mL each component in acetone (except where noted)	506540	1 mL
	Acenaphthylene Anthracene Benz[a]anthracene Benzo[b]fluoranthene Benzo[k]fluoranthene Benzo[ghi]perylene Benzo[a]pyrene Benzyl butyl phthalate Bis(2-ethylhexyl) adipate Bis(2-ethylhexyl) phthalate Chrysene Dibenz[a,h]anthracene Dibutyl phthalate	Diethyl phthalate Dimethyl phthalate 2,4-Dinitrotoluene 2,6-Dinitrotoluene Fluorene Hexachlorobenzene Hexachlorocyclopentadiene Indeno[1,2,3-cd]pyrene Isopharone Pentachlorophenol, 4000 µg/mL Phenanthrene Pyrene	
EPA 525, 525.1 PCB Mix	500 µg/mL each component in hexane	48246	1 mL
	2-Chlorobiphenyl 2,3-Dichlorobiphenyl 2,2',3,3',4,4',6-Heptachlorobiphenyl 2,2',4,4',5,6'-Hexachlorobiphenyl	2,2',3,3',4,5',6,6'-Octachlorobiphenyl 2,2',3',4,6-Pentachlorobiphenyl 2,2',4,4'-Tetrachlorobiphenyl 2,4',5-Trichlorobiphenyl	
EPA 505/525 Pesticides Mix A	500 µg/mL each component in acetone	47725-U	1 mL
	Alachlor Aldrin Dieldrin	Lindane Simazine	
EPA 505/525 Update Pesticides Mix A	500 µg/mL each component in acetone	47727-U	1 mL
	Alachlor Aldrin Lindane Dieldrin	cis-Nonachlor trans-Nonachlor Simazine	
EPA 505/525 Pesticides Mix B	500 µg/mL each component in acetone	47726-U	1 mL
	Atrazine Endrin Heptachlor Heptachlor exo-epoxide	Hexachlorobenzene Hexachlorocyclopentadiene Methoxychlor	
EPA 505/525 Update Pesticides Mix B	500 µg/mL each component in acetone	47728-U	1 mL
	Atrazine α-Chlordane γ-Chlordane Endrin Heptachlor	Heptachlor exo-epoxide Hexachlorobenzene Hexachlorocyclopentadiene Methoxychlor	
EPA 525 Update Phthalate Esters Mix	500 µg/mL each component in methanol	47973	1 mL
	Benzyl butyl phthalate Bis(2-ethylhexyl) adipate Bis(2-ethylhexyl) phthalate Dibutyl phthalate	Diethyl phthalate Dimethyl phthalate Pentachlorophenol	
EPA 525 PAH Mix A	500 µg/mL each component in methylene chloride	48953-U	1 mL
	Acenaphthylene Anthracene Benz[a]anthracene Benzo[b]fluoranthene Benzo[k]fluoranthene Benzo[ghi]perylene Benzo[a]pyrene	Chrysene Dibenz[a,h]anthracene Fluorene Indeno[1,2,3-cd]pyrene Phenanthrene Pyrene	
EPA 525 PAH Mix B	500 µg/mL each component in acetone	48249	1 mL
	Acenaphthylene Anthracene Benz[a]anthracene Benzo[b]fluoranthene Benzo[k]fluoranthene Benzo[ghi]perylene Benzo[a]pyrene	Chrysene Dibenz[a,h]anthracene Fluorene Indeno[1,2,3-cd]pyrene Phenanthrene Pyrene	
Toxaphene solution	500 µg/mL in methanol	48243	1 mL

Environmental Standards

Drinking Water Methods: Safe Drinking Water Act (SDWA) - 500 Series Methods

Description	Concentration	Cat. No.	Qty
standard type internal			
EPA 525,525.1 Internal Standard Mix	500 µg/mL each component in acetone <i>Acenaphthene-d₁₀</i> <i>Chrysene-d₁₂</i>	<i>Phenanthrene-d₁₀</i> 48242	1 mL
standard type surrogate			
Perylene-d ₁₂ solution	2000 µg/mL in methylene chloride	48081	1 mL
standard type fortification			
EPA 525 Fortification Solution A	2000 µg/mL each component in methylene chloride <i>Acenaphthene-d₁₀</i> <i>Chrysene-d₁₂</i>	<i>Phenanthrene-d₁₀</i> 48230-U	1 mL
EPA 525 Fortification Solution B	500 µg/mL each component in acetone <i>Acenaphthene-d₁₀</i> <i>Chrysene-d₁₂</i>	<i>Perylene-d₁₂</i> <i>Phenanthrene-d₁₀</i> 48099	1 mL

Method 531.1

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 531.1 Carbamate Mix	100 µg/mL each component in methanol <i>Aldicarb</i> <i>Aldicarb-sulfone</i> <i>Aldicarb-sulfoxide</i> <i>Carbofuran</i> <i>Carbofuran-3-hydroxy</i>	<i>1-Naphthyl-N-methylcarbamate</i> <i>Mercaptodimethur</i> <i>Methomyl</i> <i>Oxamyl</i> <i>Propoxur</i> 46856-U	1 mL

Method 535

Description	Cat. No.	Pkg
Acetochlor ESA	34145-10MG	10 mg
Acetochlor OA	34144-10MG	10 mg
Alachlor ESA	34147-10MG	10 mg
Alachlor OA	34146-10MG	10 mg
Flufenacet ESA	34154-10MG	10 mg
Flufenacet OA	34153-10MG	10 mg
Metolachlor ESA	34149-10MG	10 mg
Metolachlor OA	34148-10MG	10 mg
Propachlor ESA	34152-10MG	10 mg
Propachlor OA	34151-10MG	10 mg
Butachlor ESA	34211-10MG-R	10 mg

Method 547

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 547 Glyphosate Solution	1000 µg/mL in H ₂ O	44690-U	1 mL

Method 549.2

Description	Cat. No.	Pkg
Diquat dibromide	45422-250MG-R	250 mg
Paraquat dichloride	36541-100MG	100 mg

Method 550, 550.1

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA TCL PAH Mix	in acetonitrile: methanol (9:1) (varied) <i>Acenaphthene</i> , 1000 µg/mL <i>Acenaphthylene</i> , 500 µg/mL <i>Anthracene</i> , 20 µg/mL <i>Benz[a]anthracene</i> , 50 µg/mL <i>Benzo[b]fluoranthene</i> , 20 µg/mL <i>Benzo[k]fluoranthene</i> , 20 µg/mL <i>Benzo[ghi]perylene</i> , 80 µg/mL <i>Benzo[a]pyrene</i> , 50 µg/mL	<i>Chrysene</i> , 50 µg/mL <i>Dibenz[a,h]anthracene</i> , 200 µg/mL <i>Fluoranthene</i> , 50 µg/mL <i>Fluorene</i> , 100 µg/mL <i>Indeno[1,2,3-cd]pyrene</i> , 50 µg/mL <i>Naphthalene</i> , 500 µg/mL <i>Phenanthrene</i> , 40 µg/mL <i>Pyrene</i> , 100 µg/mL	49156 1 mL

Environmental Standards

Drinking Water Methods: *Safe Drinking Water Act (SDWA) - 500 Series Methods*

Method 551, 551.1

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 551A Halogenated Volatiles Mix	2000 µg/mL each component in acetone <i>Bromodichloromethane</i> <i>Bromoform</i> <i>Carbon tetrachloride</i> <i>Chloroform</i> <i>Dibromochloromethane</i>	48045 <i>1,2-Dibromo-3-chloropropane</i> <i>1,2-Dibromoethane</i> <i>Tetrachloroethylene</i> <i>1,1,1-Trichloroethane</i> <i>Trichloroethylene</i>	1 mL
EPA 551B Halogenated Volatiles Mix	2000 µg/mL each component in acetone <i>Bromochloroacetonitrile</i> <i>Dibromoacetonitrile</i> <i>Dichloroacetonitrile</i> <i>1,1-Dichloro-2-propanone</i>	48046 <i>1,1,1-Trichloroacetone</i> <i>Trichloroacetonitrile</i> <i>Trichloronitromethane</i>	1 mL
Chloral hydrate solution	1000 µg/mL in acetonitrile	47335-U	1 mL
EPA 551 Disinfection Byproducts Kit	- <i>EPA 551A Halogenated Volatiles Mix (48045), 1 mL</i> <i>Chloral hydrate solution (47335-U), 1 mL</i>	48112 <i>EPA 551B Halogenated Volatiles Mix (48046), 1 mL</i>	1 kit

Method 552, 552.1, 552.2, 552.3

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 552 Halogenated Acetic Acids Mix	2000 µg/mL each component in methyl <i>tert</i> -butyl ether <i>Bromoacetic acid</i> <i>Bromochloroacetic acid</i> <i>Chloroacetic acid</i>	48047 <i>Dibromoacetic acid</i> <i>Dichloroacetic acid</i> <i>Trichloroacetic acid</i>	1 mL
EPA 552 Methyl Esters Mix	1000 µg/mL each component in methyl <i>tert</i> -butyl ether <i>Methyl bromoacetate</i> <i>Methyl bromochloroacetate</i> <i>Methyl chloroacetate</i>	47598-U <i>Methyl dibromoacetate</i> <i>Methyl dichloroacetate</i> <i>Methyl trichloroacetate</i>	1 mL
EPA 552.1 Acids Calibration Mix with Surrogate	in methyl <i>tert</i> -butyl ether (varied) <i>Bromoacetic acid, 200 µg/mL</i> <i>Bromochloroacetic acid, 200 µg/mL</i> <i>2-Bromopropionic acid, 100 µg/mL</i> <i>Chloroacetic acid, 300 µg/mL</i>	47652-U <i>Dibromoacetic acid, 100 µg/mL</i> <i>Dichloroacetic acid, 300 µg/mL</i> <i>2,2-Dichloropropionic acid, 200 µg/mL</i> <i>Trichloroacetic acid, 100 µg/mL</i>	1 mL
EPA 552.2 Acids Calib Mix with Surrogate	in methyl <i>tert</i> -butyl ether (varied) <i>Bromoacetic acid, 200 µg/mL</i> <i>Bromochloroacetic acid, 200 µg/mL</i> <i>Bromodichloroacetic acid, 200 µg/mL</i> <i>2-Bromopropionic acid, 100 µg/mL</i> <i>Chloroacetic acid, 300 µg/mL</i> <i>Dibromochloroacetic acid, 200 µg/mL</i>	47629-U <i>Dibromoacetic acid, 100 µg/mL</i> <i>Dichloroacetic acid, 300 µg/mL</i> <i>2,2-Dichloropropionic acid, 200 µg/mL</i> <i>Tribromoacetic acid, 100 µg/mL</i> <i>Trichloroacetic acid, 100 µg/mL</i>	1 mL
EPA 552.2 Haloacetic Acids Mix	2000 µg/mL each component in methyl <i>tert</i> -butyl ether <i>Bromoacetic acid</i> <i>Bromochloroacetic acid</i> <i>Bromodichloroacetic acid</i> <i>Chloroacetic acid</i> <i>Dibromochloroacetic acid</i>	49107-U <i>Dibromoacetic acid</i> <i>Dichloroacetic acid</i> <i>Tribromoacetic acid</i> <i>Trichloroacetic acid</i>	1 mL
EPA 552.2 Methyl Ester Calibration Mix w/ Surrogate	in methyl <i>tert</i> -butyl ether (varied) <i>Methyl bromoacetate, 200 µg/mL</i> <i>Methyl bromochloroacetate, 200 µg/mL</i> <i>Methyl bromodichloroacetate, 200 µg/mL</i> <i>Methyl 2-bromopropionate, 100 µg/mL</i> <i>Methyl chloroacetate, 300 µg/mL</i> <i>Methyl chlorodibromoacetate, 200 µg/mL</i>	47630-U <i>Methyl dibromoacetate, 100 µg/mL</i> <i>Methyl dichloroacetate, 300 µg/mL</i> <i>Methyl 2,2-dichloropropionate, 200 µg/mL</i> <i>Methyl tribromoacetate, 100 µg/mL</i> <i>Methyl trichloroacetate, 100 µg/mL</i>	1 mL
EPA 552.2 Acids Calibration Mix	in methyl <i>tert</i> -butyl ether (varied) <i>Bromoacetic acid, 400 µg/mL</i> <i>Bromochloroacetic acid, 400 µg/mL</i> <i>Bromodichloroacetic acid, 400 µg/mL</i> <i>Chloroacetic acid, 600 µg/mL</i> <i>Dibromochloroacetic acid, 1000 µg/mL</i>	47787 <i>Dibromoacetic acid, 200 µg/mL</i> <i>Dichloroacetic acid, 600 µg/mL</i> <i>Tribromoacetic acid, 2000 µg/mL</i> <i>Trichloroacetic acid, 200 µg/mL</i>	1 mL
EPA 552.2 Esters Calibration Mix (without Dalapon)	in methyl <i>tert</i> -butyl ether (varied) <i>Methyl bromoacetate, 400 µg/mL</i> <i>Methyl bromochloroacetate, 400 µg/mL</i> <i>Methyl bromodichloroacetate, 400 µg/mL</i> <i>Methyl chloroacetate, 600 µg/mL</i> <i>Methyl chlorodibromoacetate, 1000 µg/mL</i>	47788 <i>Methyl dibromoacetate, 200 µg/mL</i> <i>Methyl dichloroacetate, 600 µg/mL</i> <i>Methyl tribromoacetate, 2000 µg/mL</i> <i>Methyl trichloroacetate, 200 µg/mL</i>	1 mL

Environmental Standards

Drinking Water Methods: Safe Drinking Water Act (SDWA) - 500 Series Methods

Description	Concentration	Cat. No.	Qty
Bromoacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47655-U	1 mL
Bromochloroacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47659-U	1 mL
Bromodichloroacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47278	1 mL
Chloroacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47654-U	1 mL
2,2-Dichloropropionic acid	1000 µg/mL in methyl <i>tert</i> -butyl ether	47656-U	1 mL
Dibromochloroacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47277	1 mL
Dibromoacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47660-U	1 mL
Dichloroacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47657-U	1 mL
Tribromoacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47729-U	1 mL
Trichloroacetic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47658-U	1 mL
Methyl bromoacetate solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47662-U	1 mL
Methyl bromochloroacetate solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47666-U	1 mL
Methyl 2-bromobutyrate solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	44929-U	1 mL
Methyl bromodichloroacetate solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47761	1 mL
Methyl chloroacetate	1000 µg/mL in methyl <i>tert</i> -butyl ether	47661-U	1 mL
Methyl chlorodibromoacetate solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47762	1 mL
Dalapon methyl ester solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47663-U	1 mL
Methyl dibromoacetate solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47667-U	1 mL
Methyl dichloroacetate solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47664-U	1 mL
Methyl tribromoacetate solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47730-U	1 mL
Methyl trichloroacetate solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47665-U	1 mL
standard type internal			
1,2,3-Trichloropropane solution	200 µg/mL in methanol	48355	1 mL
1,2,3-Trichloropropane solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47669-U	1 mL
standard type surrogate			
3,5-Dichlorobenzoic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	502316	1 mL
2,3-Dichloropropionic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47670-U	1 mL
2-Bromopropionic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47645	1 mL
2,3-Dibromopropionic acid solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47789	1 mL
Methyl-2-bromopropionate solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	47668-U	1 mL
Methyl 2,3-dibromopropionate solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	46970-U	1 mL

Method 556, 556.1

Description	Cat. No.	Pkg
Formaldehyde O-pentafluorophenylmethyl-oxime	41558-10MG	10 mg
Propionaldehyde O-pentafluorophenylmethyl-oxime	43508-10MG	10 mg
Valeraldehyde-O-pentafluorophenylmethyl-oxime	66156-10MG	10 mg

Drinking Water Odor Standards

Description	Concentration	Cat. No.	Qty
(±)-Geosmin solution	100 µg/mL in methanol	47522-U 4M7522-U	1 mL 5 × 2 mL
2-Methylisoborneol solution	100 µg/mL in methanol	47523-U 4M7523-U	1 mL 5 × 2 mL
(±)-Geosmin and 2-Methylisoborneol Solution	100 µg/mL in methanol	47525-U	1 mL
	(±)-Geosmin	2-Methylisoborneol	
2,4,6-Trichloroanisole solution	100 µg/mL in methanol	47526-U	1 mL
2-Isopropyl-3-methoxy-pyrazine solution	100 µg/mL in methanol	47527-U	1 mL
2-Isobutyl-3-methoxy-pyrazine solution	100 µg/mL in methanol	47528-U	1 mL
Drinking Water Odor Standards Kit	-	47529-U	6 × 1 mL
	(±) Geosmin (47522-U), 1 mL 2-Methylisoborneol (47523-U), 1 mL (±) Geosmin and 2-Methylisoborneol (47525-U), 1 mL	2,4,6-Trichloroanisole (47526-U), 1 mL 2-Isopropyl-3-methoxy-pyrazine (47527-U), 1 mL 2-Isobutyl-3-methoxy-pyrazine (47528-U), 1 mL	

Environmental Standards

Drinking Water Methods: *Related Derivatization Products*

Related Derivatization Products

The Diazald Kit is a set of distillation glassware designed for safely preparing diazomethane (~100 mmol). No sharp edges on ground-glass joints. The 19/22 Clear-Seal tapered joints do not require grease even for vacuum applications, thus avoiding that source of contamination.

For replacement parts, contact our Technical Service department (phone 800-359-3041 or 814-359-3041).

Description	Concentration	Cat. No.	Qty
Methanolic H ₂ SO ₄	10 % (v/v) in methanol	506516	6 × 5 mL
Diazald® kit with Clear-Seal® joints	-	Z100250-1KT	1 kit
<p><i>Aldrich® West condenser w/ Clear-Seal® joint (Aldrich Z100307)</i> <i>Aldrich® single-neck round-bottom flask with Clear-Seal® joint (Aldrich Z100331)</i></p> <p><i>Aldrich® bent vacuum-distilling adapter (Aldrich Z100293)</i> <i>Aldrich® single-neck round-bottom flask with Clear-Seal® joint (Aldrich Z100358)</i></p> <p><i>Aldrich® Claisen adapter (Aldrich Z100269)</i> <i>Aldrich® single-neck round-bottom flask with Clear-Seal® joint (Aldrich Z100366)</i></p> <p><i>Aldrich® three-way adapter with Clear-Seal® joints (Aldrich Z100277)</i> <i>Aldrich® single-neck round-bottom flask with Clear-Seal® joint (Aldrich Z100374)</i></p> <p><i>Distilling column (Aldrich Z100315)</i> <i>Wheaton connecting adapter (Aldrich Z106283)</i></p> <p><i>Gas-inlet tube for Aldrich® Glassware kits (Aldrich Z122513)</i> <i>PTFE stopper for Macro Diazald® kit (Aldrich Z100390)</i></p> <p><i>Aldrich® single-neck round-bottom flask with Clear-Seal® joint (Aldrich Z100323)</i> <i>Separatory funnel with PTFE stopcock and 19/22 Clear-Seal® joint (Aldrich Z100382)</i></p>			

Wastewater Methods

These analytical reference standards are specifically designed for monitoring organic chemicals on the Priority Pollutants List in municipal and industrial wastewater per methods developed by the US EPA Environmental Monitoring Systems Laboratory in Cincinnati, Ohio (EMSL/CL), under authority of the Clean Water Act (CWA).

Clean Water Act (CWA) - 600 Series Methods

US EPA 600 Series methods are analytical methods for identifying and quantifying volatile organic compounds, pesticides, and synthetic organic compounds ("Priority Pollutants") in municipal and industrial wastewater. Most of these methods call for gas chromatography with a selective detector or for gas chromatography/mass spectrometry; a few methods call for high performance liquid chromatography or allow the analyst to choose between GC and HPLC. Packed GC columns are described in the 600 Series methods, but chromatographic conditions can be changed (e.g., capillary columns may be used) if the changes do not make the method "less accurate or less precise" than the standard method.

Compound Classification	U.S. EPA Method No.
Acids (Phenols), Base-Neutrals, Organochlorine Pesticides & PCBs	625
Acrolein/Acrylonitrile	603
Benzidine/3,3'-Dichlorobenzidine	605
Benomyl and Carbendazim	631
Cyanazine	629
Dinitroaniline Pesticides	627
Haloethers	611
Nitrosamines	607
Organochlorine Pesticides and PCBs	608
Phenols	604
Phthalate Esters	606
Polynuclear Aromatic Hydrocarbons (PAHs)	610
Purgeable Aromatics	602
Purgeable Halocarbons	601
Purgeable Halocarbons	624
2,3,7,8-Tetrachlorodibenzo-p-dioxin	613

Environmental Standards

Wastewater Methods: Clean Water Act (CWA) - 600 Series Methods

Method 601

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA 601 Purgeable Mix w/o gases including 2-CEVE	2000 µg/mL each component in methanol	-	47431-U	1 mL
	<i>Bromodichloromethane</i> <i>Bromoform</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>2-Chloroethyl vinyl ether</i> <i>Chloroform</i> <i>Dibromochloromethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i>	<i>1,1-Dichloroethylene</i> <i>trans-1,2-Dichloroethylene</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i>		
EPA VOC Mix 6	2000 µg/mL each component in methanol	SES	458799 48799-U	1.5 mL 1.5 mL
	<i>Bromomethane</i> <i>Chloroethane</i> <i>Chloromethane</i>	<i>Dichlorodifluoromethane</i> <i>Trichlorofluoromethane</i> <i>Vinyl chloride</i>		
EPA 601/602 Calibration Mix includes 2-CEVE	2000 µg/mL each component in methanol	-	47507-U	1 mL
	<i>Benzene</i> <i>Bromodichloromethane</i> <i>Bromoform</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>2-Chloroethyl vinyl ether</i> <i>Chloroform</i> <i>Dibromochloromethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i>	<i>1,1-Dichloroethylene</i> <i>trans-1,2-Dichloroethylene</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i> <i>Ethylbenzene</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>Toluene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i>		
EPA 601 Purgeable Halocarbons Mix	2000 µg/mL each component in methanol	-	46964	1 mL
	<i>Bromodichloromethane</i> <i>Bromoform</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>Chloroform</i> <i>Dibromochloromethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i>	<i>1,1-Dichloroethylene</i> <i>trans-1,2-Dichloroethylene</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i>		
EPA 602 Purgeable Aromatics Mix	2000 µg/mL each component in methanol	-	46965	1 mL
	<i>Benzene</i> <i>Chlorobenzene</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i>	<i>1,4-Dichlorobenzene</i> <i>Ethylbenzene</i> <i>Toluene</i>		
2-Chloroethyl vinyl ether solution	200 µg/mL in methanol	-	48672	1 mL
2-Chloroethyl vinyl ether solution	5000 µg/mL in methanol	-	40017	1 mL
EPA 501/601 Trihalomethanes Calibration Mix	100 µg/mL each component in methanol	-	47904	1 mL
	<i>Bromodichloromethane</i> <i>Bromoform</i>	<i>Chloroform</i> <i>Dibromochloromethane</i>		
EPA 501/601 Trihalomethanes Calibration Mix	200 µg/mL each component in methanol	SES	458746 48746	1 mL 1 mL
	<i>Bromodichloromethane</i> <i>Bromoform</i>	<i>Chloroform</i> <i>Dibromochloromethane</i>		
EPA 501/601 Trihalomethanes Calibration Mix	2000 µg/mL each component in methanol	-	48140-U 4M8140-U	1 mL 5 × 1 mL
	<i>Bromodichloromethane</i> <i>Bromoform</i>	<i>Chloroform</i> <i>Dibromochloromethane</i>		
Dibromochloromethane solution	200 µg/mL in methanol	-	48608	1 mL
Bromodichloromethane solution	200 µg/mL in methanol	-	48615	1 mL
Bromodichloromethane solution	5000 µg/mL in methanol	-	40046	1 mL
Bromoform solution	5000 µg/mL in methanol	-	40212	1 mL

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Wastewater Methods: Clean Water Act (CWA) - 600 Series Methods

Method 601 (continued)

Description	Concentration		Cat. No.	Qty
Chloroform solution	200 µg/mL in methanol	-	48603	1 mL
Chloroform solution	5000 µg/mL in methanol	-	40021	1 mL
Dibromochloromethane solution	5000 µg/mL in methanol	-	40200-U	1 mL
EPA 601 Purgeables Performance Mix	in methanol (varied conc.)	-	48747	1 mL
	Carbon tetrachloride, 120 µg/mL Chlorobenzene, 600 µg/mL 1,2-Dichlorobenzene, 600 µg/mL 1,3-Dichlorobenzene, 600 µg/mL 1,4-Dichlorobenzene, 600 µg/mL 1,1-Dichloroethane, 120 µg/mL 1,2-Dichloroethane, 120 µg/mL 1,1-Dichloroethylene, 120 µg/mL trans-1,2-Dichloroethylene, 120 µg/mL	Dichloromethane, 600 µg/mL 1,2-Dichloropropane, 120 µg/mL cis-1,3-Dichloropropene, 120 µg/mL trans-1,3-Dichloropropene, 120 µg/mL 1,1,2,2-Tetrachloroethane, 120 µg/mL Tetrachloroethylene, 120 µg/mL 1,1,1-Trichloroethane, 120 µg/mL 1,1,2-Trichloroethane, 120 µg/mL Trichloroethylene, 120 µg/mL		
standard type internal				
EPA Purgeable Internal Standard Mix	20,000 µg/mL each component in methanol	-	48864	1 mL
	Bromochloromethane 2-Bromo-1-chloropropane	1,4-Dichlorobutane		
1,4-Dichlorobutane solution	2000 µg/mL in methanol	-	48066	1 mL
2-Bromo-1-chloropropane solution	20,000 µg/mL in methanol	-	48713	1 mL
standard type internal/surrogate				
2-Bromo-1-chloropropane solution	2000 µg/mL in methanol	-	48088	1 mL
standard type surrogate				
Bromochloromethane solution	2000 µg/mL in methanol	-	48067	1 mL

Method 602

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA 602 Purgeable Aromatics Mix	2000 µg/mL each component in methanol	-	46965	1 mL
	Benzene Chlorobenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene	1,4-Dichlorobenzene Ethylbenzene Toluene		
EPA 602 Purgeable Aromatics Mix	200 µg/mL each component in methanol	-	48740	1 mL
	Benzene Chlorobenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene	1,4-Dichlorobenzene Ethylbenzene Toluene		
standard type internal/surrogate				
α,α-Trifluorotoluene solution	2000 µg/mL in methanol	-	48389	1 mL

Method 603

Description	Concentration		Cat. No.	Qty
standard type calibration				
Acrolein	-	SS	458501 48501	100 mg 5 g
Acrylonitrile	-	SS	48502	1 g
Acrolein/Acrylonitrile Mix	2000 µg/mL each component in H ₂ O	SS	456870-U 46870-U	1 mL 1 mL
	Acrolein	Acrylonitrile		
Acrolein/Acrylonitrile Mix	10,000 µg/mL in deionized water	-	46871-U	1 mL
	Acrolein	Acrylonitrile		

Method 604

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA Phenols Mixture	in methanol (varied)	SS	458859 48859	1 mL 1 mL
	4-Chloro-3-methylphenol, 2500 µg/mL 2-Chlorophenol, 500 µg/mL 2,4-Dichlorophenol, 500 µg/mL 2,4-Dimethylphenol, 500 µg/mL 2,4-Dinitrophenol, 1500 µg/mL 2-Methyl-4,6-dinitrophenol, 2500 µg/mL	2-Nitrophenol, 500 µg/mL 4-Nitrophenol, 2500 µg/mL Pentachlorophenol, 2500 µg/mL Phenol, 500 µg/mL 2,4,6-Trichlorophenol, 1500 µg/mL		


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Wastewater Methods: Clean Water Act (CWA) - 600 Series Methods

Method 605

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA TCL Benzidines Mix	2000 µg/mL each component in methanol		48906 458906	1 mL 1 mL
	<i>Benzidine</i>			<i>3,3'-Dichlorobenzidine</i>

Method 606

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA Phthalate Esters Mix	2000 µg/mL each component in methanol	-	48805-U	1 mL
	<i>Bis(2-ethylhexyl) phthalate</i> <i>Benzyl butyl phthalate</i> <i>Dibutyl phthalate</i>			<i>Di-n-octyl phthalate</i> <i>Diethyl phthalate</i> <i>Dimethyl phthalate</i>
EPA Phthalate Esters Mix	2000 µg/mL each component in hexane		48231 458231	1 mL 1 mL
	<i>Bis(2-ethylhexyl) phthalate</i> <i>Benzyl butyl phthalate</i> <i>Dibutyl phthalate</i>			<i>Di-n-octyl phthalate</i> <i>Diethyl phthalate</i> <i>Dimethyl phthalate</i>
EPA 606-M Phthalate Esters Mix	200 µg/mL each component in methanol	-	48741	1 mL
	<i>Benzyl butyl phthalate</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>Dibutyl phthalate</i>			<i>Diethyl phthalate</i> <i>Dimethyl phthalate</i> <i>Di-n-octyl phthalate</i>

Method 607

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA 607 Nitrosamines Mix	2000 µg/mL each component in methanol		48240-U	1 mL
	<i>N-Nitrosodimethylamine</i> <i>N-Nitrosodiphenylamine</i>			<i>N-Nitrosodi-n-propylamine</i>

Method 608, 608.1, 608.2

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA 608 Pesticides Mix	20 µg/mL each component in hexane: toluene (1:1)		47915-U	1 mL
	<i>Aldrin</i> <i>α-1,2,3,4,5,6-Hexachlorocyclohexane</i> <i>β-BHC</i> <i>Lindane</i> <i>δ-BHC</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene</i> <i>4,4'-DDT</i> <i>Dieldrin</i>			<i>α-Endosulfan</i> <i>β-Endosulfan</i> <i>Endosulfan sulfate</i> <i>Endrin</i> <i>Endrin aldehyde</i> <i>Heptachlor</i> <i>Heptachlor exo-epoxide</i> <i>Benzene, 200 mg/L</i>
EPA Pesticide Mix	in methanol: methylene chloride (98:2) (varied)		48858-U	1 mL
	<i>Aldrin, 10 µg/mL</i> <i>α-BHC</i> <i>β-BHC</i> <i>Lindane, 10 µg/mL</i> <i>δ-BHC</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane, 60 µg/mL</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene, 20 µg/mL</i> <i>4,4'-DDT, 60 µg/mL</i>			<i>Dieldrin, 20 µg/mL</i> <i>α-Endosulfan, 20 µg/mL</i> <i>β-Endosulfan, 20 µg/mL</i> <i>Endosulfan sulfate, 60 µg/mL</i> <i>Endrin, 20 µg/mL</i> <i>Endrin aldehyde, 60 µg/mL</i> <i>Heptachlor, 10 µg/mL</i> <i>Heptachlor exo-epoxide, 10 µg/mL</i>
Chlordane (mixture of isomers)	5000 µg/mL in methanol		40089	1 mL
Toxaphene solution	5000 µg/mL in methanol		40111	1 mL
Aroclor Mix 1	200 µg/mL each component in methanol		48861	1 mL
	<i>Aroclor 1016</i> <i>Aroclor 1232</i>			<i>Aroclor 1248</i> <i>Aroclor 1260</i>
Aroclor Mix 2	200 µg/mL each component in methanol		48862	1 mL
	<i>Aroclor 1221</i> <i>Aroclor 1242</i>			<i>Aroclor 1254</i>


Environmental Standards

Wastewater Methods: Clean Water Act (CWA) - 600 Series Methods

Method 608, 608.1, 608.2 (continued)

Description	Concentration		Cat. No.	Qty
EPA 608.1 Calibration Solution	1000 µg/mL in isooctane Chlorobenzilate Chloroneb Chloropropylate 1,2-Dibromo-3-chloropropane	Etridiazole Pentachloronitrobenzene Propachlor	40351-U	1 mL
EPA 608.2 Calibration Solution	100 µg/mL each component in hexane Chlorothalonil Dacthal Dicloran	Methoxychlor Permethrin isomers	40352-U	1 mL

Method 610

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA 610 Polynuclear Aromatic Hydrocarbons Mixture	in methanol: methylene chloride (1:1) Acenaphthene, 1000 µg/mL Acenaphthylene, 2000 µg/mL Anthracene, 100 µg/mL Benz[a]anthracene, 100 µg/mL Benzo[b]fluoranthene, 200 µg/mL Benzo[k]fluoranthene, 100 µg/mL Benzo[ghi]perylene, 200 µg/mL Benzo[a]pyrene, 100 µg/mL	Chrysene, 100 µg/mL Dibenz[a,h]anthracene, 200 µg/mL Fluoranthene, 200 µg/mL Fluorene, 200 µg/mL Indeno[1,2,3-cd]pyrene, 100 µg/mL Naphthalene, 1000 µg/mL Phenanthrene, 100 µg/mL Pyrene, 100 µg/mL	 48743 4S8743	1 mL 1 mL
EPA 610-N PAH Kit	- Acenaphthylene, .1 g Anthracene, 5 g Benzo[a]anthracene, .1 g Benzo[a]pyrene, .1 g Benzo[b]fluoranthene, .05 g Benzo[ghi]perylene, .025 g Benzo[k]fluoranthene, .05 g Chrysene(93%), .1 g	Dibenzo[a,h]anthracene, .1 g Fluoranthene, 5 g Fluorene, 5 g Indeno[1,2,3-cd]pyrene, .01 g Naphthalene, 5 g Phenanthrene, 5 g Pyrene, 5 g Acenaphthene, 5 g	- 47351	1 kit
EPA 610-S PAH Kit	in methanol (except where noted) Acenaphthene solution (Supelco 48643) Acenaphthylene solution (Supelco 48630-U) Anthracene solution (Supelco 48647) Benz[a]anthracene solution (Supelco 48651) Benzo[a]pyrene solution (Supelco 48665) Benzo[b]fluoranthene solution (Supelco 48637) Benzo[ghi]perylene solution (Supelco 48667) Benzo[k]fluoranthene solution (Supelco 48668) Chrysene solution (Supelco 48650)	Dibenzo[a,h]anthracene solution (Supelco 48652) Fluoranthene solution (Supelco 48662) Fluorene solution (Supelco 48644) Indeno[1,2,3-cd]pyrene solution (Supelco 48669) Naphthalene solution (Supelco 48641) Phenanthrene solution (Supelco 48661) Pyrene (Supelco 48649) EPA 610 Polynuclear Aromatic Hydrocarbons Mixture (Supelco 48743), 1 mL	- 48755-U	1 kit

Method 611

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA Haloethers Mix	2000 µg/mL each component in hexane Bis(2-chloroethoxy)methane Bis(2-chloroethyl) ether 4-Bromodiphenyl ether	4-Chlorodiphenyl ether Bis-(2-chloroisopropyl) ether	48228-U	1 mL


Method 613

Description	Concentration		Cat. No.	Qty
standard type calibration				
2,3,7,8-Tetrachlorodibenzo-p-dioxin solution	10 µg/mL in toluene		48599	1 mL

Environmental Standards

Wastewater Methods: Clean Water Act (CWA) - 600 Series Methods

Method 624

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA 624 Calibration Mix 1	100 µg/mL each component in methanol		- 47506	1 mL
	Benzene	1,1-Dichloroethylene		
	Bromodichloromethane	trans-1,2-Dichloroethylene		
	Bromoform	Dichloromethane		
	Bromomethane	1,2-Dichloropropane		
	Carbon tetrachloride	cis-1,3-Dichloropropene		
	Chlorobenzene	trans-1,3-Dichloropropene		
	Chloroethane	Ethylbenzene		
	Chloroform	1,1,2,2-Tetrachloroethane		
	Chloromethane	Tetrachloroethylene		
	Dibromochloromethane	Toluene		
	1,2-Dichlorobenzene	1,1,1-Trichloroethane		
	1,3-Dichlorobenzene	1,1,2-Trichloroethane		
	1,4-Dichlorobenzene	Trichloroethylene		
	1,1-Dichloroethane	Trichlorofluoromethane		
	1,2-Dichloroethane	Vinyl chloride		
2-Chloroethyl vinyl ether solution	5000 µg/mL in methanol		- 40017	1 mL
2-Chloroethyl vinyl ether solution	200 µg/mL in methanol		- 48672	1 mL
EPA Purgeable Halocarbon Calibration Kit	-		- 47439-U	2 × 1 mL
	EPA 624 Calibration Mix (47056), 1 mL	2-Chloroethyl vinyl ether (40017), 1 mL		
EPA 624 Calibration Mix 1	2000 µg/mL each component in methanol (varied)		 8561311 861311	1 mL 1 mL
	Benzene	2,2-Dichloropropane		
	Bromobenzene	1,1-Dichloro-1-propene		
	Bromodichloromethane	cis-1,3-Dichloropropene		
	Bromoform	trans-1,3-Dichloropropene		
	Butylbenzene	Ethylbenzene		
	sec-Butylbenzene	Hexachloro-1,3-butadiene		
	tert-Butylbenzene	Isopropylbenzene		
	Carbon tetrachloride	p-Isopropyltoluene		
	Chlorobenzene	Naphthalene		
	Chloroform	Propylbenzene		
	2-Chlorotoluene	Styrene		
	4-Chlorotoluene	1,1,1,2-Tetrachloroethane		
	Dibromochloromethane	1,1,2,2-Tetrachloroethane		
	1,2-Dibromo-3-chloropropane	Tetrachloroethylene		
	1,2-Dibromoethane	Toluene		
	Dibromomethane	1,2,3-Trichlorobenzene		
	1,2-Dichlorobenzene	1,2,4-Trichlorobenzene		
	1,3-Dichlorobenzene	1,1,1-Trichloroethane		
	1,4-Dichlorobenzene	1,1,2-Trichloroethane		
	1,1-Dichloroethane	Trichloroethylene		
	1,2-Dichloroethane	1,2,3-Trichloropropane		
	1,1-Dichloroethylene	1,2,4-Trimethylbenzene		
	cis-1,2-Dichloroethylene	1,3,5-Trimethylbenzene		
	trans-1,2-Dichloroethylene	o-Xylene		
	Dichloromethane	m-Xylene		
	1,2-Dichloropropane	p-Xylene		
	1,3-Dichloropropane			
EPA 624 Purgeable Calibration Mix w/o Gases, includes 2-CEVE	2000 µg/mL each component in methanol		- 47432-U	1 mL
	Benzene	1,1-Dichloroethylene		
	Bromodichloromethane	trans-1,2-Dichloroethylene		
	Bromoform	Dichloromethane		
	Carbon tetrachloride	1,2-Dichloropropane		
	Chlorobenzene	cis-1,3-Dichloropropene		
	2-Chloroethyl vinyl ether	trans-1,3-Dichloropropene		
	Chloroform	Ethylbenzene		
	Dibromochloromethane	1,1,2,2-Tetrachloroethane		
	1,2-Dichlorobenzene	Tetrachloroethylene		
	1,3-Dichlorobenzene	Toluene		
	1,4-Dichlorobenzene	1,1,1-Trichloroethane		
	1,1-Dichloroethane	1,1,2-Trichloroethane		
	1,2-Dichloroethane	Trichloroethylene		
EPA Purgeable A	200 µg/mL each component in methanol		- 47969	1 mL
	Carbon tetrachloride	1,1-Dichloroethylene		
	Chlorobenzene	Dichloromethane		
	2-Chloroethyl vinyl ether	1,2-Dichloropropane		
	Chloroform	Tetrachloroethylene		
	Dibromochloromethane	1,1,2-Trichloroethane		
	1,2-Dichlorobenzene	Trichloroethylene		
	1,1-Dichloroethane	Trichlorofluoromethane		

Environmental Standards

Wastewater Methods: Clean Water Act (CWA) - 600 Series Methods


Method 624 (continued)

Description	Concentration		Cat. No.	Qty
EPA HC Purgeable B	200 µg/mL each component in methanol <i>Benzene</i> <i>Bromodichloromethane</i> <i>Bromoform</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>1,2-Dichloroethane</i> <i>trans-1,2-Dichloroethylene</i>	<i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i> <i>Ethylbenzene</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Toluene</i> <i>1,1,1-Trichloroethane</i>	- 47970-U	1 mL
EPA HC Purgeable C	200 µg/mL each component in methanol <i>Bromomethane</i> <i>Chloroethane</i>	<i>Chloromethane</i> <i>Vinyl chloride</i>	- 48853	1 mL
EPA 624 Calibration Mix A (w/o gases)	2000 µg/mL in methanol <i>Benzene</i> <i>Bromodichloromethane</i> <i>Bromoform</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>Chloroform</i> <i>Dibromochloromethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i> <i>1,1-Dichloroethylene</i>	<i>trans-1,2-Dichloroethylene</i> <i>Dichloromethane</i> <i>1,2-Dichloropropane</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i> <i>Ethylbenzene</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>Toluene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i>	- 46966	1 mL
EPA 624 Calibration Mix B	2000 µg/mL each component in methanol <i>Bromomethane</i> <i>Chloroethane</i> <i>Chloromethane</i>	<i>Trichlorofluoromethane</i> <i>Vinyl chloride</i>	- 46967-U	1 mL
EPA 624 Purgeables Kit	- <i>EPA Purgeable A (Supelco 48059), 1mL</i> <i>EPA HC Purgeable B (Supelco 48058), 1mL</i>	<i>EPA HC Purgeable C (Supelco 48057-U), 1mL</i>	- 47371	1 kit
EPA Purgeable A	200 µg/mL each component in methanol <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>2-Chloroethyl vinyl ether</i> <i>Chloroform</i> <i>Dibromochloromethane</i> <i>1,1-Dichloroethane</i> <i>1,1-Dichloroethylene</i>	<i>Dichloromethane</i> <i>1,2-Dichloropropane</i> <i>Tetrachloroethylene</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i> <i>Trichlorofluoromethane</i>	SS 48851-U 458851	1 mL 1 mL
EPA Purgeable B	200 µg/mL each component in methanol <i>Benzene</i> <i>Bromodichloromethane</i> <i>Bromoform</i> <i>1,2-Dichloroethane</i> <i>trans-1,2-Dichloroethylene</i> <i>cis-1,3-Dichloropropene</i>	<i>trans-1,3-Dichloropropene</i> <i>Ethylbenzene</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Toluene</i> <i>1,1,1-Trichloroethane</i>	SS 458852 48852-U	1 mL 1 mL
standard type internal				
EPA Purgeable Internal Standard Mix	20,000 µg/mL each component in methanol <i>Bromochloromethane</i> <i>2-Bromo-1-chloropropane</i>	<i>1,4-Dichlorobutane</i>	- 48864	1 mL
Fluorobenzene solution	2000 µg/mL in methanol		- 48943	1 mL
standard type surrogate				
Benzene-d ₆ solution	2000 µg/mL in methanol		- 48940-U	1 mL
1,2-Dichloroethane-d ₄ solution	2000 µg/mL in methanol		- 48941	1 mL
1,4-Difluorobenzene solution	2000 µg/mL in methanol		- 48944	1 mL
Pentafluorobenzene solution	2000 µg/mL in methanol		- 48945	1 mL
1-Bromo-4-fluorobenzene solution	2000 µg/mL in methanol		- 48083	1 mL
standard type tuning solution				
1-Bromo-4-fluorobenzene solution	25,000 µg/mL in methanol		- 48800	1 mL

Environmental Standards

Wastewater Methods: Clean Water Act (CWA) - 600 Series Methods

Method 625

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA 625 Semivolatile Calibration Mix	1000 µg/mL each component in methylene chloride: benzene (3:1)	-	506559	1 mL
	<i>Acenaphthene</i> <i>Acenaphthylene</i> <i>Anthracene</i> <i>Azobenzene</i> <i>Benzo[a]anthracene</i> <i>Benzo[b]fluoranthene</i> <i>Benzo[k]fluoranthene</i> <i>Benzo[ghi]perylene</i> <i>Benzo[a]pyrene</i> <i>Benzyl butyl phthalate</i> <i>Bis(2-chloroethoxy)methane</i> <i>Bis(2-chloroethyl) ether</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>4-Bromodiphenyl ether</i> <i>Carbazole</i> <i>4-Chlorodiphenyl ether</i> <i>Bis-(2-chloroisopropyl) ether</i> <i>4-Chloro-3-methylphenol</i> <i>2-Chloronaphthalene</i> <i>2-Chlorophenol</i> <i>Chrysene</i> <i>Dibenz[a,h]anthracene</i> <i>Dibutyl phthalate</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>2,4-Dichlorophenol</i> <i>Diethyl phthalate</i>	<i>2,4-Dimethylphenol</i> <i>Dimethyl phthalate</i> <i>2,4-Dinitrophenol</i> <i>2,4-Dinitrotoluene</i> <i>2,6-Dinitrotoluene</i> <i>Di-n-octyl phthalate</i> <i>Fluoranthene</i> <i>Fluorene</i> <i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Hexachlorocyclopentadiene</i> <i>Hexachloroethane</i> <i>Indeno[1,2,3-cd]pyrene</i> <i>Isophorone</i> <i>2-Methyl-4,6-dinitrophenol</i> <i>Naphthalene</i> <i>Nitrobenzene</i> <i>2-Nitrophenol</i> <i>4-Nitrophenol</i> <i>N-Nitrosodimethylamine</i> <i>N-Nitrosodi-n-propylamine</i> <i>Pentachlorophenol</i> <i>Phenanthrene</i> <i>Phenol</i> <i>Pyrene</i> <i>1,2,4-Trichlorobenzene</i> <i>2,4,6-Trichlorophenol</i>		
EPA TCL Benzidines Mix	2000 µg/mL each component in methanol		48906 458906	1 mL 1 mL
	<i>Benzidine</i>	<i>3,3'-Dichlorobenzidine</i>		
N-Nitrosodiphenylamine solution	5000 µg/mL in methanol	-	40060	1 mL
EPA 625 Semivolatile Calibration Kit	-	-	47444-U	3 × 1 ea
	625 Semivolatile Calibration Mix (506559), 1 mL TCL Benzidines Mix (48906), 1 mL			
	N-Nitrosodiphenylamine solution (40060), 1 mL			
EPA 625 Add-On Mix 1	2000 µg/mL each component in methylene chloride	-	46828-U	1 mL
	<i>Acetophenone</i> <i>Aniline</i> <i>Benzoic acid</i> <i>Carbazole</i> <i>Decane</i> <i>2,3-Dichloroaniline</i> <i>Docosane</i> <i>Dodecane</i> <i>Eicosane</i>	<i>Hexadecane</i> <i>o-Cresol</i> <i>1-Methylphenanthrene</i> <i>p-Cresol</i> <i>Octadecane</i> <i>Pyridine</i> <i>(+)-α-Terpineol</i> <i>Tetradecane</i>		
EPA 8270/625/CLP/Appendix IX Semivolatile Calibration Mix	1000 µg/mL each component in methylene chloride: benzene (3:1)	-	502049	1 mL
	<i>Acenaphthene</i> <i>Acenaphthylene</i> <i>Anthracene</i> <i>Azobenzene</i> <i>Benzo[a]anthracene</i> <i>Benzo[b]fluoranthene</i> <i>Benzo[k]fluoranthene</i> <i>Benzo[ghi]perylene</i> <i>Benzo[a]pyrene</i> <i>Benzyl butyl phthalate</i> <i>Bis(2-chloroethoxy)methane</i> <i>Bis(2-chloroethyl) ether</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>4-Bromodiphenyl ether</i> <i>Carbazole</i> <i>4-Chlorodiphenyl ether</i> <i>Bis-(2-chloroisopropyl) ether</i> <i>2-Chloronaphthalene</i> <i>Chrysene</i> <i>Dibenz[a,h]anthracene</i> <i>Dibutyl phthalate</i> <i>1,2-Dichlorobenzene</i>	<i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Diethyl phthalate</i> <i>Dimethyl phthalate</i> <i>2,4-Dinitrotoluene</i> <i>2,6-Dinitrotoluene</i> <i>Di-n-octyl phthalate</i> <i>Fluoranthene</i> <i>Fluorene</i> <i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Hexachlorocyclopentadiene</i> <i>Hexachloroethane</i> <i>Indeno[1,2,3-cd]pyrene</i> <i>Isophorone</i> <i>Naphthalene</i> <i>Nitrobenzene</i> <i>N-Nitrosodimethylamine</i> <i>N-Nitrosodi-n-propylamine</i> <i>Phenanthrene</i> <i>Pyrene</i> <i>1,2,4-Trichlorobenzene</i>		
EPA 625/CLP Pesticide Mix	2000 µg/mL each component in hexane: toluene (1:1)	-	47914	1 mL
	<i>Aldrin</i> <i>α-BHC</i> <i>β-BHC</i> <i>Lindane</i> <i>δ-BHC</i> <i>4,4' -DDD</i> <i>4,4' -DDE</i> <i>4,4' -DDT</i>	<i>Dieldrin</i> <i>α-Endosulfan</i> <i>β-Endosulfan</i> <i>Endosulfan sulfate</i> <i>Endrin</i> <i>Endrin aldehyde</i> <i>Heptachlor</i> <i>Heptachlor exo-epoxide</i>		

Environmental Standards

Wastewater Methods: Clean Water Act (CWA) - 600 Series Methods

Method 625 (continued)

Description	Concentration		Cat. No.	Qty	
EPA Pesticide Mix	in methanol: methylene chloride (98:2) (varied) <i>Aldrin, 10 µg/mL</i> <i>α-BHC</i> <i>β-BHC</i> <i>Lindane, 10 µg/mL</i> <i>δ-BHC</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane, 60 µg/mL</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene, 20 µg/mL</i> <i>4,4'-DDT, 60 µg/mL</i>	<i>Dieldrin, 20 µg/mL</i> <i>α-Endosulfan, 20 µg/mL</i> <i>β-Endosulfan, 20 µg/mL</i> <i>Endosulfan sulfate, 60 µg/mL</i> <i>Endrin, 20 µg/mL</i> <i>Endrin aldehyde, 60 µg/mL</i> <i>Heptachlor, 10 µg/mL</i> <i>Heptachlor exo-epoxide, 10 µg/mL</i>	-	48858-U	1 mL
EPA Phenols Mixture	in methanol (varied) <i>4-Chloro-3-methylphenol, 2500 µg/mL</i> <i>2-Chlorophenol, 500 µg/mL</i> <i>2,4-Dichlorophenol, 500 µg/mL</i> <i>2,4-Dimethylphenol, 500 µg/mL</i> <i>2,4-Dinitrophenol, 1500 µg/mL</i> <i>2-Methyl-4,6-dinitrophenol, 2500 µg/mL</i>	<i>2-Nitrophenol, 500 µg/mL</i> <i>4-Nitrophenol, 2500 µg/mL</i> <i>Pentachlorophenol, 2500 µg/mL</i> <i>Phenol, 500 µg/mL</i> <i>2,4,6-Trichlorophenol, 1500 µg/mL</i>	SE	458859 48859	1 mL 1 mL
EPA 625 Phenol Mix	in methylene chloride (varied) <i>4-Chloro-3-methylphenol, 2500 µg/mL</i> <i>2-Chlorophenol, 500 µg/mL</i> <i>2,4-Dichlorophenol, 500 µg/mL</i> <i>2,4-Dimethylphenol, 500 µg/mL</i> <i>2,4-Dinitrophenol, 2500 µg/mL</i> <i>2-Methyl-4,6-dinitrophenol, 2500 µg/mL</i>	<i>2-Nitrophenol, 500 µg/mL</i> <i>4-Nitrophenol, 2500 µg/mL</i> <i>Pentachlorophenol, 2500 µg/mL</i> <i>Phenol, 500 µg/mL</i> <i>2,4,6-Trichlorophenol, 1500 µg/mL</i>	-	48866	1 mL
EPA 625 Base-Neutral 1	200 µg/mL each component in methylene chloride <i>Acenaphthylene</i> <i>Benzo[b]fluoranthene</i> <i>Bis(2-chloroethyl) ether</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>4-Bromodiphenyl ether</i> <i>Bis-(2-chloroisopropyl) ether</i>	<i>Dibutyl phthalate</i> <i>1,4-Dichlorobenzene</i> <i>3,3'-Dichlorobenzidine</i> <i>Dimethyl phthalate</i> <i>2,6-Dinitrotoluene</i> <i>Nitrobenzene</i>	-	48831	1 mL
EPA 625 Base Neutral 2	200 µg/mL each component in methylene chloride <i>Acenaphthene</i> <i>Anthracene</i> <i>Benzo[a]anthracene</i> <i>Bis(2-chloroethoxy)methane</i> <i>Chrysene</i> <i>Dibenz[a,h]anthracene</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i>	<i>Diethyl phthalate</i> <i>2,4-Dinitrotoluene</i> <i>Fluorene</i> <i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Naphthalene</i> <i>Pyrene</i>	-	48832	1 mL
EPA 625 Base/Neutral 3	200 µg/mL each component in methylene chloride <i>Azobenzene</i> <i>Benzyl butyl phthalate</i> <i>2-Chloronaphthalene</i> <i>Fluoranthene</i> <i>Hexachlorocyclopentadiene</i> <i>Hexachloroethane</i>	<i>Isophorone</i> <i>N-Nitrosodiphenylamine</i> <i>N-Nitrosodi-n-propylamine</i> <i>Phenanthrene</i> <i>1,2,4-Trichlorobenzene</i>	-	48833	1 mL
EPA 625 Base Neutral 4	200 µg/mL each component in methylene chloride <i>Benidine</i> <i>Benzo[k]fluoranthene</i> <i>Benzo[ghi]perylene</i> <i>Benzo[a]pyrene</i>	<i>4-Chlorodiphenyl ether</i> <i>Di-n-octyl phthalate</i> <i>Indeno[1,2,3-cd]pyrene</i> <i>N-Nitrosodimethylamine</i>	-	48834	1 mL
Chlordane (mixture of isomers)	5000 µg/mL in methanol		-	40089	1 mL
Toxaphene solution	5000 µg/mL in methanol		-	40111	1 mL
Aroclor Mix 1	200 µg/mL each component in methanol <i>Aroclor 1016</i> <i>Aroclor 1232</i>	<i>Aroclor 1248</i> <i>Aroclor 1260</i>	-	48861	1 mL
Aroclor Mix 2	200 µg/mL each component in methanol <i>Aroclor 1221</i> <i>Aroclor 1242</i>	<i>Aroclor 1254</i>	-	48862	1 mL

Environmental Standards

Wastewater Methods: Clean Water Act (CWA) - 600 Series Methods

Description	Concentration	Cat. No.	Qty
standard type internal/surrogate			
2-Fluorophenol solution	2000 µg/mL in methylene chloride	- 48719-U	1 mL
Pentafluorophenol solution	2000 µg/mL in methylene chloride	- 48718	1 mL
Phenol-d ₆	2000 µg/mL in methylene chloride	- 48716-U	1 mL
Aniline-2,3,4,5,6-d ₅ solution	2000 µg/mL in methylene chloride	- 48788	1 mL
Anthracene-d ₁₀ solution	2000 µg/mL in methylene chloride	- 48863	1 mL
Benz[<i>a</i>]anthracene-d ₁₂ solution	2000 µg/mL in methylene chloride	- 48789	1 mL
Decafluorobiphenyl solution	2000 µg/mL in methylene chloride	- 48792	1 mL
4,4'-Dibromobiphenyl solution	2000 µg/mL in methylene chloride	- 48790-U	1 mL
4,4'-Dibromooctafluorobiphenyl solution	2000 µg/mL in methylene chloride	- 48791	1 mL
2,2'-Difluorobiphenyl solution	2000 µg/mL in methylene chloride	- 48787	1 mL
1-Fluoronaphthalene solution	2000 µg/mL in methylene chloride	- 48720-U	1 mL
2-Fluoronaphthalene solution	2000 µg/mL in methylene chloride	- 48721-U	1 mL
Naphthalene-d ₈ solution	2000 µg/mL in methylene chloride	- 48715-U	1 mL
Nitrobenzene-d ₅ solution	2000 µg/mL in methylene chloride	- 48717-U	1 mL
Phenanthrene-d ₁₀ solution	2000 µg/mL in methylene chloride	- 48710-U	1 mL
Pyridine-d ₅ solution	2000 µg/mL in methylene chloride	- 48714-U	1 mL
standard type surrogate			
EPA 625/8270C SV Surrogate Spike Mix with Indicator	in methanol (varied)	- 44671-U	25 mL
	2-Fluorobiphenyl, 100 µg/mL 2-Fluorophenol, 200 µg/mL Nitrobenzene-d ₅ , 100 µg/mL	Phenol-d ₅ , 200 µg/mL p-Terphenyl-d ₁₄ , 100 µg/mL 2,4,6-Tribromophenol	
standard type tuning solution			
Benzidine-DFTPP Standard	in methylene chloride (varied) Benzidine, 500 µg/mL	- 48727	1 mL
		Decafluorotriphenylphosphine, 250 µg/mL	
Pentachlorophenol-DFTPP	250 µg/mL each component in methylene chloride	- 48728	1 mL
Decafluorotriphenylphosphine solution	25,000 µg/mL in methylene chloride	- 48724-U	1 mL
Perfluorotributylamine (PFTBA)	-	- 442747-U	1000 mg

Method 627

CAS No.	Compound	Cat. No.	Qty
1582-09-8	Trifluralin, analytical standard	442824	250 mg

Method 629

Description	Concentration	Cat. No.	Qty
standard type calibration			
Cyanazine solution	2000 µg/mL in methanol	48592	1 mL

Method 631

Description	Concentration	Cat. No.	Qty
Benomyl	-	PS222	100 mg

Environmental Standards

Solid Waste, Groundwater Methods

Solid Waste, Groundwater Methods

US EPA 8000 Series (or SW-846) methods are analytical methods for identifying and quantifying organic compounds on the EPA's Appendix VIII and Appendix IX lists in solid wastes and groundwater at active hazardous treatment, storage, and disposal sites. Most of these methods call for gas chromatography with a selective detector or for gas chromatography/mass spectrometry; two methods call for high performance liquid chromatography. An additional method, Toxicity Characteristic Leaching Procedure (TCLP) Method 1311, is used to estimate the toxicity of solid waste materials under the leaching conditions in a landfill. Materials designated as "toxic" based on results of Method 1311 cannot be disposed of in conventional landfills.

Compound Classification	U.S. EPA Method No.
Acrylonitrile	8031
Chlorinated Herbicides	8150, 8151, 8151A
Chlorinated Hydrocarbons	8121
Chlorinated Pesticides	8081
1,2-Dibromoethane, 1,2-Dibromo-3-chloropropane	8011
Haloethers	8111
Halogenated and Aromatic Volatile Organics	8010, 8020, 8021
Nitroaromatics and Cyclic Ketones	8090
Nitroaromatics and Nitramines by HPLC	8330
Nitrosamines by GC	8070
Nonhalogenated Volatile Organics	8015
Phenols	8040
Phthalate Esters	8061
Polynuclear Aromatic Hydrocarbons	8100, 8310
Semivolatile Organic Compounds	8270
Toxicity Characteristic Leaching Procedure (TCLP)	1311
Volatile Organic Compounds (VOC)	8240, 8260
Acetonitrile	8033
PCB's	8082

Resource Conservation and Recovery Act (RCRA) - 8000 Series Methods

Method 1311

These analytical reference standards are specifically designed for monitoring organic chemicals (acids, base-neutrals, pesticides, herbicides, volatile compounds) listed in US Environmental Protection Agency Solid Waste Method 1311, "Toxicity Characteristic Leaching Procedure".

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA TCLP Acids Mix	1000 µg/mL each component in methanol <i>o</i> -Cresol <i>m</i> -Cresol <i>p</i> -Cresol	48142 <i>Pentachlorophenol</i> <i>2,4,5-Trichlorophenol</i> <i>2,4,6-Trichlorophenol</i>	1 mL
EPA 1311 Base-Neutrals Mix	1000 µg/mL each component in acetone <i>2,4-Dinitrotoluene</i> <i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i>	48947 <i>Hexachloroethane</i> <i>Nitrobenzene</i> <i>Pyridine</i>	1 mL
EPA TCLP Base Neutral Dichlorobenzene	1000 µg/mL each component in acetone <i>1,4-Dichlorobenzene</i> <i>2,4-Dinitrotoluene</i> <i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i>	47989-U <i>Hexachloroethane</i> <i>Nitrobenzene</i> <i>Pyridine</i>	1 mL
EPA TCLP Volatiles Mix	in methanol (varied) <i>Benzene, 1000 µg/mL</i> <i>2-Butanone, 5000 µg/mL</i> <i>Carbon tetrachloride, 1000 µg/mL</i> <i>Chlorobenzene, 1000 µg/mL</i> <i>Chloroform, 1000 µg/mL</i> <i>1,4-Dichlorobenzene, 1000 µg/mL</i>	48143 <i>1,2-Dichloroethane, 1000 µg/mL</i> <i>1,1-Dichloroethylene, 1000 µg/mL</i> <i>Tetrachloroethylene, 1000 µg/mL</i> <i>Trichloroethylene, 1000 µg/mL</i> <i>Vinyl chloride, 1000 µg/mL</i>	1 mL
EPA TCLP Herbicides Mix	1000 µg/mL each component in acetonitrile <i>2,4-D methyl ester</i>	48141 <i>Silvex® methyl ester</i>	1 mL
EPA TCLP Pesticides Mix	1000 µg/mL each component in methanol <i>Endrin</i> <i>Heptachlor</i> <i>Heptachlor exo-epoxide</i>	48139 <i>Lindane</i> <i>Methoxychlor</i>	1 mL
EPA TCLP Pesticide Mix	in methanol (varied) <i>Endrin, 25 µg/mL</i> <i>Heptachlor, 50 µg/mL</i> <i>Heptachlor exo-epoxide, 75 µg/mL</i>	861349 <i>Lindane, 50 µg/mL</i> <i>Methoxychlor, 200 µg/mL</i>	1 mL

Environmental Standards

Solid Waste, Groundwater Methods: Resource Conservation and Recovery Act (RCRA) - 8000 Series Methods

Description	Concentration	Cat. No.	Qty
2,4-D solution	100 µg/mL in methanol	47896	1 mL
2,4,5-TP (Silvex®) solution	100 µg/mL in methanol	47897	1 mL
Chlordane (mixture of isomers)	5000 µg/mL in methanol	40089	1 mL
Toxaphene solution	5000 µg/mL in methanol	40111	1 mL

Method 8010 (Replaced with Method 8021)

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 8010 Halogenated VOC Mix 1	2000 µg/mL each component in methanol	48224	1 mL
	<i>Bromoform</i> <i>Carbon tetrachloride</i> <i>Chloroform</i> <i>Dibromomethane</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i> <i>1,2-Dichloropropane</i>	<i>1,1,1,2-Tetrachloroethane</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i> <i>1,2,3-Trichloropropane</i>	
EPA 8010 Halogenated VOC Mix 2	2000 µg/mL each component in methanol	48395	1 mL
	<i>Bromobenzene</i> <i>Bromodichloromethane</i> <i>Chlorobenzene</i> <i>Dibromochloromethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i>	<i>1,1-Dichloroethylene</i> <i>cis-1,2-Dichloroethylene</i> <i>trans-1,2-Dichloroethylene</i> <i>Dichloromethane</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i>	
EPA VOC Mix 5	2000 µg/mL each component in methanol	458797 48797	1 mL 1 mL
	<i>Bromodichloromethane</i> <i>Dibromochloromethane</i> <i>1,1-Dichloroethylene</i>	<i>cis-1,2-Dichloroethylene</i> <i>trans-1,2-Dichloroethylene</i> <i>Dichloromethane</i>	
EPA VOC Mix 6	2000 µg/mL each component in methanol	458799 48799-U	1.5 mL 1.5 mL
	<i>Bromomethane</i> <i>Chloroethane</i> <i>Chloromethane</i>	<i>Dichlorodifluoromethane</i> <i>Trichlorofluoromethane</i> <i>Vinyl chloride</i>	
EPA 8011 EDB/DBCP Mix	2000 µg/L each component in methanol	48225-U	1 mL
	<i>1,2-Dibromo-3-chloropropane</i>	<i>1,2-Dibromoethane</i>	
standard type surrogate			
Bromochloromethane solution	2000 µg/mL in methanol	48067	1 mL
1-Bromo-4-fluorobenzene solution	2000 µg/mL in methanol	48083	1 mL
1-Bromo-2-chlorobenzene solution	750 µg/mL in methanol	47487	1 mL

Method 8011

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 8011 EDB/DBCP Mix	2000 µg/L each component in methanol	48225-U	1 mL
	<i>1,2-Dibromo-3-chloropropane</i>	<i>1,2-Dibromoethane</i>	

Method 8020 (Replaced by Method 8021)

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 8020B Aromatic Volatile Organics Mix 1	2000 µg/mL each component in methanol	48226-U	1 mL
	<i>Benzene</i> <i>Chlorobenzene</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i>	<i>Ethylbenzene</i> <i>Toluene</i> <i>o-Xylene</i> <i>m-Xylene</i>	
EPA 8020/8240 Aromatic Volatiles Mix	100 µg/mL each component in methanol	47504	1 mL
	<i>Benzene</i> <i>Chlorobenzene</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Ethylbenzene</i>	<i>Styrene</i> <i>Toluene</i> <i>o-Xylene</i> <i>m-Xylene</i> <i>p-Xylene</i>	

Environmental Standards

Solid Waste, Groundwater Methods: Resource Conservation and Recovery Act (RCRA) - 8000 Series Methods

Method 8020 (Replaced by Method 8021) (continued)

Description	Concentration	Cat. No.	Qty
Styrene solution	5000 µg/mL in methanol	40257-U	1 mL
<i>p</i> -Xylene solution	5000 µg/mL in methanol	40203	1 mL
standard type internal			
Fluorobenzene solution	2000 µg/mL in methanol	48943	1 mL
standard type internal/surrogate			
α,α,α-Trifluorotoluene solution	2000 µg/mL in methanol	48389	1 mL
standard type surrogate			
1-Bromo-2-chlorobenzene solution	750 µg/mL in methanol	47487	1 mL
1-Bromo-4-fluorobenzene solution	2000 µg/mL in methanol	48083	1 mL
1,4-Difluorobenzene solution	2000 µg/mL in methanol	48944	1 mL

Method 8021 (1987), 8021A (1990)

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA VOC Mix 1	2000 µg/mL each component in methanol	48775 4S8775	1 mL 1 mL
	<i>sec</i> -Butylbenzene <i>tert</i> -Butylbenzene Chlorobenzene 2-Chlorotoluene 4-Chlorotoluene 1,2-Dichlorobenzene	1,3-Dichlorobenzene 1,4-Dichlorobenzene Isopropylbenzene Propylbenzene <i>o</i> -Xylene <i>p</i> -Xylene	
EPA VOC Mix 2	2000 µg/mL each component in methanol	4S8777 48777	1 mL 1 mL
	Benzene Bromobenzene Butylbenzene Ethylbenzene <i>p</i> -Isopropyltoluene Naphthalene Styrene	Toluene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene <i>m</i> -Xylene	
EPA VOC Mix 3	2000 µg/mL each component in methanol	4S8779 48779	1 mL 1 mL
	1,2-Dibromo-3-chloropropane 1,2-Dibromoethane 1,2-Dichloroethane 1,2-Dichloropropane 1,3-Dichloropropane 1,1-Dichloro-1-propene <i>cis</i> -1,3-Dichloropropene	<i>trans</i> -1,3-Dichloropropene Hexachloro-1,3-butadiene 1,1,1,2-Tetrachloroethane 1,1,1,2-Tetrachloroethane 1,1,2-Trichloroethane Trichloroethylene 1,2,3-Trichloropropene	
EPA VOC Mix 4	2000 µg/mL each component in methanol	4S8786 48786	1 mL 1 mL
	Bromochloromethane Bromoform Carbon tetrachloride Chloroform Dibromomethane	1,1-Dichloroethane 2,2-Dichloropropane Tetrachloroethylene 1,1,1-Trichloroethane	
EPA VOC Mix 5	2000 µg/mL each component in methanol	4S8797 48797	1 mL 1 mL
	Bromodichloromethane Dibromochloromethane 1,1-Dichloroethylene	<i>cis</i> -1,2-Dichloroethylene <i>trans</i> -1,2-Dichloroethylene Dichloromethane	
EPA VOC Mix 6	2000 µg/mL each component in methanol	4S8799 48799-U	1.5 mL 1.5 mL
	Bromomethane Chloroethane Chloromethane	Dichlorodifluoromethane Trichlorofluoromethane Vinyl chloride	
EPA VOC Calibration Standards Kit	-	48804 4S8804	1 kit 1 kit
	EPA Volatile Organic Compounds Mix 1 (48775), 1 mL EPA Volatile Organic Compounds Mix 2 (48777), 1 mL EPA Volatile Organic Compounds Mix 3 (48779), 1 mL	EPA Volatile Organic Compounds Mix 4 (48786), 1 mL EPA Volatile Organic Compounds Mix 5 (48797), 1 mL EPA Volatile Organic Compounds Mix 6 (48799-U), 1.5 mL	
2-Chloroethyl vinyl ether solution	200 µg/mL in methanol	48672	1 mL
2-Chloroethyl vinyl ether solution	5000 µg/mL in methanol	40017	1 mL
standard type internal			
EPA 502 Internal Standard Mix	2000 µg/L each component in methanol	48950-U	1 mL
	2-Bromo-1-chloropropane	Fluorobenzene	

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Description	Concentration	Cat. No.	Qty
2-Bromo-1-chloropropane solution	20,000 µg/mL in methanol	48713	1 mL
1,4-Dichlorobutane solution	2000 µg/mL in methanol	48066	1 mL
standard type surrogate			
Bromochloromethane solution	2000 µg/mL in methanol	48067	1 mL
1-Bromo-2-chlorobenzene solution	750 µg/mL in methanol	47487	1 mL

Method 8031C₃H₃N FW 53.06

Description	Concentration	Cat. No.	Qty
standard type calibration			
Acrylonitrile	-	48502	1 g
Acrylonitrile solution	1000 µg/mL in H ₂ O	48709	1 mL
Acrylonitrile solution	5000 µg/mL in methanol	40003	1 mL


Method 8033

Description	Concentration	Cat. No.	Qty
Acetonitrile	-	48484	1000 mg

Method 8040

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 8040A Phenol Calibration Mix	500 µg/mL each component in isopropanol	47899	1 mL
	4-Chloro-3-methylphenol 2-Chlorophenol m-Cresol p-Cresol 2,4-Dichlorophenol 2,6-Dichlorophenol 2,4-Dimethylphenol 2,4-Dinitrophenol Dinoseb 2-Methyl-4,6-dinitrophenol o-Cresol 2-Nitrophenol	4-Nitrophenol Pentachlorophenol Phenol 2,3,4,5-Tetrachlorophenol 2,3,4,6-Tetrachlorophenol 2,3,5,6-Tetrachlorophenol 2,3,4-Trichlorophenol 2,3,5-Trichlorophenol 2,3,6-Trichlorophenol 2,4,5-Trichlorophenol 2,4,6-Trichlorophenol 3,4,5-Trichlorophenol	
EPA 8040A Phenols Mix	2000 µg/mL each component in isopropanol	48235-U	1 mL
	4-Chloro-3-methylphenol m-Cresol 2,4-Dichlorophenol 2-Methyl-4,6-dinitrophenol 2-Nitrophenol	4-Nitrophenol Pentachlorophenol Phenol 2,4,6-Trichlorophenol	
EPA 8040B Phenols Mix	2000 µg/mL each component in isopropanol	48238	1 mL
	2-Chlorophenol p-Cresol 2,6-Dichlorophenol 2,4-Dimethylphenol 2,4-Dinitrophenol	Dinoseb o-Cresol 2,3,4,6-Tetrachlorophenol 2,4,5-Trichlorophenol	
standard type surrogate			
EPA 8040 Surrogate Standard Mix	2000 µg/mL each component in isopropanol	47951	1 mL
	2-Fluorophenol 2,4,6-Tribromophenol		

Method 8061

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA Phthalate Esters Mix	2000 µg/mL each component in hexane	 48231 458231	1 mL 1 mL
	Bis(2-ethylhexyl) phthalate Benzyl butyl phthalate Dibutyl phthalate	Di-n-octyl phthalate Diethyl phthalate Dimethyl phthalate	
EPA Phthalate Esters Mix	2000 µg/mL each component in methanol	-	48805-U
	Bis(2-ethylhexyl) phthalate Benzyl butyl phthalate Dibutyl phthalate	Di-n-octyl phthalate Diethyl phthalate Dimethyl phthalate	1 mL


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Method 8070

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 607 Nitrosamines Mix	2000 µg/mL each component in methanol <i>N-Nitrosodimethylamine</i> <i>N-Nitrosodiphenylamine</i>	48240-U	1 mL
		<i>N-Nitrosodi-n-propylamine</i>	

Method 8081

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 8080 Pesticides Mix	each component in hexane: toluene (1:1) (varied) <i>α-BHC, 250 µg/mL</i> <i>β-BHC, 250 µg/mL</i> <i>Lindane, 250 µg/mL</i> <i>δ-BHC, 250 µg/mL</i> <i>Aldrin, 250 µg/mL</i> <i>6-Hydroxy-2-naphthyl disulfide, 250 µg/mL</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane, 250 µg/mL</i> <i>4,4'-DDT, 250 µg/mL</i> <i>Dieldrin, 250 µg/mL</i>	- 47913	1 mL
		<i>α-Endosulfan, 250 µg/mL</i> <i>β-Endosulfan, 250 µg/mL</i> <i>Endosulfan sulfate, 250 µg/mL</i> <i>Endrin, 250 µg/mL</i> <i>Endrin aldehyde, 250 µg/mL</i> <i>Heptachlor, 250 µg/mL</i> <i>Heptachlor exo-epoxide, 250 µg/mL</i> <i>Methoxychlor, 1000 µg/mL</i>	
EPA 8081 Pesticide Standard Mix	200 µg/mL each component in hexane: toluene (1:1) <i>Aldrin</i> <i>α-BHC</i> <i>β-BHC</i> <i>Lindane</i> <i>δ-BHC</i> <i>α-Chlordane</i> <i>γ-Chlordane</i> <i>4,4'-DDE</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane</i> <i>4,4'-DDT</i> <i>Decachlorobiphenyl</i>	- 46845-U	1 mL
		<i>Dieldrin</i> <i>α-Endosulfan</i> <i>β-Endosulfan</i> <i>Endosulfan sulfate</i> <i>Endrin</i> <i>Endrin aldehyde</i> <i>Endrin ketone</i> <i>Heptachlor</i> <i>Heptachlor exo-epoxide</i> <i>Methoxychlor</i> <i>2,4,5,6-Tetrachloro-m-xylene</i>	
EPA TCL Pesticides Mix	2000 µg/mL each component in hexane: toluene (1:1) <i>Aldrin</i> <i>α-BHC</i> <i>β-BHC</i> <i>Lindane</i> <i>δ-BHC</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane</i> <i>4,4'-DDE</i> <i>4,4'-DDT</i> <i>Dieldrin</i>	 458913 48913	1 mL 1 mL
		<i>α-Endosulfan</i> <i>β-Endosulfan</i> <i>Endosulfan sulfate</i> <i>Endrin</i> <i>Endrin aldehyde</i> <i>Endrin ketone</i> <i>Heptachlor</i> <i>Heptachlor exo-epoxide</i> <i>Methoxychlor</i>	
α-Chlordane solution	100 µg/mL in hexane	- 48192	1 mL
γ-Chlordane solution	100 µg/mL in hexane	- 48193	1 mL
Toxaphene solution	200 µg/mL in isooctane	- 47616-U 49135-U	1 mL 10 mL
standard type internal			
Pentachloronitrobenzene solution	5000 µg/mL in methanol	- 40156	1 mL
standard type surrogate			
Pesticide Surrogate Spike Mix	200 µg/mL each component in acetone <i>Decachlorobiphenyl</i>	- 48460	1 mL
		<i>2,4,5,6-Tetrachloro-m-xylene</i>	
Decachlorobiphenyl solution	200 µg/mL in acetone	- 48318	1 mL
2,4,5,6-Tetrachloro-m-xylene solution	200 µg/mL in methanol	- 48317	1 mL
standard type degradation check mix			
DDT-Endrin Mix	500 µg/mL each component in methanol <i>4,4'-DDT</i>	- 48282	1 mL
		<i>Endrin</i>	

Method 8082

Description	Concentration	Cat. No.	Qty
standard type calibration			
Aroclor 1016 solution	200 µg/mL in methanol	- 48701	1 mL
Aroclor 1016 solution	1000 µg/mL in isooctane	 458097 48097	1 mL 1 mL
Aroclor 1221 solution	200 µg/mL in methanol	- 48705	1 mL
Aroclor 1221 solution	1000 µg/mL in isooctane	 458098 48098	1 mL 1 mL
Aroclor 1232 solution	200 µg/mL in methanol	- 48702	1 mL

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Description	Concentration		Cat. No.	Qty
Aroclor 1232 solution	1000 µg/mL in isooctane	SS	44805 454805	1 mL 1 mL
Aroclor 1242 solution	200 µg/mL in methanol	-	48706	1 mL
Aroclor 1242 solution	1000 µg/mL in isooctane	SS	44806 454806	1 mL 1 mL
Aroclor 1248 solution	200 µg/mL in methanol	-	48703	1 mL
Aroclor 1248 solution	1000 µg/mL in isooctane	SS	454807 44807	1 mL 1 mL
Aroclor 1254 solution	200 µg/mL in methanol	-	48707	1 mL
Aroclor 1254 solution	1000 µg/mL in isooctane	SS	454808 44808	1 mL 1 mL
Aroclor 1260 solution	200 µg/mL in methanol	-	48704	1 mL
Aroclor 1260 solution	1000 µg/mL in isooctane	SS	44809 454809	1 mL 1 mL
PCB Kit 3	200 µg/mL each component in methanol <i>Aroclor 1016 solution (Supelco 48701), 1 mL Aroclor 1221 solution (Supelco 48705), 1 mL Aroclor 1232 solution (Supelco 48702), 1 mL Aroclor 1242 solution (Supelco 48706), 1 mL</i>	-	48825	1 kit
PCB kit - high conc.	1000 µg/mL in isooctane (each solution) <i>Aroclor 1232 solution (Supelco 44805), 1 mL Aroclor 1242 solution (Supelco 44806), 1 mL Aroclor 1248 solution (Supelco 44807), 1 mL</i>	-	44803	1 kit
Aroclor Standard Mix 1	in acetone: methanol (2:3) (varied) <i>Aroclor 1016, 500 µg/mL Aroclor 1260, 500 µg/mL</i>	-	46846-U	1 mL
Aroclor Mix 2	200 µg/mL each component in methanol <i>Aroclor 1221 Aroclor 1242</i>	-	48862	1 mL
PCB No 1	-	-	35586-100MG	100 mg
PCB No 5	-	-	35588-100MG	100 mg
PCB No 31	-	-	36679-10MG-R	10 mg
PCB No 153	-	-	35602-10MG 35602-1G	10 mg 1 g
PCB No 153 solution	10 ng/µL in isooctane	-	36904-2ML	2 mL

Method 8090

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA Nitroaromatics/Cyclo Ketones Mix	2000 µg/mL each component in hexane: acetone (94:6) <i>1,3-Dinitrobenzene 2,4-Dinitrotoluene 2,6-Dinitrotoluene</i>		48227	1 mL
			<i>Isophorone 1,4-Naphthoquinone Nitrobenzene</i>	
standard type surrogate				
2-Fluorobiphenyl solution	2000 µg/mL in methylene chloride		48722-U	1 mL

Method 8100

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA TCL Polynuclear Aromatic Hydrocarbons Mix	2000 µg/mL each component in methylene chloride: benzene (1:1) <i>Acenaphthene Acenaphthylene Anthracene Benzo[a]anthracene Benzo[b]fluoranthene Benzo[k]fluoranthene Benzo[ghi]perylene Benzo[a]pyrene</i>	SS	48905-U 458905	1 mL 1 mL
			<i>Chrysene Dibenz[a,h]anthracene Fluoranthene Fluorene Indeno[1,2,3-cd]pyrene Naphthalene Phenanthrene Pyrene</i>	

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Method 8100 (continued)

Description	Concentration	Cat. No.	Qty
EPA 8100 PAH Additional Components Mix	1000 µg/mL in methylene chloride	- 44694-U	1 mL
	<i>Dibenzo[a,e]pyrene</i> <i>Dibenzo[a,h]pyrene</i> <i>3-Methylcholanthrene</i> <i>Dibenz[a,h]acridine</i>	<i>Benzo[<i>l</i>]fluoranthene</i> <i>Dibenz[a,j]acridine</i> <i>7H Dibenzo[c,g]carbazole</i> <i>Dibenzo[a,i]pyrene</i>	
standard type internal/surrogate			
1-Fluoronaphthalene solution	2000 µg/mL in methylene chloride	- 48720-U	1 mL
standard type surrogate			
2-Fluorobiphenyl solution	2000 µg/mL in methylene chloride	- 48722-U	1 mL

Method 8111

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA Haloethers Mix	2000 µg/mL each component in hexane	48228-U	1 mL
	<i>Bis(2-chloroethoxy)methane</i> <i>Bis(2-chloroethyl) ether</i> <i>4-Bromodiphenyl ether</i>	<i>4-Chlorodiphenyl ether</i> <i>Bis-(2-chloroisopropyl) ether</i>	

Method 8121

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA Chlorinated Hydrocarbon Mix	2000 µg/mL each component in hexane	48229	1 mL
	<i>2-Chloronaphthalene</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Hexachlorobenzene</i>	<i>Hexachloro-1,3-butadiene</i> <i>Hexachlorocyclopentadiene</i> <i>Hexachloroethane</i> <i>1,2,4,5-Tetrachlorobenzene</i> <i>1,2,4-Trichlorobenzene</i>	

Method 8150/8151/8151A

Description	Concentration	Cat. No.	Qty
standard type calibration			
Acid Herbicide Mix	in methanol (varied)	46861-U	1 mL
	<i>4-Amino-3,5,6-trichloropyridine-2-carboxylic acid</i> , 100 µg/mL <i>4-Chloro-2-methylphenoxyacetic acid</i> , 10000 µg/mL <i>Dicamba</i> , 10 µg/mL <i>2,4-Dichlorophenoxyacetic acid</i> , 100 µg/mL <i>4-(2,4-Dichlorophenoxy)butyric acid</i> , 100 µg/mL <i>2-(2,4-Dichlorophenoxy)propionic acid</i> , 100 µg/mL	<i>2,2-Dichloropropionic acid</i> , 250 µg/mL <i>Dinoseb</i> , 50 µg/mL <i>Mecoprop</i> , 10000 µg/mL <i>Pentachlorophenol</i> , 50 µg/mL <i>2-(2,4,5-Trichlorophenoxy)propionic acid</i> , 200 µg/mL <i>2,4,5-Trichlorophenoxyacetic acid</i> , 200 µg/mL	
EPA 8150 Herbicide Methyl Derivatives Mix	in hexane (varied conc.)	47375	1 mL
	<i>4-Chloro-2-methylphenoxyacetic acid</i> , 200 µg/mL <i>2,4-Dichlorophenoxyacetic acid</i> , 200 µg/mL <i>4-(2,4-Dichlorophenoxy)butyric acid</i> , 200 µg/mL <i>2,2-Dichloropropionic acid</i> , 200 µg/mL <i>Dicamba</i> , 200 µg/mL	<i>Dichlorprop</i> , 200 µg/mL <i>Dinoseb</i> , 200 µg/mL <i>Mecoprop</i> , 2000 µg/mL <i>2,4,5-Trichlorophenoxyacetic acid</i> , 200 µg/mL <i>2-(2,4,5-Trichlorophenoxy)propionic acid</i> , 200 µg/mL	
Methyl Herbicide Mix	in hexane (varied conc.)	861264	1 mL
	<i>Dicamba methyl ester</i> , 100 µg/mL <i>Dichlorprop-methyl ester</i> , 100 µg/mL <i>Dinoseb methyl ether</i> , 100 µg/mL <i>Methyl (4-chloro-2-methylphenoxy)acetate</i> , 10000 µg/mL	<i>2,4-D methyl ester</i> , 100 µg/mL <i>Methyl 2,2-dichloropropionate</i> <i>Methyl (2,4,5-trichlorophenoxy)acetate</i> , 100 µg/mL <i>Methyl 2-(2,4,5-trichlorophenoxy)propionate</i>	
EPA 8151 Herbicide acid mix	in acetone (varied)	48996-U	1 mL
	<i>Acifluorfen</i> , 100 µg/mL <i>Bentazon</i> , 100 µg/mL <i>Chloramben</i> , 100 µg/mL <i>2,4-D</i> , 100 µg/mL <i>2,4-DB acid</i> , 100 µg/mL <i>Dalapon</i> , 100 µg/mL <i>DCPA diacid (Dacthal®)</i> <i>Dicamba</i> , 100 µg/mL <i>3,5-Dichlorobenzoic acid</i> , 100 µg/mL	<i>Dichlorprop</i> , 100 µg/mL <i>Dinoseb</i> , 100 µg/mL <i>MCPA</i> , 10000 µg/mL <i>MCPP</i> , 10000 µg/mL <i>4-Nitrophenol</i> , 100 µg/mL <i>Pentachlorophenol</i> , 100 µg/mL <i>Picloram</i> , 100 µg/mL <i>2,4,5-T</i> , 100 µg/mL <i>2,4,5-TP</i> , 100 µg/mL	

Environmental Standards

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Description	Concentration	Cat. No.	Qty
EPA 8151 Methylated herbicide mix	in acetone (varied) Acifluorfen methyl ester, 100 µg/mL Bentazon methyl derivative, 100 µg/mL Chloroamben methyl ester, 100 µg/mL 2,4-D methyl ester, 100 µg/mL 2,4-DB methyl ester, 100 µg/mL Dacthal dimethyl (DCPA methyl ester), 100 µg/mL Dalapon methyl ester, 100 µg/mL Dicamba methyl ester, 100 µg/mL 3,5-Dichlorobenzoic acid methyl ester, 100 µg/mL Dichloroprop methyl ester, 100 µg/mL Dinoseb methyl ether, 100 µg/mL MCPA methyl ester, 10000 µg/mL MCPP methyl ester, 10000 µg/mL 4-Nitroanisole, 100 µg/mL Pentachloroanisole, 100 µg/mL Picloram methyl ester, 100 µg/mL 2,4,5-T methyl ester, 100 µg/mL 2,4,5-TP methyl ester, 100 µg/mL	48997-U	1 mL
2,4-D methyl ester solution	200 µg/mL in hexane	47979	1 mL
2,4-DB methyl ester solution	200 µg/mL in hexane	47981	1 mL
Dicamba methyl ester solution	200 µg/mL in hexane	47982	1 mL
Dinoseb methyl ether solution	200 µg/mL in hexane	47984	1 mL
MCPA methyl ester solution	2000 µg/mL in hexane	47985-U	1 mL
MCPP methyl ester solution	2000 µg/mL in hexane	47986	1 mL
2,4,5-T methyl ester solution	200 µg/mL in hexane	47988	1 mL
2,4,5-TP methyl ester solution	200 µg/mL in hexane	47987-U	1 mL
standard type internal/surrogate			
4,4'-Dibromooctafluorobiphenyl solution	250 µg/mL in acetone	47644-U	1 mL
standard type surrogate			
Methyl 2,4-dichlorophenylacetate solution	100 µg/mL in acetone	47339	1 mL
Methyl 2,4-dichlorophenylacetate solution	2000 µg/mL in acetone	47329-U	1 mL
2,4-Dichlorophenylacetic acid solution	100 µg/mL in acetone	49344-U 49343-U	1 mL 2 × 5 mL
standard type spiking			
Acid Herbicide Spiking Mix	in methanol (varied) 4-Chloro-2-methylphenoxyacetic acid Dicamba, 100 µg/mL 2,4-Dichlorophenoxyacetic acid, 200 µg/mL 4-(2,4-Dichlorophenoxy)butyric acid, 200 µg/mL 2,2-Dichloropropionic acid, 100 µg/mL Dichloroprop, 200 µg/mL Dinoseb, 30 µg/mL Mecoprop, 20000 µg/mL Pentachlorophenol, 25 µg/mL Silvex, 50 µg/mL 2,4,5-T, 50 µg/mL	861386-U	1 mL
Acid Herbicide Spiking Mix 2	in acetone (varied) 2,4-Dichlorophenoxyacetic acid, 50 µg/mL 2-(2,4,5-Trichlorophenoxy)propionic acid 2,4,5-Trichlorophenoxyacetic acid	861259	10 mL

Method 8240 (Replaced with Method 8260)

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA 8020/8240 Aromatic Volatiles Mix	100 µg/mL each component in methanol Benzene Chlorobenzene 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene Ethylbenzene Styrene Toluene o-Xylene m-Xylene p-Xylene	- 47504	1 mL
EPA 8240B Calibration Standard Mix 1	2000 µg/mL each component in methanol Bromochloromethane Bromodichloromethane Dibromochloromethane 1,2-Dibromo-3-chloropropane 1,2-Dibromoethane cis-1,4-Dichloro-2-butene trans-1,4-Dichloro-2-butene 1,1-Dichloroethylene cis-1,2-Dichloroethylene trans-1,2-Dichloroethylene Dichloromethane 1,3-Dichloropropane 2,2-Dichloropropane 1,1-Dichloro-1-propene cis-1,3-Dichloropropene trans-1,3-Dichloropropene	- 47363	1 mL
EPA 8240B Calibration Mix	2000 µg/mL each component in methanol Bromodichloromethane Dibromochloromethane 1,2-Dibromo-3-chloropropane 1,2-Dibromoethane cis-1,4-Dichloro-2-butene trans-1,4-Dichloro-2-butene 1,1-Dichloroethylene 1,1-Dichloroethylene trans-1,2-Dichloroethylene Dichloromethane cis-1,3-Dichloropropene trans-1,3-Dichloropropene	- 47276	1 mL
EPA 8240B Calibration Standard Mix 2	2000 µg/mL each component in methanol: water (4:1) Acetone Acetonitrile Acrylonitrile 2-Butanone 2-Hexanone 4-Methyl-2-pentanone 2-Methyl-1-propanol	- 47364	1 mL

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Method 8240 (Replaced with Method 8260) (continued)

Description	Concentration		Cat. No.	Qty
EPA 8240B Calibration Standard Mix 3	2000 µg/mL each component in methanol	-	47365	1 mL
	<i>Allyl chloride</i>	<i>Methacrylonitrile</i>		
	<i>Benzene</i>	<i>Methyl methacrylate</i>		
	<i>Chlorobenzene</i>	<i>Propionitrile</i>		
	<i>1,2-Dichlorobenzene</i>	<i>Styrene</i>		
	<i>1,3-Dichlorobenzene</i>	<i>Toluene</i>		
	<i>1,4-Dichlorobenzene</i>	<i>1,2,3-Trichlorobenzene</i>		
	<i>Ethylbenzene</i>	<i>o-Xylene</i>		
	<i>Ethyl methacrylate</i>	<i>m-Xylene</i>		
EPA 8240B Calibration Standard Mix 4	2000 µg/mL each component in methanol	-	47366	1 mL
	<i>Bromoform</i>	<i>1,1,1,2-Tetrachloroethane</i>		
	<i>Carbon tetrachloride</i>	<i>1,1,2,2-Tetrachloroethane</i>		
	<i>Chloroform</i>	<i>Tetrachloroethylene</i>		
	<i>Dibromomethane</i>	<i>1,1,1-Trichloroethane</i>		
	<i>1,1-Dichloroethane</i>	<i>1,1,2-Trichloroethane</i>		
	<i>1,2-Dichloroethane</i>	<i>Trichloroethylene</i>		
	<i>1,2-Dichloropropane</i>	<i>1,2,3-Trichloropropane</i>		
EPA VOC Mix 6	2000 µg/mL each component in methanol	SS	458799 48799-U	1.5 mL 1.5 mL
	<i>Bromomethane</i>	<i>Dichlorodifluoromethane</i>		
	<i>Chloroethane</i>	<i>Trichlorofluoromethane</i>		
	<i>Chloromethane</i>	<i>Vinyl chloride</i>		
EPA 8240B Calibration Mix 6	2000 µg/mL each component in methanol	-	48256	1 mL
	<i>cis-1,4-Dichloro-2-butene</i>	<i>1,4-Dioxane</i>		
	<i>trans-1,4-Dichloro-2-butene</i>	<i>Iodomethane</i>		
	<i>cis-1,3-Dichloropropene</i>	<i>Pentachloroethane</i>		
	<i>trans-1,3-Dichloropropene</i>			
EPA 8240B Calibration Mix 7	2000 µg/mL each component in methanol	-	48257	1 mL
	<i>Allyl chloride</i>	<i>2-Picoline</i>		
	<i>Ethyl methacrylate</i>	<i>Propionitrile</i>		
	<i>Methacrylonitrile</i>	<i>Pyridine</i>		
	<i>Methyl methacrylate</i>	<i>Styrene</i>		
Acrolein	-	SS	458501 48501	100 mg 5 g
Chloral hydrate solution	1000 µg/mL in acetonitrile	-	47335-U	1 mL
Chloroprene solution	2000 µg/mL in methanol	SS	85561145 861145	1 mL 1 mL
Vinyl acetate	-	SS	458486 48486	100 mg 1 g
standard type internal				
EPA 8240/8260 VOA Internal Standards Mix	1000 µg/mL each component in methanol	-	48835	1 mL
	<i>Bromochloromethane</i>	<i>1,4-Difluorobenzene</i>		
	<i>Chlorobenzene-d₅</i>			
standard type surrogate				
EPA 8240/8260 VOA Surrogate Spike Mix	1000 µg/mL each component in methanol	-	48101	1 mL
	<i>4-Bromofluorobenzene</i>	<i>Toluene-d₈</i>		
	<i>1,2-Dichloroethane-d₄</i>			
standard type matrix spiking				
EPA 8240B/8260A Matrix Spike Mix	25 µg/mL each component in methanol 25 µg/L each component in methanol	-	47075-U 47412	1 mL 10 × 1 mL
	<i>Benzene</i>	<i>Toluene</i>		
	<i>Chlorobenzene</i>	<i>Trichloroethylene</i>		
	<i>1,1-Dichloroethylene</i>			
EPA 8240B/8260A Matrix Spike Mix	2500 µg/mL each component in methanol	-	47411-U	1 mL
	<i>Benzene</i>	<i>Toluene</i>		
	<i>Chlorobenzene</i>	<i>Trichloroethylene</i>		
	<i>1,1-Dichloroethylene</i>			
standard type system performance check				
EPA 8240B/8260A System Performance Check Compounds	2000 µg/mL each component in methanol	-	47389	1 mL
	<i>Bromoform</i>	<i>1,1-Dichloroethane</i>		
	<i>Chlorobenzene</i>	<i>1,1,2,2-Tetrachloroethane</i>		
	<i>Chloromethane</i>			
EPA 8240B/8260A Calibration Check Compounds	2000 µg/mL each component in methanol	SS	47385-U 457385	1 mL 1 mL
	<i>Chloroform</i>	<i>Ethylbenzene</i>		
	<i>1,1-Dichloroethylene</i>	<i>Toluene</i>		
	<i>1,2-Dichloropropane</i>	<i>Vinyl chloride</i>		

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Description	Concentration		Cat. No.	Qty
standard type tuning solution				
EPA 8240B/8260A GC-MS Tuning Mix	25 µg/mL in methanol	-	47077 47414	1 mL 4 × 1 mL
	4-Bromofluorobenzene			
1-Bromo-4-fluorobenzene solution	25,000 µg/mL in methanol	-	48800	1 mL
Decafluorotriphenylphosphine solution	25,000 µg/mL in methylene chloride	-	48724-U	1 mL
Perfluorotributylamine (PFTBA)	-	-	442747-U	1000 mg

Method 8260

For the most current and complete listing of EPA 8260 calibration standards, visit www.sigmaaldrich.com.

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA 8260 Volatiles Calibration Mix	2000 µg/mL each component in methanol	-	500607	1 mL
	Benzene	1,2-Dichloropropane		
	Bromobenzene	1,3-Dichloropropane		
	Bromochloromethane	2,2-Dichloropropane		
	Bromodichloromethane	1,1-Dichloro-1-propene		
	Bromoform	Ethylbenzene		
	Butylbenzene	Hexachloro-1,3-butadiene		
	sec-Butylbenzene	Isopropylbenzene		
	tert-Butylbenzene	p-Isopropyltoluene		
	Carbon tetrachloride	Naphthalene		
	Chlorobenzene	Propylbenzene		
	Chloroform	Styrene		
	2-Chlorotoluene	1,1,1,2-Tetrachloroethane		
	4-Chlorotoluene	1,1,2,2-Tetrachloroethane		
	Dibromochloromethane	Tetrachloroethylene		
	1,2-Dibromo-3-chloropropane	Toluene		
	1,2-Dibromoethane	1,2,3-Trichlorobenzene		
	Dibromomethane	1,2,4-Trichlorobenzene		
	1,2-Dichlorobenzene	1,1,1-Trichloroethane		
	1,3-Dichlorobenzene	1,1,2-Trichloroethane		
	1,4-Dichlorobenzene	Trichloroethylene		
	1,1-Dichloroethane	1,2,3-Trichloropropane		
	1,2-Dichloroethane	1,2,4-Trimethylbenzene		
	1,1-Dichloroethylene	1,3,5-Trimethylbenzene		
	cis-1,2-Dichloroethylene	o-Xylene		
	trans-1,2-Dichloroethylene	m-Xylene		
	Dichloromethane	p-Xylene		
EPA VOC Mix 6	2000 µg/mL each component in methanol	SS	458799 48799-U	1.5 mL 1.5 mL
	Bromomethane	Dichlorodifluoromethane		
	Chloroethane	Trichlorofluoromethane		
	Chloromethane	Vinyl chloride		
EPA VOC Mix 6	2000 µg/mL each component in methanol	-	47408	4 × 1 mL
	Bromomethane	Dichlorodifluoromethane		
	Chloroethane	Trichlorofluoromethane		
	Chloromethane	Vinyl chloride		
EPA 8260 Volatile Calibration Kit	-	-	47442-U	1 kit
	EPA 8260 Volatiles Calibration Mix (Supelco 500607), EPA VOC Mix 6 (Supelco 48799-U) 1 mL			
Iodomethane solution	2000 µg/mL in methanol: water (4:1)	-	506052	1 mL
EPA VOC Mix 1	2000 µg/mL each component in methanol	SS	48775 48775	1 mL 1 mL
	sec-Butylbenzene	1,3-Dichlorobenzene		
	tert-Butylbenzene	1,4-Dichlorobenzene		
	Chlorobenzene	Isopropylbenzene		
	2-Chlorotoluene	Propylbenzene		
	4-Chlorotoluene	o-Xylene		
	1,2-Dichlorobenzene	p-Xylene		
EPA VOC Mix 2	2000 µg/mL each component in methanol	SS	458777 48777	1 mL 1 mL
	Benzene	Toluene		
	Bromobenzene	1,2,3-Trichlorobenzene		
	Butylbenzene	1,2,4-Trichlorobenzene		
	Ethylbenzene	1,2,4-Trimethylbenzene		
	p-Isopropyltoluene	1,3,5-Trimethylbenzene		
	Naphthalene	m-Xylene		
	Styrene			

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Method 8260 (continued)

Description	Concentration		Cat. No.	Qty
EPA VOC Mix 3	2000 µg/mL each component in methanol		SS 458779 48779	1 mL 1 mL
	1,2-Dibromo-3-chloropropane 1,2-Dibromoethane 1,2-Dichloroethane 1,2-Dichloropropane 1,3-Dichloropropane 1,1-Dichloro-1-propene cis-1,3-Dichloropropene	trans-1,3-Dichloropropene Hexachloro-1,3-butadiene 1,1,1,2-Tetrachloroethane 1,1,2,2-Tetrachloroethane 1,1,2-Trichloroethane Trichloroethylene 1,2,3-Trichloropropane		
EPA VOC Mix 4	2000 µg/mL each component in methanol		SS 458786 48786	1 mL 1 mL
	Bromochloromethane Bromoform Carbon tetrachloride Chloroform Dibromomethane	1,1-Dichloroethane 2,2-Dichloropropane Tetrachloroethylene 1,1,1-Trichloroethane		
EPA VOC Mix 5	2000 µg/mL each component in methanol		SS 458797 48797	1 mL 1 mL
	Bromodichloromethane Dibromochloromethane 1,1-Dichloroethylene	cis-1,2-Dichloroethylene trans-1,2-Dichloroethylene Dichloromethane		
EPA VOC Calibration Standards Kit	-		SS 48804 458804	1 kit 1 kit
	EPA Volatile Organic Compounds Mix 1 (48775), 1 mL EPA Volatile Organic Compounds Mix 2 (48777), 1 mL EPA Volatile Organic Compounds Mix 3 (48779), 1 mL	EPA Volatile Organic Compounds Mix 4 (48786), 1 mL EPA Volatile Organic Compounds Mix 5 (48797), 1 mL EPA Volatile Organic Compounds Mix 6 (48799-U), 1.5 mL		
EPA 8260 Calibration Mix 2	2000 µg/mL each component in methanol: water (19:1)		SS 456831-U 46831-U	1.5 mL 1.5 mL
	Acetone 2-Butanone Carbon disulfide 2-Chloroethyl vinyl ether	2-Hexanone Iodomethane 4-Methyl-2-pentanone Vinyl acetate		
Acrolein/Acrylonitrile Mix	2000 µg/mL each component in H ₂ O		SS 456870-U 46870-U	1 mL 1 mL
	Acrolein	Acrylonitrile		
Acrolein/Acrylonitrile Mix	10,000 µg/mL in deionized water		- 46871-U	1 mL
	Acrolein	Acrylonitrile		
EPA Appendix IX Volatiles Calibration Mix	2000 µg/mL each component in methanol		- 506532	4 × 1 mL
	Acetonitrile Acrylonitrile Allyl chloride Benzene Bromodichloromethane Bromoform Carbon disulfide Carbon tetrachloride Chlorobenzene Chloroform Dibromochloromethane 1,2-Dibromo-3-chloropropane 1,2-Dibromoethane Dibromomethane 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene trans-1,4-Dichloro-2-butene 1,1-Dichloroethane 1,2-Dichloroethane 1,1-Dichloroethylene trans-1,2-Dichloroethylene Dichloromethane 1,2-Dichloropropane cis-1,3-Dichloropropene	trans-1,3-Dichloropropene 1,4-Dioxane Ethylbenzene Ethyl methacrylate Hexachloroethane Methacrylonitrile Methyl methacrylate 2-Methyl-1-propanol Naphthalene Pentachloroethane Propionitrile Pyridine trifluoroacetate Styrene 1,1,1,2-Tetrachloroethane 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethylene 1,2,3-Trichloropropane o-Xylene m-Xylene p-Xylene		
EPA TCL Volatiles Mix 1	2000 µg/mL each component in methanol: water (9:1)		SS 458949 48949	1 mL 1 mL
	Acetone 2-Butanone	2-Hexanone 4-Methyl-2-pentanone		
Acrolein	-		SS 458501 48501	100 mg 5 g
Vinyl acetate	-		SS 458486 48486	100 mg 1 g

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Description	Concentration		Cat. No.	Qty
EPA 8260 Calibration Mix 1	2000 µg/mL each component in methanol		 861339 8561339	1 mL 1.5 mL
	Benzene Bromobenzene Bromochloromethane Bromodichloromethane Bromoforn Butylbenzene sec-Butylbenzene tert-Butylbenzene Carbon tetrachloride Chlorobenzene Chloroform 2-Chlorotoluene 4-Chlorotoluene Cumene Dibromochloromethane 1,2-Dibromo-3-chloropropane 1,2-Dibromoethane Dibromomethane 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene 1,1-Dichloroethane 1,2-Dichloroethane 1,1-Dichloroethylene cis-1,2-Dichloroethylene trans-1,2-Dichloroethylene Dichloromethane	1,2-Dichloropropane 1,3-Dichloropropane 2,2-Dichloropropane 1,1-Dichloro-1-propene cis-1,3-Dichloropropene trans-1,3-Dichloropropene Ethylbenzene Hexachloro-1,3-butadiene p-Cymene Naphthalene Propylbenzene Styrene 1,1,1,2-Tetrachloroethane 1,1,2,2-Tetrachloroethane Tetrachloroethylene Toluene 1,2,3-Trichlorobenzene 1,2,4-Trichlorobenzene 1,1,1-Trichloroethane 1,1,2-Trichloroethane Trichloroethylene 1,2,3-Trichloropropane 1,2,4-Trimethylbenzene Mesitylene o-Xylene m-Xylene p-Xylene		
EPA 8260 Calibration Mix 1 Low	in methanol (varied conc.)		- 861326	1 mL
	Benzene, 200 µg/mL Bromobenzene, 1000 µg/mL Bromochloromethane, 1000 µg/mL Bromodichloromethane, 200 µg/mL Bromoforn, 800 µg/mL Butylbenzene, 1000 µg/mL sec-Butylbenzene, 1000 µg/mL tert-Butylbenzene, 1000 µg/mL Carbon tetrachloride, 400 µg/mL Chlorobenzene, 1000 µg/mL Chloroform, 1000 µg/mL 2-Chlorotoluene, 1000 µg/mL 4-Chlorotoluene, 1000 µg/mL Dibromochloromethane, 1000 µg/mL 1,2-Dibromo-3-chloropropane, 1000 µg/mL Dibromomethane, 1000 µg/mL Dibromomethane, 1000 µg/mL 1,2-Dichlorobenzene, 1000 µg/mL 1,3-Dichlorobenzene, 1000 µg/mL 1,4-Dichlorobenzene, 1000 µg/mL 1,1-Dichloroethane, 1000 µg/mL 1,2-Dichloroethane, 400 µg/mL 1,1-Dichloroethylene, 400 µg/mL cis-1,2-Dichloroethylene, 1000 µg/mL trans-1,2-Dichloroethylene, 1000 µg/mL Dichloromethane, 600 µg/mL 1,2-Dichloropropane, 200 µg/mL	1,3-Dichloropropane, 1000 µg/mL 2,2-Dichloropropane, 1000 µg/mL 1,1-Dichloro-1-propene, 1000 µg/mL cis-1,3-Dichloropropene, 1000 µg/mL trans-1,3-Dichloropropene, 1000 µg/mL Ethylbenzene, 800 µg/mL Hexachloro-1,3-butadiene, 1000 µg/mL p-Isopropyltoluene, 1000 µg/mL Isopropylbenzene, 1000 µg/mL Naphthalene, 1000 µg/mL Propylbenzene, 1000 µg/mL Styrene, 1000 µg/mL 1,1,1,2-Tetrachloroethane, 1000 µg/mL 1,1,2,2-Tetrachloroethane, 200 µg/mL Tetrachloroethylene, 200 µg/mL Toluene, 1000 µg/mL 1,2,3-Trichlorobenzene, 1000 µg/mL 1,2,4-Trichlorobenzene, 1000 µg/mL 1,1,1-Trichloroethane, 1000 µg/mL 1,1,2-Trichloroethane, 600 µg/mL Trichloroethylene, 200 µg/mL 1,2,3-Trichloropropane, 1000 µg/mL 1,2,4-Trimethylbenzene, 1000 µg/mL 1,3,5-Trimethylbenzene, 1000 µg/mL o-Xylene, 1000 µg/mL m-Xylene, 2000 µg/mL p-Xylene, 2000 µg/mL		
8260 Calibration Mix 2A	2000 µg/mL each component in methanol		- 861208	1 mL
	Allyl chloride tert-Butyl methyl ether Carbon disulfide trans-1,4-Dichloro-2-butene Dichlorofluoromethane Diethyl ether	Ethyl methacrylate Hexane Methyl methacrylate 2-Nitropropane Tetrahydrofuran 1,1,2-Trichloro-1,2,2-trifluoroethane		
EPA 8260 Calibration Mix 3	in methanol (varied conc.)		- 868084	1 mL
	Acetonitrile, 2000 µg/mL Acrylonitrile, 2000 µg/mL 1-Butanol, 4000 µg/mL tert-Butanol, 4000 µg/mL Diisopropyl ether, 1000 µg/mL	1,4-Dioxane, 10000 µg/mL Ethanol, 10000 µg/mL Methacrylonitrile, 2000 µg/mL 2-Methyl-1-propanol, 4000 µg/mL Propionitrile, 2000 µg/mL		
EPA 8260 Calibration Mix 5	in methanol: water (85:15) (varied conc.)		 8561298 861298	1.5 mL 1.5 mL
	Acetonitrile, 10000 µg/mL Acrylonitrile, 10000 µg/mL Allyl chloride, 2000 µg/mL tert-Butanol, 40000 µg/mL tert-Butyl methyl ether, 2000 µg/mL Cyclohexanone, 40000 µg/mL trans-1,4-Dichloro-2-butene, 2000 µg/mL Diethyl ether, 2000 µg/mL 1,4-Dioxane, 40000 µg/mL Ethyl methacrylate, 2000 µg/mL	Heptane, 2000 µg/mL Methacrylonitrile, 2000 µg/mL Methyl methacrylate, 2000 µg/mL 2-Methyl-1-propanol, 40000 µg/mL Nitrobenzene, 4000 µg/mL 2-Nitropropane, 4000 µg/mL Propionitrile, 10000 µg/mL Tetrahydrofuran, 2000 µg/mL 1,1,2-Trichloro-1,2,2-trifluoroethane, 2000 µg/mL		

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Method 8260 (continued)

Description	Concentration		Cat. No.	Qty
EPA 8260 Mix 5	in methanol: water (9:1) (varied)	SS	8561323 861323	1 mL 1 mL
	Acetone, 2000 µg/mL tert-Butanol, 40000 µg/mL 2-Butanone, 2000 µg/mL tert-Butyl methyl ether, 2000 µg/mL			
	Carbon disulfide, 2000 µg/mL 2-Hexanone, 2000 µg/mL 4-Methyl-2-pentanone, 2000 µg/mL Vinyl acetate, 2000 µg/mL			
EPA 8260 Mix 6	in methanol (varied)	SS	8561309 861309	1 mL 1 mL
	Acetonitrile, 40000 µg/mL Benzyl chloride, 2000 µg/mL Butyl acetate, 4000 µg/mL Cyclohexane, 2000 µg/mL Diethyl ether, 2000 µg/mL Diisopropyl ether, 2000 µg/mL (±)-Epichlorohydrin, 40000 µg/mL Ethyl acetate, 4000 µg/mL			
	Isoprene, 2000 µg/mL Isopropyl acetate, 4000 µg/mL Methyl acetate, 2000 µg/mL Methylcyclohexane, 2000 µg/mL Methyl methacrylate, 2000 µg/mL Pentane, 2000 µg/mL Propyl acetate, 4000 µg/mL 1,1,2-Trichloro-1,2,2-trifluoroethane, 2000 µg/mL			
EPA 8270 Base Neutral Calibration Mix 2 (2nd Lot)	2000 µg/mL each component in methylene chloride	-	861217	5 mL
	Acenaphthene Acenaphthylene Aniline Anthracene Benz[a]anthracene Benzo[b]fluoranthene Benzo[k]fluoranthene Benzo[ghi]perylene Benzo[a]pyrene Benzyl alcohol Benzyl butyl phthalate Bis(2-chloroethoxy)methane Bis(2-chloroethyl) ether Bis(2-ethylhexyl) phthalate 4-Bromodiphenyl ether Carbazole 4-Chloroaniline 4-Chlorodiphenyl ether Bis-(2-chloroisopropyl) ether 2-Chloronaphthalene Chrysene Dibenz[a,h]anthracene Dibenzofuran Dibutyl phthalate 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene Diethyl phthalate			
	Dimethylamine Dimethyl phthalate 2,4-Dinitrotoluene 2,6-Dinitrotoluene Di-n-octyl phthalate 1,4-Dioxane Diphenyl ether Fluoranthene Fluorene Hexachlorobenzene Hexachloro-1,3-butadiene Hexachlorocyclopentadiene Hexachloroethane Hydrazobenzene Indeno[1,2,3-cd]pyrene Isophorone 2-Methylnaphthalene Naphthalene 2-Nitroaniline 3-Nitroaniline 4-Nitroaniline Nitrobenzene N-Nitrosodimethylamine N-Nitrosodi-n-propylamine Phenanthrene Pyrene Pyridine trifluoroacetate 1,2,4-Trichlorobenzene			
EPA 8260 Ketones Mix	in methanol: water (3:7) (varied)	-	861149	1 mL
	Acetone, 2000 µg/mL 2-Butanone, 2000 µg/mL Cyclohexanone, 20000 µg/mL			
	2-Hexanone, 2000 µg/mL 4-Methyl-2-pentanone, 2000 µg/mL			
standard type internal				
EPA 8260A Internal Standards Mix 1	250 µg/mL each component in methanol	-	47776 46839-U 861184	1 mL 5 mL 5 × 5 mL
	Chlorobenzene-d ₅ 1,4-Dichlorobenzene-d ₄			
	Fluorobenzene			
EPA 8260 Internal Standards Mix 1	2500 µg/mL in methanol	-	46838-U 861183	1 mL 5 × 1 mL
	Chlorobenzene-d ₅ 1,4-Dichlorobenzene-d ₄			
	Fluorobenzene			
EPA 8260 Internal Standard Mix	25 µg/mL in methanol	-	47392	1 mL
	Chlorobenzene-d ₅ 1,4-Dichlorobenzene-d ₄			
	1,4-Difluorobenzene Pentafluorobenzene			
EPA 8260 Internal Standards Mix	2000 µg/mL each component in methanol	-	48958	1 mL
	Chlorobenzene-d ₅ 1,4-Dichlorobenzene-d ₄			
	1,4-Difluorobenzene Pentafluorobenzene			
EPA 8260 Internal Standards Mix	2500 µg/mL each component in methanol	-	47081-U 861299	1 mL 5 × 1 mL
	Chlorobenzene-d ₅ 1,4-Dichlorobenzene-d ₄			
	1,4-Difluorobenzene Pentafluorobenzene			
EPA 8260 Internal Standards Mix HC	10000 µg/mL in methanol	-	47082-U	1 kit
	Chlorobenzene-d ₅ 1,4-Dichlorobenzene-d ₄			
	1,4-Difluorobenzene Pentafluorobenzene			

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Description	Concentration		Cat. No.	Qty
standard type surrogate				
EPA 8260 Surrogate Standard Mix	2000 µg/mL each component in methanol <i>4-Bromofluorobenzene</i> <i>Dibromofluoromethane</i>	<i>Toluene-d₈</i>	- 48959	1 mL
EPA 8260A Surrogate Standards Mix	250 µg/mL each component in methanol <i>4-Bromofluorobenzene</i> <i>Dibromofluoromethane</i>	<i>1,2-Dichloroethane-d₄</i> <i>Toluene-d₈</i>	- 47779	1 mL
EPA 8260A Surrogate Standards Mix	2000 µg/mL each component in methanol <i>4-Bromofluorobenzene</i> <i>Dibromofluoromethane</i>	<i>1,2-Dichloroethane-d₄</i> <i>Toluene-d₈</i>	- 47778	1 mL
EPA 8260 Surrogate Std. Mix	2500 µg/mL each component in methanol <i>4-Bromofluorobenzene</i> <i>Dibromofluoromethane</i>	<i>1,2-Dichloroethane-d₄</i> <i>Toluene-d₈</i>	- 861135	10 mL
EPA 8260 Surrogate Standards Mix, High Concentration	10,000 µg/mL in methanol <i>4-Bromofluorobenzene</i> <i>Dibromofluoromethane</i>	<i>1,2-Dichloroethane-d₄</i> <i>Toluene-d₈</i>	- 49112-U	1 mL
standard type matrix spiking				
EPA 8240B/8260A Matrix Spike Mix	25 µg/L each component in methanol 25 µg/mL each component in methanol <i>Benzene</i> <i>Chlorobenzene</i> <i>1,1-Dichloroethylene</i>	<i>Toluene</i> <i>Trichloroethylene</i>	- 47075-U 47412	1 mL 10 × 1 mL
EPA 8240B/8260A Matrix Spike Mix	2500 µg/mL each component in methanol <i>Benzene</i> <i>Chlorobenzene</i> <i>1,1-Dichloroethylene</i>	<i>Toluene</i> <i>Trichloroethylene</i>	- 47411-U	1 mL
standard type system performance check				
EPA 8240B/8260A System Performance Check Compounds	2000 µg/mL each component in methanol <i>Bromoform</i> <i>Chlorobenzene</i> <i>Chloromethane</i>	<i>1,1-Dichloroethane</i> <i>1,1,2,2-Tetrachloroethane</i>	- 47389	1 mL
EPA 8240B/8260A Calibration Check Compounds	2000 µg/mL each component in methanol <i>Chloroform</i> <i>1,1-Dichloroethylene</i> <i>1,2-Dichloropropane</i>	<i>Ethylbenzene</i> <i>Toluene</i> <i>Vinyl chloride</i>	 47385-U 457385	1 mL 1 mL
standard type tuning solution				
EPA 8240B/8260A GC-MS Tuning Mix	25 µg/mL in methanol <i>4-Bromofluorobenzene</i>		- 47077 47414	1 mL 4 × 1 mL
1-Bromo-4-fluorobenzene solution	25,000 µg/mL in methanol		- 48800	1 mL



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Method 8270

This method calls for a phenol-d₆ standard, and phenol-d₆ raw material is used to manufacture product numbers 47960-U, 48875, 47260-U, 47419, and 47619-U. However, phenolic hydrogen exchange occurs naturally, converting phenol-d₆ to phenol-d₅. In analyzing this standard, your system will detect phenol-d₅, not phenol-d₆.

For the most current and complete listing of EPA 8270 calibration standards, visit www.sigmaaldrich.com.

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA CLP Semivolatile Calibration Mix	1000 µg/mL each component in methylene chloride: benzene (3:1)		506508 506508	1 mL 1 mL
	<i>Acenaphthene</i> <i>Acenaphthylene</i> <i>Anthracene</i> <i>Azobenzene</i> <i>Benzo[a]anthracene</i> <i>Benzo[b]fluoranthene</i> <i>Benzo[k]fluoranthene</i> <i>Benzo[ghi]perylene</i> <i>Benzo[a]pyrene</i> <i>Benzyl butyl phthalate</i> <i>Bis(2-chloroethoxy)methane</i> <i>Bis(2-chloroethyl) ether</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>4-Bromodiphenyl ether</i> <i>Carbazole</i> <i>4-Chloroaniline</i> <i>4-Chlorodiphenyl ether</i> <i>Bis-(2-chloroisopropyl) ether</i> <i>4-Chloro-3-methylphenol</i> <i>2-Chloronaphthalene</i> <i>2-Chlorophenol</i> <i>Chrysene</i> <i>p-Cresol</i> <i>Dibenz[a,h]anthracene</i> <i>Dibenzofuran</i> <i>Dibutyl phthalate</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>2,4-Dichlorophenol</i> <i>Diethyl phthalate</i> <i>2,4-Dimethylphenol</i>	<i>Dimethyl phthalate</i> <i>2,4-Dinitrophenol</i> <i>2,4-Dinitrotoluene</i> <i>2,6-Dinitrotoluene</i> <i>Di-n-octyl phthalate</i> <i>Fluoranthene</i> <i>Fluorene</i> <i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Hexachlorocyclopentadiene</i> <i>Hexachloroethane</i> <i>Indeno[1,2,3-cd]pyrene</i> <i>Isophorone</i> <i>2-Methyl-4,6-dinitrophenol</i> <i>2-Methylnaphthalene</i> <i>o-Cresol</i> <i>Naphthalene</i> <i>2-Nitroaniline</i> <i>3-Nitroaniline</i> <i>4-Nitroaniline</i> <i>Nitrobenzene</i> <i>2-Nitrophenol</i> <i>4-Nitrophenol</i> <i>N-Nitrosodimethylamine</i> <i>N-Nitrosodi-n-propylamine</i> <i>Pentachlorophenol</i> <i>Phenanthrene</i> <i>Phenol</i> <i>Pyrene</i> <i>1,2,4-Trichlorobenzene</i> <i>2,4,5-Trichlorophenol</i> <i>2,4,6-Trichlorophenol</i>		
EPA 8270/APP IX SemivolCalib Mix	1000 µg/mL each component in methylene chloride		506567 456701-U	1 mL 1 mL
	<i>4-Aminobiphenyl</i> <i>Aniline</i> <i>Benzyl alcohol</i> <i>m-Cresol</i> <i>2,6-Dichlorophenol</i> <i>p-Dimethylaminoazobenzene</i> <i>7,12-Dimethylbenz[a]anthracene</i> <i>1,3-Dinitrobenzene</i> <i>Dinoseb (2-sec-Butyl-4,6-dinitrophenol)</i> <i>Diphenylamine</i> <i>Ethyl methanesulfonate</i> <i>N-(2-Fluorenyl)acetamide</i> <i>Hexachloropropene</i> <i>Isosafrol</i> <i>Methapyrene HCl</i> <i>3-Methylcholanthrene</i> <i>Methyl methanesulfonate</i> <i>2-Methyl-5-nitroaniline</i>	<i>1-Naphthylamine</i> <i>2-Naphthylamine</i> <i>4-Nitroquinoline N-oxide</i> <i>N-Nitrosodibutylamine</i> <i>N-Nitrosodiethylamine</i> <i>N-Nitrosomethylethylamine</i> <i>Nitrosomorpholine</i> <i>1-Nitrosopiperidine</i> <i>1-Nitrosopyrrolidine</i> <i>Pentachlorobenzene</i> <i>Phenacetin</i> <i>2-Picoline (2-methylpyridine)</i> <i>Safrole</i> <i>1,2,4,5-Tetrachlorobenzene</i> <i>2,3,4,6-Tetrachlorophenol</i> <i>o-Toluidine (2-methylaniline)</i> <i>1,3,5-Trinitrobenzene</i>		
Benzoic acid solution	2000 µg/mL in methylene chloride	-	47508-U	1 mL
Hexachlorophene solution	5000 µg/mL in methanol	-	40323	1 mL
1,4-Naphthoquinone solution	2000 µg/mL in methylene chloride	-	47511-U	1 mL
N-Nitrosodiphenylamine solution	5000 µg/mL in methanol	-	40060	1 mL
EPA 8270 Appendix IX Kit	-	-	47348-U	1 ea
	<i>CLP Semivolatile Calibration Mix (506508), 1 mL</i> <i>EPA 8270/Appendix IX Semivolatile Calibration Mix (506567), 1 mL</i> <i>EPA 8270 Benzidines Mix (48467), 1 mL</i> <i>Benzoic Acid (47508-U), 1 mL</i>	<i>Hexachlorophene (40323), 1 mL</i> <i>1,4-Naphthoquinone (47511-U), 1 mL</i> <i>N-Nitrosodiphenylamine (40060), 1 mL</i> <i>1,4-Phenylenediamine (48298), 1 mL</i>		
Aramite solution	2000 µg/mL in methylene chloride	-	47519-U	1 mL

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Description	Concentration		Cat. No.	Qty
EPA 8270/625/CLP/Appendix IX Semivolatile Calibration Mix	1000 µg/mL each component in methylene chloride: benzene (3:1)	-	502049	1 mL
	<i>Acenaphthene</i> <i>Acenaphthylene</i> <i>Anthracene</i> <i>Azobenzene</i> <i>Benzo[a]anthracene</i> <i>Benzo[b]fluoranthene</i> <i>Benzo[k]fluoranthene</i> <i>Benzo[ghi]perylene</i> <i>Benzo[a]pyrene</i> <i>Benzyl butyl phthalate</i> <i>Bis(2-chloroethoxy)methane</i> <i>Bis(2-chloroethyl) ether</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>4-Bromodiphenyl ether</i> <i>Carbazole</i> <i>4-Chlorodiphenyl ether</i> <i>Bis-(2-chloroisopropyl) ether</i> <i>2-Chloronaphthalene</i> <i>Chrysene</i> <i>Dibenz[a,h]anthracene</i> <i>Dibutyl phthalate</i> <i>1,2-Dichlorobenzene</i>	<i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Diethyl phthalate</i> <i>Dimethyl phthalate</i> <i>2,4-Dinitrotoluene</i> <i>2,6-Dinitrotoluene</i> <i>Di-n-octyl phthalate</i> <i>Fluoranthene</i> <i>Fluorene</i> <i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Hexachlorocyclopentadiene</i> <i>Hexachloroethane</i> <i>Indeno[1,2,3-cd]pyrene</i> <i>Isophorone</i> <i>Naphthalene</i> <i>Nitrobenzene</i> <i>N-Nitrosodimethylamine</i> <i>N-Nitrosodi-n-propylamine</i> <i>Phenanthrene</i> <i>Pyrene</i> <i>1,2,4-Trichlorobenzene</i>		
EPA APP IX Supplemental Mix 1 SS	2000 µg/mL each component in methylene chloride	SS	456704-U 46704-U	1 mL 1 mL
	<i>Dimethoate</i> <i>Disulfoton</i> <i>Famphur</i> <i>Parathion</i> <i>Parathion-methyl</i>	<i>Phorate</i> <i>Sulfotep</i> <i>Thionazin</i> <i>Triethyl thiophosphate</i>		
EPA 8270 Appendix IX Supplemental Mix 2	2000 µg/mL each component in methylene chloride: benzene (4:1)	SS	8561141 861141	1 mL 1 mL
	<i>Kepone</i> <i>Chlorobenzilate</i> <i>Diallate</i> <i>Dibenz[a,j]acridine</i> <i>α,α-Dimethylphenethylamine</i> <i>1,4-Dinitrobenzene</i>	<i>1,4-Dioxane</i> <i>Isodrine</i> <i>1-Methylnaphthalene</i> <i>1,4-Naphthoquinone</i> <i>Propyzamide</i> <i>2,3,5,6-Tetrachlorophenol</i>		
EPA Acid Calibration Mix 1	2000 µg/mL each component in methylene chloride	-	861213	2 mL
	<i>2,4-Dinitrophenol</i> <i>2-Methyl-4,6-dinitrophenol</i>	<i>4-Nitrophenol</i> <i>Pentachlorophenol</i>		
EPA 8270 Acid Calibration Mix 2	2000 µg/mL each component in methylene chloride	-	861214	1 mL
	<i>Benzoic acid</i> <i>4-Chloro-2-methylphenol</i> <i>2-Chlorophenol</i> <i>p-Cresol</i> <i>2,4-Dichlorophenol</i> <i>2,4-Dimethylphenol</i>	<i>o-Cresol</i> <i>2-Nitrophenol</i> <i>Phenol</i> <i>2,4,5-Trichlorophenol</i> <i>2,4,6-Trichlorophenol</i>		
EPA 8270 Acid Calibration Mix 2	2000 µg/mL each component in methylene chloride	-	861220	5 mL
	<i>Benzoic acid</i> <i>4-Chloro-3-methylphenol</i> <i>2-Chlorophenol</i> <i>p-Cresol</i> <i>2,4-Dichlorophenol</i>	<i>2,4-Dimethylphenol</i> <i>o-Cresol</i> <i>4-Nitrophenol</i> <i>2,4,5-Trichlorophenol</i> <i>2,4,6-Trichlorophenol</i>		
EPA 8270 Acid Calibration Mix 1(2nd lot)	2000 µg/mL each component in methylene chloride	-	861218	5 mL
	<i>2,4-Dinitrophenol</i> <i>2-Methyl-4,6-dinitrophenol</i>	<i>4-Nitrophenol</i> <i>Pentachlorophenol</i>		
EPA 8270 Phenols Mix	2000 µg/mL each component in isopropanol	-	47377	1 mL
	<i>4-Chloro-3-methylphenol</i> <i>2-Chlorophenol</i> <i>m-Cresol</i> <i>p-Cresol</i> <i>2,4-Dichlorophenol</i> <i>2,6-Dichlorophenol</i> <i>2,4-Dimethylphenol</i> <i>2,4-Dinitrophenol</i> <i>Dinoseb</i>	<i>2-Methyl-4,6-dinitrophenol</i> <i>o-Cresol</i> <i>2-Nitrophenol</i> <i>4-Nitrophenol</i> <i>Pentachlorophenol</i> <i>Phenol</i> <i>2,3,4,6-Tetrachlorophenol</i> <i>2,4,5-Trichlorophenol</i> <i>2,4,6-Trichlorophenol</i>		
EPA 8270 Phenols Mix 2	2000 µg/mL each component in methylene chloride	-	47909	1 mL
	<i>m-Cresol</i> <i>p-Cresol</i> <i>2,6-Dichlorophenol</i> <i>Dinoseb</i>	<i>Hexachlorophene</i> <i>o-Cresol</i> <i>2,3,4,6-Tetrachlorophenol</i> <i>2,4,5-Trichlorophenol</i>		

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Method 8270 (continued)

Description	Concentration	Cat. No.	Qty
EPA 8270A Base-Neutrals Mix	2000 µg/mL each component in methanol <i>Aniline</i> <i>Benzyl alcohol</i> <i>4-Chloroaniline</i> <i>Dibenzofuran</i> <i>2-Methylnaphthalene</i>	- 48470	1 mL
	<i>2-Naphthylamine</i> <i>2-Nitroaniline</i> <i>3-Nitroaniline</i> <i>4-Nitroaniline</i> <i>o-Toluidine</i>		
EPA 8270 Base/Neutrals Mix B	2000 µg/mL each component in methanol <i>Acetophenone</i> <i>4-Aminobiphenyl</i> <i>α,α-Dimethylphenethylamine</i> <i>N-(2-Fluorenyl)acetamide</i>	- 48195	1 mL
	<i>1-Naphthylamine</i> <i>2-Methyl-5-nitroaniline</i> <i>2-Picoline</i> <i>Pyridine</i>		
EPA 8270 Base Neutral Calibration Mix 1	50-1000 µg/mL in methylene chloride (varied) <i>Acenaphthene, 500 µg/mL</i> <i>Acenaphthylene, 500 µg/mL</i> <i>Aniline, 500 µg/mL</i> <i>Anthracene, 500 µg/mL</i> <i>Benz[a]anthracene, 50 µg/mL</i> <i>Benzo[b]fluoranthene, 50 µg/mL</i> <i>Benzo[k]fluoranthene, 50 µg/mL</i> <i>Benzo[ghi]perylene, 500 µg/mL</i> <i>Benzo[a]pyrene, 50 µg/mL</i> <i>Benzyl alcohol, 500 µg/mL</i> <i>Benzyl butyl phthalate, 500 µg/mL</i> <i>Bis(2-chloroethoxy)methane, 500 µg/mL</i> <i>Bis(2-chloroethyl) ether, 50 µg/mL</i> <i>Bis(2-ethylhexyl) phthalate, 500 µg/mL</i> <i>4-Bromodiphenyl ether, 500 µg/mL</i> <i>Carbazole, 500 µg/mL</i> <i>4-Chloroaniline, 500 µg/mL</i> <i>4-Chlorodiphenyl ether, 500 µg/mL</i> <i>Bis-(2-chloroisopropyl) ether, 500 µg/mL</i> <i>2-Chloronaphthalene, 500 µg/mL</i> <i>Chrysene, 500 µg/mL</i> <i>Dibenz[a,h]anthracene, 50 µg/mL</i> <i>Dibenzofuran, 500 µg/mL</i> <i>Dibutyl phthalate, 500 µg/mg protein</i> <i>1,2-Dichlorobenzene, 500 µg/mL</i> <i>1,3-Dichlorobenzene, 500 µg/mL</i> <i>1,4-Dichlorobenzene, 500 µg/mL</i> <i>Diethyl phthalate, 500 µg/mL</i>	- 861212	1 mL
	<i>N,N-Dimethylaniline, 50 µg/mL</i> <i>Dimethyl phthalate, 500 µg/mL</i> <i>2,4-Dinitrotoluene, 100 µg/mL</i> <i>2,6-Dinitrotoluene, 100 µg/mL</i> <i>Di-n-octyl phthalate, 500 µg/mL</i> <i>1,4-Dioxane, 500 µg/mL</i> <i>Diphenyl ether, 500 µg/mL</i> <i>Fluoranthene, 500 µg/mg protein</i> <i>Fluorene, 500 µg/mL</i> <i>Hexachlorobenzene, 50 µg/mL</i> <i>Hexachloro-1,3-butadiene, 100 µg/mL</i> <i>Hexachlorocyclopentadiene, 500 µg/mL</i> <i>Hexachloroethane, 50 µg/mL</i> <i>Hydrazobenzene, 500 µg/mL</i> <i>Indeno[1,2,3-cd]pyrene, 50 µg/mL</i> <i>Isophorone, 500 µg/mL</i> <i>2-Methylnaphthalene, 500 µg/mL</i> <i>Naphthalene, 500 µg/mL</i> <i>2-Nitroaniline, 1000 µg/mL</i> <i>3-Nitroaniline, 1000 µg/mL</i> <i>4-Nitroaniline, 1000 µg/mL</i> <i>Nitrobenzene, 50 µg/mL</i> <i>N-Nitrosodimethylamine, 500 µg/mL</i> <i>N-Nitrosodi-n-propylamine, 50 µg/mL</i> <i>Phenanthrene, 500 µg/mL</i> <i>Pyrene, 500 µg/mg protein</i> <i>Pyridine trifluoroacetate, 500 µg/mL</i> <i>1,2,4-Trichlorobenzene, 50 µg/mL</i>		
EPA 8270 Base Neutral Calibration Mix 2	2000 µg/mL each component in methylene chloride <i>Acenaphthene</i> <i>Acenaphthylene</i> <i>Aniline</i> <i>Anthracene</i> <i>Benz[a]anthracene</i> <i>Benzo[b]fluoranthene</i> <i>Benzo[k]fluoranthene</i> <i>Benzo[ghi]perylene</i> <i>Benzo[a]pyrene</i> <i>Benzyl alcohol</i> <i>Benzyl butyl phthalate</i> <i>Bis(2-chloroethoxy)methane</i> <i>Bis(2-chloroethyl) ether</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>4-Bromodiphenyl ether</i> <i>Carbazole</i> <i>4-Chloroaniline</i> <i>4-Chlorodiphenyl ether</i> <i>Bis-(2-chloroisopropyl) ether</i> <i>2-Chloronaphthalene</i> <i>Chrysene</i> <i>Dibenz[a,h]anthracene</i> <i>Dibenzofuran</i> <i>Dibutyl phthalate</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Diethyl phthalate</i>	- 861216	1 mL
	<i>N,N-Dimethylaniline</i> <i>Dimethyl phthalate</i> <i>2,4-Dinitrotoluene</i> <i>2,6-Dinitrotoluene</i> <i>Di-n-octyl phthalate</i> <i>1,4-Dioxane</i> <i>Diphenyl ether</i> <i>Fluoranthene</i> <i>Fluorene</i> <i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Hexachlorocyclopentadiene</i> <i>Hexachloroethane</i> <i>Hydrazobenzene</i> <i>Indeno[1,2,3-cd]pyrene</i> <i>Isophorone</i> <i>2-Methylnaphthalene</i> <i>Naphthalene</i> <i>2-Nitroaniline</i> <i>3-Nitroaniline</i> <i>4-Nitroaniline</i> <i>Nitrobenzene</i> <i>N-Nitrosodimethylamine</i> <i>N-Nitrosodi-n-propylamine</i> <i>Phenanthrene</i> <i>Pyrene</i> <i>Pyridine trifluoroacetate</i> <i>1,2,4-Trichlorobenzene</i>		

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Solid Waste, Groundwater Methods: Resource Conservation and Recovery Act (RCRA) - 8000 Series Methods

Description	Concentration		Cat. No.	Qty
EPA 8270 Base Neutral Calibration Mix 2 (2nd Lot)	2000 µg/mL each component in methylene chloride	-	861217	5 mL
	<i>Acenaphthene</i> <i>Acenaphthylene</i> <i>Aniline</i> <i>Anthracene</i> <i>Benzo[a]anthracene</i> <i>Benzo[b]fluoranthene</i> <i>Benzo[k]fluoranthene</i> <i>Benzo[ghi]perylene</i> <i>Benzo[a]pyrene</i> <i>Benzyl alcohol</i> <i>Benzyl butyl phthalate</i> <i>Bis(2-chloroethoxy)methane</i> <i>Bis(2-chloroethyl) ether</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>4-Bromodiphenyl ether</i> <i>Carbazole</i> <i>4-Chloroaniline</i> <i>4-Chlorodiphenyl ether</i> <i>Bis-(2-chloroisopropyl) ether</i> <i>2-Chloronaphthalene</i> <i>Chrysene</i> <i>Dibenz[a,h]anthracene</i> <i>Dibenzofuran</i> <i>Dibutyl phthalate</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Diethyl phthalate</i>	<i>Dimethylamine</i> <i>Dimethyl phthalate</i> <i>2,4-Dinitrotoluene</i> <i>2,6-Dinitrotoluene</i> <i>Di-n-octyl phthalate</i> <i>1,4-Dioxane</i> <i>Diphenyl ether</i> <i>Fluoranthene</i> <i>Fluorene</i> <i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Hexachlorocyclopentadiene</i> <i>Hexachloroethane</i> <i>Hydrazobenzene</i> <i>Indeno[1,2,3-cd]pyrene</i> <i>Isophorone</i> <i>2-Methylnaphthalene</i> <i>Naphthalene</i> <i>2-Nitroaniline</i> <i>3-Nitroaniline</i> <i>4-Nitroaniline</i> <i>Nitrobenzene</i> <i>N-Nitrosodimethylamine</i> <i>N-Nitrosodi-n-propylamine</i> <i>Phenanthrene</i> <i>Pyrene</i> <i>Pyridine trifluoroacetate</i> <i>1,2,4-Trichlorobenzene</i>		
EPA 8270 Benzidines Mix	2000 µg/mL each component in methanol	-	5507199	1 mL
	<i>Benzidine</i> <i>3,3'-Dichlorobenzidine</i>	<i>o-Tolidine</i>		
Benzidine solution	5000 µg/mL in methanol	-	861221	2 mL
3,3-Dichlorobenzidine (2nd Lot)	5000 µg/mL in methanol	-	861222	2 mL
EPA 8270 Benzidines Mix	2000 µg/mL in methanol	-	48467	1 mL
	<i>Benzidine</i> <i>3,3'-Dichlorobenzidine</i>	<i>3,3'-Dimethylbenzidine</i>		
EPA Chlorinated Hydrocarbon Mix	2000 µg/mL each component in hexane	-	48229	1 mL
	<i>2-Chloronaphthalene</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Hexachlorobenzene</i>	<i>Hexachloro-1,3-butadiene</i> <i>Hexachlorocyclopentadiene</i> <i>Hexachloroethane</i> <i>1,2,4,5-Tetrachlorobenzene</i> <i>1,2,4-Trichlorobenzene</i>		
EPA 8270 Chlorinated Hydrocarbons Mix	2000 µg/mL each component in methylene chloride	-	47926	1 mL
	<i>2-Chloronaphthalene</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Hexachlorocyclopentadiene</i>	<i>Hexachloroethane</i> <i>Hexachloropropene</i> <i>Pentachlorobenzene</i> <i>Pentachloroethane</i> <i>1,2,4,5-Tetrachlorobenzene</i> <i>1,2,4-Trichlorobenzene</i>		
EPA 8270 Herbicide Ester Mix	2000 µg/mL each component in hexane	-	48474	1 mL
	<i>2,4-D methyl ester</i>	<i>Silvex® methyl ester</i>		
EPA Haloethers Mix	2000 µg/mL each component in hexane	-	48228-U	1 mL
	<i>Bis(2-chloroethoxy)methane</i> <i>Bis(2-chloroethyl) ether</i> <i>4-Bromodiphenyl ether</i>	<i>4-Chlorodiphenyl ether</i> <i>Bis-(2-chloroisopropyl) ether</i>		
EPA 8270 Ether/Phthalate Mix	2000 µg/mL each component in methylene chloride	-	47643-U	1 mL
	<i>Benzyl butyl phthalate</i> <i>Bis(2-chloroethoxy)methane</i> <i>Bis(2-chloroethyl) ether</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>4-Bromodiphenyl ether</i> <i>4-Chlorodiphenyl ether</i>	<i>Bis-(2-chloroisopropyl) ether</i> <i>Dibutyl phthalate</i> <i>Diethyl phthalate</i> <i>Dimethyl phthalate</i> <i>Di-n-octyl phthalate</i>		
EPA Phthalate Esters Mix	2000 µg/mL each component in hexane	SS	48231 458231	1 mL 1 mL
	<i>Bis(2-ethylhexyl) phthalate</i> <i>Benzyl butyl phthalate</i> <i>Dibutyl phthalate</i>	<i>Di-n-octyl phthalate</i> <i>Diethyl phthalate</i> <i>Dimethyl phthalate</i>		
EPA 607 Nitrosamines Mix	2000 µg/mL each component in methanol	-	48240-U	1 mL
	<i>N-Nitrosodimethylamine</i> <i>N-Nitrosodiphenylamine</i>	<i>N-Nitrosodi-n-propylamine</i>		

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Method 8270 (continued)

Description	Concentration		Cat. No.	Qty
EPA 8270 Nitrosamines Mix	2000 µg/mL each component in methanol <i>N</i> -Nitrosodibutylamine <i>N</i> -Nitrosodiethylamine <i>N</i> -Nitrosomethylethylamine	Nitrosomorpholine 1-Nitrosopiperidine 1-Nitrosopyrrolidine	- 48489	1 mL
<i>N</i> -Nitrosodiphenylamine (2nd Lot)	5000 µg/mL in methanol		- 861227	2 mL
EPA Nitroaromatics/Cyclo Ketones Mix	2000 µg/mL each component in hexane: acetone (94:6) 1,3-Dinitrobenzene 2,4-Dinitrotoluene 2,6-Dinitrotoluene	Isophorone 1,4-Naphthoquinone Nitrobenzene	- 48227	1 mL
EPA 8270/Appendix IX Nitrosamines Mix	2000 µg/mL each component in methanol <i>N</i> -Nitrosodibutylamine <i>N</i> -Nitrosodiethylamine <i>N</i> -Nitrosodimethylamine <i>N</i> -Nitrosodiphenylamine <i>N</i> -Nitrosodi- <i>n</i> -propylamine	<i>N</i> -Nitrosomethylethylamine Nitrosomorpholine 1-Nitrosopiperidine 1-Nitrosopyrrolidine	- 502138	1 mL
EPA 8270 Organophosphorus Pesticides Mix	2000 µg/mL each component in hexane: acetone (80:20) <i>Dimethoate</i> <i>Disulfoton</i> <i>Famphur</i> <i>Parathion</i> <i>Parathion-methyl</i>	<i>Phorate</i> <i>Sulfotep</i> <i>Thionazin</i> <i>Triethyl thiophosphate</i>	- 48469	1 mL
EPA 8270 Organophosphorus Pesticide Mix 2	2000 µg/mL each component in methylene chloride <i>Dimethoate</i> <i>Disulfoton</i> <i>Famphur</i> <i>Parathion</i> <i>Parathion-methyl</i>	<i>Phorate</i> <i>Sulfotep</i> <i>Thionazin</i> <i>Triethyl thiophosphate</i>	- 47908	1 mL
EPA TCL Pesticides Mix	2000 µg/mL each component in hexane: toluene (1:1) <i>Aldrin</i> <i>α</i> -BHC <i>β</i> -BHC <i>Lindane</i> <i>δ</i> -BHC 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane 4,4'-DDE 4,4'-DDT <i>Dieldrin</i>	<i>α</i> -Endosulfan <i>β</i> -Endosulfan Endosulfan sulfate <i>Endrin</i> <i>Endrin aldehyde</i> <i>Endrin ketone</i> <i>Heptachlor</i> <i>Heptachlor exo-epoxide</i> <i>Methoxychlor</i>	SS 458913 48913	1 mL 1 mL
EPA TCL Polynuclear Aromatic Hydrocarbons Mix	2000 µg/mL each component in methylene chloride: benzene (1:1) <i>Acenaphthene</i> <i>Acenaphthylene</i> <i>Anthracene</i> <i>Benz[a]anthracene</i> <i>Benzo[b]fluoranthene</i> <i>Benzo[k]fluoranthene</i> <i>Benzo[ghi]perylene</i> <i>Benzo[a]pyrene</i>	<i>Chrysene</i> <i>Dibenz[a,h]anthracene</i> <i>Fluoranthene</i> <i>Fluorene</i> <i>Indeno[1,2,3-cd]pyrene</i> <i>Naphthalene</i> <i>Phenanthrene</i> <i>Pyrene</i>	SS 48905-U 458905	1 mL 1 mL
Chlordane (mixture of isomers)	5000 µg/mL in methanol		- 40089	1 mL

Environmental Standards

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Description	Concentration		Cat. No.	Qty
EPA 8270 LCS Mix 1	100 µg/mL each component in acetone: methylene chloride (9:1)	-	46853-U	25 mL
	Acenaphthene	1,2-Dinitrobenzene		
	Acenaphthylene	1,3-Dinitrobenzene		
	Aniline	1,4-Dinitrobenzene		
	Anthracene	2,4-Dinitrophenol		
	Azobenzene	2,4-Dinitrotoluene		
	Benz[a]anthracene	2,6-Dinitrotoluene		
	Benzo[b]fluoranthene	Di-n-octyl phthalate		
	Benzo[k]fluoranthene	Fluoranthene		
	Benzo[ghi]perylene	Fluorene		
	Benzoic acid	Hexachlorobenzene		
	Benzo[a]pyrene	Hexachloro-1,3-butadiene		
	Benzyl alcohol	Hexachlorocyclopentadiene		
	Benzyl butyl phthalate	Hexachloroethane		
	Bis(2-chloroethoxy)methane	Indeno[1,2,3-cd]pyrene		
	Bis(2-chloroethyl) ether	Isophorone		
	Bis(2-ethylhexyl) adipate	2-Methyl-4,6-dinitrophenol		
	Bis(2-ethylhexyl) phthalate	1-Methylnaphthalene		
	4-Bromodiphenyl ether	2-Methylnaphthalene		
	Carbazole	o-Cresol		
	4-Chloroaniline	Naphthalene		
	4-Chlorodiphenyl ether	2-Nitroaniline		
	Bis-(2-chloroisopropyl) ether	3-Nitroaniline		
	4-Chloro-3-methylphenol	4-Nitroaniline		
	2-Chloronaphthalene	Nitrobenzene		
	2-Chlorophenol	2-Nitrophenol		
	Chrysene	4-Nitrophenol		
	m-Cresol	N-Nitrosodimethylamine		
	p-Cresol	N-Nitrosodiphenylamine		
	Dibenz[a,h]anthracene	N-Nitrosodi-n-propylamine		
	Dibenzofuran	Pentachlorophenol		
	Dibutyl phthalate	Phenanthrene		
	1,2-Dichlorobenzene	Phenol		
	1,3-Dichlorobenzene	Pyrene		
	1,4-Dichlorobenzene	Pyridine		
	3,3'-Dichlorobenzidine	2,3,4,6-Tetrachlorophenol		
	2,4-Dichlorophenol	2,3,5,6-Tetrachlorophenol		
	Diethyl phthalate	1,2,4-Trichlorobenzene		
	2,4-Dimethylphenol	2,4,5-Trichlorophenol		
	Dimethyl phthalate	2,4,6-Trichlorophenol		
EPA 8270 LCS Mix, High Concentration	200 µg/mL each component in methanol: benzene: methylene chloride (80:1.25:18.75)	-	40032-U	25 mL
	Acenaphthene	Dimethyl phthalate		
	Acenaphthylene	1,2-Dinitrobenzene		
	Aniline	1,3-Dinitrobenzene		
	Anthracene	1,4-Dinitrobenzene		
	Azobenzene	2,4-Dinitrophenol		
	Benz[a]anthracene	2,4-Dinitrotoluene		
	Benzo[b]fluoranthene	2,6-Dinitrotoluene		
	Benzo[k]fluoranthene	Di-n-octyl phthalate		
	Benzo[ghi]perylene	Fluoranthene		
	Benzoic acid	Fluorene		
	Benzo[a]pyrene	Hexachlorobenzene		
	Benzyl alcohol	Hexachloro-1,3-butadiene		
	Benzyl butyl phthalate	Hexachlorocyclopentadiene		
	Bis(2-chloroethoxy)methane	Hexachloroethane		
	Bis(2-chloroethyl) ether	Indeno[1,2,3-cd]pyrene		
	Bis(2-ethylhexyl) adipate	Isophorone		
	Bis(2-ethylhexyl) phthalate	2-Methyl-4,6-dinitrophenol		
	4-Bromodiphenyl ether	1-Methylnaphthalene		
	Carbazole	2-Methylnaphthalene		
	4-Chloroaniline	Naphthalene		
	4-Chlorodiphenyl ether	2-Nitroaniline		
	Bis-(2-chloroisopropyl) ether	3-Nitroaniline		
	4-Chloro-3-methylphenol	4-Nitroaniline		
	2-Chloronaphthalene	Nitrobenzene		
	2-Chlorophenol	2-Nitrophenol		
	Chrysene	4-Nitrophenol		
	m-Cresol	N-Nitrosodimethylamine		
	o-Cresol	N-Nitrosodiphenylamine		
	p-Cresol	N-Nitrosodi-n-propylamine		
	Dibenz[a,h]anthracene	Pentachlorophenol		
	Dibenzofuran	Phenanthrene		
	Dibutyl phthalate	Phenol		
	1,2-Dichlorobenzene	Pyrene		
	1,3-Dichlorobenzene	Pyridine		
	1,4-Dichlorobenzene	2,3,4,6-Tetrachlorophenol		
	3,3'-Dichlorobenzidine	2,3,5,6-Tetrachlorophenol		
	2,4-Dichlorophenol	1,2,4-Trichlorobenzene		
	Diethyl phthalate	2,4,5-Trichlorophenol		
	2,4-Dimethylphenol	2,4,6-Trichlorophenol		
PCB Kit 3	200 µg/mL each component in methanol	-	48825	1 kit
	Aroclor 1016 solution (Supelco 48701), 1 mL	Aroclor 1248 solution (Supelco 48703), 1 mL		
	Aroclor 1221 solution (Supelco 48705), 1 mL	Aroclor 1254 solution (Supelco 48707), 1 mL		
	Aroclor 1232 solution (Supelco 48702), 1 mL	Aroclor 1260 solution (Supelco 48704), 1 mL		
	Aroclor 1242 solution (Supelco 48706), 1 mL			
1,4-Phenylenediamine	20000 µg/mL in methylene chloride	-	861305	1 mL

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Method 8270 (continued)

Description	Concentration		Cat. No.	Qty
EPA TCLP Mix 1	2000 µg/mL each component in methane <i>m</i> -Cresol <i>p</i> -Cresol 2-Methylphenol (Supelco 442361)	Pentachlorophenol 2,4,5-Trichlorophenol 2,4,6-Trichlorophenol	- 861426-U	5 × 1 mL
EPA TCLP Mix 2	2000 µg/mL each component in acetone 1,4-Dichlorobenzene 2,4-Dinitrotoluene Hexachlorobenzene Hexachloro-1,3-butadiene	Hexachloroethane Nitrobenzene Pyridine trifluoroacetate	- 861427-U	5 × 1 mL
Toxaphene solution	2000 µg/mL in methanol		- 48700-U	1 mL
standard type internal				
EPA 8270 Semivolatile Internal Standards Mix	2000 µg/mL each component in methylene chloride <i>Acenaphthene-d₁₀</i> <i>Chrysene-d₁₂</i> 1,4-Dichlorobenzene- <i>d</i> ₄	<i>Naphthalene-d₈</i> <i>Perylene-d₁₂</i> <i>Phenanthrene-d₁₀</i>	- 46955-U 48902 5M07296 46866-U	1 mL 2 × 1 mL 5 × 1 mL 25 mL
EPA 8270 Internal Standard Mix 2	2000 µg/mL each component in methylene chloride: benzene (1:1) <i>Acenaphthene-d₁₀</i> <i>Chrysene-d₁₂</i> 1,4-Dichlorobenzene- <i>d</i> ₄	<i>Naphthalene-d₈</i> <i>Perylene-d₁₂</i> <i>Phenanthrene-d₁₀</i>	- 861238	100 mL
standard type surrogate				
EPA 8270 Acids Surrogate Spike Mix	2000 µg/mL each component in methanol 2-Fluorophenol Phenol- <i>d</i> ₆	2,4,6-Tribromophenol	- 48875 861249	1 mL 100 mL
EPA 8270 Acids Surrogate Spike Mix HC	10,000 µg/mL in methanol 2-Fluorophenol Phenol- <i>d</i> ₆	2,4,6-Tribromophenol	- 47260-U 861376	1 mL 4 × 5 mL
EPA 8270 Base/Neutrals Surrogate Spike Mix	500 µg/mL each component in methylene chloride 2-Fluorobiphenyl Nitrobenzene- <i>d</i> ₅	<i>p</i> -Terphenyl- <i>d</i> ₁₄	- 47417	10 × 1 mL
EPA 8270 Base/Neutrals Surrogate Spike Mix	5000 µg/mL each component in methylene chloride 2-Fluorobiphenyl Nitrobenzene	<i>p</i> -Terphenyl- <i>d</i> ₁₄	- 47263 861377	1 mL 5 × 5 mL
EPA 8270 Base-Neutral Surrogate Spike Mix	1000 µg/mL each component in methylene chloride 2-Fluorobiphenyl Nitrobenzene- <i>d</i> ₅	<i>p</i> -Terphenyl- <i>d</i> ₁₄	- 48925	1 mL
EPA 8270 Base Neutral Surrogate Mix 1	2000 µg/mL each component in methylene chloride: benzene (1:1) 2-Fluorobiphenyl Nitrobenzene- <i>d</i> ₅	<i>p</i> -Terphenyl- <i>d</i> ₁₄	- 861252	100 mL
EPA 8270 Semivolatile Acid/Base Surrogate Spike (Low)	in methanol: methylene chloride (98:2) (varied conc.) 2-Chlorophenol-3,4,5,6- <i>d</i> ₄ , 150 µg/mL 1,2-Dichlorobenzene- <i>d</i> ₄ , 100 µg/mL 2-Fluorobiphenyl, 100 µg/mL 2-Fluorophenol, 150 µg/mL	Nitrobenzene- <i>d</i> ₅ , 100 µg/mL Phenol- <i>d</i> ₆ , 150 µg/mL <i>p</i> -Terphenyl- <i>d</i> ₁₄ , 100 µg/mL 2,4,6-Tribromophenol, 150 µg/mL	- 861143	100 mL
EPA 8270 Semivolatile Acid/Base Surrogate Spike (High)	in methylene chloride (varied conc.) 2-Chlorophenol-3,4,5,6- <i>d</i> ₄ , 1500 µg/mL 1,2-Dichlorobenzene- <i>d</i> ₄ , 1000 µg/mL 2-Fluorobiphenyl, 1000 µg/mL 2-Fluorophenol, 1500 µg/mL	Nitrobenzene- <i>d</i> ₅ , 1000 µg/mL Phenol- <i>d</i> ₆ , 1500 µg/mL <i>p</i> -Terphenyl- <i>d</i> ₁₄ , 1000 µg/mL 2,4,6-Tribromophenol, 1500 µg/mL	- 861142	100 mL
EPA 8270 Surrogate Standard	4000 µg/mL each component in methylene chloride 2-Fluorobiphenyl 2-Fluorophenol Nitrobenzene- <i>d</i> ₅	Phenol- <i>d</i> ₆ <i>p</i> -Terphenyl- <i>d</i> ₁₄ 2,4,6-Tribromophenol	- 47960-U	1 mL
EPA 8270 Surrogate Standards Mix 1	4000 µg/mL each component in methylene chloride 2-Chlorophenol-3,4,5,6- <i>d</i> ₄ 1,2-Dichlorobenzene- <i>d</i> ₄ 2-Fluorobiphenyl 2-Fluorophenol	Nitrobenzene- <i>d</i> ₅ Phenol- <i>d</i> ₆ <i>p</i> -Terphenyl- <i>d</i> ₁₄ 2,4,6-Tribromophenol	- 861155	1 mL
EPA 8080/8270 Pesticide Surrogate Mix	2000 µg/mL each component in hexane: toluene (1:1) Dibutyl chlorendate	2,4,5,6-Tetrachloro- <i>m</i> -xylene	- 47903	1 mL

Environmental Standards

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Description	Concentration		Cat. No.	Qty
standard type matrix spiking				
EPA 8270 Acids Matrix Spiking Solution	1000 µg/mL each component in methanol	-	47423	10 × 1 mL
	4-Chloro-3-methylphenol 2-Chlorophenol 4-Nitrophenol	Pentachlorophenol Phenol		
EPA 8270 Acids Matrix Spiking Solution	2000 µg/mL each component in methanol	-	502308	1 mL
	4-Chloro-3-methylphenol 2-Chlorophenol 4-Nitrophenol	Pentachlorophenol Phenol		
EPA 8270 Base/Neutrals Matrix Spike Mix	500 µg/mL each component in methanol	-	47421	10 × 1 mL
	Acenaphthene 1,4-Dichlorobenzene 2,4-Dinitrotoluene	N-Nitrosodi-n-propylamine Pyrene 1,2,4-Trichlorobenzene		
EPA 8270 Base/Neutrals Matrix Spike Mix	1000 µg/mL each component in methanol	-	502294	1 mL
	Acenaphthene 1,4-Dichlorobenzene 2,4-Dinitrotoluene	N-Nitrosodi-n-propylamine Pyrene 1,2,4-Trichlorobenzene		
EPA 8270 Matrix Spike Mix	in methanol (varied conc.)	-	46854-U	10 mL
	Acenaphthene, 1000 µg/mL 4-Chloro-3-methylphenol, 1500 µg/mL 2-Chlorophenol, 1500 µg/mL 1,4-Dichlorobenzene, 1000 µg/mL 2,4-Dinitrotoluene, 1000 µg/mL 4-Nitrophenol, 1500 µg/mL	N-Nitrosodi-n-propylamine, 1000 µg/mL Pentachlorophenol, 1500 µg/mL Phenol, 1500 µg/mL Pyrene, 1000 µg/mL 1,2,4-Trichlorobenzene, 1000 µg/mL		
standard type performance check				
EPA 8270B System Performance Check Compounds	1000 µg/mL each component in methylene chloride	-	47390-U	1 mL
	2,4-Dinitrophenol Hexachlorocyclopentadiene	4-Nitrophenol N-Nitrosodi-n-propylamine		
EPA 8270A Acids Calibration Check Compounds	2000 µg/mL each component in methylene chloride	SE	47386 457386	1 mL 1 mL
	4-Chloro-3-methylphenol 2,4-Dichlorophenol 2-Nitrophenol	Pentachlorophenol Phenol 2,4,6-Trichlorophenol		
EPA 8270 Base-Neutrals Calibration Check Mix	2000 µg/mL each component in methylene chloride	-	48464	1 mL
	Acenaphthene Benzo[a]pyrene 1,4-Dichlorobenzene Di-n-octyl phthalate	Fluoranthene Hexachloro-1,3-butadiene N-Nitrosodiphenylamine		
standard type tuning solution				
DFTPP solution	1000 µg/mL in acetone	-	47941	1 mL
Decafluorotriphenylphosphine solution	25,000 µg/mL in methylene chloride	-	48724-U	1 mL
EPA 8270 GC-MS Tuning Solution	50 µg/mL in methylene chloride	-	47415	4 × 1 mL
	Benzidine 4,4'-DDT	Pentachlorophenol		
EPA 8270 GC-MS Tuning Solution II	1000 µg/mL each component in methylene chloride	-	47548-U	1 mL
	Benzidine 4,4'-DDT	Decafluorotriphenylphosphine Pentachlorophenol		
EPA 8270 GC-MS Tuning Solution	50 µg/mL each component in methylene chloride	-	47387	1 mL
	Benzidine 4,4'-DDT	Decafluorotriphenylphosphine Pentachlorophenol		

Environmental Standards

Solid Waste, Groundwater Methods: Resource Conservation and Recovery Act (RCRA) - 8000 Series Methods

Method 8310

Description	Concentration	Cat. No.	Qty	
standard type calibration				
EPA TCL PAH Mix	in acetonitrile: methanol (9:1) (varied) <i>Acenaphthene, 1000 µg/mL</i> <i>Acenaphthylene, 500 µg/mL</i> <i>Anthracene, 20 µg/mL</i> <i>Benz[a]anthracene, 50 µg/mL</i> <i>Benzo[b]fluoranthene, 20 µg/mL</i> <i>Benzo[k]fluoranthene, 20 µg/mL</i> <i>Benzo[ghi]perylene, 80 µg/mL</i> <i>Benzo[a]pyrene, 50 µg/mL</i>	<i>Chrysene, 50 µg/mL</i> <i>Dibenz[a,h]anthracene, 200 µg/mL</i> <i>Fluoranthene, 50 µg/mL</i> <i>Fluorene, 100 µg/mL</i> <i>Indeno[1,2,3-cd]pyrene, 50 µg/mL</i> <i>Naphthalene, 500 µg/mL</i> <i>Phenanthrene, 40 µg/mL</i> <i>Pyrene, 100 µg/mL</i>	49156	1 mL
EPA 8310 Polynuclear Aromatic Hydrocarbons Mix	2000 µg/mL each component in methylene chloride: benzene (1:1) <i>Acenaphthene</i> <i>Acenaphthylene</i> <i>Anthracene</i> <i>Benz[a]anthracene</i> <i>Benzo[b]fluoranthene</i> <i>Benzo[k]fluoranthene</i> <i>Benzo[ghi]perylene</i> <i>Benzo[a]pyrene</i> <i>Chrysene</i>	<i>Dibenz[a,h]anthracene</i> <i>Fluoranthene</i> <i>Fluorene</i> <i>Indeno[1,2,3-cd]pyrene</i> <i>1-Methylnaphthalene</i> <i>2-Methylnaphthalene</i> <i>Naphthalene</i> <i>Phenanthrene</i> <i>Pyrene</i>	47543-U	1 mL
standard type surrogate				
Decachlorobiphenyl solution	200 µg/mL in acetone	48318	1 mL	

Method 8330

For a more complete listing of calibration standards to monitor for energetics residue, please visit our sister company, Sigma-Aldrich Cerilliant at cerilliant.com .

Description	Concentration	Cat. No.	Qty	
standard type calibration				
EPA 8330 Mix A	100 µg/mL each component in acetonitrile <i>2-Amino-4,6-dinitrotoluene</i> <i>1,3-Dinitrobenzene</i> <i>2,4-Dinitrotoluene</i> <i>HMX</i>	<i>Nitrobenzene</i> <i>RDX</i> <i>1,3,5-Trinitrobenzene</i> <i>2,4,6-Trinitrotoluene</i>	47283	1 mL
EPA 8330 Mix B	100 µg/mL in acetonitrile <i>4-Amino-2,6-dinitrotoluene</i> <i>2,6-Dinitrotoluene</i> <i>2-Nitrotoluene</i>	<i>3-Nitrotoluene</i> <i>4-Nitrotoluene</i> <i>Tetryl</i>	47284	1 mL
2-Amino-4,6-dinitrotoluene solution	1000 µg/mL in acetonitrile		47749-U	1 mL
4-Amino-2,6-dinitrotoluene solution	1000 µg/mL in acetonitrile		47750	1 mL
1,3-Dinitrobenzene solution	1000 µg/mL in acetonitrile		47746-U	1 mL
2,4-Dinitrotoluene solution	1000 µg/mL in acetonitrile		47747	1 mL
2,6-Dinitrotoluene solution	1000 µg/mL in acetonitrile		47748-U	1 mL
Nitrobenzene solution	1000 µg/mL in acetonitrile		47239	1 mL
3-Nitrotoluene solution	1000 µg/mL in acetonitrile		47241	1 mL
4-Nitrotoluene solution	1000 µg/mL in acetonitrile		47242	1 mL
1,3,5-Trinitrobenzene solution	1000 µg/mL in acetonitrile		47243	1 mL

CLP Standards

US EPA Contract Laboratory Program Methods

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Superfund Act.

US EPA Contract Laboratory Program (CLP) methods are analytical methods for identifying and quantifying organic compounds on the EPA's Target Compound List (TCL) in groundwater, sediment, and soil samples at abandoned hazardous waste sites.

The following analytical reference standards are specifically designed for monitoring organic chemicals on the US EPA's Target Compound List in water, sediment or soil from hazardous waste sites, per methods developed by the Environmental Monitoring Systems Laboratory in Las Vegas (EMSL-LV), under authority of the Superfund Amendments Reauthorization Act (SARA).

Data Packets – Free of Charge

Our data packets meet US EPA requirements specified in the March 1990 and subsequent CLP Statements of Work. Each packet documents the rigorous analytical methods we use to verify a raw material's identity and purity, and provides certification as to purity and final concentration accuracy. All data packets are free of charge.

Environmental Standards

CLP Standards: U.S. EPA Contract Laboratory Programs Methods

U.S. EPA Contract Laboratory Programs Methods

OLMO4 Statement of Work

Description	Concentration	Cat. No.	Qty
standard type calibration			
EPA CLP Volatile Mix 1	1000 µg/mL in methanol: water (19:1)	47547-U	1 mL
	<i>Acetone</i> <i>Benzene</i> <i>Bromodichloromethane</i> <i>Bromoform</i> <i>Bromomethane</i> <i>2-Butanone</i> <i>Carbon disulfide</i> <i>Carbon tetrachloride</i> <i>Chlorobenzene</i> <i>Chloroethane</i> <i>Chloroform</i> <i>Chloromethane</i> <i>Dibromochloromethane</i> <i>1,1-Dichloroethane</i> <i>1,2-Dichloroethane</i> <i>1,1-Dichloroethylene</i> <i>cis-1,2-Dichloroethylene</i> <i>trans-1,2-Dichloroethylene</i>	<i>Dichloromethane</i> <i>1,2-Dichloropropane</i> <i>cis-1,3-Dichloropropene</i> <i>trans-1,3-Dichloropropene</i> <i>Ethylbenzene</i> <i>2-Hexanone</i> <i>4-Methyl-2-pentanone</i> <i>Styrene</i> <i>1,1,2,2-Tetrachloroethane</i> <i>Tetrachloroethylene</i> <i>Toluene</i> <i>1,1,1-Trichloroethane</i> <i>1,1,2-Trichloroethane</i> <i>Trichloroethylene</i> <i>Vinyl chloride</i> <i>o-Xylene</i> <i>m-Xylene</i> <i>p-Xylene</i>	
EPA CLP SOW OLM04 Volatiles Mix	2000 µg/mL each component in methanol	47513-U	1 mL
	<i>tert-Butyl methyl ether</i> <i>Cyclohexane</i> <i>1,2-Dibromo-3-chloropropane</i> <i>1,2-Dibromoethane</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i>	<i>Dichlorodifluoromethane</i> <i>Isopropylbenzene (cumene)</i> <i>Methyl acetate</i> <i>Methylcyclohexane</i> <i>1,2,4-Trichlorobenzene</i> <i>Trichlorofluoromethane</i> <i>1,1,2-Trichloro-1,2,2-trifluoroethane</i>	
EPA CLP Semivolatile Calibration Mix	1000 µg/mL each component in methylene chloride: benzene (3:1)	5506508 506508	1 mL 1 mL
	<i>Acenaphthene</i> <i>Acenaphthylene</i> <i>Anthracene</i> <i>Azobenzene</i> <i>Benz[a]anthracene</i> <i>Benzo[b]fluoranthene</i> <i>Benzo[k]fluoranthene</i> <i>Benzo[ghi]perylene</i> <i>Benzo[a]pyrene</i> <i>Benzyl butyl phthalate</i> <i>Bis(2-chloroethoxy)methane</i> <i>Bis(2-chloroethyl) ether</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>4-Bromodiphenyl ether</i> <i>Carbazole</i> <i>4-Chloroaniline</i> <i>4-Chlorodiphenyl ether</i> <i>Bis-(2-chloroisopropyl) ether</i> <i>4-Chloro-3-methylphenol</i> <i>2-Chloronaphthalene</i> <i>2-Chlorophenol</i> <i>Chrysene</i> <i>p-Cresol</i> <i>Dibenz[a,h]anthracene</i> <i>Dibenzofuran</i> <i>Dibutyl phthalate</i> <i>1,2-Dichlorobenzene</i> <i>1,3-Dichlorobenzene</i> <i>1,4-Dichlorobenzene</i> <i>2,4-Dichlorophenol</i> <i>Diethyl phthalate</i> <i>2,4-Dimethylphenol</i>	<i>Dimethyl phthalate</i> <i>2,4-Dinitrophenol</i> <i>2,4-Dinitrotoluene</i> <i>2,6-Dinitrotoluene</i> <i>Di-n-octyl phthalate</i> <i>Fluoranthene</i> <i>Fluorene</i> <i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Hexachlorocyclopentadiene</i> <i>Hexachloroethane</i> <i>Indeno[1,2,3-cd]pyrene</i> <i>Isophorone</i> <i>2-Methyl-4,6-dinitrophenol</i> <i>2-Methylnaphthalene</i> <i>o-Cresol</i> <i>Naphthalene</i> <i>2-Nitroaniline</i> <i>3-Nitroaniline</i> <i>4-Nitroaniline</i> <i>Nitrobenzene</i> <i>2-Nitrophenol</i> <i>4-Nitrophenol</i> <i>N-Nitrosodimethylamine</i> <i>N-Nitrosodi-n-propylamine</i> <i>Pentachlorophenol</i> <i>Phenanthrene</i> <i>Phenol</i> <i>Pyrene</i> <i>1,2,4-Trichlorobenzene</i> <i>2,4,5-Trichlorophenol</i> <i>2,4,6-Trichlorophenol</i>	
3,3'-Dichlorobenzidine solution	2000 µg/mL in methanol	48029	1 mL
N-Nitrosodiphenylamine solution	5000 µg/mL in methanol	40060	1 mL
EPA CLP SOW OLM04 Semi-Volatile Mix solution	2000 µg/mL each component in methylene chloride	47514-U 457514-U	1 mL 1 mL
	<i>Acetaphenone</i> <i>Atrazine</i> <i>Benzaldehyde</i>	<i>Biphenyl</i> <i>ε-Caprolactam</i>	
EPA OLM04 Pesticide Standard Mix A-1	in hexane: toluene (99:1) (varied)	47977	1 mL
	<i>α-BHC</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane,</i> <i>1 µg/mL</i> <i>4,4'-DDT, 1 µg/mL</i> <i>Decachlorobiphenyl, 1 µg/mL</i> <i>Dieldrin, 1 µg/mL</i> <i>α-Endosulfan, .5 µg/mL</i>	<i>Endrin, 1 µg/mL</i> <i>Heptachlor, .5 µg/mL</i> <i>Lindane, .5 µg/mL</i> <i>Methoxychlor, 5 µg/mL</i> <i>2,4,5,6-Tetrachloro-m-xylene, .5 µg/mL</i>	

Environmental Standards

CLP Standards: U.S. EPA Contract Laboratory Programs Methods

OLMO4 Statement of Work (continued)

Description	Concentration	Cat. No.	Qty
EPA OLMO4 Pesticide Standard Mix B-1	in hexane: toluene (99.5:0.5) (varied) Aldrin, .5 µg/mL β-BHC δ-BHC α-Chlordane, .5 µg/mL γ-Chlordane, .5 µg/mL 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene, 1 µg/mL Decachlorobiphenyl, 1 µg/mL	β-Endosulfan, 1 µg/mL Endosulfan sulfate, 1 µg/mL Endrin aldehyde, 1 µg/mL Endrin ketone, 1 µg/mL Heptachlor exo-epoxide, .5 µg/mL 2,4,5,6-Tetrachloro-m-xylene, .5 µg/mL	47978 1 mL
Toxaphene solution	1000 µg/mL in isooctane	48103	1 mL
Aroclor 1016 solution	1000 µg/mL in isooctane	458097 48097	1 mL 1 mL
Aroclor 1221 solution	1000 µg/mL in isooctane	458098 48098	1 mL 1 mL
Aroclor 1232 solution	1000 µg/mL in isooctane	44805 454805	1 mL 1 mL
Aroclor 1242 solution	1000 µg/mL in isooctane	44806 454806	1 mL 1 mL
Aroclor 1248 solution	1000 µg/mL in isooctane	454807 44807	1 mL 1 mL
Aroclor 1254 solution	1000 µg/mL in isooctane	454808 44808	1 mL 1 mL
Aroclor 1260 solution	1000 µg/mL in isooctane	44809 454809	1 mL 1 mL
standard type internal			
EPA 8240/8260 VOA Internal Standards Mix	1000 µg/mL each component in methanol Bromochloromethane Chlorobenzene-d ₅	1,4-Difluorobenzene	48835 1 mL
standard type surrogate			
EPA 8240/8260 VOA Surrogate Spike Mix	1000 µg/mL each component in methanol 4-Bromofluorobenzene 1,2-Dichloroethane-d ₄	Toluene-d ₈	48101 1 mL
EPA CLP Semivolatiles Surrogate Standards Mix	4000 µg/mL each component in methylene chloride	2-Chlorophenol-3,4,5,6-d ₄ 1,2-Dichlorobenzene-d ₄ 2-Fluorobiphenyl 2-Fluorophenol	Nitrobenzene-d ₅ Phenol-d ₆ p-Terphenyl-d ₁₄ 2,4,6-Tribromophenol
Pesticide Surrogate Spike Mix	200 µg/mL each component in acetone Decachlorobiphenyl	2,4,5,6-Tetrachloro-m-xylene	48460 1 mL
standard type check mix			
Pesticide Resolution Check Mix-A	in hexane: toluene (99:1) (varied) γ-Chlordane, 1 µg/mL 1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene, 2 µg/mL Decachlorobiphenyl, 2 µg/mL Dieldrin, 2 µg/mL α-Endosulfan, 1 µg/mL	Endosulfan sulfate, 2 µg/mL Endrin ketone, 2 µg/mL Methoxychlor, 10 µg/mL 2,4,5,6-Tetrachloro-m-xylene, 2 µg/mL	47976 1 mL

UST/GRO/DRO

Supelco offers the following stock standards for use in Underground Storage Tank (UST) remediation, Gasoline Range Organics (GRO) analyses and Diesel Range Organics (DRO) analyses. Individual fuel standards can be used for fingerprint analyses. State-specific Total Petroleum Hydrocarbon (TPH)/Extractable Petroleum Hydrocarbon (EPH) standards are also available for your convenience. Custom mixes are available through our Custom Chemical Service.

BTEX Standards

standard type calibration

Description	Concentration	Cat. No.	Qty
standard type calibration			
BTEX Mix, Underground Storage Tank	200 µg/mL each component in methanol Benzene Ethylbenzene Toluene	o-Xylene m-Xylene p-Xylene	- CRM48026 1 pkg
BTEX Mix, HC	2000 µg/mL each component in methanol Benzene Ethylbenzene tert-Butyl methyl ether Toluene	o-Xylene m-Xylene p-Xylene	- CRM47993 1 pkg

Environmental Standards

UST/GRO/DRO

Description	Concentration		Cat. No.	Qty
BTEX/MTBE Mix, HC	2000 µg/mL each component in methanol Benzene Toluene Ethylbenzene o-Xylene	m-Xylene p-Xylene tert-Butyl methyl ether	CRM47505	1 pkg

Gasoline Range Organics (GRO) Standards

Description	Concentration		Cat. No.	Qty
standard type calibration				
Gasoline Additives Mix	200 µg/mL each component in methanol tert-Butyl methyl ether 1,2-Dibromoethane	Dibromomethane 1,2-Dichloroethane	47905	1 mL
GRO Mix	2000 µg/mL each component in methanol Benzene Ethylbenzene 3-Methylpentane Naphthalene Toluene	1,2,4-Trimethylbenzene 2,2,4-Trimethylpentane o-Xylene m-Xylene	47576-U	1 mL
PVOC Mix	2000 µg/mL each component in methanol Benzene tert-Butyl methyl ether Ethylbenzene Toluene	1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene (Mesitylene) m-Xylene	47916	1 mL
EPA GRO Mix	in methanol (varied) Benzene, 500 µg/mL Ethylbenzene, 500 µg/mL Heptane, 500 µg/mL 2-Methylpentane, 1500 µg/mL Toluene, 1500 µg/mL	1,2,4-Trimethylbenzene, 1000 µg/mL 2,2,4-Trimethylpentane, 1500 µg/mL o-Xylene, 1000 µg/mL m-Xylene, 1000 µg/mL	47577-U	1 mL
Underground Storage Tank (UST) Modified GRO	1000 µg/mL each component in methanol Benzene tert-Butyl methyl ether Ethylbenzene Naphthalene Toluene	1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene o-Xylene m-Xylene p-Xylene	48167	1 mL
standard type surrogate				
α,α-Trifluorotoluene solution	10,000 µg/mL in methanol		47582-U	1 mL
standard type internal				
1-Chloro-4-fluorobenzene solution	5000 µg/mL in methanol		48194	1 mL

Diesel Range Organics (DRO) Standards

Description	Concentration		Cat. No.	Qty
standard type calibration				
DRO Calibration Mix	500 µg/mL each component in hexane Chlorobenzene Decane Docosane Dodecane Eicosane Hexacosane	Hexadecane Octacosane Octadecane o-Terphenyl Tetracosane Tetradecane	861287	5 mL
Underground Storage Tank (UST) Modified DRO	1000 µg/mL each component in hexane Decane Docosane Dodecane Eicosane Hexacosane	Hexadecane Octacosane Octadecane Tetracosane Tetradecane	48166	1 mL
standard type internal/surrogate				
1-Chlorooctadecane	10000 µg/mL in methylene chloride		47584-U	1 mL
standard type internal				
5-α-Androstane solution	2000 µg/mL in methylene chloride		48168	1 mL
standard type surrogate				
2-Fluorobiphenyl solution	10,000 µg/mL in methylene chloride		47581-U	1 mL
o-Terphenyl solution	2000 µg/mL in acetone		48169	1 mL
o-Terphenyl solution	10000 µg/mL in methylene chloride		47580-U	1 mL

Environmental Standards

UST/GRO/DRO

Individual Fuel Standards

Description	Concentration	Cat. No.	Qty
standard type calibration			
Aviation Gasoline	20,000 µg/mL in methanol	47531-U	1 mL
Gasoline, premium unleaded	20,000 µg/mL in methanol	47516-U	1 mL
Jet (Turbine) Fuel solution	20,000 µg/mL in methanol	47533-U	1 mL
JP-4 Military Fuel Standard	10,000 µg/mL in methylene chloride	47585-U	1 mL
JP-5 Military Fuel Standard	10,000 µg/mL in methylene chloride	47586-U	1 mL
JP-8 Military Fuel Standard	10,000 µg/mL in methylene chloride	47587-U	1 mL
Kerosene Reference Standard	50,000 µg/mL in hexane	47517-U	1 mL
No. 1 Fuel Oil	20,000 µg/mL in methanol	47518-U	1 mL
No. 2 Fuel Oil	20,000 µg/mL in methanol	47515-U	1 mL
No. 3 Fuel Oil	50,000 µg/mL in hexane	47534-U	1 mL
No. 4 Fuel Oil	50,000 µg/mL in hexane	47535-U	1 mL
No. 6 Fuel Oil	20,000 µg/mL in hexane: chloroform (1:1)	47536-U	1 mL

State-Specific Petroleum Method Standards


Description	Concentration	Cat. No.	Qty
standard type calibration			
Connecticut <i>n</i> -Hydrocarbon Mix	1000 µg/mL each component in methylene chloride: carbon disulfide 85:15 <i>Decane</i> <i>Docosane</i> <i>Dodecane</i> <i>Dotriacontane</i> <i>Eicosane</i> <i>Hexacosane</i> <i>Hexadecane</i> <i>Hexatriacontane</i>	<i>Nonane</i> <i>Octacosane</i> <i>Octadecane</i> <i>Tetracosane</i> <i>Tetradecane</i> <i>Tetraatriacontane</i> <i>Triacontane</i>	46827-U 1 mL
Florida <i>n</i> -Hydrocarbon Mix	1000 µg/mL each component in methylene chloride: carbon disulfide (1:1) <i>Decane</i> <i>Docosane</i> <i>Dodecane</i> <i>Dotriacontane</i> <i>Eicosane</i> <i>Hexacosane</i> <i>Hexadecane</i> <i>Hexatriacontane</i> <i>Octacosane</i>	<i>Octadecane</i> <i>Octane</i> <i>Octatriacontane</i> <i>Tetracontane</i> <i>Tetracosane</i> <i>Tetradecane</i> <i>Tetraatriacontane</i> <i>Triacontane</i>	46855-U 1 mL
PA DEP UST Standard	2000 µg/mL in methanol <i>Benzene</i> <i>1,2-Dibromoethane</i> <i>1,2-Dichloroethane</i> <i>Ethylbenzene</i> <i>Cumene</i> <i>tert-Butyl methyl ether</i>	<i>Naphthalene</i> <i>Toluene</i> <i>m-Xylene</i> <i>o-Xylene</i> <i>p-Xylene</i>	44686-U 1 mL
Total Petroleum Hydrocarbons (TPH) Mixture 3	1000 µg/mL each component in carbon disulfide <i>Decane</i> <i>Dodecane</i> <i>Dotriacontane</i> <i>Eicosane</i> <i>Heptane</i> <i>Hexadecane</i> <i>Hexane</i> <i>Hexatriacontane</i> <i>Nonane</i>	<i>Octacosane</i> <i>Octadecane</i> <i>Octane</i> <i>Tetracontane</i> <i>Tetracosane</i> <i>Tetradecane</i> <i>Tetraatriacontane</i> <i>Undecane</i>	8561394-U 861394-U 1 mL 1 mL

Related DRO Hydrocarbon Standards

Description	Concentration	Cat. No.	Qty
standard type calibration			
Total Petroleum Hydrocarbons (TPH) Mixture 1	2000 µg/mL each component in hexane: methylene chloride (1:1) <i>Decane</i> <i>Docosane</i> <i>Dodecane</i> <i>Eicosane</i> <i>Hexacosane</i>	<i>Hexadecane</i> <i>Octacosane</i> <i>Octadecane</i> <i>Tetracosane</i> <i>Tetradecane</i>	- 861424-U 1 mL

Environmental Standards

UST/GRO/DRO

Description	Concentration		Cat. No.	Qty
Total Petroleum Hydrocarbons (TPH) Mixture 3	1000 µg/mL each component in carbon disulfide		8561394-U 861394-U	1 mL 1 mL
	<i>Decane</i>	<i>Octacosane</i>		
	<i>Dodecane</i>	<i>Octadecane</i>		
	<i>Dotriacontane</i>	<i>Octane</i>		
	<i>Eicosane</i>	<i>Tetracontane</i>		
	<i>Heptane</i>	<i>Tetracosane</i>		
	<i>Hexadecane</i>	<i>Tetradecane</i>		
	<i>Hexane</i>	<i>Tetratetracontane</i>		
	<i>Hexatriacontane</i>	<i>Undecane</i>		
	<i>Nonane</i>			

Flame Retardant Standards

Fluka flame retardant standards are ideally suited for GC and GC/MS analyses. The standards are prepared from raw materials having a minimum purity >98% and, then assayed to verify concentration. A certificate of analysis is supplied with each standard. Shelf life is three years from the date of manufacture.

CAS No.	Compound	Concentration	Cat. No.	Qty
101-55-3	BDE No 3 solution	50 µg/mL in isooctane	33661-1ML	1 mL
2050-47-7	BDE No 15 solution	50 µg/mL in isooctane	33662-1ML	1 mL
41318-75-6	BDE No 28 solution	50 µg/mL in isooctane	33663-1ML	1 mL
147217-79-6	BDE No 36 solution	50 µg/mL in isooctane	33664-1ML	1 mL
147217-81-0	BDE No 37 solution	50 µg/mL in isooctane	34123-1ML	1 mL
5436-43-1	BDE No 47 solution	50 µg/mL in isooctane	33670-1ML	1 mL
243982-82-3	BDE No 49 solution	50 µg/mL in isooctane	33671-1ML	1 mL
189084-61-5	BDE No 66 solution	50 µg/mL in isooctane	34119-1ML	1 mL
189084-62-6	BDE No 71 solution	50 µg/mL in isooctane	34118-1ML	1 mL
189084-63-7	BDE No 75 solution	50 µg/mL in isooctane	34116-1ML	1 mL
93703-48-1	BDE No 77 solution	50 µg/mL in isooctane	34115-1ML	1 mL
182346-21-0	BDE No 85 solution	50 µg/mL in isooctane	34114-1ML	1 mL
60348-60-9	BDE No 99 solution	50 µg/mL in isooctane	33676-1ML	1 mL
189084-64-8	BDE No 100 solution	50 µg/mL in isooctane	33681-1ML	1 mL
189084-66-0	BDE No 119 solution	50 µg/mL in isooctane	34121-1ML	1 mL
366791-32-4	BDE No 126 solution	50 µg/mL in isooctane	33682-1ML	1 mL
182677-30-1	BDE No 138 solution	50 µg/mL in isooctane	34122-1ML	1 mL
68631-49-2	BDE No 153 solution	50 µg/mL in isooctane	33683-1ML	1 mL
207122-15-4	BDE No 154 solution	50 µg/mL in isooctane	33684-1ML	1 mL
189084-67-1	BDE No 181 solution	50 µg/mL in isooctane	33685-1ML	1 mL
207122-16-5	BDE No 183 solution	50 µg/mL in isooctane	33686-1ML	1 mL
337513-72-1	BDE No 203 solution	50 µg/mL in isooctane	33687-1ML	1 mL
446255-56-7	BDE No 205 solution	50 µg/mL in isooctane	33688-1ML	1 mL
63387-28-0	BDE No 206 solution	50 µg/mL in isooctane	33689-1ML	1 mL
1163-19-5	BDE No 209 solution	50 µg/mL in isooctane:toluene (9:1)	34120-1ML	1 mL

PCB Standards

Description	Concentration		Cat. No.	Qty
PCB No 1	-	-	35586-100MG	100 mg
PCB No 5	-	-	35588-100MG	100 mg
PCB No 31	-	-	36679-10MG-R	10 mg
PCB No 32	-	-	34158-10MG	10 mg
PCB No 33	-	-	34159-10MG	10 mg
PCB No 44	-	-	33702-10MG	10 mg
PCB No 63	-	-	34160-10MG	10 mg
PCB No 70	-	-	34199-10MG	10 mg
PCB No 151	-	-	34156-10MG	10 mg
PCB No 153	-	-	35602-10MG 35602-1G	10 mg 1 g
PCB No 153 solution	10 ng/µL in isooctane	-	36904-2ML	2 mL
PCB No 156 solution	100 ng/µL in hexane	-	33710-2ML	2 mL
PCB No 174	-	-	34157-10MG	10 mg

Environmental Standards

PCB Standards

Description	Concentration		Cat. No.	Qty
standard type calibration				
PCB kit - high conc.	1000 µg/mL in isoctane (each solution) <i>Aroclor 1232 solution (Supelco 44805), 1 mL</i> <i>Aroclor 1242 solution (Supelco 44806), 1 mL</i> <i>Aroclor 1248 solution (Supelco 44807), 1 mL</i>	- <i>Aroclor 1254 solution (Supelco 44808), 1 mL</i> <i>Aroclor 1260 solution (Supelco 44809), 1 mL</i> <i>Aroclor 1262 solution (Supelco 44810), 1 mL</i>	44803	1 kit
PCB kit - low conc.	1 µg/mL in isoctane <i>Aroclor 1232 solution (Supelco 44811), 1 mL</i> <i>Aroclor 1242 solution (Supelco 44812), 1 mL</i> <i>Aroclor 1248 solution (Supelco 44813), 1 mL</i>	- <i>Aroclor 1254 solution (Supelco 44814), 1 mL</i> <i>Aroclor 1260 solution (Supelco 44815), 1 mL</i> <i>Aroclor 1262 solution (Supelco 44816), 1 mL</i>	44804	1 kit
PCB Congener Mix 1	10 µg/mL each component in isoctane <i>2,6-Dichlorobiphenyl</i> <i>2,2',3,4,4',5,5'-Heptachlorobiphenyl</i> <i>2,2',3,4,4',5'-Hexachlorobiphenyl</i>	- <i>2,2',4,4',5,5'-Hexachlorobiphenyl</i> <i>2,2',5,5'-Tetrachlorobiphenyl</i> <i>2,4,4'-Trichlorobiphenyl</i>	47330-U	10 mL
CEN PCB Congener Mix-1	10 µg/mL each component in heptane <i>2,2',3,4,4',5,5'-Heptachlorobiphenyl</i> <i>2,2',3,4,4',5'-Hexachlorobiphenyl</i> <i>2,2',3,4,4',5,6-Hexachlorobiphenyl</i> <i>2,2',4,4',5,5'-Hexachlorobiphenyl</i> <i>2,2',3,3',4,4',5,5'-Octachlorobiphenyl</i> <i>2,2',4,5,5'-Pentachlorobiphenyl</i>	- <i>2,3',4,4',5-Pentachlorobiphenyl</i> <i>2,2',3,5'-Tetrachlorobiphenyl</i> <i>2,2',5,5'-Tetrachlorobiphenyl</i> <i>2,2',5-Trichlorobiphenyl</i> <i>2,4,4'-Trichlorobiphenyl</i> <i>2,4',5-Trichlorobiphenyl</i>	47927	1 mL
Pesticide-HC Calibration Standards Kit	- <i>Aroclor 1016 solution (48097), 1 mL</i> <i>Aroclor 1221 solution (48098), 1 mL</i> <i>Aroclor 1232 solution (44805), 1 mL</i> <i>Aroclor 1242 solution (44806), 1 mL</i> <i>Aroclor 1248 solution (44807), 1 mL</i> <i>Aroclor 1254 solution (44808), 1 mL</i>	- <i>Aroclor 1260 solution(44809), 1 mL</i> <i>Aroclor 1262 solution (44810), 1 mL</i> <i>Chlordane (48065-U), 1 mL</i> <i>TCL Pesticides Mix (48913), 1 mL</i> <i>Toxaphene (48103), 1 mL</i>	48114	1 kit
DCMA PCB Mixture	in hexane (varied) <i>2-Chlorobiphenyl, 100 µg/mL</i> <i>Decachlorobiphenyl, 5 µg/mL</i> <i>3,3'-Dichlorobiphenyl, 100 µg/mL</i> <i>2,2',3,4',5,5',6-Heptachlorobiphenyl, 5 µg/mL</i> <i>2,2',3,3',6,6'-Hexachlorobiphenyl, 10 µg/mL</i>	- <i>2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl, 5 µg/mL</i> <i>2,2',3,3',4,4',5,5'-Octachlorobiphenyl, 5 µg/mL</i> <i>2,3',4,5',6-Pentachlorobiphenyl, 10 µg/mL</i> <i>2,2',4,4'-Tetrachlorobiphenyl, 10 µg/mL</i> <i>2,4,5-Trichlorobiphenyl, 10 µg/mL</i>	48596-U	2 × 5 mL
Aroclor 1016 solution	200 µg/mL in methanol	-	48701	1 mL
Aroclor 1016 solution	1000 µg/mL in isoctane	SS	458097 48097	1 mL 1 mL
Aroclor 1221 solution	200 µg/mL in methanol	-	48705	1 mL
Aroclor 1221 solution	1000 µg/mL in isoctane	SS	458098 48098	1 mL 1 mL
Aroclor 1232 solution	200 µg/mL in methanol	-	48702	1 mL
Aroclor 1232 solution	1000 µg/mL in isoctane	SS	44805 454805	1 mL 1 mL
Aroclor 1242 solution	200 µg/mL in methanol	-	48706	1 mL
Aroclor 1242 solution	1000 µg/mL in isoctane	SS	44806 454806	1 mL 1 mL
Aroclor 1248 solution	200 µg/mL in methanol	-	48703	1 mL
Aroclor 1248 solution	1000 µg/mL in isoctane	SS	454807 44807	1 mL 1 mL
Aroclor 1254 solution	200 µg/mL in methanol	-	48707	1 mL
Aroclor 1254 solution	1000 µg/mL in isoctane	SS	454808 44808	1 mL 1 mL
Aroclor 1260 solution	200 µg/mL in methanol	-	48704	1 mL
Aroclor 1262 solution	1000 µg/mL in isoctane	SS	44810 454810	1 mL 1 mL
Aroclor 1268 solution	1000 µg/mL in isoctane	SS	5502146 502146	1 mL 1 mL
PCB Kit 3	200 µg/mL each component in methanol <i>Aroclor 1016 solution (Supelco 48701), 1 mL</i> <i>Aroclor 1221 solution (Supelco 48705), 1 mL</i> <i>Aroclor 1232 solution (Supelco 48702), 1 mL</i> <i>Aroclor 1242 solution (Supelco 48706), 1 mL</i>	- <i>Aroclor 1248 solution (Supelco 48703), 1 mL</i> <i>Aroclor 1254 solution (Supelco 48707), 1 mL</i> <i>Aroclor 1260 solution (Supelco 48704), 1 mL</i>	48825	1 kit
Aroclor Mix 1	200 µg/mL each component in methanol <i>Aroclor 1016</i> <i>Aroclor 1232</i>	- <i>Aroclor 1248</i> <i>Aroclor 1260</i>	48861	1 mL
Aroclor Mix 2	200 µg/mL each component in methanol <i>Aroclor 1221</i> <i>Aroclor 1242</i>	- <i>Aroclor 1254</i>	48862	1 mL
Transformer oil (PCB free)	-	-	46956 40900-U	10 × 5 mL 250 mL

Environmental Standards

Pesticide Mixtures

Pesticide Mixtures

Description	Concentration	Cat. No.	Qty
standard type calibration			
Triazine Pesticides Standards Mix	100 µg/mL each component in methanol <i>Ametryn</i> <i>Atrazine</i> <i>Prometon</i> <i>Prometryn</i>	<i>Propazine</i> <i>Simazine</i> <i>Terbutryn</i>	CRM48392 1 pkg
Organophosphorus Pesticides Mix A	2000 µg/mL each component in hexane: acetone (9:1) <i>Azinphos-methyl</i> <i>Chlorpyrifos</i> <i>Dichlorvos</i> <i>Disulfoton</i>	<i>Ethoprophos</i> <i>Fenchlorphos</i> <i>Parathion-methyl</i> <i>Prothiofos</i>	48391 1 mL
OP Pesticide Spike Mix	1000 µg/mL each component in acetone <i>Azinphos-methyl</i> <i>Demeton O&S</i> <i>Diazinon</i> <i>Disulfoton</i>	<i>Fenthion</i> <i>Malathion</i> <i>Parathion</i> <i>Parathion-methyl</i>	8561268 1 mL
Chlorinated Pesticides Mix	- <i>Aldrin, 50 µg/mL</i> <i>α-BHC</i> <i>β-BHC</i> <i>1-(2-Chlorophenyl)-1-(4-chlorophenyl)-2,2-dichloroethane, 200 µg/mL</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane, 190 µg/mL</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethene, 100 µg/mL</i> <i>2,4'-DDT, 225 µg/mL</i>	<i>4,4'-DDT, 260 µg/mL</i> <i>Dieldrin, 120 µg/mL</i> <i>Endrin, 200 µg/mL</i> <i>Heptachlor, 25 µg/mL</i> <i>Heptachlor exo-epoxide, 80 µg/mL</i> <i>Lindane, 25 µg/mL</i>	47557-U 49151 1 mL 5 × 1 mL

Pesticide Neats and Solutions

Our extensive line of pesticide and pesticide metabolites includes 1500+ Fluka PESTANAL® standards for environmental and food residue analyses. We also offer several ChemService reference materials for analysts requiring a separate (second) source standard. Listed below are some of the many pesticide standards we have in stock, ready to ship when you need them. Because this line continues to grow at a rapid pace, we recommend you visit sigmaaldrich.com/analyticalstandards to view the most current offerings.

Description	Concentration	Cat. No.	Qty
Abamectin	-	- 31732-100MG	100 mg
Abamectin	-	- N10995-100MG	100 mg
Acephate	-	- N11002-250MG	250 mg
Acephate	-	- 45315-250MG	250 mg
Acephate solution	100 ng/µL in acetonitrile	- 36992-10ML	10 mL
Acequinocyl	-	- 32527-50MG	50 mg
Acetaldehyde	-	- 506788	1000 mg
Acetamidrid	-	- 33674-100MG-R	100 mg
Acetamidrid-d ₃	-	- 39246-50MG	50 mg
Acetamidride- <i>o</i> -desmethyl	-	- 32979-10MG	10 mg
Acetochlor	-	- 33379-100MG	100 mg
Acibenzolar acid	-	- 35371-50MG	50 mg
Acibenzolar- <i>S</i> -methyl	-	- 32820-100MG	100 mg
Acifluorfen	-	- N11027-250MG	250 mg
Acifluorfen	-	- 34311-50MG	50 mg
Aclonifen	-	- 36792-250MG-R	250 mg
Acrinathrin	-	- 46415-100MG-R	100 mg
Alachlor	-	- 45316-250MG	250 mg
Alachlor solution	200 µg/mL in methanol	- 48308	1 mL
Alachlor solution	1000 µg/mL in methanol	- 41089	1 mL
Alanycarb	-	- 32872-100MG	100 mg
Aldicarb	-	- 33386-100MG	100 mg
Aldicarb-sulfone	-	- 33387-100MG	100 mg
Aldicarb-sulfoxide	-	- 31258-100MG	100 mg
Aldrin	-	- 36666-25MG	25 mg
Aldrin	-	- 49000-U	1 mL
Aldrin solution	100 ng/µL in acetonitrile	- 36664-2ML 36664-10ML	2 mL 10 mL

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Aldrin solution	2 µg/mL in isooctane	-	48963	10 mL
Aldrin solution	200 µg/mL in isooctane	-	48962	10 mL
Aldrin solution	20 µg/mL in methanol	-	48673	1 mL
Aldrin solution	5000 µg/mL in methanol	-	40220-U	1 mL
Allethrin	-	-	33396-100MG	100 mg
Allidochlor	-	-	45318-100MG	100 mg
Alloxydim-sodium	-	-	45319-250MG	250 mg
Allyl isothiocyanate	-	-	36682-1G	1 g
Ametoctradin	-	-	32461-50MG	50 mg
Ametryn	-	-	N11064-500MG	500 mg
Ametryn	-	-	45321-250MG	250 mg
Ametryn	-	-	49084	100 mg
Amidosulfuron	-	-	33588-100MG	100 mg
2-Aminobenzimidazole	-	-	31189-250MG	250 mg
Aminocarb	-	-	45322-250MG	250 mg
Aminoethoxyvinyl glycine hydrochloride	-	-	32999-25MG	25 mg
(Aminomethyl)phosphonic acid	-	-	MET12133A-100MG	100 mg
2-Aminophenol	-	-	36683-1G	1 g
3-Aminophenol	-	-	36684-1G	1 g
Aminopyralid	-	-	32457-25MG	25 mg
2-Aminopyridine	-	-	36685-1G	1 g
4-Aminopyridine	-	-	36687-1G	1 g
Amisulbrom	-	-	32849-25MG	25 mg
Amitraz	-	-	N11068-250MG	
Amitraz	-	-	45323-250MG	250 mg
Amitraz Metabolite BTS 27271	-	-	32442-10MG	10 mg
Amitraz Metabolite BTS 27271 (N-methyl-d ₃)	-	-	32440-10MG	10 mg
Amitrol	-	-	45324-250MG	250 mg
Anilazine	-	-	31464-250MG	250 mg
(S)-3-Anilino-5-methyl-5-phenylimidazolidine-2,4-dione	-	-	34183-100MG	100 mg
Anilofos	-	-	37876-100MG	100 mg
Anthraquinone	-	-	N10970-1G	1 g
Anthraquinone	-	-	31466-250MG	250 mg
ANTU	-	-	45328-250MG	250 mg
Asulam	-	-	45329-250MG	250 mg
Atraton	-	-	31206-250MG	250 mg
Atrazine	-	-	N11106-250MG	250 mg
Atrazine	-	-	45330-250MG-R	250 mg
Atrazine	-	-	49085	100 mg
Atrazine solution	100 ng/µL in methanol	-	31212-2ML	2 mL
Atrazine solution	1000 µg/mL in methyl <i>tert</i> -butyl ether	-	48187	1 mL
Atrazine-d ₅	-	-	34053-10MG-R	10 mg
Atrazine-desethyl	-	-	MET11106B-50MG	50 mg
Atrazine-desethyl	-	-	36629-250MG	250 mg
Atrazine-desethyl solution	100 ng/µL in methanol	-	31210-2ML	2 mL
Atrazine-desethyl-desisopropyl	-	-	36667-250MG	250 mg
Atrazine-desethyl-desisopropyl-2-hydroxy	-	-	45613-250MG	250 mg
Atrazine-desethyl-2-hydroxy	-	-	45490-100MG	100 mg
Atrazine-desisopropyl	-	-	36628-250MG	250 mg
Atrazine-desisopropyl-2-hydroxy	-	-	31523-100MG	100 mg
Atrazine-2-hydroxy	-	-	MET11106F-50MG	50 mg
Atrazine-2-hydroxy	-	-	36631-250MG	250 mg
Azadirachtin	-	-	N11107-10MG	10 mg
Azamethiphos	-	-	45331-250MG	250 mg
Azimsulfuron	-	-	32521-25MG	25 mg
Azinphos-ethyl	-	-	45332-250MG	250 mg
Azinphos-methyl	-	-	45333-250MG	250 mg
Aziprotryne	-	-	45334-250MG	250 mg
Azobenzene	-	-	36689-1G	1 g
Azocyclotin	-	-	45335-250MG	250 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Azoxystrobin	-	-	31697-100MG	100 mg
Barban	-	-	N11123-100MG	100 mg
Baythroid®	-	-	33738-250MG	250 mg
BDMC	-	-	N11131-100MG	
Beflubutamid	-	-	32866-100MG	100 mg
Benalaxyl	-	-	31222-250MG	250 mg
Benalaxyl-M	-	-	32900-10MG	10 mg
Benazolin	-	-	31038-100MG	100 mg
Benazolin-ethyl ester	-	-	31227-250MG	250 mg
Bendiocarb	-	-	45336-250MG	250 mg
Benfluralin	-	-	45337-250MG	250 mg
Benfuracarb	-	-	31544-100MG	100 mg
Benfuresate	-	-	31637-100MG	100 mg
Benodanil	-	-	45338-250MG	250 mg
Benomyl	-	-	N11138-100MG	100 mg
Benomyl	-	-	45339-1EA	1 ea
			45339-250MG	250 mg
Benoxacor	-	-	46001-250MG	250 mg
Bensulfuron-methyl	-	-	37897-100MG	100 mg
Bensulide	-	-	31469-250MG	250 mg
Bensultap	-	-	33863-100MG-R	100 mg
Bentazon	-	-	N11142-250MG	250 mg
Bentazon	-	-	32052-250MG	250 mg
Bentazon-d ₇	-	-	32965-10MG	10 mg
Bentazon methyl derivative	-	-	N11143-50MG	50 mg
Benthiavalicarb isopropyl	-	-	33006-10MG	10 mg
Bentranil	-	-	37872-25MG	25 mg
Benzofenap solution	100 ng/μL in acetonitrile	-	32474-2ML	2 mL
Benzoximate	-	-	33397-100MG	100 mg
Benzoylprop-ethyl	-	-	31476-100MG	100 mg
Benzthiazuron	-	-	36563-100MG	100 mg
Benzyl benzoate	-	-	N11182-1G	1 g
α-BHC	-	-	48493	50 mg
α-BHC solution	1000 μg/mL in methanol	-	40100-U	1 mL
α-BHC solution	20 μg/mL in methanol	-	48683	1 mL
β-BHC	-	-	48494	50 mg
β-BHC solution	20 μg/mL in methanol	-	48684	1 mL
β-BHC solution	1000 μg/mL in acetone	-	40101	1 mL
γ-BHC	2 μg/mL in isooctane	-	48961	10 mL
γ-BHC	20 μg/mL in methanol	-	48685	1 mL
γ-BHC	200 μg/mL in isooctane	-	48960-U	10 mL
γ-BHC	1000 μg/mL in methanol	-	40102	1 mL
γ-BHC	-	-	49049	1000 mg
γ-BHC	-	-	442598	250 mg
δ-BHC	1000 μg/mL in methanol	-	40103-U	1 mL
δ-BHC	-	-	48495	50 mg
BHC d-isomer	-	-	N11196-100MG	100 mg
BHC (mixture of hexachlorocyclohexanes)	-	-	49007	500 mg
Bifenazate	-	-	32504-50MG	50 mg
Bifenox	-	-	31477-250MG	250 mg
Bifenthrin	-	-	N11203-100MG	100 mg
Bifenthrin	-	-	34314-100MG	100 mg
Bifenthrin solution	100 ng/μL in acetonitrile	-	36993-2ML	2 mL
Binapacryl	-	-	31484-250MG	250 mg
Bioallethrin	-	-	31489-250MG	250 mg
Bioresmethrin	-	-	31496-250MG	250 mg
Biphenyl	-	-	35800-1G	1 g
2,2'-Bipyridyl	-	-	36759-1G	1 g
4,4'-Bipyridyl	-	-	36690-1G	1 g
Bis(5-chloro-2-hydroxyphenyl)methane	-	-	N11667-1G	1 g
Bis(2-ethylhexyl) phthalate	-	-	36735-1G	1 g
Bismethiazol	-	-	34238-100MG	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration	Cat. No.	Qty
Bispyribac sodium salt	-	- 32967-100MG	100 mg
Bixafen	-	- 32581-100MG	100 mg
Boscalid	-	- 33875-100MG-R	100 mg
Brodifacoum	-	- 46036-100MG	100 mg
Bromacil	-	- 45350-250MG	250 mg
Bromadiolon	-	- 46035-100MG	100 mg
Bromfenvinphos-ethyl	-	- 45816-100MG	100 mg
Bromfenvinphos-methyl	-	- 45815-100MG	100 mg
Bromobutide	-	- 37042-25MG	25 mg
Bromocyclen	-	- 33398-100MG	100 mg
Bromophos-ethyl	-	- 33399-100MG	100 mg
Bromophos-methyl	-	- 33400-100MG	100 mg
Bromopropylate	-	- 45357-250MG	250 mg
Bromopyrazone	-	- 45358-250MG	250 mg
Bromoxynil	-	- 45355-250MG	250 mg
Bromoxynil-octanoate	-	- 45356-250MG	250 mg
Bromuconazol	-	- 31644-100MG	100 mg
Bronopol	-	- 32053-250MG	250 mg
Bupirimate	-	- 31510-250MG	250 mg
Buprofezin	-	- 37886-100MG	100 mg
Butachlor	-	- 37887-100MG	100 mg
Butafenacil	-	- 33659-100MG-R	100 mg
Butamifos	-	- 37046-25MG	25 mg
Butocarboxim	-	- 36121-100MG	100 mg
Butocarboximsulfoxide	-	- 45719-100MG	100 mg
Butoxy-carboxim	-	- 36122-100MG	100 mg
Butralin	-	- 36528-250MG	250 mg
Buturon	-	- 36510-100MG	100 mg
Butylat	-	- N11383-1G	1 g
Butylat	-	- 45363-250MG	250 mg
4-tert-Butylphenol	-	- 506761	1000 mg
Cacodylic acid	-	- N11779-500MG	500 mg
Cadusafos	-	- 32505-50MG	50 mg
Cafenstrole	-	- 32430-50MG	50 mg
Calflo E	-	- 34316-250G 34316-4X250G	250 g 4 × 250 g
Captafol	-	- 45365-250MG	250 mg
Captan	-	- N11400-1G	1 g
Captan solution	100 ng/μL in acetonitrile	- 36994	
Carbaryl	-	- 32055-250MG	250 mg
Carbaryl solution	100 ng/μL in cyclohexane	- 36856-10ML	10 mL
Carbazole solution	2000 μg/mL in methylene chloride	- 48076	1 mL
Carbendazim	-	- N11404-100MG	100 mg
Carbendazim	-	- 45368-250MG	250 mg
Carbendazim-d ₃	-	- 32413-10MG	10 mg
Carbetamide	-	- 45369-250MG	250 mg
Carbofuran	-	- N11405-250MG	250 mg
Carbofuran	-	- 32056-250MG	250 mg
Carbofuran-d ₃	-	- 34019-10MG-R	10 mg
Carbofuran-3-hydroxy	-	- 37896-10MG	10 mg
Carbofuran-3-keto	-	- 37895-10MG-R	10 mg
Carbophenothion	-	- 31461-250MG	250 mg
Carbosulfan	-	- N11409-250MG	250 mg
Carbosulfan	-	- 32005-100MG	100 mg
Carbosulfan	-	- 32005-250MG	250 mg
Carboxine	-	- 45371-250MG	250 mg
Carfentrazone-ethyl	-	- 34079-10MG	10 mg
Carpropamid	-	- 31682-100MG	100 mg
Cartap	-	- N11412-250MG	250 mg
Cartap hydrochloride	-	- 45995-100MG	100 mg
Chinomethionate	-	- 45372-250MG	250 mg
Chloralose	-	- 45373-250MG	250 mg
Chloramben	-	- 33392-100MG-R	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Chloranil	-	-	45374-250MG	250 mg
Chlorantraniliprole	-	-	32510-25MG	25 mg
Chlorbensid	-	-	36123-100MG	100 mg
Chlorbufam	-	-	45301-250MG	250 mg
cis-Chlordane	-	-	N11480-10MG	10 mg
trans-Chlordane	-	-	N13615-10MG	10 mg
α-Chlordane solution	10 ng/μL in cyclohexane	-	31197-2ML	2 mL
α-Chlordane solution	100 μg/mL in hexane	-	48192	1 mL
γ-Chlordane	-	-	442599	50 mg
γ-Chlordane solution	10 ng/μL in cyclohexane	-	36592-2ML 36592-10ML	2 mL 10 mL
γ-Chlordane solution	100 μg/mL in hexane	-	48193	1 mL
Chlordane (mixture of isomers)	20 μg/mL in methanol	-	48699	1 mL
Chlordane (mixture of isomers)	5000 μg/mL in methanol	-	40089	1 mL
Chlordane (mixture of isomers)	1000 μg/mL in isooctane	-	48065-U	1 mL
Chlordane (mixture of isomers)	200 μg/mL in isooctane	-	48984	10 mL
Chlordane (technical mixture)	-	-	45378-250MG	250 mg
Chlordecone	-	-	45379-250MG	250 mg
Chlorden	-	-	31517-250MG	250 mg
Chlordimeform	-	-	31099-250MG	250 mg
Chlorethoxyfos	-	-	32456-25MG	25 mg
Chlorfenapyr	-	-	37913-100MG-R	100 mg
Chlorfenethol	-	-	34319-50MG	50 mg
Chlorfenson	-	-	36124-100MG	100 mg
Chlorfenvinphos	-	-	36551-250MG	250 mg
Chlorfenvinphos solution	100 ng/μL in cyclohexane	-	45828-2ML 45828-10ML	2 mL 10 mL
Chlorfluazuron	-	-	36530-250MG-R	250 mg
Chlorflurenol	-	-	45721-100MG	100 mg
Chlorflurenol-methyl	-	-	45302-250MG	250 mg
Chloridazon	-	-	45385-250MG	250 mg
Chlorimuron ethyl	-	-	32874-100MG	100 mg
Chlorimuron ethyl	-	-	N11432-100MG	100 mg
Chlorinated Pesticides Mix	in isooctane (varied)	-	47557-U	1 mL
Chlorinated Pesticides Mix	in isooctane (varied)	-	49151	5 × 1 mL
Chlormefos	-	-	45386-250MG	250 mg
Chlormequat chloride	-	-	45387-250MG	250 mg
Chloroacetic acid	-	-	36544-1G	1 g
2-Chloroaniline	-	-	31215-1G	1 g
3-Chloroaniline	-	-	35824-1G	1 g
4-Chloroaniline	-	-	35823-1G	1 g
Chlorobenzilate	-	-	45376-250MG	250 mg
Chlorobenzilate solution	200 μg/mL in methylene chloride	-	48370	1 mL
2-Chlorobenzoic acid	-	-	506877	1000 mg
4-Chlorobenzoic acid	-	-	506885	1000 mg
6-Chlorobenzoxazol-2(3H)-one	-	-	33673-100MG-R	100 mg
Chlorobromouron	-	-	45377-250MG	250 mg
2-Chloro-5-chloromethylthiazole	-	-	63227-5G	5 g
5-Chloro-2,4-dimethoxyaniline	-	-	35991-1G	1 g
2-Chloroethanol	-	-	36693-1G	1 g
Chlorofenprop-methyl	-	-	45381-250MG	250 mg
3-Chloro-4-methylaniline	-	-	36761-1G	1 g
4-Chloro-2-methylphenol	-	-	35833-1G	1 g
Chloroneb	-	-	36125-100MG	100 mg
Chlorophacinone	-	-	45390-250MG	250 mg
2-Chlorophenol	-	-	36746-1G	1 g
3-Chlorophenol	-	-	36747-1G	1 g
4-Chlorophenol	-	-	35826-1G	1 g
4-Chlorophenoxyacetic acid	-	-	45391-250MG	250 mg
1-(2-Chlorophenyl)-1-(4-chlorophenyl)-2,2-dichloroethane	-	-	N12706-250MG	
6-Chloropyridine-3-carboxylic acid	-	-	68678-100MG	100 mg
Chloropyrifos solution	1000 μg/mL in methyl <i>tert</i> -butyl ether	-	48104	1 mL
Chlorosulfuron	-	-	N11461-100MG	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration	Cat. No.	Qty
Chlorosulfuron	-	34322-100MG	100 mg
Chlorothalonil	-	N11454-250MG	
Chlorothalonil	-	36791-250MG	250 mg
Chlorothalonil solution	100 ng/μL in acetonitrile	36981-2ML 36981-10ML	2 mL 10 mL
2-Chlorotoluene	-	36695-1G	1 g
3-Chlorotoluene	-	36696-1G	1 g
4-Chlorotoluene	-	36697-1G	1 g
Chloroxuron	-	45389-250MG	250 mg
Chloroxynil	-	33363-25MG	25 mg
Chlorpropham	-	45393-250MG	250 mg
Chlorpropham solution	100 ng/μL in acetonitrile	45829-2ML	2 mL
Chlorpropylat	-	45394-250MG	250 mg
Chlorpyrifos	-	45395-250MG	250 mg
Chlorpyrifos solution	100 ng/μL in acetonitrile	31553-2ML 31553-10ML	2 mL 10 mL
Chlorpyrifos-methyl	-	N11460-250MG	250 mg
Chlorpyrifos-methyl	-	45396-250MG	250 mg
Chlorpyrifos-methyl solution	100 ng/μL in acetonitrile	45831-2ML 45831-10ML	2 mL 10 mL
Chlorthal-dimethyl	-	45397-250MG	250 mg
Chlorthiamid	-	45398-250MG	250 mg
Chlorthion	-	35030-25MG-R	25 mg
Chlorthiophos	-	36126-100MG	100 mg
Chlortoluron	-	N11455-250MG	
Chlortoluron	-	45400-250MG-R	250 mg
Chlozolate solution	100 ng/μL in cyclohexane	33743-2ML	2 mL
Cinidon-ethyl	-	46336-100MG	100 mg
Cinmethylin	-	34237-50MG	50 mg
Cinosulfuron	-	37893-100MG	100 mg
Clethodim	-	34190-50MG	50 mg
Climbazole	-	36127-100MG	100 mg
Clodinafop-propargyl	-	31676-250MG	250 mg
Clofentezine	-	36763-250MG	250 mg
Clomazone	-	46120-100MG-R	100 mg
Clomeprop	-	37056-10MG	10 mg
Clopyralid	-	36758-250MG	250 mg
Clopyralid (2-hydroxyethyl)ammonium	-	36529-250MG	250 mg
Cloquintocet	-	34239-25MG-R	25 mg
Cloquintocet-mexyl	-	31678-250MG	250 mg
Closantel	-	34093-100MG	100 mg
Clothianidin	-	33589-100MG	100 mg
Clothianidin-d ₃	-	56816-50MG	50 mg
Codlemone	-	32716-50MG	50 mg
Copper naphthenate	-	N11501-1G	1 g
Copper oxychloride	-	N11502-1G	1 g
Coumachlor	-	45402-250MG	250 mg
Coumafuryl	-	34324-10MG	10 mg
Coumaphos	-	45403-250MG	250 mg
Coumaphos	-	N11507-100MG	100 mg
Coumatetralyl	-	45404-250MG	250 mg
Creatine	-	MET11840A-1G	1 g
Cresyl diphenyl phosphate	-	32957-100MG	100 mg
Crimidine	-	36564-250MG	250 mg
Cuelure	-	35376-25MG	25 mg
Cumene	-	36698-1G	1 g
Cumyluron	-	37023-25MG	25 mg
Cyanazine	-	45407-250MG	250 mg
Cyanazine solution	2000 μg/mL in methanol	48592	1 mL
Cyanofenphos solution	100 ng/μL in acetonitrile	33028-2ML	2 mL
Cyanophos	-	46279-25MG	25 mg
Cyanuric acid- ¹³ C ₃	-	32679-10MG	10 mg
Cyazofamid	-	33874-100MG-R	100 mg
Cyclanilide	-	32871-100MG	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Cycloate	-	-	45408-250MG	250 mg
Cycloheximide	-	-	N11534-100MG	100 mg
Cycloheximide	-	-	46401-100MG-R	100 mg
Cyclosulfamuron	-	-	32743-100MG	100 mg
Cyloxidim	-	-	31596-100MG	100 mg
Cycluron	-	-	45409-250MG	250 mg
(EZ)-Cyenopyrafen	-	-	32069-25MG	25 mg
Cyflufenamid	-	-	32403-25MG	25 mg
β-Cyfluthrin	-	-	46003-250MG	250 mg
Cyhalofop-butyl	-	-	32753-50MG	50 mg
Cyhalothrin solution	100 ng/μL in acetonitrile	-	36996-2ML	2 mL
λ-Cyhalothrin	-	-	31058-100MG	100 mg
λ-Cyhalothrin	-	-	N12307-100MG	100 mg
Cyhexatin	-	-	45411-250MG	250 mg
Cymoxanil	-	-	34326-100MG	100 mg
Cypermethrin	-	-	36128-100MG	100 mg
Cypermethrin	-	-	N11545-100MG	100 mg
Cypermethrin solution	100 ng/μL in acetonitrile	-	45835-2ML 45835-10ML	2 mL 10 mL
α-Cypermethrin	-	-	N11061-250MG	250 mg
α-Cypermethrin	-	-	45806-100MG	100 mg
Cyphenothrin	-	-	46037-100MG	100 mg
Cyproconazol	-	-	46068-100MG	100 mg
Cyprodinil	-	-	34389-250MG	250 mg
Cyprofuram	-	-	45413-250MG	250 mg
Cyprosulfamide	-	-	32522-100MG	100 mg
Cyromazin	-	-	45414-250MG	250 mg
Cyromazine	-	-	N11550-500MG	500 mg
2,4-D	-	-	31518-250MG	250 mg
2,4-D	-	-	49083	1000 mg
2,4-D solution	100 μg/mL in methanol	-	47896	1 mL
2,4-D solution	5000 μg/mL in acetonitrile	-	40330	1 mL
2,4-D dimethylamine salt	-	-	N10612-1G	1 g
2,4-D butylglycol ester	-	-	31057-250MG	250 mg
2,4-D 1-butyl ester	-	-	45732-250MG-R	250 mg
2,4-D isooctyl ester	-	-	N10615-1G	1 g
2,4-D methyl ester	-	-	45416-250MG	250 mg
2,4-D methyl ester	-	-	49142	1000 mg
2,4-D methyl ester solution	200 μg/mL in hexane	-	47979	1 mL
Dalapon	-	-	35562-250MG	250 mg
Dalapon	-	-	442535	100 mg
Dalapon-methyl	-	-	45383-250MG	250 mg
Daminozide	-	-	45418-250MG	250 mg
Dazomet	-	-	45419-250MG	250 mg
2,4-DB	-	-	45420-250MG-R	250 mg
2,4-DB-methyl ester	-	-	31244-250MG	250 mg
4,4'-DBP	-	-	45421-250MG	250 mg
DCU	-	-	45812-250MG	250 mg
4,4'-DDA	-	-	35484-250MG	250 mg
2,4'-DDD	-	-	35485-250MG	250 mg
2,4'-DDD	-	-	49015	1000 mg
4,4'-DDD	-	-	35486-250MG	250 mg
4,4'-DDD	-	-	49009	1000 mg
4,4'-DDD solution	20 μg/mL in methanol	-	48680	1 mL
4,4'-DDD solution	5000 μg/mL in methanol	-	40092	1 mL
p,p'-DDE	-	-	N12809-100MG	100 mg
2,4'-DDE	-	-	N12707-50MG	
2,4'-DDE solution	100 ng/μL in methanol	-	36663-2ML	2 mL
4,4'-DDE	-	-	35487-100MG 35487-250MG	100 mg 250 mg
4,4'-DDE	-	-	49017	1000 mg
4,4'-DDE solution	100 ng/μL in methanol	-	45838-1ML 45838-2ML	1 mL 2 mL
4,4'-DDE solution	200 μg/mL in isooctane	-	48968	10 mL

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
4,4'-DDE solution	5000 µg/mL in methanol	-	40091	1 mL
4,4'-DDE solution	20 µg/mL in methanol	-	48679	1 mL
4,4'-DDM	-	-	35488-250MG	250 mg
4,4'-DDMU	-	-	35489-250MG	250 mg
4,4'-DDOH	-	-	31091-250MG	250 mg
DDT (o,p' & p,p')	-	-	N11567-250MG	250 mg
2,4'-DDT	-	-	49018	100 mg
2,4'-DDT	-	-	N12708-50MG	
2,4'-DDT solution	100 ng/µL in methanol	-	45839-2ML 45839-10ML	2 mL 10 mL
4,4'-DDT	-	-	N12810-1G	1 g
4,4'-DDT	-	-	31041-100MG	100 mg
4,4'-DDT	-	-	49019	1000 mg
4,4'-DDT solution	100 ng/µL in methanol	-	36662-2ML	2 mL
4,4'-DDT solution	20 µg/mL in methanol	-	48678	1 mL
4,4'-DDT solution	200 µg/mL in isooctane	-	48980	10 mL
4,4'-DDT solution	5000 µg/mL in methanol	-	40124	1 mL
4,4'-DDT-d ₈	-	-	34021-10MG-R	10 mg
DDT-Endrin Mix	500 µg/mL each component in methanol	-	48282	1 mL
DEET	-	-	36542-250MG	250 mg
DEET	-	-	442541	250 mg
Deltamethrin	-	-	N11579-100MG	100 mg
Deltamethrin	-	-	45423-250MG	250 mg
Deltamethrin solution	100 ng/µL in cyclohexane	-	31554	
Demeton-O	-	-	34205-100MG	100 mg
Demeton S	-	-	N11582-100MG	100 mg
Demeton-S-methyl solution	100 ng/µL in acetonitrile	-	34234-2ML	2 mL
Demeton-S-methyl-sulfon	-	-	45424-250MG	250 mg
Demeton O&S	-	-	N11581-100MG	100 mg
N-Desethyl-pirimiphos-methyl	-	-	33991-100MG-R	100 mg
Desmedipham	-	-	45426-250MG	250 mg
Desmethyl-formamido-pirimicarb	-	-	33887-10MG-R	10 mg
Desmethyl-pirimicarb	-	-	33886-10MG-R	10 mg
Desmetryn	-	-	45427-250MG	250 mg
Desnitro-imidacloprid hydrochloride	-	-	37052-25MG	25 mg
Diafenthiuron	-	-	31571-250MG	250 mg
Dialifos	-	-	36500-100MG	100 mg
di-Allate	-	-	N11587-100MG	100 mg
Diazinon	-	-	N11621-250MG	250 mg
Diazinon	-	-	45428-250MG	250 mg
Diazinon	-	-	49021	1000 mg
Diazinon solution	100 ng/µL in acetonitrile	-	45842-2ML	2 mL
Dibrom®	-	-	45429-250MG	250 mg
4,4'-Dibromobenzophenone	-	-	36601-500MG	500 mg
1,2-Dibromo-3-chloropropane	-	-	31257-250MG	250 mg
Dibutyl phthalate	-	-	36736-1G	1 g
Dibutyl succinate	-	-	33983-100MG-R	100 mg
Dicamba	-	-	45430-250MG	250 mg
Dicamba-d ₃	-	-	34233-10MG-R	10 mg
Dicamba methyl ester	-	-	N11657-100MG	100 mg
Dicamba methyl ester	-	-	34102-10MG-R	10 mg
Dicamba methyl ester solution	200 µg/mL in hexane	-	47982	1 mL
Dicapthon	-	-	N11658-1G	1 g
Dichlobenil	-	-	45431-250MG	250 mg
Dichlofenthion	-	-	45432-250MG	250 mg
Dichlofuanid	-	-	45433-250MG	250 mg
Dichlon	-	-	45434-250MG	250 mg
Dichloran	-	-	45435-250MG	250 mg
Dichlormid	-	-	33613-100MG	100 mg
Dichloroacetic acid	-	-	36545-1G	1 g
2,3-Dichloroaniline	-	-	36701-1G	1 g
2,4-Dichloroaniline	-	-	35829-1G	1 g
2,5-Dichloroaniline	-	-	36702-1G	1 g

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration	Cat. No.	Qty
2,6-Dichloroaniline	-	36703-1G	1 g
3,4-Dichloroaniline	-	35827-1G	1 g
3,5-Dichloroaniline	-	36704-1G	1 g
2,6-Dichlorobenzamide	-	36605-1G	1 g
o-Dichlorobenzene	-	N12681-1G	1 g
1,2-Dichlorobenzene	-	36707-1G	1 g
1,3-Dichlorobenzene	-	36708-1G	1 g
1,4-Dichlorobenzene	-	35775-1G	1 g
2,4-Dichlorobenzoic acid	-	36749-1G	1 g
2,6-Dichlorobenzoic acid	-	36706-1G	1 g
1,2-Dichloro-3-nitrobenzene	-	45682-250MG	250 mg
1,2-Dichloro-4-nitrobenzene	-	35831-1G	1 g
1,4-Dichloro-2-nitrobenzene	-	36572-250MG	250 mg
Dichlorophene	-	35992-250MG	250 mg
2,4-Dichlorophenol	-	35811-1G	1 g
2,6-Dichlorophenol	-	31102-1G	1 g
3,4-Dichlorophenol	-	31274-250MG	250 mg
3,5-Dichlorophenol	-	31595-250MG	250 mg
2,4-Dichlorophenoxyacetic acid	-	N10609-1G	1 g
Dichloroprop-P	-	31237-250MG	250 mg
1,3-Dichloropropane	-	45439-250MG	250 mg
1,3-Dichloropropene	-	45440-250MG	250 mg
α,α -Dichlorotoluene	-	31059-250MG	250 mg
Dichlorprop	-	45436-250MG	250 mg
Dichlorprop-methyl ester	-	45437-250MG	250 mg
Dichlorvos	-	45441-250MG	250 mg
Dichlorvos	-	N11675-250MG	250 mg
Diclobutrazol	-	36764-50MG	50 mg
Diclofop-methyl	-	45442-250MG	250 mg
Dicofol	-	36677-100MG-R	100 mg
Dicofol solution	100 ng/ μ L in methanol	45848-2ML	2 mL
Dicrotophos	-	45305-100MG	100 mg
Dicyclanil	-	46391-100MG	100 mg
Dicyclohexyl phthalate	-	36908-250MG	250 mg
Dicyclohexyl phthalate-3,4,5,6-d ₄	-	34186-25MG	25 mg
Dicyclopentadiene	-	N11686-500MG	500 mg
Dieldrin	-	33491-100MG-R	100 mg
Dieldrin	-	N11688-250MG	250 mg
Dieldrin	-	49024	50 mg
Dieldrin solution	100 ng/ μ L in acetonitrile	36660-2ML-R	2 mL
Dieldrin solution	200 μ g/mL in isooctane	48972	10 mL
Dieldrin solution	20 μ g/mL in methanol	48674	1 mL
Dieldrin solution	1000 μ g/mL in methanol	40088	1 mL
Dienochlor	-	45443-250MG	250 mg
Diethofencarb	-	34087-100MG	100 mg
2,6-Diethylaniline	-	36765-1G	1 g
Diethyl phosphate	-	MET11621C-100MG	100 mg
Diethyl phthalate	-	36737-1G	1 g
N,N-Diethyl-m-toluamide	-	N12618-250MG	250 mg
Difenacoum	-	32677-25MG	25 mg
Difenoconazol	-	36531-250MG	250 mg
Difenoxyurone	-	45444-250MG	250 mg
Difenzoquat methyl sulfate	-	34331-250MG	250 mg
Diflovidazin	-	32582-25MG	25 mg
Diflubenzuron	-	45446-250MG	250 mg
Diflufenican	-	45751-100MG	100 mg
Diflufenopyr sodium salt	-	37916-100MG-R	100 mg
Dimethluthrin	-	32432-100MG	100 mg
Dimefox	-	36502-100MG	100 mg
Dimefuron	-	36788-250MG-R	250 mg
Dimepiperate	-	33943-100MG	100 mg
Dimethachlor	-	45447-250MG	250 mg
Dimethachlor Metabolite CGA 373464	-	32632-100MG	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Dimethachlor Metabolite SYN 528702 sodium salt	-	-	32497-100MG	100 mg
Dimethametryn	-	-	45448-250MG	250 mg
Dimethenamid	-	-	31726-100MG	100 mg
Dimethenamide-P	-	-	33697-100MG-R	100 mg
Dimethipin	-	-	N11757-1G	1 g
Dimethoate	-	-	N11758-250MG	250 mg
Dimethoate	-	-	45449-100MG	100 mg
Dimethoate solution	200 µg/mL in methylene chloride	-	48371	1 mL
Dimethomorph	-	-	46027-100MG	100 mg
2,6-Dimethylaniline	-	-	36766-1G-R	1 g
2,3-Dimethylphenol	-	-	36713-1G	1 g
2,4-Dimethylphenol	-	-	36607-1G	1 g
2,5-Dimethylphenol	-	-	36714-1G	1 g
2,6-Dimethylphenol	-	-	36715-1G	1 g
3,4-Dimethylphenol	-	-	36716-1G	1 g
3,5-Dimethylphenol	-	-	36717-1G	1 g
Dimethyl phthalate	-	-	36738-1G	1 g
Dimethyl terephthalate	-	-	31298-250MG	250 mg
Dimethyltin dichloride	-	-	34301-250MG	250 mg
<i>N,N'</i> -Dimethylurea	-	-	36574-250MG	250 mg
Dimetilan	-	-	45450-250MG	250 mg
Dimoxystrobin	-	-	33499-100MG-R	100 mg
Diniconazole	-	-	46049-250MG	250 mg
Dinitramine	-	-	34333-250MG	250 mg
2,4-Dinitrophenol	-	-	34334-250MG	250 mg
Dinobuton	-	-	45451-250MG	250 mg
Dinocap	-	-	45452-100MG 45452-250MG	100 mg 250 mg
Dinoseb	-	-	45453-100MG 45453-250MG	100 mg 250 mg
Dinoseb	-	-	442570	100 mg
Dinoseb solution	200 µg/mL in methylene chloride	-	48378	1 mL
Dinoseb acetate	-	-	31281-250MG	250 mg
Dinotefuran	-	-	32499-50MG	50 mg
Dinoterb	-	-	31241-250MG	250 mg
Dinoterb acetate	-	-	34337-250MG	250 mg
Diufenolan	-	-	31668-250MG	250 mg
Dioxabenzofos	-	-	35352-10MG	10 mg
Dioxathion	-	-	N11790-100MG	100 mg
Diphacinone	-	-	N11793-100MG	100 mg
Diphenamid	-	-	45455-250MG	250 mg
Diphenylamine	-	-	45456-250MG	250 mg
Diphenylmercury(II)	-	-	45457-250MG	250 mg
Diphenyl phthalate	-	-	36617-1G-R	1 g
Diphenyl sulfone	-	-	45458-250MG	250 mg
Dipropetryn	-	-	45459-250MG	250 mg
Dipropyl phthalate	-	-	45624-250MG	250 mg
Diquat dibromide monohydrate	-	-	45422-250MG-R	250 mg
Diquat dibromide monohydrate	-	-	N11816-500MG	500 mg
Disodium methyl arsenate	-	-	N11817-500MG	500 mg
Disulfoton	-	-	45460-250MG	250 mg
Disulfoton	-	-	442572	100 mg
Disulfoton-sulfone	-	-	45871-100MG	100 mg
Disulfoton-sulfoxide	-	-	31562-100MG	100 mg
Ditalimfos solution	100 ng/µL in acetonitrile	-	32832-2ML	2 mL
Dithianon	-	-	45462-250MG	250 mg
Diuron	-	-	45463-250MG	250 mg
Diuron solution	100 ng/µL in acetonitrile	-	45851-2ML	2 mL
Diuron-d ₆	-	-	34018-10MG-R	10 mg
DMST solution	100 ng/µL in acetonitrile	-	32958-2ML	2 mL
DNC-d ₈	-	-	34214-10MG	10 mg
DNOC	-	-	45464-250MG	250 mg
Dodemorph	-	-	45465-250MG	250 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Dodin	-	-	N11840-250MG	250 mg
Dodin	-	-	45466-250MG	250 mg
Drazoxolon	-	-	34338-250MG	250 mg
Dursban	-	-	442573	100 mg
Edifenphos	-	-	45467-250MG	250 mg
Emamectin-benzoate	-	-	31733-250MG	250 mg
Empenthrin	-	-	33312-100MG-R	100 mg
Endosulfan	-	-	N11848-500MG	500 mg
Endosulfan	-	-	32015-250MG	250 mg
Endosulfan solution	100 ng/μL in hexane	-	45852-2ML	2 mL
α-Endosulfan	-	-	45468-100MG	100 mg
α-Endosulfan solution	100 ng/μL in hexane	-	36659-2ML-R	2 mL
β-Endosulfan	-	-	33385-100MG	100 mg
β-Endosulfan solution	100 ng/μL in hexane	-	36582-2ML	2 mL
Endosulfan alcohol	-	-	36674-100MG	100 mg
Endosulfan I (alpha)	-	-	48576	25 mg
Endosulfan II (beta)	-	-	48578	25 mg
Endosulfan ether	-	-	36673-100MG	100 mg
Endosulfan lactone	-	-	36675-100MG	100 mg
Endosulfan sulfate	-	-	36676-100MG-R	100 mg
Endosulfan sulfate	-	-	48580	100 mg
Endosulfan sulfate solution	100 ng/μL in hexane	-	31555-2ML	2 mL
Endosulfan sulfate solution	20 μg/mL in methanol	-	48687	1 mL
Endothal monohydrate	-	-	35525-250MG	250 mg
Endrin	-	-	32014-250MG	250 mg
Endrin	-	-	49032	100 mg
Endrin solution	200 μg/mL in isooctane	-	48976	10 mL
Endrin solution	20 μg/mL in methanol	-	48675	1 mL
Endrin solution	5000 μg/mL in methanol	-	40087	1 mL
Endrin aldehyde	-	-	442578	25 mg
Endrin aldehyde solution	20 μg/mL in methanol	-	48723-U	1 mL
Endrin aldehyde solution	1000 μg/mL in methanol	-	40097	1 mL
Endrin ketone	-	-	442579	25 mg
Endrin-ketone solution	100 ng/μL in acetonitrile	-	46390-2ML-R	2 mL
EPA Pesticide Mix	in methanol: methylene chloride (98:2) (varied)	-	48858-U	1 mL
EPN	100 ng/μL in acetonitrile	-	36984-10ML	10 mL
EPN	-	-	36503-100MG	100 mg
Epoxiconazole	-	-	36848-100MG	100 mg
Eptam®	-	-	442581	250 mg
EPTC	-	-	45469-250MG	250 mg
Esbiol	-	-	N13187-250MG	250 mg
Esbiol	-	-	45470-250MG	250 mg
Esbiothrin	-	-	33309-100MG-R	100 mg
Esfenvalerate	-	-	46277-100MG	100 mg
Etaconazol	-	-	45471-250MG	250 mg
Ethalfuralin	-	-	45472-250MG	250 mg
Ethanethiol (ethyl mercaptan)	-	-	506818	1000 mg
Ethephon	-	-	45473-250MG	250 mg
Ethidimuron	-	-	45474-250MG	250 mg
Ethiofencarb	-	-	45475-250MG	250 mg
Ethiofencarb-sulfone	-	-	45810-10MG	10 mg
Ethiofencarb-sulfoxide	-	-	45811-10MG	10 mg
Ethiolat	-	-	45476-250MG	250 mg
Ethion	-	-	45477-250MG	250 mg
Ethiprole	-	-	33976-100MG-R	100 mg
Ethirimol	-	-	45478-250MG	250 mg
Ethofumesate	-	-	N11874-1G	1 g
Ethofumesate	-	-	45479-250MG	250 mg
Ethofumesate-2-keto	-	-	33888-10MG-R	10 mg
Ethoprophos	-	-	45306-100MG	100 mg
Ethoprophos	-	-	45306-250MG	250 mg
Ethoxyquin	-	-	N11877-250MG	250 mg
Ethoxyquin	-	-	31519-250MG	250 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Ethoxysulfuron	-	-	46300-100MG-R	100 mg
Ethychlozate	-	-	34085-100MG	100 mg
N-(2-Ethylhexyl)-5-norbornene-2,3-dicarboximide	-	-	N12483-250MG	250 mg
Ethyl mercuric chloride	-	-	N11940-250MG	250 mg
2-Ethylphenol	-	-	31198-1G	1 g
3-Ethylphenol	-	-	36723-1G	1 g
4-Ethylphenol	-	-	36724-1G	1 g
Etiocholanone solution	100 ng/μL in acetonitrile	-	32833-2ML	2 mL
Etofenprox	-	-	34094-100MG	100 mg
Etozazole	-	-	32506-50MG	50 mg
Etridiazole	-	-	34340-100MG-R	100 mg
Etridiazole	-	-	442590	250 mg
Etrimfos	-	-	45481-250MG	250 mg
Eugenol	-	-	35995-250MG	250 mg
Famoxadone solution	100 ng/μL in acetonitrile	-	33495-2ML-R	2 mL
Famphur	-	-	34341-100MG	100 mg
Famphur solution	200 μg/mL in methylene chloride	-	48379	1 mL
Febantel	-	-	33981-100MG-R	100 mg
Fenamidone	-	-	33965-100MG-R	100 mg
Fenaminosulf	-	-	45482-250MG	250 mg
Fenamiphos	-	-	45483-250MG	250 mg
Fenamiphos-sulfone	-	-	46292-50MG 46292-100MG	50 mg 100 mg
Fenamiphos-sulfoxide	-	-	46293-100MG	100 mg
Fenarimol	-	-	45484-250MG	250 mg
Fenazaflor	-	-	36504-100MG	100 mg
Fenazaquin	-	-	31635-100MG	100 mg
Fenazox	-	-	45763-250MG-R	250 mg
Fenbuconazol	-	-	N11950-100MG	100 mg
Fenbuconazol	-	-	31654-100MG	100 mg
Fenbutatin oxide	-	-	34342-250MG	250 mg
Fenchlorazol-ethyl	-	-	31548-250MG	250 mg
Fenchlorphos	-	-	45485-100MG	100 mg
Fencloirim	-	-	46005-250MG	250 mg
Fenfuram	-	-	45486-250MG	250 mg
Fenhexamid	-	-	31713-100MG	100 mg
Fenitrothion	-	-	N11955-250MG	250 mg
Fenitrothion	-	-	45487-250MG	250 mg
Fenitrothion	-	-	442592	250 mg
Fenitrothion solution	100 ng/μL in cyclohexane	-	45854-2ML	2 mL
Fenobucarb	-	-	45488-250MG	250 mg
Fenothiocarb	-	-	32475-25MG	25 mg
Fenoxanil	-	-	33872-100MG-R	100 mg
Fenoxaprop	-	-	36849-100MG-R	100 mg
Fenoxaprop-P	-	-	36850-100MG	100 mg
Fenoxaprop-ethyl	-	-	45518-250MG	250 mg
Fenoxaprop-P-ethyl	-	-	36851-250MG	250 mg
Fenoxycarb	-	-	34343-250MG	250 mg
Fenpiclonil	-	-	36532-250MG	250 mg
Fenpropathrin	-	-	N11960-250MG	250 mg
Fenpropathrin	-	-	31223-250MG	250 mg
Fenpropidin	-	-	46017-250MG	250 mg
Fenpropimorph	-	-	36772-250MG-R	250 mg
Fenpyroximate	-	-	31684-100MG	100 mg
Fenson	-	-	45489-250MG	250 mg
Fensulfothion	-	-	45307-100MG	100 mg
Fenthion	-	-	N11964-250MG	250 mg
Fenthion	-	-	36552-250MG	250 mg
Fenthion-sulfone	-	-	46023-10MG	10 mg
Fenthionsulfoxide	-	-	37885-50MG	50 mg
Fentin acetate	-	-	45491-250MG	250 mg
Fentin chloride	-	-	45492-250MG	250 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration	Cat. No.	Qty
Fentin hydroxide	-	45493-250MG	250 mg
Fentrazamide	-	37903-100MG-R	100 mg
Fentrazamide Metabolite solution	100 ng/μL in acetonitrile	33951-2ML-R	2 mL
Fenuron	-	45494-250MG	250 mg
Fenvalerate	-	N11969-250MG	250 mg
Fenvalerate	-	45495-250MG	250 mg
Ferbam	-	45496-250MG	250 mg
Fipronil	-	46451-100MG	100 mg
Fipronil-desulfinyl	-	41865-25MG	25 mg
Flamprop-isopropyl	-	45497-250MG	250 mg
Flamprop-M-isopropyl	-	45752-250MG	250 mg
Flazasulfuron	-	34052-50MG-R	50 mg
Flocoumafen	-	34084-50MG	50 mg
Flonicamid	-	32509-25MG	25 mg
Florasulam	-	32586-50MG	50 mg
Fluazifop	-	32824-10MG	10 mg
Fluazifop solution	10 ng/μL in ethyl acetate	31285-2ML	2 mL
Fluazifop-P	-	35372-25MG	25 mg
Fluazifop-butyl	-	36783-250MG-R	250 mg
Fluazifop-P-butyl	-	31712-100MG	100 mg
Fluazifop-methyl	-	34027-50MG-R	50 mg
Fluazinam	-	34095-100MG	100 mg
Fluazinam solution	100 ng/μL in acetonitrile	46316-2ML	2 mL
Fluazuron	-	46113-100MG-R	100 mg
Flubendiamide	-	32801-100MG	100 mg
Flubenzimin	-	45499-250MG	250 mg
Fluchloralin	-	45500-250MG	250 mg
Flucycloxuron	-	32529-25MG	25 mg
Flucythrinate	-	33496-100MG-R	100 mg
Flucythrinate solution	10 ng/μL in cyclohexane	36885-1ML-R 36885-2ML-R	1 mL 2 mL
Fludioxonil	-	46102-100MG-R	100 mg
Flufenacet	-	31718-100MG	100 mg
Flufenacet OA	-	34153-10MG	10 mg
Flufenoxuron	-	31594-250MG	250 mg
Flumequine	-	45735-250MG	250 mg
Flumethrin	-	46417-100MG	100 mg
Flumetralin	-	45501-250MG	250 mg
Flumioxazin	-	32525-100MG	100 mg
Flumorph	-	37038-25MG	25 mg
Fluometuron	-	45502-250MG	250 mg
Fluometuron	-	442593-U	500 mg
Fluopicolide	-	41132-100MG	100 mg
Fluopyram	-	32462-50MG	50 mg
Fluorodifen	-	45506-250MG	250 mg
Fluoroglycofen-ethyl	-	31674-250MG	250 mg
Fluotrimazol	-	45507-250MG	250 mg
Fluoxastrobin	-	33797-100MG	100 mg
Flupyradifurone	-	37050-100MG	100 mg
Flupyrsulfuron-methyl sodium	-	32405-25MG	25 mg
Fluquinconazole	-	46301-100MG	100 mg
Flurenol-methyl ester	-	31520-250MG	250 mg
Fluridon	-	45511-250MG	250 mg
Flurochloridon	-	36517-100MG	100 mg
Fluroxypyr	-	45758-100MG-R	100 mg
Fluroxypyr-1-methylheptyl ester	-	36780-100MG-R	100 mg
Flurprimidol	-	32523-100MG	100 mg
Flurtamone	-	46286-100MG	100 mg
Flusilazole	-	45753-100MG	100 mg
Fluthiacet-methyl	-	32464-25MG	25 mg
Flutolanil	-	N12004-250MG	250 mg
Flutriafol	-	34344-100MG	100 mg
τ-Fluvalinate	-	N13263-100MG	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration	Cat. No.	Qty
τ-Fluvalinate	-	- 46294-100MG 46294-250MG	100 mg 250 mg
Fluxapyroxad	-	- 37047-100MG	100 mg
Fluxofenim	-	- 34387-250MG	250 mg
Folpet	-	- 32057-250MG	250 mg
Fomesafen	-	- 46325-100MG-R	100 mg
Fonofos	-	- N11842-100MG	100 mg
Fonofos solution	100 ng/μL in acetonitrile	- 33587-2ML	2 mL
Foramsulfuron	-	- 33977-100MG-R	100 mg
Forchlorfenuron	-	- 32974-100MG	100 mg
Formetanate hydrochloride	-	- 45514-250MG	250 mg
Formothion solution	~80% in xylene	- 46424-250MG	250 mg
Fosetyl-aluminum	-	- N12019-100MG	100 mg
Fosthiazate	-	- 34099-50MG	50 mg
Fuberidazole	-	- 45515-250MG	250 mg
Furalaxyl	-	- 45516-250MG	250 mg
Furathiocarb	-	- 45517-250MG	250 mg
Furilazole	-	- 32431-50MG	50 mg
Furmecyclox	-	- 34347-100MG	100 mg
Fusarenon X solution	100 μg/mL in acetonitrile	- 34130-2ML	2 mL
Gibberellic acid	-	- 36575-250MG	250 mg
Glufosinate-ammonium	-	- 45520-100MG	100 mg
Glyphosate	-	- 45521-250MG	250 mg
Guazatine acetate salt	-	- 37915-100MG-R	100 mg
Halfenprox	-	- 37054-10MG	10 mg
Halofenozide	-	- 68535-25MG	25 mg
Halosulfuron-methyl	-	- 32918-50MG	50 mg
Haloxyfop	-	- 45817-100MG	100 mg
Haloxyfop-P	-	- 35378-25MG	25 mg
Haloxyfop-2-ethoxyethyl	-	- 31256-100MG	100 mg
Haloxyfop-methyl	-	- 45820-50MG	50 mg
Haloxyfop-P-methyl	-	- 33197-100MG	100 mg
Haloxyfop P-methyl solution	100 ng/μL in acetonitrile	- 34043-2ML-R	2 mL
HCH	-	- 36756-250MG	250 mg
α-HCH	-	- 33856-50MG 33856-100MG-R	50 mg 100 mg
β-HCH	-	- 33376-100MG	100 mg
β-HCH solution	100 ng/μL in methanol	- 36584-2ML	2 mL
δ-HCH	-	- 33377-50MG	50 mg
δ-HCH solution	20 μg/mL in methanol	- 48686	1 mL
Heptachlor	-	- N12147-100MG	100 mg
Heptachlor solution	100 ng/μL in methanol	- 31211-2ML 31211-10ML	2 mL 10 mL
Heptachlor solution	20 μg/mL in methanol	- 48676	1 mL
Heptachlor solution	200 μg/mL in isooctane	- 48964	10 mL
Heptachlor solution	1000 μg/mL in methanol	- 40098	1 mL
Heptachlor epoxide	-	- 49042	100 mg
Heptachlor endo-epoxide	-	- 35492-50MG	50 mg
Heptachlor endo-epoxide solution	100 ng/μL in methanol	- 31557-2ML	2 mL
Heptachlor exo-epoxide	-	- 34309-50MG	50 mg
Heptachlor exo-epoxide	-	- N12148-50MG	50 mg
Heptachlor exo-epoxide solution	100 ng/μL in methanol	- 45861-2ML	2 mL
Heptachlor epoxide isomer A solution	1000 μg/mL in methanol	- 48198	1 mL
Heptachlor epoxide isomer B solution	20 μg/mL in methanol	- 48677	1 mL
Heptachlor epoxide isomer B solution	1000 μg/mL in methanol	- 40099	1 mL
Heptenophos	-	- 41373-25MG	25 mg
Hexabromobenzene	-	- 45524-250MG	250 mg
Hexachlorobenzene	-	- N12159-250MG	250 mg
Hexachlorobenzene	-	- 45522-250MG	250 mg
Hexachloro-1,3-butadiene	-	- 45525-250MG	250 mg
Hexachlorophene	-	- 45526-250MG	250 mg
Hexaconazol	-	- 34348-100MG	100 mg
Hexaflumuron	-	- 37902-100MG-R	100 mg
Hexazinone	-	- 36129-100MG	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Hexythiazox	-	-	33365-100MG	100 mg
Hydramethylnon	-	-	35373-100MG	100 mg
5-Hydroprene	-	-	46426-250MG	250 mg
4-Hydroxybenzotrile	-	-	45528-250MG	250 mg
7-Hydroxycoumarin	-	-	MET13750A-1G	1 g
6-Hydroxypyridine-3-carboxylic acid	-	-	19386-100MG	100 mg
5-Hydroxythiabenzazole	-	-	33818-10MG	10 mg
Imazalil	-	-	32007-100MG	100 mg
Imazalil sulfate	-	-	33997-100MG-R	100 mg
Imazamethabenz-methyl	-	-	34350-100MG	100 mg
Imazamox	-	-	34227-100MG	100 mg
Imazapic	-	-	34179-100MG	100 mg
Imazapyr	-	-	N12203-100MG	100 mg
Imazapyr	-	-	37877-100MG	100 mg
Imazaquin	-	-	37878-100MG	100 mg
Imazethapyr	-	-	37923-100MG-R	100 mg
Imazosulfuron	-	-	32919-50MG	50 mg
Imidacloprid	-	-	37894-100MG	100 mg
Imidacloprid	-	-	N12206-500MG	500 mg
Imidacloprid solution	100 ng/μL in acetonitrile	-	46341-2ML	2 mL
Imidacloprid-d ₄	-	-	34170-10MG	10 mg
2-Imidazolidinethione	-	-	45531-250MG	250 mg
2-Imidazolidone	-	-	31534-250MG	250 mg
Iminoctadine triacetate	-	-	37007-10MG	10 mg
Imiprothrin	-	-	33442-50MG	50 mg
Inabenfide	-	-	35351-10MG	10 mg
3-Indoleacetic acid	-	-	45533-250MG	250 mg
Indole-3-butyric acid	-	-	45532-250MG	250 mg
Indoxacarb	-	-	33969-25MG-R	25 mg
Iodosulfuron-methyl-sodium	-	-	30317-100MG-R	100 mg
Ioxynil	-	-	36131-100MG	100 mg
Ioxynil-octanoate	-	-	33381-100MG	100 mg
Iprobenfos	-	-	45814-100MG	100 mg
Iprodione	-	-	36132-100MG	100 mg
Ipronidazole-d ₃	-	-	34216-10MG	10 mg
Iprovalicarb	-	-	33431-100MG-R	100 mg
Irgarol®	-	-	46105-250MG-R	250 mg
Isazophos	-	-	36133-100MG	100 mg
Isocarbamide	-	-	36134-100MG	100 mg
Isocarbophos	-	-	37901-100MG-R	100 mg
Isodrine	-	-	33389-100MG	100 mg
Isodrine	-	-	442625	250 mg
Isodrine solution	5000 μg/mL in methanol	-	40856	1 mL
Isofenphos solution	100 ng/μL in acetonitrile	-	32860-2ML	2 mL
Isofenphos-methyl	-	-	33436-50MG	50 mg
Isomethiozin	-	-	36136-100MG	100 mg
Isoprocarb	-	-	45541-250MG	250 mg
Isopropalin	-	-	36505-100MG	100 mg
N-Isopropylaniline	-	-	31576-1G	1 g
4-Isopropylaniline	-	-	35979-250MG	250 mg
2-Isopropylthioxanthone	-	-	34221-50MG	50 mg
4-Isopropylthioxanthone	-	-	34222-50MG	50 mg
Isoproturon	-	-	N12279-100MG	100 mg
Isoproturon	-	-	36137-100MG	100 mg
Isoproturon-d ₆	-	-	34017-10MG-R	10 mg
Isopyrazam	-	-	32532-100MG	100 mg
Isotianil	-	-	32524-100MG	100 mg
Isouron	-	-	37009-10MG	10 mg
Isoxaben	-	-	36138-100MG	100 mg
Isxadifen-ethyl	-	-	33799-100MG	100 mg
Isoxafutole	-	-	46437-100MG	100 mg
Isoxathion	-	-	76529-25MG	25 mg
Jodfenphos	-	-	45544-250MG	250 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Kadethrin	-	-	36139-100MG	100 mg
Karbutylate	-	-	45546-250MG	250 mg
Kelevan	-	-	35493-250MG	250 mg
Kepone	-	-	N12291-50MG	50 mg
Kepone	-	-	49046	100 mg
Kresoxim-methyl	-	-	37899-100MG	100 mg
Lactofen	-	-	32972-100MG	100 mg
Lenacil	-	-	31112-100MG	100 mg
Leptophos	-	-	33366-100MG	100 mg
Lindane	-	-	45548-250MG	250 mg
Linuron	-	-	N12322-250MG	250 mg
Linuron	-	-	36141-100MG	100 mg
Linuron solution	100 ng/μL in methanol	-	45868-2ML	2 mL
Lufenuron	-	-	31662-100MG	100 mg
Malaoxon	-	-	36142-100MG	100 mg
Malathion	-	-	36143-100MG	100 mg
Malathion	-	-	N12346-500MG	500 mg
Malathion solution	100 ng/μL in cyclohexane	-	31558-2ML 31558-10ML	2 mL 10 mL
Maleic hydrazide	-	-	45552-250MG	250 mg
Mancozeb	-	-	45553-250MG	250 mg
Mandipropamid	-	-	32805-100MG	100 mg
Maneb	-	-	N12355-1G	1 g
Maneb	-	-	45554-250MG	250 mg
MCPA	-	-	45555-250MG	250 mg
MCPA solution	100 ng/μL in acetonitrile	-	45873-2ML	2 mL
MCPA sodium salt monohydrate	-	-	45746-250MG	250 mg
MCPA-butoxyethylester solution	10 ng/μL in isooctane	-	31290-2ML	2 mL
MCPA-2-ethylhexyl ester	-	-	33394-100MG	100 mg
MCPA methyl ester	-	-	36144-100MG	100 mg
MCPA methyl ester solution	2000 μg/mL in hexane	-	47985-U	1 mL
MCPB	-	-	36145-100MG	100 mg
MCPP methyl ester solution	2000 μg/mL in hexane	-	47986	1 mL
Mecarbam	-	-	36515-100MG	100 mg
Mecoprop	-	-	36147-100MG	100 mg
Mecoprop-P	-	-	36773-250MG-R	250 mg
Mecoprop methyl ester	-	-	36148-100MG	100 mg
Mecoprop-2-octyl ester	-	-	37871-100MG	100 mg
Mefenacet	-	-	36150-100MG-R	100 mg
Mefenpyr-diethyl	-	-	46302-100MG	100 mg
Mepanipyrim	-	-	33970-50MG	50 mg
Mephosfolan	-	-	34352-100MG	100 mg
Mepiquat chloride	-	-	36151-100MG	100 mg
Mepronil	-	-	33361-100MG	100 mg
Mercaptodimethur	-	-	36152-100MG	100 mg
Mercaptodimethursulfon	-	-	45729-100MG	100 mg
Mercaptodimethursulfon	-	-	MET12398A-50MG	50 mg
Mesosulfuron-methyl	-	-	34178-100MG	100 mg
Mesotrione	-	-	33855-100MG-R	100 mg
Metaflumizone	-	-	32966-100MG	100 mg
Metalaxyl	-	-	N12380-100MG	100 mg
Metalaxyl	-	-	32012-100MG	100 mg
Metalaxyl-M	-	-	32808-100MG	100 mg
Metalddehyde	-	-	N12381-1G	1 g
Metalddehyde	-	-	36611-1G-R	1 g
Metamitron	-	-	36154-100MG	100 mg
Metam sodium	-	-	N12382-250MG	250 mg
Metam-sodium hydrate	-	-	45570-250MG	250 mg
Metazachlor	-	-	36155-100MG	100 mg
Metconazole	-	-	37909-100MG-R	100 mg
Methabenzthiazuron	-	-	36156-100MG	100 mg
Methacrifos	-	-	45569-250MG	250 mg
Methamidophos	-	-	N12393-100MG	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Methamidophos	-	-	33395-100MG	100 mg
Methamidophos solution	100 ng/μL in acetonitrile	-	46342-2ML 46342-10ML	2 mL 10 mL
Methfuroxam	-	-	36157-100MG	100 mg
Methidathion	-	-	N12397-250MG	250 mg
Methidathion	-	-	36158-100MG	100 mg
Methiocarb sulfoxide	-	-	34177-100MG	100 mg
Methomyl	-	-	N12399-100MG	100 mg
Methomyl	-	-	36159-100MG	100 mg
Methomyl	-	-	442642	250 mg
Methoprene	-	-	33375-100MG	100 mg
Methoprotryne	-	-	31115-100MG	100 mg
Methoxychlor	-	-	36161-100MG	100 mg
Methoxychlor	-	-	49054	1000 mg
Methoxychlor solution	100 ng/μL in methanol	-	45881-2ML	2 mL
Methoxychlor solution	200 μg/mL in isoctane	-	48982	10 mL
Methoxyfenozide	-	-	32507-50MG	50 mg
Methyl chloroacetate	-	-	36546-1G	1 g
3-Methylcholanthrene solution	100 ng/μL in acetonitrile	-	46434-2ML-R 46434-10ML-R	2 mL 10 mL
Methyl dichloroacetate	-	-	36547-1G	1 g
Methyl 2,4-dichlorophenylacetate solution	100 μg/mL in acetone	-	47339	1 mL
Methyl isothiocyanate	-	-	45576-250MG	250 mg
Methylmercury(II) chloride	-	-	33368-100MG-R	100 mg
Methyl parathion	-	-	N12452-250MG	250 mg
Methyl parathion solution	1000 μg/mL in acetone	-	40572	1 mL
Methyl-pentachlorophenylsulfide	-	-	33367-100MG	100 mg
3-(Methylphosphinico)propionic acid	-	-	31264-100MG	100 mg
Methyl trichloroacetate	-	-	36548-1G	1 g
Metiram	-	-	45577-250MG	250 mg
Metobromuron	-	-	36162-100MG	100 mg
Metolachlor	-	-	N12478-100MG	100 mg
Metolachlor	-	-	36163-100MG	100 mg
Metolachlor solution	100 ng/μL in acetonitrile	-	45883-10ML	10 mL
S-Metolachlor	-	-	33859-100MG-R	100 mg
Metolachlor ESA sodium salt	-	-	34149-10MG	10 mg
S-Metolachlor Metabolite CGA 357704	-	-	32637-100MG	100 mg
Metolcarb	-	-	31037-100MG	100 mg
(E)-Metominostrobin	-	-	34230-10MG	10 mg
Metosulam	-	-	46317-100MG	100 mg
Metoxuron	-	-	36164-100MG	100 mg
Metrafenone	-	-	32964-100MG	100 mg
Metribuzin	-	-	N12481-250MG	
Metribuzin	-	-	36165-100MG	100 mg
Metribuzin solution	100 ng/μL in acetonitrile	-	31559-10ML	10 mL
Metsulfuron-methyl	-	-	46432-100MG	100 mg
Metsulfuron-methyl	-	-	N12482-100MG	
Mevinphos	-	-	N13037-250MG	
cis-Mevinphos solution	100 ng/μL in acetonitrile	-	33767-2ML	2 mL
trans-Mevinphos solution	100 ng/μL in acetonitrile	-	33765-2ML	2 mL
MGK 264	-	-	36168-100MG	100 mg
MGK 326	-	-	36169-100MG	100 mg
Mirex	-	-	36170-100MG	100 mg
Mirex solution	100 ng/μL in acetonitrile	-	45887-10ML	10 mL
Molinate	-	-	N12487-250MG	250 mg
Molinate	-	-	36171-100MG	100 mg
Monalide	-	-	36172-100MG	100 mg
Monocrotophos	-	-	N12493-250MG	250 mg
Monocrotophos	-	-	36173-100MG	100 mg
Monocrotophos solution	100 ng/μL in acetonitrile	-	46159-2ML-R	2 mL
Monolinuron	-	-	45590-250MG	250 mg
Monosodium acid methane arsonate sesquihydrate	-	-	N12495-100MG	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Monosultap	-	-	32811-100MG	100 mg
Monuron	-	-	36174-100MG	100 mg
Muscalure	-	-	46449-100MG	100 mg
Myclobutanil	-	-	34360-100MG	100 mg
Nabam-d ₄ hexahydrate	-	-	32668-10MG	10 mg
Naftalofos	-	-	34231-100MG	100 mg
1-Naphthaleneacetic acid	-	-	35745-1G	1 g
1-Naphthol	-	-	31097-1G	1 g
1-Naphthylacetamide	-	-	36732-1G	1 g
Napropamid	-	-	36175-100MG	100 mg
Naptalam	-	-	33371-100MG	100 mg
Naptalam	-	-	N12507-250MG	250 mg
Neburon	-	-	36176-100MG	100 mg
Nicosamide monohydrate	-	-	36177-100MG	100 mg
Nicosulfuron	-	-	34210-100MG-R	100 mg
(-)-Nicotine	-	-	36733-1G	1 g
(-)-Nicotine solution	100 ng/μL in acetonitrile	-	46343-10ML	10 mL
Nitenpyram	-	-	46077-100MG	100 mg
Nitralin	-	-	36178-100MG	100 mg
Nitrapyrin	-	-	33372-100MG	100 mg
Nitrofen	-	-	N12663-100MG	100 mg
Nitrofen	-	-	33374-100MG	100 mg
4-Nitrophenol sodium salt dihydrate	-	-	36612-1G-R	1 g
Nitrothal-isopropyl	-	-	36179-100MG	100 mg
cis-Nonachlor solution	100 ng/μL in acetonitrile	-	36845-2ML	2 mL
cis-Nonachlor solution	100 μg/mL in hexane	-	48138	1 mL
trans-Nonachlor solution	100 ng/μL in acetonitrile	-	36846-2ML	2 mL
trans-Nonachlor solution	100 μg/mL in hexane	-	48137	1 mL
Nonylphenol	-	-	46018-1G	1 g
4-Nonylphenol	-	-	46405-100MG	100 mg
Norflurazon	-	-	34364-100MG	100 mg
Norflurazon	-	-	N12668-100MG	100 mg
Novaluron	-	-	32419-25MG	25 mg
Nuarimol	-	-	31116-100MG	100 mg
Octachloronaphthalene solution	10 ng/μL in cyclohexane	-	36935-2ML-R	2 mL
2-Octyl-4-isothiazolin-3-one	-	-	46078-250MG-R	250 mg
Ofurace	-	-	46143-100MG-R	100 mg
Omethoate	-	-	N12726-100MG	
Omethoate	-	-	36181-100MG	100 mg
Orbencarb	-	-	33362-100MG	100 mg
Orthosulfamuron	-	-	32427-50MG	50 mg
Oryastrobin	-	-	32428-100MG	100 mg
Oryzalin	-	-	36182-100MG	100 mg
Oryzalin	-	-	N12729-1G	1 g
Oxabetrinil	-	-	36183-100MG	100 mg
Oxadiazol	-	-	33966-100MG-R	100 mg
Oxadiazon	-	-	33382-100MG	100 mg
Oxadiazon	-	-	442729	100 mg
Oxadixyl	-	-	34365-100MG	100 mg
Oxamyl	-	-	36184-100MG	100 mg
Oxamyl	-	-	442730	100 mg
Oxasulfuron	-	-	46416-100MG	100 mg
Oxaziclomefone	-	-	37005-10MG	10 mg
Oxycarboxine	-	-	36185-100MG	100 mg
Oxydemeton-methyl	-	-	N12741-50MG	50 mg
Oxyfluorfen	-	-	35031-100MG	100 mg
Oxyfluorfen	-	-	N12742-250MG	250 mg
Paclbutrazol	-	-	46046-250MG	250 mg
Paraoxon	-	-	N12816-100MG	100 mg
Paraoxon-ethyl	-	-	36186-100MG	100 mg
Paraoxon-methyl	-	-	N11775-100MG	100 mg
Paraoxon-methyl	-	-	46192-100MG-R	100 mg
Paraquat CL tetrahydrate	-	-	N12817-500MG	500 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Paraquat dichloride	-	-	36541-100MG	100 mg
Parathion	-	-	45607-100MG	100 mg
Parathion	-	-	49062	500 mg
Parathion solution	100 ng/μL in cyclohexane	-	45890-2ML	2 mL
Parathion-ethyl-d ₁₀	-	-	33452-10MG-R	10 mg
Parathion-methyl	-	-	36187-100MG	100 mg
Parathion-methyl	-	-	49055	500 mg
Parathion-methyl solution	100 ng/μL in cyclohexane	-	45891-2ML-R	2 mL
PCB No 156 solution	100 ng/μL in hexane	-	33710-2ML	2 mL
Pebulat	-	-	36188-100MG	100 mg
Penconazol	-	-	36189-100MG	100 mg
Pencycuron	-	-	31118-100MG	100 mg
Pendimethalin	-	-	36191-100MG	100 mg
Pendimethalin solution	100 ng/μL in methanol	-	45892-2ML	2 mL
Penflufen	-	-	37049-100MG	100 mg
Penoxsulam	-	-	32094-25MG	25 mg
Pentachloroaniline	-	-	46012-100MG	100 mg
2,3,4,5,6-Pentachloroanisole	-	-	N12826-1G	1 g
Pentachloroethane	-	-	31061-250MG	250 mg
Pentachlorophenol	-	-	N12831-1G	1 g
Pentachlorophenol solution	100 ng/μL in methanol	-	36594-2ML	2 mL
Pentachlorophenyl acetate	-	-	35550-100MG	100 mg
Pentachlorothiophenol	-	-	MET12159B-100MG	100 mg
Pentanochlor solution	100 ng/μL in acetonitrile	-	32861-2ML	2 mL
Permethrin	-	-	N12848-250MG	250 mg
Permethrin	-	-	45614-250MG	250 mg
cis-Permethrin	-	-	N11483-50MG	50 mg
cis-Permethrin solution	10 ng/μL in cyclohexane	-	36892-2ML	2 mL
trans-Permethrin solution	10 ng/μL in cyclohexane	-	36893-2ML	2 mL
Permethrin (isomers)	-	-	442748	100 mg
Permethrin (isomers) solution	100 ng/μL in acetonitrile	-	45893-2ML-R	2 mL
Permethrin (isomers) solution	1000 μg/mL in methanol	-	47956	1 mL
Perthan	-	-	45615-250MG	250 mg
Pesticide standard 17 solution	-	-	36978-2ML	2 mL
Pethoxamid	-	-	32528-50MG	50 mg
Phenmedipham	-	-	36192-100MG	100 mg
Phenmedipham-ethyl	-	-	37079-25MG	25 mg
Phenol solution	100 ng/μL in acetonitrile	-	46344-2ML 46344-10ML	2 mL 10 mL
Phenothrin	-	-	36193-100MG	100 mg
Phenoxyacetic acid	-	-	34366-250MG	250 mg
3-Phenoxybenzoic acid	-	-	46319-250MG-R	250 mg
Phenthoate	-	-	31611-100MG	100 mg
Phenylmercury chloride	-	-	45619-250MG	250 mg
2-Phenylphenol	-	-	N12692-1G	1 g
2-Phenylphenol	-	-	45529-250MG	250 mg
4-Phenylphenol	-	-	506842	1000 mg
N-Phenylthiourea	-	-	31056-250MG	250 mg
Phorate	-	-	N13035-100MG	100 mg
Phorate	-	-	33388-100MG	100 mg
Phorat-sulfone	-	-	46031-100MG	100 mg
Phorat-sulfoxide	-	-	45762-100MG-R	100 mg
Phosalone	-	-	N13036-100MG	100 mg
Phosalone	-	-	36194-100MG	100 mg
Phosfolan	-	-	N13038-1G	1 g
Phosmet	-	-	36195-100MG	100 mg
Phosphamidon	-	-	45622-100MG 45622-250MG	100 mg 250 mg
N-(Phosphonomethyl)glycine	-	-	N12133-1G	1 g
Phoxim	-	-	36197-100MG	100 mg
Phthalimide	-	-	36734-1G	1 g
Picloram	-	-	36774-250MG-R	250 mg
Picolinafen	-	-	37912-100MG-R	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Picoxystrobin	-	-	33658-100MG-R	100 mg
Picric acid solution	100 µg/mL in acetonitrile	-	46209-10ML	10 mL
Pindone	-	-	45625-250MG	250 mg
Pinoxaden	-	-	32821-25MG	25 mg
Piperonylbutoxide	-	-	N13061-100MG	100 mg
Piperonylbutoxide	-	-	45626-100MG	100 mg
Piperophos	-	-	46011-250MG	250 mg
Pirimicarb	-	-	45627-250MG	250 mg
Pirimicarb-d ₆	-	-	34209-10MG-R	10 mg
Pirimiphos-ethyl	-	-	45628-250MG	250 mg
Pirimiphos-methyl	-	-	N13064-250MG	250 mg
Pirimiphos-methyl	-	-	32058-250MG	250 mg
Piroctone olamine	-	-	51872-100MG	100 mg
Plifenat	-	-	36569-25MG-R	25 mg
Potassium clavulanate	-	-	33454-100MG	100 mg
Prallethrin	-	-	32917-100MG	100 mg
Pretilachlor	-	-	31251-250MG	250 mg
Primisulfuron-methyl	-	-	32433-100MG	100 mg
Prochloraz	-	-	45631-250MG	250 mg
Procymidone	-	-	36640-250MG-R	250 mg
Prodiamine solution	10 µg/mL in cyclohexane	-	46454-10ML	10 mL
Profenofos	-	-	N13097-250MG	250 mg
Profenofos	-	-	45632-250MG	250 mg
Profluralin	-	-	45633-250MG	250 mg
Profoxydim lithium salt	-	-	33698-100MG-R	100 mg
Prohexadione-Calcium	-	-	31720-100MG	100 mg
Promecarb	-	-	45634-250MG	250 mg
Prometon	-	-	45635-250MG	250 mg
Prometryn	-	-	N13103-1G	1 g
Prometryn	-	-	45636-250MG	250 mg
Prometryn solution	100 ng/µL in acetonitrile	-	31561-2ML	2 mL
Pronamide (Kerb)	-	-	442764	100 mg
Propachlor	-	-	45637-250MG	250 mg
Propachlor	-	-	442765	250 mg
Propachlor OA	-	-	34151-10MG	10 mg
Propamocarb	-	-	45638-250MG	250 mg
Propanil	-	-	45639-250MG	250 mg
Propaquizafop	-	-	31572-250MG	250 mg
Propargite	-	-	N12727-100MG	100 mg
Propargite	-	-	32051-100MG	100 mg
Propazine	-	-	45640-250MG	250 mg
Propazine	-	-	49088	100 mg
Propazine solution	100 ng/µL in methanol	-	36587-2ML	2 mL
Propetamphos	-	-	34371-100MG	100 mg
Propham	-	-	45641-250MG	250 mg
Propiconazole	-	-	N13576-250MG	250 mg
Propiconazole	-	-	45642-250MG	250 mg
Propiconazole solution	100 ng/µL in methanol	-	45899-10ML	10 mL
Propineb	-	-	45643-250MG	250 mg
Propisochlor	-	-	34056-50MG-R	50 mg
Propoxur	-	-	45644-250MG	250 mg
Propoxycarbazone sodium salt	-	-	33985-100MG-R	100 mg
Propylene thiourea	-	-	32949-25MG	25 mg
Propylthiourea	-	-	46427-100MG-R	100 mg
Propyzamide	-	-	45645-250MG	250 mg
Proquinazid	-	-	32508-50MG	50 mg
Prosulfocarb	-	-	31141-250MG	250 mg
Prosulfuron	-	-	31666-100MG	100 mg
Prothioconazole	-	-	34232-100MG	100 mg
Prothioconazole-desthio	-	-	32429-20MG	20 mg
Prothiofos	-	-	45311-50MG	50 mg
Prowl® (Pendimethaline)	-	-	442771-U	250 mg
Pymetrozin	-	-	46119-250MG-R	250 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration	Cat. No.	Qty
Pyracarbolid	-	45646-250MG	250 mg
Pyraclufos	-	N13142-50MG	50 mg
Pyraclostrobin	-	33696-100MG-R	100 mg
Pyraflufen-ethyl	-	35346-10MG	10 mg
Pyranocoumarin	-	45647-250MG	250 mg
Pyrasulfotole	-	32973-100MG	100 mg
Pyrazolynate	-	32459-25MG	25 mg
Pyrazophos	-	45648-250MG	250 mg
Pyrazosulfuron-ethyl	-	46323-100MG-R	100 mg
Pyrazoxyfen	-	32437-50MG	50 mg
Pyrethroid Standard mixture	-	33417-2ML-R	2 mL
Pyrethrum	-	N13151-100MG	100 mg
Pyrethrum extract	-	33739-100MG	100 mg
Pyribencarb	-	37051-25MG	25 mg
Pyribenzoxim	-	37077-100MG	100 mg
Pyridaben	-	46047-25MG-R	25 mg
Pyridaphenthion	-	32538-100MG	100 mg
Pyridaphenthion solution	10 ng/μL in ethyl acetate	36895-1ML 36895-2ML	1 mL 2 mL
Pyridat	-	N13155-500MG	500 mg
Pyridat	-	45312-250MG	250 mg
Pyrifenox	-	45737-100MG	100 mg
Pyriftalid	-	33694-100MG-R	100 mg
Pyrimethanil	-	31577-250MG	250 mg
Pyrimidifen	-	35999-10MG	10 mg
Pyroquilon	-	45650-250MG	250 mg
Quinalphos	-	45651-250MG	250 mg
Quinchlorac	-	36521-250MG	250 mg
Quinmerac	-	36522-250MG	250 mg
Quinoclamine	-	32719-100MG	100 mg
8-Quinolinol	-	36524-250MG	250 mg
8-Quinolinol hemisulfate salt hemihydrate	-	31143-250MG	250 mg
Quinoxifen	-	46439-100MG	100 mg
Quintozene	-	45653-250MG	250 mg
Quizalofop	-	MET13174A-50MG	
Quizalofop-p	-	33822-100MG	100 mg
Quizalofop-ethyl	-	N13174-100MG	
Quizalofop-ethyl	-	34306-50MG	50 mg
Quizalofop- <i>p</i> -ethyl	-	34074-100MG	100 mg
Quizalofop- <i>p</i> -tefuryl solution	100 ng/μL in acetonitrile	33942-2ML	2 mL
Rabenzazol	-	45654-10MG	10 mg
Resmethrin	-	45655-250MG	250 mg
Rimsulfuron	-	31658-100MG	100 mg
Ronidazole-d ₃	-	34217-10MG	10 mg
Ronnel	-	442776	100 mg
Rotenone	-	N13184-250MG	
Rotenone	-	45656-250MG	250 mg
S 421	-	45657-250MG	250 mg
Saflufenacil	-	32435-100MG	100 mg
Sebuthylazin	-	31261-250MG	250 mg
Sebuthylazin-desethyl	-	36511-250MG	250 mg
Secbumeton	-	45658-250MG	250 mg
Sedaxane, mixture of isomers	-	37048-100MG	100 mg
Sethoxydim	-	N13210-100MG	100 mg
Sethoxydim	-	36795-10MG	10 mg
Sevin (Carbaryl)	-	442779	250 mg
Siduron	-	34373-250MG	250 mg
Silafluofen	-	31574-50MG 31574-250MG	50 mg 250 mg
Silthiofam	-	32498-25MG	25 mg
Silvex®	-	49117	1000 mg
Silvex® solution	5000 μg/mL in methanol	40552	1 mL

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Simazin solution	100 ng/μL in methanol	-	36588-1ML 36588-2ML	1 mL 2 mL
Simazine	-	-	N13800-500MG	500 mg
Simazine	-	-	32059-250MG	250 mg
Simazine	-	-	49089	100 mg
Simazine-d ₁₀	-	-	34054-10MG-R	10 mg
Simeconazole	-	-	35369-25MG	25 mg
Simetryn	-	-	45660-250MG	250 mg
Sodium cacodylate hydrate	-	-	31533-250MG	250 mg
Sodium diethylthiocarbamate trihydrate	-	-	34399-100MG	100 mg
Sodium fluoroacetate	-	-	N13216-1G	1 g
Sodium fluoroacetate	-	-	31220-100MG	100 mg
Spinosad	-	-	33706-50MG	50 mg
Spirodiclofen	-	-	33654-100MG-R	100 mg
Spiromesifen	-	-	33599-100MG	100 mg
Spiromesifen Metabolite M01	-	-	30482-10MG	10 mg
Spirotetramat	-	-	32713-100MG	100 mg
Spirotetramat Metabolite BY108330- <i>cis</i> -enol	-	-	32484-10MG	10 mg
Spirotetramat Metabolite BY108330 enol-glucoside	-	-	32487-10MG	10 mg
Spirotetramat Metabolite BY108330- <i>cis</i> -keto-hydroxy	-	-	32485-10MG	10 mg
Spirotetramat Metabolite BY108330-mono-hydroxy	-	-	32486-10MG	10 mg
Spiroxamine	-	-	46443-100MG	100 mg
Strychnine	-	-	45661-250MG	250 mg
Sulcofuron-sodium monohydrate	-	-	46076-250MG	250 mg
Sulcotrione	-	-	46318-100MG	100 mg
Sulfaquinoxaline	-	-	N13251-10MG	10 mg
Sulfaquinoxaline	-	-	45662-250MG	100 mg
Sulfluramid	-	-	91242-25MG	25 mg
Sulfometuron methyl	-	-	N13254-100MG	100 mg
Sulfometuron methyl	-	-	34224-100MG	100 mg
Sulfosulfuron	-	-	33307-100MG	100 mg
Sulfotep	-	-	N13256-50MG	50 mg
Sulfotep	-	-	45664-100MG	100 mg
Sulfur	-	-	36576-250MG	250 mg
Sulprofos	-	-	45665-250MG	250 mg
Swep	-	-	45666-250MG	250 mg
2,4,5-T	-	-	45667-250MG	250 mg
2,4,5-T solution	100 ng/μL in acetonitrile	-	46367-2ML	2 mL
2,4,5-T-2-ethylhexyl ester	-	-	45709-250MG	250 mg
2,4,5-T methyl ester	-	-	45668-250MG	250 mg
2,4,5-T methyl ester solution	200 μg/mL in hexane	-	47988	1 mL
TBPP	-	-	34188-100MG	100 mg
TBTC	-	-	45713-250MG	250 mg
TBTO	-	-	45669-250MG	250 mg
TCA	-	-	31525-250MG	250 mg
T CPP	-	-	32952-100MG	100 mg
TDCPP	-	-	32951-100MG	100 mg
Tebuconazol	-	-	32013-250MG	250 mg
Tebufenozide	-	-	31652-100MG	100 mg
Tebufenpyrad	-	-	46438-100MG	100 mg
Tebupirimfos	-	-	31599-100MG	100 mg
Tebutam	-	-	36566-250MG	250 mg
Tebuthiuron	-	-	N13505-1G	1 g
Tebuthiuron	-	-	45671-250MG	250 mg
Tecnazene	-	-	45672-250MG	250 mg
Teflubenzuron	-	-	45756-250MG-R	250 mg
Tefluthrin	-	-	35548-100MG	100 mg
Telodrin	-	-	36506-10MG	10 mg
Tembotrione	-	-	32766-100MG	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Tembotrione metabolite AE 1417268	-	-	32584-25MG	25 mg
Temephos	-	-	N10996-100MG	100 mg
Temephos	-	-	31526-250MG	250 mg
TEPP	-	-	32434-50MG	50 mg
Tepraloxydim	-	-	46331-100MG	100 mg
Terbacil	-	-	45675-250MG	250 mg
Terbufos	-	-	45313-100MG	100 mg
Terbufos-sulfone	-	-	31580-50MG	50 mg
Terbufos-sulfoxide	-	-	46044-100MG-R	100 mg
Terbumeton	-	-	31527-250MG	250 mg
Terbumeton-desethyl	-	-	36514-250MG	250 mg
Terbuthylazin solution	100 ng/μL in methanol	-	36589-2ML	2 mL
Terbuthylazin-desethyl	-	-	31229-250MG	250 mg
Terbuthylazine	-	-	N13512-50MG	50 mg
Terbuthylazine	-	-	45678-250MG-R	250 mg
Terbutol	-	-	N13513-100MG	100 mg
Terbutryn	-	-	45677-250MG	250 mg
Terbutylazine-2-hydroxy	-	-	46019-100MG	100 mg
1,2,3,4-Tetrachlorobenzene	-	-	46014-100MG	100 mg
1,2,3,5-Tetrachlorobenzene	-	-	36928-250MG	250 mg
1,2,4,5-Tetrachlorobenzene	-	-	34379-250MG	250 mg
1,2,3,4-Tetrachloro-5-nitrobenzene	-	-	34374-100MG	100 mg
2,3,4,6-Tetrachlorophenol solution	100 ng/μL in methanol	-	45907-2ML	2 mL
2,3,5,6-Tetrachlorophenol	-	-	36518-10MG	10 mg
2,4,5,6-Tetrachloro- <i>m</i> -xylene	-	-	442298	1000 mg
2,4,5,6-Tetrachloro- <i>m</i> -xylene solution	200 μg/mL in methanol	-	48317	1 mL
Tetrachlorvinphos	-	-	45679-250MG	250 mg
Tetraconazole	-	-	37087-100MG	100 mg
Tetradifon	-	-	N13539-250MG	250 mg
Tetradifon	-	-	45680-250MG	250 mg
Tetraethyl pyrophosphate	-	-	N13543-500MG	500 mg
<i>cis</i> -1,2,3,6-Tetrahydrophthalimide	-	-	MET11399A-5G	5 g
Tetramethrin	-	-	45681-250MG-R	250 mg
Tetrasul	-	-	36568-250MG	250 mg
Thiabendazole	-	-	N13560-1G	1 g
Thiabendazole	-	-	45684-250MG	250 mg
Thiacloprid	-	-	37905-100MG-R	100 mg
Thiacloprid-amide	-	-	33897-100MG-R	100 mg
Thiamethoxam	-	-	37924-100MG-R	100 mg
Thiamethoxam-d ₃	-	-	38176-25MG	25 mg
Thiazafuron	-	-	31529-250MG	250 mg
Thidiazuron	-	-	N13564-250MG	250 mg
Thidiazuron	-	-	45686-250MG	250 mg
Thiencarbazone-methyl	-	-	32721-100MG	100 mg
Thifensulfuron-methyl	-	-	46028-100MG	100 mg
Thifluzamide	-	-	49792-100MG	100 mg
Thiobencarb	-	-	45687-250MG	250 mg
Thiocyclam hydrogenoxalate	-	-	31716-100MG	100 mg
Thiodicarb	-	-	N13568-250MG	250 mg
Thiodicarb	-	-	34375-250MG	250 mg
Thiofanox	-	-	45314-100MG	100 mg
Thiofanox-sulfoxide	-	-	31551-100MG	100 mg
Thiometon in Shellsol	-	-	31681-250MG	250 mg
Thionazin	-	-	33941-50MG	50 mg
Thionazin solution	100 ng/μL in acetonitrile	-	33854-2ML-R	2 mL
Thionazin solution	2000 μg/mL in methylene chloride	-	48285-U	1 mL
Thiophanate	-	-	N13571-1G	1 g
Thiophanate-methyl	-	-	45688-250MG	250 mg
Thiosultap disodium	-	-	32994-100MG	100 mg
Thiram	-	-	45689-250MG	250 mg
Tiadinil	-	-	37076-25MG	25 mg
Tolclofos-methyl	-	-	31209-250MG	250 mg
Tolfenpyrad	-	-	37043-25MG	25 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Tolyfluanid	-	-	32060-250MG	250 mg
Topramezone	-	-	34225-100MG	100 mg
Toxaphen component 26 solution	5 ng/μL in isooctane	-	31688-1.25ML	1.25 mL
Toxaphen component 50 solution	5 ng/μL in isooctane	-	31695-1.25ML	1.25 mL
Toxaphen component 62 solution	5 ng/μL in isooctane	-	46147-1.25ML	1.25 mL
Toxaphene	-	-	N13586-250MG	250 mg
Toxaphene solution	1000 μg/mL in isooctane	-	48103	1 mL
Toxaphene solution	2000 μg/mL in methanol	-	48700-U	1 mL
Toxaphene solution	5000 μg/mL in methanol	-	40111	1 mL
Toxaphen multi standard solution 3	-	-	46151-1.25ML	1.25 mL
2,4,5-TP methyl ester	-	-	45692-250MG	250 mg
2,4,5-TP methyl ester solution	200 μg/mL in hexane	-	47987-U	1 mL
2,4,5-TP (Silvex®) solution	100 μg/mL in methanol	-	47897	1 mL
Tralkoxidym	-	-	36536-250MG	250 mg
Tralomethrin	-	-	32531-50MG	50 mg
Tralopyril	-	-	32418-100MG	100 mg
Transfluthrin	-	-	46114-250MG	250 mg
Triadimefon	-	-	N13636-500MG	500 mg
Triadimefon	-	-	45693-250MG	250 mg
Triadimenol	-	-	46138-250MG	250 mg
Triadimenol A	-	-	45694-250MG	250 mg
Triallat	-	-	N13628-1G	1 g
Triallat	-	-	45695-250MG	250 mg
Triasulfuron	-	-	33383-100MG	100 mg
Triazophos	-	-	45696-50MG	50 mg
			45696-250MG	250 mg
Triazoxid	-	-	33373-100MG	100 mg
Tribenuron-methyl	-	-	46013-100MG	100 mg
2,4,6-Tribromoanisole	-	-	33489-100MG-R	100 mg
1,2,4-Tributyl phosphorotrithioate	-	-	N13194-250MG	250 mg
Trichlorfon	-	-	45698-250MG-R	250 mg
Trichlorfon	-	-	N11843-1G	1 g
Trichloroacetic acid	-	-	31267-250MG	250 mg
2,4,5-Trichloroaniline	-	-	35828-1G	1 g
2,4,6-Trichloroaniline	-	-	35996-250MG	250 mg
2,3,4-Trichloroanisole	-	-	33412-100MG-R	100 mg
2,3,6-Trichloroanisole	-	-	36625-25MG	25 mg
2,4,6-Trichloroanisole	-	-	34384-100MG	100 mg
2,4,6-Trichloroanisole-d ₅	-	-	34023-50MG-R	50 mg
1,2,3-Trichlorobenzene	-	-	36742-1G	1 g
1,2,4-Trichlorobenzene	-	-	36627-1G	1 g
1,3,5-Trichlorobenzene	-	-	36555-250MG	250 mg
2,3,6-Trichlorobenzoic acid	-	-	N10605-1G	1 g
1,1,1-Trichloro-2-methyl-2-propanol hemihydrate	-	-	36681-1G	1 g
Trichloronate	-	-	N13657-100MG	100 mg
Trichloronitromethane	-	-	34321-250MG	250 mg
2,3,4-Trichlorophenol	-	-	33393-50MG	50 mg
2,3,5-Trichlorophenol solution	100 ng/μL in acetonitrile	-	34112-2ML	2 mL
2,3,6-Trichlorophenol	-	-	36745-250MG	250 mg
2,4,5-Trichlorophenol	-	-	36513-250MG	250 mg
2,4,6-Trichlorophenol	-	-	36543-250MG	250 mg
			36543-1G	1 g
2-(2,4,5-Trichlorophenoxy)propionic acid	-	-	45691-250MG	250 mg
3,5,6-Trichloro-2-pyridinol	-	-	33972-100MG-R	100 mg
Triclopyr	-	-	32016-250MG	250 mg
Triclopyr 2-butoxyethylester	-	-	36538-100MG	100 mg
Triclosan-methyl	-	-	34228-50MG	50 mg
Tricyclazol	-	-	45808-10MG	10 mg
Tridemorph	-	-	36199-100MG	100 mg
Trietazine	-	-	31761-100MG	100 mg
Trifloxystrobin	-	-	46447-100MG	100 mg
Trifloxysulfuron sodium salt	-	-	33672-100MG-R	100 mg

Environmental Standards

Pesticide Neats and Solutions

Description	Concentration		Cat. No.	Qty
Triflumizole	-	-	32611-100MG	100 mg
Triflumuron	-	-	35029-100MG	100 mg
(±)-4,4,4-Trifluoro-3-(3-indolyl)butyric acid	-	-	34026-50MG-R	50 mg
Trifluralin	-	-	N13689-1G	1 g
Trifluralin	-	-	32061-250MG	250 mg
Trifluralin	-	-	442824	250 mg
Trifluralin solution	100 ng/μL in acetonitrile	-	45913-2ML	2 mL
Triflurosulfuron-methyl	-	-	31717-100MG	100 mg
Triforin	-	-	45701-250MG	250 mg
2,3,5-Trimethacarb	-	-	37874-10MG	10 mg
2,3,5-Trimethylphenol	-	-	34308-250MG	250 mg
2,4,6-Trimethylphenol	-	-	35998-250MG	250 mg
Trimethyltin chloride	-	-	34377-250MG	250 mg
Trinexapac-ethyl	-	-	37898-100MG-R	100 mg
Triticonazole	-	-	34172-100MG	100 mg
Tritosulfuron	-	-	33873-100MG-R	100 mg
Uniconazole	-	-	37044-50MG	50 mg
Valifenalate	-	-	37078-25MG	25 mg
Vamidothion solution	100 ng/μL in acetonitrile	-	32931-2ML	2 mL
Vernolat	-	-	45704-250MG-R	250 mg
Vinclozolin	-	-	N13745-1G	
Vinclozolin	-	-	45705-250MG	250 mg
Warfarin™	-	-	45706-250MG-R	250 mg
(Z)-Metominostrobin	-	-	34229-10MG	10 mg
Zineb	-	-	45707-250MG	250 mg
Ziram	-	-	45708-250MG	250 mg
Zoxamide	-	-	32501-50MG	50 mg

International Standards

Canada

The Ontario Ministry of the Environment has established monitoring of wastewater discharges by nine industrial sectors as part of the Municipal/Industrial Strategy for Abatement (MISA) program. Analytes that must be monitored under MISA regulations include 34 volatile and 70 semivolatile organic compounds. Because analyses of these compounds at low levels in waste effluents can be complex, high-quality standards are essential for routine daily calibration of instruments. We have developed these analytical standard solutions for analytes monitored under the May 1990 MISA regulations.

MISA Group 16 - Halogenated Organics

Description	Concentration		Cat. No.	Qty
standard type calibration				
MISA Group 16 Halogen Volatile Organic Mix	2000 μg/mL each component in methanol	-	48132	1 mL
	<i>Bromoform</i>	<i>1,2-Dichloroethane</i>		
	<i>Carbon tetrachloride</i>	<i>1,2-Dichloropropane</i>		
	<i>Chlorobenzene</i>	<i>cis-1,3-Dichloropropene</i>		
	<i>Chloroform</i>	<i>trans-1,3-Dichloropropene</i>		
	<i>1,2-Dibromoethane</i>	<i>1,1,2,2-Tetrachloroethane</i>		
	<i>1,2-Dichlorobenzene</i>	<i>Tetrachloroethylene</i>		
	<i>1,3-Dichlorobenzene</i>	<i>1,1,2-Trichloroethane</i>		
	<i>1,4-Dichlorobenzene</i>	<i>Trichloroethylene</i>		
	<i>1,1-Dichloroethane</i>			
EPA VOC Mix 5	2000 μg/mL each component in methanol	SS	458797 48797	1 mL 1 mL
	<i>Bromodichloromethane</i>	<i>cis-1,2-Dichloroethylene</i>		
	<i>Dibromochloromethane</i>	<i>trans-1,2-Dichloroethylene</i>		
	<i>1,1-Dichloroethylene</i>	<i>Dichloromethane</i>		
EPA VOC Mix 6	2000 μg/mL each component in methanol	SS	458799 48799-U	1.5 mL 1.5 mL
	<i>Bromomethane</i>	<i>Dichlorodifluoromethane</i>		
	<i>Chloroethane</i>	<i>Trichlorofluoromethane</i>		
	<i>Chloromethane</i>	<i>Vinyl chloride</i>		

International Standards

Canada

MISA Group 17 - Nonhalogenated Organics

Description	Concentration	Cat. No.	Qty
standard type calibration			
MISA Group 17 Non-Halogen Organic Mix	2000 µg/mL each component in methanol	48133	1 mL
	<i>Benzene</i> <i>Ethylbenzene</i> <i>Styrene</i> <i>Toluene</i>	<i>o-Xylene</i> <i>m-Xylene</i> <i>p-Xylene</i>	

MISA Group 18 - Water Soluble Volatile Compounds

Description	Concentration	Cat. No.	Qty
standard type calibration			
Acrolein	-	SS 458501 48501	100 mg 5 g
Acrylonitrile	-	SS 48502	1 g

MISA Group 19 - Base Neutral Extractables

Description	Concentration	Cat. No.	Qty
standard type calibration			
MISA Group 19 Base-Neutral Extractables Mix B	2000 µg/mL each component in methylene chloride	- 48135	1 mL
	<i>Benzyl butyl phthalate</i> <i>Biphenyl</i> <i>Bis(2-ethylhexyl) phthalate</i> <i>Dibutyl phthalate</i> <i>2,4-Dinitrotoluene</i> <i>2,6-Dinitrotoluene</i>	<i>Di-n-octyl phthalate</i> <i>Diphenyl ether</i> <i>Indole</i> <i>N-Nitrosodiphenylamine</i> <i>N-Nitrosodi-n-propylamine</i> <i>Perylene</i>	
EPA TCL Polynuclear Aromatic Hydrocarbons Mix	2000 µg/mL each component in methylene chloride: benzene (1:1)	SS 48905-U 458905	1 mL 1 mL
	<i>Acenaphthene</i> <i>Acenaphthylene</i> <i>Anthracene</i> <i>Benzo[a]anthracene</i> <i>Benzo[b]fluoranthene</i> <i>Benzo[k]fluoranthene</i> <i>Benzo[ghi]perylene</i> <i>Benzo[a]pyrene</i>	<i>Chrysene</i> <i>Dibenz[a,h]anthracene</i> <i>Fluoranthene</i> <i>Fluorene</i> <i>Indeno[1,2,3-cd]pyrene</i> <i>Naphthalene</i> <i>Phenanthrene</i> <i>Pyrene</i>	


MISA Group 20 - Phenolic Extractables

Description	Concentration	Cat. No.	Qty
standard type calibration			
MISA Group 20 Phenols Mix A	2000 µg/mL each component in methanol	48130-U	1 mL
	<i>o-Cresol</i> <i>p-Cresol</i> <i>2,6-Dichlorophenol</i> <i>2,4-Dimethylphenol</i> <i>2-Methyl-4,6-dinitrophenol</i>	<i>2,3,4,6-Tetrachlorophenol</i> <i>2,3,5,6-Tetrachlorophenol</i> <i>2,3,4-Trichlorophenol</i> <i>2,3,5-Trichlorophenol</i> <i>2,4,5-Trichlorophenol</i>	
MISA Group 20 Phenols Mix B	2000 µg/mL each component in methanol	48131	1 mL
	<i>4-Chloro-3-methylphenol</i> <i>2-Chlorophenol</i> <i>m-Cresol</i> <i>2,4-Dichlorophenol</i> <i>2,4-Dinitrophenol</i>	<i>4-Nitrophenol</i> <i>Pentachlorophenol</i> <i>Phenol</i> <i>2,3,4,5-Tetrachlorophenol</i> <i>2,4,6-Trichlorophenol</i>	

International Standards

Canada

MISA Group 22 - Organochlorine Pesticides

Description	Concentration		Cat. No.	Qty
standard type calibration				
EPA TCL Pesticides Mix	2000 µg/mL each component in hexane: toluene (1:1)		458913 48913	1 mL 1 mL
	<i>Aldrin</i> <i>α-BHC</i> <i>β-BHC</i> <i>Lindane</i> <i>δ-BHC</i> <i>1,1-Dichloro-2,2-bis(4-chlorophenyl)ethane</i> <i>4,4'-DDE</i> <i>4,4'-DDT</i> <i>Dieldrin</i>	<i>α-Endosulfan</i> <i>β-Endosulfan</i> <i>Endosulfan sulfate</i> <i>Endrin</i> <i>Endrin aldehyde</i> <i>Endrin ketone</i> <i>Heptachlor</i> <i>Heptachlor exo-epoxide</i> <i>Methoxychlor</i>		
Hexachlorobenzene	-	-	48508	1000 mg
Hexachlorobenzene solution	1000 µg/mL in acetone	-	40008	1 mL

MISA Group 23 - Chlorinated Hydrocarbons

Description	Concentration		Cat. No.	Qty
standard type calibration				
MISA Group 23 Chlorinated Hydrocarbon Mix	2000 µg/mL each component in methylene chloride		48136	1 mL
	<i>Hexachlorobenzene</i> <i>Hexachloro-1,3-butadiene</i> <i>Hexachlorocyclopentadiene</i> <i>Hexachloroethane</i> <i>Pentachlorobenzene</i> <i>1,2,3,4-Tetrachlorobenzene</i>	<i>1,2,3,5-Tetrachlorobenzene</i> <i>1,2,4,5-Tetrachlorobenzene</i> <i>1,2,3-Trichlorobenzene</i> <i>1,2,4-Trichlorobenzene</i> <i>2,4,5-Trichlorotoluene</i>		

MISA Group 27 - Polychlorinated Biphenyls

Description	Concentration		Cat. No.	Qty
standard type calibration				
Aroclor 1016 solution	200 µg/mL in methanol		48701	1 mL
Aroclor 1221 solution	200 µg/mL in methanol		48705	1 mL
Aroclor 1232 solution	200 µg/mL in methanol		48702	1 mL
Aroclor 1242 solution	200 µg/mL in methanol		48706	1 mL
Aroclor 1248 solution	200 µg/mL in methanol		48703	1 mL
Aroclor 1254 solution	200 µg/mL in methanol		48707	1 mL
Aroclor 1260 solution	200 µg/mL in methanol		48704	1 mL
PCB Kit 3	200 µg/mL each component in methanol		48825	1 kit
	<i>Aroclor 1016 solution (Supelco 48701), 1 mL</i> <i>Aroclor 1221 solution (Supelco 48705), 1 mL</i> <i>Aroclor 1232 solution (Supelco 48702), 1 mL</i> <i>Aroclor 1242 solution (Supelco 48706), 1 mL</i>	<i>Aroclor 1248 solution (Supelco 48703), 1 mL</i> <i>Aroclor 1254 solution (Supelco 48707), 1 mL</i> <i>Aroclor 1260 solution (Supelco 48704), 1 mL</i>		
PCB kit - high conc.	1000 µg/mL in isoctane (each solution)		44803	1 kit
	<i>Aroclor 1232 solution (Supelco 44805), 1 mL</i> <i>Aroclor 1242 solution (Supelco 44806), 1 mL</i> <i>Aroclor 1248 solution (Supelco 44807), 1 mL</i>	<i>Aroclor 1254 solution (Supelco 44808), 1 mL</i> <i>Aroclor 1260 solution (Supelco 44809), 1 mL</i> <i>Aroclor 1262 solution (Supelco 44810), 1 mL</i>		
PCB kit - low conc.	1 µg/mL in isoctane		44804	1 kit
	<i>Aroclor 1232 solution (Supelco 44811), 1 mL</i> <i>Aroclor 1242 solution (Supelco 44812), 1 mL</i> <i>Aroclor 1248 solution (Supelco 44813), 1 mL</i>	<i>Aroclor 1254 solution (Supelco 44814), 1 mL</i> <i>Aroclor 1260 solution (Supelco 44815), 1 mL</i> <i>Aroclor 1262 solution (Supelco 44816), 1 mL</i>		

International Standards

Canada

Single Component Standards for MISA Analyses

Description	Concentration	Cat. No.	Qty
standard type calibration			
Biphenyl solution	2000 µg/mL in methanol	48161	1 mL
1-Chloronaphthalene solution	2000 µg/mL in methanol	48159	1 mL
Diphenyl ether solution	2000 µg/mL in methanol	48155	1 mL
Indole solution	2000 µg/mL in methanol	48157	1 mL
1-Methylnaphthalene solution	2000 µg/mL in methanol	48162	1 mL
1,2,3,4-Tetrachlorobenzene solution	2000 µg/mL in methanol	48158	1 mL
1,2,3,5-Tetrachlorobenzene solution	2000 µg/mL in methanol	48156	1 mL
2,3,4,5-Tetrachlorophenol solution	2000 µg/mL in methanol	48153	1 mL
2,3,5,6-Tetrachlorophenol solution	2000 µg/mL in methanol	48152	1 mL
2,3,4-Trichlorophenol solution	2000 µg/mL in methanol	48154	1 mL
2,4,5-Trichlorotoluene solution	2000 µg/mL in methanol	48150	1 mL
CEN PCB Congener Mix-1	10 µg/mL each component in heptane	47927	1 mL
	2,2',3,4,4',5,5'-Heptachlorobiphenyl 2,2',3,4,4',5'-Hexachlorobiphenyl 2,2',3,4',5',6-Hexachlorobiphenyl 2,2',4,4',5,5'-Hexachlorobiphenyl 2,2',3,3',4,4',5,5'-Octachlorobiphenyl 2,2',4,5,5'-Pentachlorobiphenyl	2,3',4,4',5-Pentachlorobiphenyl 2,2',3,5'-Tetrachlorobiphenyl 2,2',5,5'-Tetrachlorobiphenyl 2,2',5-Trichlorobiphenyl 2,4,4'-Trichlorobiphenyl 2,4',5-Trichlorobiphenyl	

European Mixes

DNPH Mixes - The following dinitrophenylhydrazine (DNPH) standards were developed in response to European requests for working and calibration check standards for the ambient air analysis of carbonyl emissions from automobile exhaust. Methods for this analysis are equivalent to California Air Resources Board 1004 (Sacramento, CA, USA). Concentrations are of the equivalent carbonyl quantity before derivatization. The Certificate of Analysis accompanying each of these products states both DNPH-derivatized and non-derivatized concentrations.

PAH Mix - The PAH Calibration Mix (Cat. No. 47940-U) was developed for determining polynuclear aromatic hydrocarbons (PAHs) by HPLC, using fluorescence detection, for the following methods:

- DIN Method 38407, part 8 (for PAHs in drinking water, groundwater, and surface water)
- DIN NAW (Normenausschuss Wasserwesen) working group draft method DIN 38407, part 18 (for PAHs in water)
- DIN 3814, part 21, draft method (for PAHs in sediment and sludge)

Description	Concentration	Cat. No.	Qty
standard type calibration			
Carbonyl-DNPH Mix 1	20 µg/mL in acetonitrile (except where indicated; aldehyde & ketone equivalents)	47672-U	1 mL
	Acetaldehyde-2,4-dinitrophenylhydrazone Acetone-2,4-dinitrophenylhydrazone Acrolein-2,4-dinitrophenylhydrazone Benzaldehyde-2,4-dinitrophenylhydrazone 2-Butanone-2,4-dinitrophenylhydrazone Butyraldehyde-2,4-dinitrophenylhydrazone Crotonaldehyde-2,4-dinitrophenylhydrazone	Formaldehyde-2,4-dinitrophenylhydrazone, 40 µg/mL Hexaldehyde-2,4-dinitrophenylhydrazone Methacrolein-2,4-dinitrophenylhydrazone Propionaldehyde-2,4-dinitrophenylhydrazone p-Tolualdehyde 2,4-dinitrophenylhydrazone Valeraldehyde-2,4-dinitrophenylhydrazone	
Carbonyl-DNPH Mix 2	2 µg/mL in acetonitrile (except where indicated; aldehyde & ketone equivalents)	47671-U	1 mL
	Acetaldehyde-2,4-dinitrophenylhydrazone Acetone-2,4-dinitrophenylhydrazone Acrolein-2,4-dinitrophenylhydrazone Benzaldehyde-2,4-dinitrophenylhydrazone 2-Butanone-2,4-dinitrophenylhydrazone Butyraldehyde-2,4-dinitrophenylhydrazone Crotonaldehyde-2,4-dinitrophenylhydrazone	Cyclohexanone 2,4-dinitrophenylhydrazone, 5 µg/mL Formaldehyde-2,4-dinitrophenylhydrazone, 4 µg/ mL Hexaldehyde-2,4-dinitrophenylhydrazone Methacrolein-2,4-dinitrophenylhydrazone Propionaldehyde-2,4-dinitrophenylhydrazone p-Tolualdehyde 2,4-dinitrophenylhydrazone Valeraldehyde-2,4-dinitrophenylhydrazone	
Cyclohexanone-2,4-DNPH solution	500 µg/mL in acetonitrile (as ketone equivalent)	47673-U	1 mL
PAH Calibration Mix	10 µg/mL each component in acetonitrile	47940-U	1 mL
	Acenaphthene Acenaphthylene Anthracene Benz[a]anthracene Benzo[b]fluoranthene Benzo[k]fluoranthene Benzo[ghi]perylene Benzo[a]pyrene	Chrysene Dibenz[a,h]anthracene Fluoranthene Fluorene Indeno[1,2,3-cd]pyrene Naphthalene Phenanthrene Pyrene	

International Standards

Korean Drinking Water Regulations

Korean Drinking Water Regulations

Korean calibration reference standards are quantitative mixtures of volatile organic chemicals and pesticides of known concern. These formulations are intended for the calibration of a gas chromatographic system equipped with a capillary column and an appropriate detector. Products are packaged in amber ampules to prevent photodegradation and solvent or analyte loss. Five ampules are packaged per product. Each product includes a Certificate of Analysis. The following products were introduced to support laboratories conducting drinking water analyses under Korean Drinking Water Regulations (KDWR).

Description	Concentration	Cat. No.	Qty
KDWR Pesticides Kit	1000 µg/mL each component in methanol <i>1-Naphthyl-N-methylcarbamate</i> <i>Diazinon</i> <i>Fenitrothion</i>	<i>Malathion</i> <i>Parathion</i> 47627-U	1 kit
KDWR VOC Mix A	100 µg/mL each component in methanol <i>Benzene</i> <i>Bromodichloromethane</i> <i>Bromoform</i> <i>Carbon tetrachloride</i> <i>Chloroform</i> <i>Dibromochloromethane</i> <i>1,1-Dichloroethylene</i> <i>Dichloromethane</i> <i>Ethylbenzene</i>	<i>Phenol</i> <i>Tetrachloroethylene</i> <i>Toluene</i> <i>1,1,1-Trichloroethane</i> <i>Trichloroethylene</i> <i>o-Xylene</i> <i>m-Xylene</i> <i>p-Xylene</i> 506575	5 × 1 mL
KDWR VOC Mix B	100 µg/mL each component in methanol <i>Bromodichloromethane</i> <i>Bromoform</i> <i>Carbon tetrachloride</i> <i>Chloroform</i> <i>Dibromochloromethane</i>	<i>1,1-Dichloroethylene</i> <i>Dichloromethane</i> <i>Tetrachloroethylene</i> <i>1,1,1-Trichloroethane</i> <i>Trichloroethylene</i> 506583	5 × 1 mL

Food & Beverage Standards

Natural Products

Natural plant extracts and their individual constituents are used in a variety of consumer goods including flavorings, perfumes and homeopathic remedies. Sigma-Aldrich, through its Fluka brand, offers several natural product reference materials for preparing your own qualitative and quantitative solutions. Because these reference materials are derived from natural extracts, purities may vary.

CAS No.	Compound	Cat. No.	Qty
140-67-0	4-Allylanisole, analytical standard, for terpene analysis	05818-1ML 05818-5ML	1 mL 5 mL
638-95-9	α-Amyrin, analytical standard, for terpene analysis	53017-10MG-F	10 mg
559-70-6	β-Amyrin, analytical standard, for terpene analysis	09236-10MG-F	10 mg
4180-23-8	<i>trans</i> -Anethole, analytical standard, for terpene analysis	10368-1ML 10368-5ML	1 mL 5 mL
578-74-5	Apigenin 7-glucoside, analytical standard	44692-5MG-F 44692-25MG-F	5 mg 25 mg
2883-98-9	α-Asarone, analytical standard, for terpene analysis	11107-1G	1 g
16830-15-2	Asiaticoside, analytical standard	43191-1MG-F 43191-5MG-F	1 mg 5 mg
479-98-1	Aucubin, analytical standard	55561-5MG-F 55561-25MG-F	5 mg 25 mg
3061-75-4	Behenamide, analytical standard	16879-100MG-F	100 mg
7380-40-7	Bergamottin, analytical standard, for terpene analysis	01338-5MG-F	5 mg
22567-36-8	Bisabolol oxide A, analytical standard	59761-10MG	10 mg
464-45-9	(-)-Borneol, analytical standard, for terpene analysis	15598-1G 15598-5G	1 g 5 g
464-48-2	(-)-Camphor, analytical standard	21293-1G	1 g
498-15-7	(+)-3-Carene, analytical standard, for terpene analysis	21986-5ML 21986-25ML	5 mL 25 mL
2244-16-8	(+)-Carvone, analytical standard, for terpene analysis	22070-1ML 22070-25ML 22070-100ML	1 mL 25 mL 100 mL
470-67-7	1,4-Cineole, analytical standard, for terpene analysis	27393-1ML-F 27393-5ML-F	1 mL 5 mL
10281-55-7	(+)-β-Citronellene, analytical standard, for terpene analysis	27475-1ML-F 27475-5ML-F	1 mL 5 mL
7540-51-4	(-)-β-Citronellol, analytical standard, for terpene analysis	27483-1ML-F 27483-5ML-F	1 mL 5 mL
246021-20-5	9,11-Didehydroestriol, purum, ≥97.0% (HPLC)	28078-5MG-F	5 mg

Food & Beverage Standards

Natural Products

CAS No.	Compound	Cat. No.	Qty
1128-08-1	Dihydrojasnone, analytical standard, for terpene analysis	00138-1ML	1 mL
490-46-0	(-)-Epicatechin, purum, ≥95.0% (HPLC)	39263-5MG-F	5 mg
989-51-5	(-)-Epigallocatechin gallate, purum, ≥97.0% (HPLC)	50299-1MG-F	1 mg
140-67-0	Estragole, analytical standard, for environmental analysis	34098-1ML	1 mL
470-82-6	Eucalyptol, analytical standard, for terpene analysis	29210-1ML	1 mL
18794-84-8	<i>trans</i> -β-Farnesene, analytical standard	73492-1ML-F	1 mL
2217-02-9	(+)-Fenchol, analytical standard, for terpene analysis	46198-1G-F	1 g
4695-62-9	(+)-Fenchone, analytical standard, for terpene analysis	46208-1ML-F 46208-5ML-F 46208-25ML-F	1 mL 5 mL 25 mL
2948-76-7	Fisetinidin chloride, analytical standard	42724-1MG-F 42724-5MG-F	1 mg 5 mg
106-24-1	Geraniol, analytical standard, for terpene analysis	48798-1ML 48798-5ML	1 mL 5 mL
105-87-3	Geranyl acetate, analytical standard, for terpene analysis	45896-1ML-F	1 mL
22910-60-7	Ginkgolic acid C15:1, analytical standard	75741-5MG	5 mg
15291-75-5	Ginkgolide A, analytical standard	51863-10MG-F	10 mg
107438-79-9	Ginkgolide J, analytical standard	89556-5MG	5 mg
52286-58-5	Ginsenoside Rf, analytical standard	65839-5MG	5 mg
22427-39-0	Ginsenoside Rg1, analytical standard, for terpene analysis	68317-5MG	5 mg
22427-39-0	Ginsenoside Rg1 (saponin of Panax ginseng), 1000 µg/mL in methanol	18826-1.2ML	1.2 mL
489-86-1	(-)-Guaiaol, analytical standard, for terpene analysis	29242-250MG	250 mg
19210-12-9	Harpagoside, analytical standard	68527-10MG	10 mg
14216-03-6	Hederacoside C, analytical standard	97151-50MG-F	50 mg
80923-99-5	(22R)-30-Homohop-17(21)ene solution, 0.05 mg/mL in isooctane, analytical standard	41133-0.5ML	0.5 mL
13849-96-2	17α(H),21β(H)-Hopane solution, 0.1 mg/mL in isooctane, analytical standard	90656-1ML	1 mL
471-62-5	17β(H),21β(H)-Hopane solution, 0.1 mg/mL in isooctane, analytical standard	07562-1ML	1 mL
1615-91-4	Hop-22(29)-ene solution, 0.1 mg/mL in isooctane, analytical standard	04626-1ML	1 mL
89-79-2	(-)-Isopulegol, analytical standard, for terpene analysis	59770-5ML	5 mL
104870-56-6	(+)-Isopulegol, analytical standard, for terpene analysis	59765-1ML	1 mL
3155-48-4	DL-Kavain, analytical standard	59780-500MG-F 59780-5G-F	500 mg 5 g
18719-76-1	Keracyanin chloride, analytical standard	36428-1MG-F 36428-5MG-F	1 mg 5 mg
470-69-9	1-Kestose, analytical standard	72555-25MG 72555-100MG	25 mg 100 mg
5989-27-5	(R)-(+)-Limonene, analytical standard, for terpene analysis	62118-1ML 62118-5ML 62118-25ML	1 mL 5 mL 25 mL
5989-54-8	(S)-(-)-Limonene, analytical standard, for terpene analysis	62128-1ML 62128-5ML	1 mL 5 mL
126-91-0	(-)-Linalool, analytical standard, for terpene analysis	74856-1ML-F 74856-5ML-F	1 mL 5 mL
18524-94-2	Loganin, analytical standard	36483-10MG-F	10 mg
108-48-5	2,6-Lutidine, analytical standard	04991-5ML-F	5 mL
1195-31-9	(+)- <i>p</i> -Menth-1-ene, analytical standard, for terpene analysis	63655-1ML	1 mL
17957-94-7	(+)-Menthofuran, analytical standard, for terpene analysis	63661-1ML-F 63661-5ML-F	1 mL 5 mL
2216-51-5	(-)-Menthol, analytical standard, for terpene analysis	63660-1G 63660-100G 63660-500G	1 g 100 g 500 g
14073-97-3	(-)-Menthone, analytical standard, for terpene analysis	63677-5ML 63677-25ML	5 mL 25 mL
3391-87-5	(+)-Menthone, analytical standard, for terpene analysis	63675-1ML-F	1 mL
5157-89-1	(1S)-(+)-Menthyl acetate, analytical standard, for terpene analysis	45987-1ML-F 45987-5ML-F	1 mL 5 mL
108214-28-4	16-O-Methylcafestol, analytical standard	68328-2MG	2 mg
123-35-3	Myrcene, analytical standard	64643-100MG-F 64643-500MG-F	100 mg 500 mg
544-63-8	Myristic acid, analytical standard	70079-5G	5 g
607-91-0	Myristicin, analytical standard	09237-10MG-F 09237-50MG-F	10 mg 50 mg
51152-12-6	(-)- <i>cis</i> -Myrtanol, analytical standard, for terpene analysis	70154-10ML	10 mL
132203-71-5	(+)- <i>trans</i> -Myrtanol, analytical standard, for terpene analysis	70117-1ML	1 mL
19894-97-4	(-)-Myrtenol, analytical standard, for terpene analysis	70158-1ML	1 mL
21681-17-4	Neohop-13(18)ene solution, 0.1 mg/mL in isooctane, analytical standard	42689-1ML	1 mL
20747-49-3	(-)-Neomenthol, analytical standard, for terpene analysis	72139	

Food & Beverage Standards

Natural Products

CAS No.	Compound	Cat. No.	Qty
40716-66-3	<i>trans</i> -Nerolidol, analytical standard	18143-100MG-F	100 mg
141-12-8	Neryl acetate, analytical standard, for terpene analysis	46015-1ML	1 mL
3258-87-5	17β(H),21α(H)-30-Norhopane solution, 0.1 mg/mL in isooctane, analytical standard	90102-1ML	1 mL
10379-57-4	30-Norhop-17(21)ene solution, 0.1 mg/mL in isooctane, analytical standard	03707-1ML	1 mL
72633-85-3	30-Norneohop-13(18)-ene solution, 0.05 mg/mL in isooctane, analytical standard	44133-0.5ML	0.5 mL
18457-55-1	(-)-Perillyl alcohol, analytical standard, for terpene analysis	77311-1ML	1 mL
4795-86-2	(1 <i>R</i>)-(+)- <i>cis</i> -Pinane, analytical standard, for terpene analysis	80593-5ML	5 mL
10281-53-5	(1 <i>S</i>)-(-)- <i>trans</i> -Pinane, analytical standard, for terpene analysis	80595-1ML	1 mL
7785-26-4	(-)-α-Pinene, analytical standard, for terpene analysis	80599-1ML 80599-5ML	1 mL 5 mL
18172-67-3	(-)-β-Pinene, analytical standard, for terpene analysis	80609-1ML 80609-5ML	1 mL 5 mL
7785-70-8	(+)-α-Pinene, analytical standard, for terpene analysis	80605-1ML 80605-5ML	1 mL 5 mL
20315-25-7	Procyanidin B1, analytical standard	19542-1MG-F	1 mg
29106-49-8	Procyanidin B2, analytical standard	42157-1MG-F	1 mg
501-36-0	Resveratrol, analytical standard	34092-100MG	100 mg
90-19-7	Rhamnetin, analytical standard	17799-1MG-F 17799-5MG-F	1 mg 5 mg
3020-09-5	Robinetinidin chloride, analytical standard	42046-1MG-F	1 mg
16409-43-1	(-)-Rose oxide, analytical standard, for terpene analysis	83917-1ML	1 mL
16409-43-1	(+)-Rose oxide, analytical standard, for terpene analysis	83915-1ML	1 mL
250249-75-3	Rutin trihydrate, analytical standard	78095-25MG-F 78095-100MG-F	25 mg 100 mg
546-79-2	Sabinene hydrate, analytical standard	96573-500MG-F 96573-5G-F	500 mg 5 g
35671-15-9	(+)-Santolina alcohol, analytical standard, for terpene analysis	84500-1ML	1 mL
19351-63-4	Secologanin, analytical standard	50741-5MG-F	5 mg
81-27-6	Senoside A, analytical standard	68909-5MG-F 68909-25MG-F	5 mg 25 mg
128-57-4	Senoside B, analytical standard	75412-25MG-F	25 mg
480-18-2	Taxifolin, analytical standard	78666-25MG-F 78666-100MG-F	25 mg 100 mg
565-50-4	<i>trans</i> -Terpin, analytical standard, for terpene analysis, for GC	09828-1G	1 g
99-85-4	γ-Terpinene, analytical standard, for terpene analysis	86476-1ML 86476-5ML	1 mL 5 mL
-	Thujone Standard Mixture, analytical standard, for food analysis	04314-1ML-F 04314-5ML-F	1 mL 5 mL
53584-59-1	17α(H)-22,29,30-Trisnorhopan solution, 0.1 mg/mL in isooctane, analytical standard	61695-1ML	1 mL
63543-60-2	22,29,30-Trisnorneohop-13(18)-ene solution, 0.05 mg/mL in isooctane, analytical standard	16411-0.5ML	0.5 mL
77-52-1	Ursolic acid, analytical standard	89797-5MG-F 89797-25MG-F	5 mg 25 mg
1196-01-6	(1 <i>S</i>)-(-)-Verbenone, analytical standard, for terpene analysis	94882-1ML 94882-5ML	1 mL 5 mL
64820-99-1	Vitexin 2- <i>O</i> -rhamnoside, analytical standard	55608-5MG-F 55608-25MG-F	5 mg 25 mg

Antimicrobials/Preservatives

CAS No.	Compound	Cat. No.	Qty
65-85-0	Benzoic acid, analytical standard	47849	1000 mg
99-76-3	Methyl Paraben, analytical standard	47889	1000 mg
24634-61-5	Potassium Sorbate, analytical standard	47848	1000 mg
532-32-1	Sodium benzoate, analytical standard	47850	1000 mg
110-44-1	Sorbic acid, analytical standard	47845	1000 mg

Food & Beverage Standards

Antioxidants

Antioxidants

Description	Concentration	Cat. No.	Qty
Phenolic Antioxidant Kit 2	(individually packaged in quantities indicated) <i>Butylated hydroxyanisole, 500 mg</i> <i>tert-Butylhydroquinone, 500 mg</i> <i>2,6-Di-tert-butyl-4-hydroxymethylphenol, 500 mg</i> <i>3,5-Di-tert-butyl-4-hydroxytoluene, 500 mg</i> <i>Ethoxyquin, 500 mg</i>	<i>Lauryl gallate, 500 mg</i> <i>Nordihydroguaiaretic acid, 500 mg</i> <i>Octyl gallate, 500 mg</i> <i>Propyl gallate, 500 mg</i>	40048-U 1 kit
3,5-Di-tert-4-butylhydroxytoluene (BHT)	-	47168	500 mg

Carbohydrates/Organic Acids/Sugar Alcohols

Carbohydrates

Prepared, tested, and individually packaged using rigorous manufacturing procedures.

Description	Concentration	Cat. No.	Qty
Monosaccharides Kit	(individually packaged in quantities indicated) <i>D-(-)Arabinose, 500 mg</i> <i>Fructose, 500 mg</i> <i>D-(+)Galactose, 500 mg</i> <i>D-(+)Glucose, mixed anomers (47249), 500 mg</i>	<i>D-(+)Mannose (mixed anomers), 500 mg</i> <i>D-(-)Ribose, 500 mg</i> <i>D-(+)Xylose, 500 mg</i>	47267 1 kit
Disaccharides Kit	(individually packaged in quantities indicated) <i>Isomaltose (mixed anomers), 100 mg</i> <i>α-Lactose, 500 mg</i>	<i>Maltose (47288), 500 mg</i> <i>Sucrose (47289), 500 mg</i>	47268-U 1 kit
Oligosaccharides Kit	(individually packaged in quantities indicated) <i>Maltoheptaose, Dp7 (47872), 100 mg</i> <i>Maltohexaose, Dp6 (47873), 100 mg</i> <i>Maltopentaose, Dp5 (47876), 100 mg</i> <i>Maltotetraose, Dp4 (47877), 100 mg</i> <i>Stachyose, Dp4, 100 mg</i>	<i>Maltotriose, Dp3, 100 mg</i> <i>D-(+)Melezitose, Dp3, 100 mg</i> <i>D-(+)Raffinose, Dp3, 100 mg</i> <i>Isomaltotriose, Dp3 (47884), 100 mg</i>	47265 1 kit
Organic Acids Kit	(individually packaged) <i>Acetic acid, 500 mg</i> <i>Adipic acid, 500 mg</i> <i>L-Ascorbic acid, 500 mg</i> <i>Benzoic acid, 500 mg</i> <i>Butyric acid, 500 mg</i> <i>Citric acid, 500 mg</i> <i>Isobutyric acid, 500 mg</i> <i>Formic acid, 500 mg</i> <i>Fumaric acid, 500 mg</i> <i>L-(+)-Lactic acid, 100 mg</i> <i>DL-Isocitric acid trisodium salt hydrate, 100 mg</i>	<i>Maleic acid, 500 mg</i> <i>Malonic acid, 500 mg</i> <i>D-(+)-Malic acid, 100 mg</i> <i>Oxalic acid, 500 mg</i> <i>Phytic acid, 500 mg</i> <i>Propionic acid, 500 mg</i> <i>(-)Quinic acid, 500 mg</i> <i>Succinic acid, 500 mg</i> <i>Shikimic acid, 100 mg</i> <i>D-(+)-Tartaric acid, 500 mg</i>	47264 1 kit
Sugar Alcohol Kit	(individually packaged in quantities indicated) <i>D-(+)Arabitol, 500 mg</i> <i>Dulcitol (Galactitol), 500 mg</i> <i>iso-Erythritol, 500 mg</i> <i>Glycerol, 500 mg</i> <i>Maltitol, 500 mg</i>	<i>D-Mannitol, 500 mg</i> <i>Ribitol (Adonitol), 500 mg</i> <i>D-Sorbitol, 500 mg</i> <i>Xylitol, 500 mg</i>	47266 1 kit

Flavenoids/Polyphenols

Standards are prepared, dispensed, packaged and stored in a manner that minimizes the possibility of chemical degradation and maximizes shelf life. Each standard is supplied with a certificate of analysis. These products can also be custom formulated for your specific application. To learn more about our Custom standards program, please email techservice@sial.com. Or place your request on-line at www.sigma-aldrich.com/standards.

Description	Concentration	Cat. No.	Qty
Catechin solution	2000 µg/mL in methanol	49040-U	0.5 mL
Catechin gallate solution	2000 µg/mL in methanol	49061-U	0.5 mL
Epicatechin solution	2000 µg/mL in methanol	49045-U	0.5 mL
Epicatechin gallate solution	2000 µg/mL in methanol	49060-U	0.5 mL
Epigallocatechin solution	2000 µg/mL in methanol	49037-U	0.5 mL
Epigallocatechin gallate solution	2000 µg/mL in methanol	49044-U	0.5 mL
Gallocatechin solution	2000 µg/mL in methanol	49069-U	0.5 mL
Gallocatechin gallate solution	2000 µg/mL in methanol	49047-U	0.5 mL

Food & Beverage Standards

Food Dyes

Food Dyes

Sigma-Aldrich offers a wide range of reference standards for the accurate detection of regulated dyes. These dyes, although banned in many countries, are still being used illicitly as additives in food products.

CAS No.	Compound	Concentration	Cat. No.	Qty
5413-75-2	Acid Red 73	-	49823-25MG	25 mg
915-67-3	Amaranth	-	87612-25MG	25 mg
514-78-3	Canthaxanthin (trans)	-	32993-10MG	10 mg
1260-17-9	Carminic acid	-	11298-25MG	25 mg
7488-99-5	α -Carotene solution	1 mg/mL in methylene chloride	05784	
6358-53-8	Citrus Red 2	-	89774-25MG	25 mg
2581-69-3	Disperse Orange 1	-	29173-25MG	25 mg
730-40-5	Disperse Orange 3	-	53882-25MG	25 mg
82-28-0	Disperse Orange 11	-	42994-25MG	25 mg
13301-61-6	Disperse Orange 37	-	50323-25MG	25 mg
2872-52-8	Disperse Red 1	-	11074-25MG	25 mg
947601-97-0	Disperse Red 1-d ₃	-	32944-10MG	10 mg
2832-40-8	Disperse Yellow 3	-	11344-25MG	25 mg
947601-96-9	Disperse Yellow 3-d ₃	-	32946-10MG	10 mg
6373-73-5	Disperse Yellow 9	-	38464-25MG	25 mg
7367-79-5	Docosanoic acid tryptamide	-	12094-100MG-F	100 mg
8016-11-3	Epoxidized linseed oil	-	06681-500MG-F 06681-2.5G-F	500 mg 2.5 g
8013-07-8	Epoxidized soya bean oil	-	43956-500MG-F 43956-2.5G-F	500 mg 2.5 g
79873-36-2	Fast Yellow AB	-	93883-25MG	25 mg
6410-10-2	Pararot	-	40446-100MG	100 mg
3761-53-3	Ponceau Xylidine	-	22308-25MG	25 mg
3734-67-6	Red 2G	-	40462-25MG	25 mg
34432-92-3	Solvent Yellow 124	-	49639-50MG	50 mg
842-07-9	Sudan I	-	51383-25MG	25 mg
752211-63-5	Sudan I-d ₅	-	34184-10MG	10 mg
752211-63-5	Sudan I-d ₅ solution	100 ng/ μ L in acetonitrile	34181-2ML	2 mL
3118-97-6	Sudan II	-	07937-25MG	25 mg
85-86-9	Sudan III	-	68562-25MG	25 mg
85-83-6	Sudan IV	-	67386-25MG	25 mg
1014689-18-9	Sudan IV-d ₆	-	34161-10MG	10 mg
2051-85-6	Sudan Orange G	-	43207-25MG	25 mg
1229-55-6	Sudan red G	-	91282-25MG	25 mg
6368-72-5	Sudan Red 7B	-	53373-25MG	25 mg
2783-94-0	Sunset Yellow FCF	-	68775-25MG	25 mg
1934-21-0	Tartrazine	-	03322-25MG	25 mg
152766-94-4	Tetracosanoic acid tryptamide	-	07347-100MG-F	100 mg
2425-85-6	Toluidine Red	-	59659-25MG	25 mg
152766-93-3	Tricosanoic acid tryptamide	-	56924-100MG-F	100 mg

Food & Beverage Standards

Food Packaging Material Residues

Food Packaging Material Residues

The inks and dyes used to produce graphic designs on food packaging materials contain solvents. These solvents can impart off-flavors to food if they are absorbed by the food product. Use the mixtures listed below to monitor for solvent residues in food.

All raws have been screened for identity and purity. A certificate of composition accompanies each standard.

Description	Concentration	Cat. No.	Qty
Residual Solvents in Packaging Material Mixture 1	7.14 % (v/v)	48994-U	1 mL
	1-Butanol 2-Butanol 2-Butanone Butyl acetate Cyclohexane Cyclohexanone Ethanol	2-Ethoxyethanol Ethyl acetate Isobutyl acetate Methanol Methyl acetate 2-Methoxyethyl acetate Toluene	
Residual Solvents in Packaging Material Mixture 2	9.09 % (v/v)	48995-U	1 mL
	2-Ethoxyethyl acetate Isopropyl acetate Propyl acetate 2-Methoxyethanol 1-Methoxy-2-propanol 4-Methyl-2-pentanone	2-Methyl-1-propanol Acetone 1-Propanol 2-Propanol Tetrahydrofuran	

Lipids/FAMES

Lipid Standards

Fatty Acid Methyl Esters (FAMES)

A Word on Nomenclature

Common names are used in this catalog where brevity does not sacrifice clarity. Geneva names are used where possible.

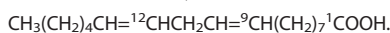
Saturated and unsaturated fatty acid methyl esters are named according to the number of carbon atoms of the parent hydrocarbon chain. Saturated fatty acids are named according to the modified Geneva system, by replacing the terminal "e" of the parent hydrocarbon with the suffix "oic" (e.g., decane to decanoic). The common names of most of these fatty acid methyl esters are also listed.

Unsaturated fatty acid methyl esters are named by replacing the "e" of the corresponding unsaturated hydrocarbon with the suffix "oic" (e.g., decene to decenoic). The number of multiple double bonds is indicated by adding dienoic and so on to the hydrocarbon name. For example, the 18 carbon chain acid with three double bonds is named octadecatrienoic.

Double bonds are also designated by position and geometric configuration. Naturally occurring fatty acids are usually of the cis configuration, unless stated as trans. Octadecenoic acid with the double bond in the nine position has both cis (common name, oleic acid) and trans (elaidic acid) forms. The simplest way to name double-bond positions is to count carbons, starting with the carboxyl carbon, until you reach the double bond. Thus, oleic acid named by the Geneva system is cis-9-octadecenoic acid:



and linoleic acid is cis-9,12-octadecadienoic acid:



In the product descriptions for lipid mixes, chain length, followed by the number of double bonds, is indicated in parentheses after the component names. For example, linolenic acid, which has a chain length of 18 and 3 double bonds, is listed as:

Linolenic acid (18:3)

C18 FAME Isomer Mixes

Qualitative mixtures. Useful for establishing a retention time identification. Data sheet supplied with each ampule.

Description	Concentration	Cat. No.	Qty
Linoleic Acid Methyl Ester Mix, <i>cis/trans</i>	10 mg/mL in methylene chloride (as total weight)	47791	1 mL
	<i>cis</i> -9, <i>cis</i> -12-Octadecadienoic acid methyl ester, ~10 % (w/w) <i>cis</i> -9, <i>trans</i> -12-Octadecadienoic acid methyl ester, ~20 % (w/w)	<i>trans</i> -9, <i>cis</i> -12-Octadecadienoic acid methyl ester, ~20 % (w/w) <i>trans</i> -9, <i>trans</i> -12-Octadecadienoic acid methyl ester, ~50 % (w/w)	
Linolenic Acid Methyl Ester Isomer Mix	10 mg/mL in methylene chloride (as total weight)	47792	1 mL
	<i>cis</i> -9, <i>cis</i> -12, <i>cis</i> -15-Octadecatrienoic acid methyl ester, ~3 % (w/w) <i>cis</i> -9, <i>cis</i> -12, <i>trans</i> -15-Octadecatrienoic acid methyl ester, ~7 % (w/w) <i>cis</i> -9, <i>trans</i> -12, <i>cis</i> -15-Octadecatrienoic acid methyl ester, ~7 % (w/w) <i>cis</i> -9, <i>trans</i> -12, <i>trans</i> -15-Octadecatrienoic acid methyl ester, ~15 % (w/w)	<i>trans</i> -9, <i>cis</i> -12, <i>cis</i> -15-Octadecatrienoic acid methyl ester, ~7 % (w/w) <i>trans</i> -9, <i>cis</i> -12, <i>trans</i> -15-Octadecatrienoic acid methyl ester, ~15 % (w/w) <i>trans</i> -9, <i>trans</i> -12, <i>cis</i> -15-Octadecatrienoic acid methyl ester, ~15 % (w/w) <i>trans</i> -9, <i>trans</i> -12, <i>trans</i> -15-Octadecatrienoic acid methyl ester, ~30 % (w/w)	

Food & Beverage Standards

Lipids/FAMES: *Lipid Standards*

C18 cis/trans Fatty Acids/FAMES

CAS No.	Compound	Cat. No.	Qty
2566-90-7	all-cis-4,7,10,13,16,19-Docosahexaenoic acid methyl ester, 10 mg/mL in heptane, analytical standard	47570-U	1 mL
108698-02-8	cis-7,10,13,16,19-Docosapentaenoic methyl ester, 10 mg/mL in heptane, analytical standard	47563-U	1 mL
2734-47-6	cis-5,8,11,14,17-Eicosapentaenoic acid methyl ester, 10 mg/mL in heptane, analytical standard	47571-U	1 mL
112-63-0	cis-9,cis-12-Octadecadienoic acid methyl ester, 10 mg/mL in heptane, analytical standard	46950-U	1 mL
2566-97-4	trans-9,12-Octadecadienoic acid methyl ester, 10 mg/mL in heptane, analytical standard	46951-U	1 mL
2777-58-4	cis-6-Octadecenoic methyl ester, 10 mg/mL in heptane, analytical standard	47198	1 mL
-	trans-6-Octadecenoic methyl ester, 10 mg/mL in heptane, analytical standard	47199	1 mL
112-62-9	cis-9-Octadecenoic methyl ester, 10 mg/mL in heptane, analytical standard	46902-U	1 mL
1937-62-8	trans-9-Octadecenoic methyl ester, 10 mg/mL in heptane, analytical standard	46903	1 mL
1937-63-9	cis-11-Octadecenoic methyl ester, 10 mg/mL in heptane, analytical standard	46904	1 mL
6198-58-9	trans-11-Octadecenoic methyl ester, 10 mg/mL in heptane, analytical standard	46905-U	1 mL

Characterized Reference Oils

We offer characterized reference oil samples for use as controls or check samples for fatty acid methyl ester (FAME) analyses. These samples provide an excellent means of standardizing your lipid procedures and comparing your results to others. A Certificate of Composition, which includes the chromatographic fingerprint analysis, is provided with each oil sample. Packed in an amber ampule under nitrogen.

CAS No.	Compound	Cat. No.	Qty
120962-03-0	Canola oil, analytical standard	46961	1000 mg
8001-31-8	Coconut oil, analytical standard	46949	1000 mg
8001-30-7	Corn oil, analytical standard	47112-U	1000 mg
8001-29-4	Cottonseed oil, analytical standard	47113	1000 mg
8016-28-2	Lard oil, analytical standard	47115-U	1000 mg
8001-26-1	Linseed (flaxseed) oil, analytical standard	47559-U	1000 mg
8002-50-4	Menhaden fish oil, analytical standard	47116	1000 mg
8001-25-0	Olive oil, analytical standard	47118	1000 mg
8002-75-3	Palm oil, analytical standard	46962	1000 mg
8002-03-7	Peanut oil, analytical standard	47119	1000 mg
8001-23-8	Safflower oil, analytical standard	47120-U	1000 mg
8001-22-7	Soybean oil, analytical standard	47122	1000 mg
8001-21-6	Sunflower seed oil, analytical standard	47123	1000 mg

Quantitative FAME Reference Mixes

The quantitative reference mixes, listed in the table below, are carefully prepared by weight percent. A certificate of analysis is included with each product. Ordering information can be found following the table.

AOCS Animal and Vegetable Reference Mixes

The quantitative mixes listed here conform to the requirements of American Oil Chemists' Society (AOCS) Method Ce 1-62. The composition of each mix is similar to the fatty acid distribution of certain oils (see following table). *Please note that the AOCS mixtures sold under the Supelco brand label are named RM-1, RM-2, etc.*

- AOCS No. 1 (RM-1) – Corn, cottonseed, kapok, poppyseed, rice, safflower, sesame, soybean, sunflower, and walnut oils
- AOCS No. 2 (RM-2) – Hempseed, linseed, perilla, and rubberseed oils
- AOCS No. 3 (RM-3) – Mustard seed, peanut, and rapeseed oils
- Rapeseed Oil Reference Mix – Modern low erucic acid oils
- AOCS No. 4 (RM-4) – Neatsfoot, olive, and teaseed oils
- AOCS No. 5 (RM-5) – Babassu, coconut, ouri-curi, and palm kernel oils
- AOCS No. 6 (RM-6) – Lard, beef tallow, mutton tallow, and palm oil

Food & Beverage Standards

Lipids/FAMES: *Lipid Standards*Quantitative FAME Reference Mixes (*continued*)

NHI/NIH Fatty Acid Methyl Ester Reference Mixes

Quantitative standards, identical in composition to those developed and distributed for several years by the National Institutes of Health (Horning, E.C., et al., *J. Lipid Research*, 5:20-27, 1964).

Each mix (see following table) was designed to test part of the chromatographic system to ensure its reliability for quantitative analyses.

GLC Standard Mixes

These quantitative mixes are useful for determining relative retention times and approximating response factors.

Specifications for Quantitative Products

Each mix is carefully prepared by weight percent.

Mix	Cat. No.	Methyl Ester (% Composition by Weight)																						
		C8:0 (caprylate)	C9:0 (nonanoate)	C10:0 (caprate)	C11:0 (undecanoate)	C12:0 (laurate)	C13:0 (tridecanoate)	C14:0 (myristate)	C15:0 (pentadecanoate)	C16:0 (palmitate)	C16:1 (palmitoleate)	C17:0 (heptadecanoate)	C18:0 (stearate)	C18:1 (oleate)	C18:2 (linoleate)	C18:3 (linolenate)**	C19:0 (nonadecanoate)	C20:0 (arachidate)	C20:1 (eicosenoate)	C21:0 (heneicosanoate)	C22:0 (behenate)	C22:1 (erucate)	C24:0 (lignocerate)	
Qty.: 100 mg each, neat Storage Temp.: 0 °C to -20 °C																								
AOCS No. 1 (RM-1)	07006-1AMP								6.0			3.0	35.0	50.0	3.0		3.0							
AOCS No. 2 (RM-2)	07131-1AMP								7.0			5.0	18.0	36.0	34.0									
AOCS No. 3 (RM-3)	07256-1AMP						1.0	4.0				3.0	45.0	15.0	3.0		3.0				3.0	20.0	3.0	
AOCS Low Euric Rapeseed Oil	07756-1AMP						1.0	4.0				3.0	60.0	12.0	5.0		3.0	1.0			3.0	5.0	3.0	
AOCS No. 4 (RM-4)	07381-1AMP								11.0			3.0	80.0	6.0										
AOCS No. 5 (RM-5)	07506-1AMP	7.0		5.0		48.0		15.0	7.0			3.0	12.0	3.0										
AOCS No. 6 (RM-6)	07631-1AMP							2.0	30.0	3.0		14.0	41.0	7.0	3.0									
NHI-C	08256-1AMP	1.5		3.0		6.0		12.0	19.4			24.9						33.2						
NHI-D	08381-1AMP							11.8	23.6	6.9		13.1	44.6											
NHI-F	08631-1AMP							2.5	4.2			7.3						13.6			25.4			47.0
GLC-10	1891-1AMP								20.0			20.0	20.0	20.0	20.0									
GLC-20	1892-1AMP								20.0			20.0	20.0		20.0			20.0						
GLC-30	1893-1AMP	20.0		20.0		20.0		20.0	20.0															
GLC-40	1895-1AMP								25.0			25.0						25.0			25.0			
GLC-50	1894-1AMP									25.0		25.0							25.0				25.0	
GLC-70	1897-1AMP	20.0	20.0	20.0	20.0	20.0																		
GLC-80	1898-1AMP						20.0	20.0	20.0	20.0		20.0												
GLC-90	1896-1AMP						20.0	20.0			20.0						20.0			20.0				
GLC-100	1899-1AMP											20.0					20.0	20.0		20.0	20.0			

**Stability problems arise with international shipment of mixtures containing linolenate. When ordering such mixtures from outside the continental U.S. or central Europe, please check with your local dealer regarding ordering practices.

Food & Beverage Standards

Lipids/FAMES: Lipid Standards

Polyunsaturated Fatty Acid (PUFA) Methyl Esters

These are complex qualitative standard mixtures. Because they are extracted from natural materials, relative peak sizes and composition may vary from lot to lot.

Description	Concentration	Cat. No.	Qty
PUFA No.1 (Marine Source)	(varied concentration) <i>cis</i> -4,7,10,13,16,19-Docosahexaenoic acid methyl ester Methyl oleate 11-Docosenoic acid methyl ester Methyl palmitate Methyl palmitoleate Methyl all- <i>cis</i> -7,10,13,16,19-docosapentaenoate Methyl stearidonate Methyl <i>cis</i> -13-docosenoate <i>cis</i> -11-Octadecenoic methyl ester Methyl all- <i>cis</i> -5,8,11,14,17-eicosapentaenoate Methyl <i>cis</i> -11-eicosenoate Methyl linoleate Methyl myristate	47033	100 mg
PUFA No.2 (Animal Source)	(varied concentration) <i>cis</i> -4,7,10,13,16,19-Docosahexaenoic acid methyl ester Methyl γ -linolenate <i>cis</i> -8,11,14-Eicosatrienoic acid methyl ester Methyl myristate Methyl arachidonate Methyl oleate Methyl palmitate Methyl all- <i>cis</i> -7,10,13,16,19-docosapentaenoate Methyl palmitoleate Methyl all- <i>cis</i> -5,8,11,14,17-eicosapentaenoate Methyl stearate Methyl linoleate <i>cis</i> -11-Octadecenoic methyl ester Methyl linolenate	47015-U	100 mg
PUFA No.3 (from menhaden oil)	(var. concentration) <i>cis</i> -4,7,10,13,16,19-Docosahexaenoic acid methyl ester Methyl myristate <i>cis</i> -11,14,17-Eicosatrienoic acid methyl ester Methyl oleate 9, 12 - Hexadecadienoic acid methyl ester Methyl palmitate 6, 9, 12, 15 - Hexadecatetraenoic acid methyl ester Methyl palmitoleate Methyl arachidonate Methyl stearate Methyl all- <i>cis</i> -7,10,13,16,19-docosapentaenoate 11,14-Octadecadienoic acid methyl ester Methyl all- <i>cis</i> -5,8,11,14,17-eicosapentaenoate 9,11,14-Octadecatrienoic acid methyl ester Methyl <i>cis</i> -11-eicosenoate <i>cis</i> -11-Octadecenoic methyl ester Methyl linoleate Methyl linolenate	47085-U	100 mg

Grain Fatty Acid Methyl Ester Mix

▶ 10 mg/mL in methylene chloride (as total weight), analytical standard

This fatty acid methyl ester (FAME) mixture is carefully prepared by weight. The weight percentage of each component is indicated. Each ampule contains 10 mg/mL of the FAME reference standard mix in methylene chloride.

For information on the chromatographic analysis of this standard, please contact Technical Services at techservice@sial.com.

Components

Methyl arachidate 1.9 wt. %
Methyl behenate 1.9 wt. %
Methyl caprylate 1.9 wt. %
Methyl decanoate 3.2 wt. %
Methyl *cis*-11-eicosenoate 1.9 wt. %
Methyl elaidate 2.6 wt. %
Methyl erucate 1.9 wt. %
Methyl heptadecanoate 3.2 wt. %
Methyl laurate 6.4 wt. %
Methyl linoleate 13 wt. %
Methyl linolenate 6.4 wt. %
Methyl myristate 3.2 wt. %
Methyl myristoleate 1.9 wt. %
Methyl oleate 19.6 wt. %
Methyl palmitate 13 wt. %
Methyl palmitoleate 6.4 wt. %
Methyl pentadecanoate 1.9 wt. %
Methyl stearate 6.5 wt. %
Methyl tridecanoate 3.2 wt. %
store at: -20°C

47801

1 mL

Food & Beverage Standards

Lipids/FAMES: Lipid Standards

Supelco® 37 Component FAME Mix

▶ 10 mg/mL in methylene chloride (varied), analytical standard

Use this qualitative standard to identify key fatty acid methyl esters in a variety of food products. The complex nature of this mix eliminates the need to purchase multiple mixtures for identification while minimizing expenses.

For information on the chromatographic analysis of this standard, please contact Technical Services at techservice@sial.com.

Components

cis-13,16-Docosadienoic acid methyl ester 2 wt. %
cis-4,7,10,13,16,19-Docosahexaenoic acid methyl ester 2 wt. %
cis-11,14-Eicosadienoic acid methyl ester 2 wt. %
cis-5,8,11,14,17-Eicosapentaenoic acid methyl ester 2 wt. %
cis-8,11,14-Eicosatrienoic acid methyl ester 2 wt. %
cis-11,14,17-Eicosatrienoic acid methyl ester 2 wt. %
cis-11-Eicosenoic acid methyl ester 2 wt. %
Methyl *cis*-10-heptadecenoate 2 wt. %
Methyl hexanoate 4 wt. %
Methyl γ -linolenate 2 wt. %
Methyl arachidate 4 wt. %
Methyl arachidonate 2 wt. %
Methyl behenate 4 wt. %
Methyl butyrate 4 wt. %
Methyl decanoate 4 wt. %
Methyl dodecanoate 4 wt. %
Methyl elaidate 2 wt. %
Methyl erucate 2 wt. %
Methyl heneicosanoate 2 wt. %
Methyl heptadecanoate 2 wt. %
Methyl linoleate 2 wt. %
Methyl linoleaidate 2 wt. %
Methyl linolenate 2 wt. %
Methyl myristate 4 wt. %
Methyl myristoleate 2 wt. %
Methyl oleate 4 wt. %
Methyl octanoate 4 wt. %
Methyl palmitate 6 wt. %
Methyl palmitoleate 2 wt. %
Methyl pentadecanoate 2 wt. %
Methyl *cis*-10-pentadecenoate 2 wt. %
Methyl stearate 4 wt. %
Methyl tricosanoate 2 wt. %
Methyl tetracosanoate 4 wt. %
Methyl tridecanoate 2 wt. %
Methyl undecanoate 2 wt. %
Methyl *cis*-15-tetracosenoate 2 wt. %
ship: dry ice store at: -20°C

47885-U

1 mL

Fatty Acid Methyl Ester Kits and Mixes (Qualitative)

Our kits and mixes are prepared from unsaturated medium-chain fatty acids. They are useful for establishing retention times and for peak identification. All components are 99% pure by GLC and/or TLC, unless otherwise stated.

Saturated FAMES

Description	Concentration	Cat. No.	Qty
Fatty Acid Methyl Esters, Saturated Straight (individually packaged in quantities indicated)		ME10-1KT	1 kit
Chains	<i>Caproic</i> (C6:0), 1 g <i>Caprylic</i> (C8:0), 1 g <i>Capric</i> (C10:0), 1 g <i>Lauric</i> (C12:0), 1 g <i>Myristic</i> (C14:0), 1 g	<i>Palmitic</i> (C16:0), 1 g <i>Stearic</i> (C18:0), 1 g <i>Arachidic</i> (C20:0), 1 g <i>Behenic</i> (C22:0), 1 g <i>Lignoceric</i> (C24:0), 100 mg	
Fatty Acid Methyl Esters, Saturated Straight (individually packaged in quantities indicated)		ME19-1KT	1 kit
Chain	<i>Caproic</i> (C6:0), 1 g <i>Heptanoic</i> (C7:0), 1 g <i>Caprylic</i> (C8:0), 1 g <i>Nonanoic</i> (C9:0), 1 g <i>Capric</i> (C10:0), 1 g <i>Undecanoic</i> (C11:0), 1 g <i>Lauric</i> (C12:0), 1 g <i>Tridecanoic</i> (C13:0), 1 g <i>Myristic</i> (C14:0), 1 g <i>Pentadecanoic</i> (C15:0), 1 g	<i>Palmitic</i> (C16:0), 1 g <i>Heptadecanoic</i> (C17:0), 1 g <i>Stearic</i> (C18:0), 1 g <i>Nonadecanoic</i> (C19:0), 1 g <i>Arachidic</i> (C20:0), 1 g <i>Heneicosanoic</i> (C21:0), 1 g <i>Behenic</i> (C22:0), 1 g <i>Tricosanoic</i> (C23:0), 1 g <i>Lignoceric</i> (C24:0), 1 g	

Food & Beverage Standards

Lipids/FAMES: Fatty Acid Methyl Ester Kits and Mixes (Qualitative)

Unsaturated FAMES

Description	Concentration	Cat. No.	Qty	
F.A.M.E. Mix, C4-C24 Unsaturates	wt. % (varied) <i>cis</i> -13,16-Docosadienoic acid methyl ester, 2 wt. % <i>cis</i> -4,7,10,13,16,19-Docosahexaenoic acid methyl ester, 2 wt. % <i>cis</i> -11,14-Eicosadienoic acid methyl ester, 2 wt. % <i>cis</i> -5,8,11,14,17-Eicosapentaenoic acid methyl ester, 2 wt. % <i>cis</i> -8,11,14-Eicosatrienoic acid methyl ester, 2 wt. % <i>cis</i> -11,14,17-Eicosatrienoic acid methyl ester, 2 wt. % Methyl arachidate, 4 wt. % Methyl arachidonate, 2 wt. % Methyl behenate, 4 wt. % Methyl butyrate, 4 wt. % Methyl decanoate, 4 wt. % Methyl <i>cis</i> -13-docosenoate, 2 wt. % Methyl dodecanoate, 4 wt. % Methyl <i>cis</i> -11-eicosenoate, 2 wt. % Methyl elaidate, 2 wt. % Methyl heneicosanoate, 2 wt. % Methyl heptadecanoate, 2 wt. % Methyl <i>cis</i> -10-heptadecenoate, 2 wt. % Methyl hexanoate, 4 wt. %	Methyl linoleate, 2 wt. % Methyl linoleaidate, 2 wt. % Methyl linolenate, 2 wt. % Methyl γ -linolenate, 2 wt. % Methyl myristate, 4 wt. % Methyl myristoleate, 2 wt. % Methyl octanoate, 4 wt. % Methyl oleate, 4 wt. % Methyl palmitate, 6 wt. % Methyl palmitoleate, 2 wt. % Methyl pentadecanoate, 2 wt. % Methyl <i>cis</i> -10-pentadecenoate, 2 wt. % Methyl stearate, 4 wt. % Methyl tetracosanoate, 4 wt. % Methyl <i>cis</i> -15-tetracosenoate, 2 wt. % Methyl tricosanoate, 2 wt. % Methyl tridecanoate, 2 wt. % Methyl undecanoate, 2 wt. %	18919-1AMP	100 mg
F.A.M.E. Mix, C8-C22 Unsaturates	wt. % (varied) Methyl arachidate, 1.9 wt. % Methyl behenate, 1.9 wt. % Methyl decanoate, 3.2 wt. % Methyl <i>cis</i> -13-docosenoate, 1.9 wt. % Methyl dodecanoate, 6.4 wt. % Methyl <i>cis</i> -11-eicosenoate, 1.9 wt. % Methyl elaidate, 2.6 wt. % Methyl heptadecanoate, 3.2 wt. % Methyl linoleate, 13 wt. % Methyl linolenate, 6.4 wt. %	Methyl myristate, 3.2 wt. % Methyl myristoleate, 1.9 wt. % Methyl octanoate, 1.9 wt. % Methyl oleate, 19.6 wt. % Methyl palmitate, 13 wt. % Methyl palmitoleate, 6.4 wt. % Methyl pentadecanoate, 1.9 wt. % Methyl stearate, 6.5 wt. % Methyl tridecanoate, 3.2 wt. %	18920-1AMP	100 mg
F.A.M.E. Mix, C8-C24	wt. % (varied) Methyl arachidate, 8 wt. % Methyl behenate, 8 wt. % Methyl decanoate, 8 wt. % Methyl <i>cis</i> -13-docosenoate, 5 wt. % Methyl dodecanoate, 8 wt. % Methyl linoleate, 5 wt. % Methyl linolenate, 5 wt. %	Methyl myristate, 8 wt. % Methyl octanoate, 8 wt. % Methyl oleate, 5 wt. % Methyl palmitate, 11 wt. % Methyl palmitoleate, 5 wt. % Methyl stearate, 8 wt. % Methyl tetracosanoate, 8 wt. %	18918-1AMP	100 mg
F.A.M.E. Mix, C20 Unsaturates	(approx. 25% (by weight) each component) <i>cis</i> -11-Eicosenoic acid methyl ester, ~10 mg <i>cis</i> -11,14-Eicosadienoic acid methyl ester, ~10 mg	<i>cis</i> -5,8,11,14-Eicosatetraenoic acid methyl ester, ~10 mg <i>cis</i> -5,8,11,14,17-Eicosapentaenoic acid methyl ester, ~10 mg	18912-1AMP	40 mg
Fatty Acid Methyl Ester Mix	(approx. 20% (by weight) each component) <i>cis</i> -11,14-Eicosadienoic acid methyl ester, ~10 mg <i>cis</i> -11-Eicosenoic acid methyl ester, ~10 mg <i>cis</i> -5,8,11,14,17-Eicosapentaenoic acid methyl ester, ~10 mg	<i>cis</i> -5,8,11,14-Eicosatetraenoic acid methyl ester, ~10 mg <i>cis</i> -11,14,17-Eicosatrienoic acid methyl ester, ~10 mg	18913-1AMP	50 mg
Fatty Acid Methyl Ester Mix	wt. % (varied) Methyl arachidate, 10 % (w/w) Methyl elaidate, 20 % (w/w) Methyl linoleate, 20 % (w/w)	Methyl linoleaidate, 20 % (w/w) Methyl oleate, 20 % (w/w) Methyl stearate, 10 % (w/w)	18916-1AMP	100 mg
Fatty Acid Methyl Ester Mix	wt. % (varied) Methyl arachidate, 2 % (w/w) Methyl behenate, 2 % (w/w) Methyl elaidate, 10 % (w/w) Methyl linoleate, 34 % (w/w) Methyl linoleaidate, 2 % (w/w)	Methyl linolenate, 5 % (w/w) Methyl myristate, 4 % (w/w) Methyl oleate, 25 % (w/w) Methyl palmitate, 10 % (w/w) Methyl stearate, 6 % (w/w)	18917-1AMP	100 mg
Fatty Acid Methyl Esters, Unsaturated Kit	(individually packaged in quantities indicated) <i>cis</i> -4,7,10,13,16,19-Docosahexaenoic acid methyl ester, 100 mg Methyl arachidonate, 100 mg Methyl <i>cis</i> -13-docosenoate, 100 mg Methyl <i>cis</i> -11-eicosenoate, 100 mg Methyl elaidate, 500 mg Methyl linoleate, 1000 mg Methyl linoleaidate, 100 mg	Methyl linolenate, 100 mg Methyl myristoleate, 100 mg Methyl nervonate Methyl oleate, 100 mg Methyl palmitoleate, 100 mg Methyl petroselinic acid, 100 mg Methyl <i>cis</i> -15-tetracosenoate, 100 mg	ME14-1KT	1 kit

Food & Beverage Standards

Lipids/FAMES: *Free Fatty Acid Kits (Qualitative)*

Free Fatty Acid Kits (Qualitative)

These kits are prepared from unsaturated medium-chain fatty acids. They are useful for establishing retention times and for peak identification. All components are 99% pure by GLC and/or TLC, unless otherwise stated.

Saturated Fatty Acids			
Description	Concentration	Cat. No.	Qty
Fatty Acid Kit	(individually packaged, quantities indicated) <i>Arachidic acid, 5 g</i> <i>Behenic acid, 5 g</i> <i>Decanoic acid, 10 g</i> <i>Dodecanoic acid, 10 g</i> <i>Hexanoic acid, 10 mL</i>	<i>Lignoceric acid, 1 g</i> <i>Myristic acid, 10 g</i> <i>Octanoic acid, 10 mL</i> <i>Palmitic acid, 10 g</i> <i>Stearic acid, 5 g</i>	EC10A-1KT 1 kit
Fatty Acids Even Carbon Straight Chains	(individually packaged in quantities indicated) <i>Hexanoic acid, 10 mL</i> <i>Octanoic acid, 10 mL</i> <i>Decanoic acid, 10 g</i> <i>Dodecanoic acid, 10 g</i> <i>Myristic acid, 10 g</i>	<i>Palmitic acid, 10 g</i> <i>Stearic acid, 10 g</i> <i>Arachidic acid, 10 g</i> <i>Behenic acid, 10 g</i> <i>Lignoceric acid, 10 g</i>	EC10-1KT 1 kit
Fatty Acids, Odd Carbon Straight Chains Kit	(individually packaged in quantities indicated) <i>Heneicosanoic acid, 1 g</i> <i>Heptadecanoic acid, 1 g</i> <i>Heptanoic acid, 1 g</i> <i>Nonadecanoic acid, 1 g</i> <i>Nonanoic acid, 1 g</i>	<i>Pentadecanoic acid, 1 g</i> <i>Tricosanoic acid, 1 g</i> <i>Tridecanoic acid, 1 g</i> <i>Undecanoic acid, 1 g</i>	OC9-1KT 1 kit

Unsaturated Fatty Acids			
Description	Concentration	Cat. No.	Qty
Fatty Acids Unsaturated Kit	(individually packaged in quantities indicated) <i>Arachidonic acid, 100 mg</i> <i>cis-4,7,10,13,16,19-Docosahexaenoic acid, 100 mg</i> <i>Elaidic acid, 100 mg</i> <i>Erucic acid, 100 mg</i> <i>Linoleic acid, 100 mg</i>	<i>Linolenic acid, 100 mg</i> <i>Nervonic acid, 100 mg</i> <i>Oleic acid, 100 mg</i> <i>Palmitoleic acid, 100 mg</i> <i>Petroselinic acid, 100 mg</i>	UN10-1KT 1 kit

Sterols

Sterols make up the majority of the unsaponifiable matter in vegetable and animal fats. Animal fats contain mostly cholesterol, whereas most vegetable fats contain only traces of this sterol. Plant sterols are collectively called phytosterols. These standards are not corrected for purity. Packed in amber ampule under nitrogen.

CAS No.	Compound	Cat. No.	Qty
481-21-0	5 α -Cholestane, 10 mg/mL in chloroform, analytical standard	47124	1 mL
80-97-7	Cholesterol, 10 mg/mL in chloroform, analytical standard	47129	1 mL
57-88-5	Cholesterol solution, 10 mg/mL in chloroform, analytical standard	47127-U	1 mL
57-87-4	Ergosterol, 10 mg/mL in chloroform, analytical standard	47130-U	1 mL
83-46-5	β -Sitosterol, 100 μ g/mL in chloroform, analytical standard	47133	1 mL
83-48-7	Stigmasterol, 10 mg/mL in chloroform, analytical standard	47132	1 mL

Mono-, Di-, and Triglycerides

These qualitative standards are useful in determining relative retention times and for establishing approximate response factors. Mixes are prepared by weight, and the composition verified by gas and/or thin layer liquid chromatography. The weight percentage of each component is indicated.

Description	Concentration	Cat. No.	Qty
Lipid Standard, Mono-, Di-, & Triglyceride Mix	- <i>1,3-Diolein, 10 mg</i> <i>1,2-Dioleoyl-rac-glycerol, 10 mg</i>	- <i>Glyceryl trioleate, 10 mg</i> <i>Monoolein, 10 mg</i>	1787-1AMP 40 mg
Lipid standards: triglyceride mixtures	- <i>Glyceryl tridecanoate, ~20 mg</i> <i>Glyceryl tridodecanoate, ~20 mg</i> <i>Glyceryl trimyristate, ~20 mg</i>	- <i>Glyceryl trioctanoate, ~20 mg</i> <i>Tripalmitin, ~20 mg</i>	17811-1AMP 100 mg

Food & Beverage Standards

Lipids/FAMES: Mono-, Di-, and Triglycerides

Description	Concentration	Cat. No.	Qty
Mono-, Di-, and Triglycerides Kit	(individually packaged) Dilaurin Mixed Isomers, 100 mg 1,2-Dimyristoyl-rac-glycerol, 100 mg Dipalmitin, 100 mg 1,2-Distearoyl-rac-glycerol, 100 mg rac-Glycerol 1-myristate, 100 mg Glycerol tridodecanoate, 100 mg Glycerol triarachidate, 100 mg Glycerol trihexanoate, 1 mL Glycerol tridecanoate, 100 mg Glycerol tri(cis-13-docosenoate), 100 mg Glycerol tridodecanoate, 100 mg Glycerol tri(cis-11-eicosenoate), 100 mg Glycerol trielaidate, 100 mg Glycerol trilinoleate, 100 mg Glycerol trilinolenate, 100 mg Glycerol trimyristate, 100 mg	- MDT12-1KT	1 kit
Phospholipid Mixture for HPLC	in chloroform (varied) L- α -Lysophosphatidylcholine Glycine max (soybean), .3 mg/mL L- α -Phosphatidylcholine, 1.5 mg/mL L- α -Phosphatidylinositol ammonium salt Glycine max (soybean), .9 mg/mL L- α -Phosphatidylethanolamine Glycine max (soybean), 1.2 mg/mL	- P3817-1VL	
Triglycerides Kit	(individually packaged in quantities indicated) Glycerol triarachidate, 100 mg Glycerol trihexanoate, 1 mL Glycerol tridecanoate, 100 mg Glycerol tri(cis-13-docosenoate), 100 mg Glycerol tridodecanoate, 100 mg Glycerol tri(cis-11-eicosenoate), 100 mg Glycerol trielaidate, 100 mg Glycerol trilinoleate, 100 mg Glycerol trilinolenate, 100 mg Glycerol trimyristate, 100 mg Glycerol trioctanoate, .5 mL Glycerol tripalmitoleate, 100 mg Glycerol tripetroselinate, 100 mg Glycerol tristearate, 100 mg Triacetin, 100 mg Tribehenin, 100 mg Glycerol tributryate, 100 mg Tripalmitin, 100 mg Glycerol trioleate, 100 mg	- TRI19-1KT	1 kit
Triglycerides, Saturated, Even Carbon Kit	(individually packaged in quantities indicated) Triacetin, 100 mg Glycerol tributryate, 100 mg Glycerol trihexanoate, 1 mL Glycerol trioctanoate, 1 mL Glycerol tridecanoate, 100 mg Glycerol tridodecanoate, 100 mg Glycerol trimyristate, 100 mg Tripalmitin, 100 mg Glycerol tristearate, 100 mg Glycerol triarachidate, 100 mg Tribehenin, 100 mg	- TRI11-1KT	1 kit

Bacterial Identification Standards

Bacterial Acid Methyl Ester (BAME) Mix

► solution (10 mg/mL total concentration in methyl caproate), analytical standard

This is a qualitative standard of bacterial acid methyl esters in methyl caproate (10 mg/mL total concentration). Use this mix to distinguish between various bacteria on the basis of their cellular fatty acid composition. For information on the chromatographic analysis of this standard, please contact Technical Services at techservice@sial.com.

Components

Methyl undecanoate
Methyl (\pm)-2-hydroxydodecanoate
Methyl dodecanoate
Methyl tridecanoate
Methyl 2-hydroxydodecanoate
Methyl (\pm)-3-hydroxydodecanoate
Methyl myristate
Methyl 13-methyltetradecanoate
Methyl 12-methyltetradecanoate
Methyl pentadecanoate
Methyl 2-hydroxytetradecanoate
Methyl 3-hydroxytetradecanoate
Methyl 14-methylpentadecanoate
Methyl cis-9-hexadecanoate
Methyl palmitate
Methyl 15-methylhexadecanoate
Methyl cis-9,10-methylenehexadecanoate
Methyl heptadecanoate
Methyl 2-hydroxyhexadecanoate
Methyl linoleate
Methyl oleate
Methyl trans-9-octadecanoate
Methyl stearate
Methyl cis-9,10-methyleneoctadecanoate
Methyl nonadecanoate
Methyl eicosanoate

store at: -20°C

47080-U

1 mL

Food & Beverage Standards

Lipids/FAMES: Bacterial Identification Standards

Non-volatile Acid Standard Mix

▶ 0.01 meq/mL each component in deionized water, analytical standard

Components

Fumaric acid
 α-Lactic acid
 Malonic acid
 Methylmalonic acid
 Oxalacetic acid
 Oxalic acid
 Pyruvic acid
 Succinic acid
 store at: 2-8°C

46985-U

100 mL

Volatile Free Acid Mix

▶ analytical standard

Components

Acetic acid
 Butyric acid
 Formic acid
 Heptanoic acid
 Hexanoic acid
 Isobutyric acid
 Isovaleric acid
 4-Methylvaleric acid
 Propionic acid
 Valeric acid
 store at: 2-8°C

46975-U

100 mL

WSFA-2

▶ 0.1 wt. % each component in deionized water, qualitative standard

Components

Acetic acid
 Butyric acid
 Isobutyric acid
 Isovaleric acid
 Propionic acid
 Valeric acid

47056

5 mL

WSFA-4

▶ 0.1 wt. % each component in deionized water, qualitative standard

Components

Acetic acid
 Butyric acid
 Isobutyric acid
 Isovaleric acid
 2-Methylbutyric acid
 Propionic acid
 Valeric acid

47058

5 mL

Mycotoxins

Sigma-Aldrich offers a comprehensive line of certified reference materials and analytical standards for measuring the levels of unsafe mycotoxins in crops, fruits, processed foods and animal feeds. Products are tested by spectroscopy and/or HPLC against known standards and previous lots to ensure precision and uniformity, ensuring that you are obtaining the finest mycotoxin standards available.

Caution: Mycotoxins may be carcinogenic and, therefore, should be handled only by qualified personnel.

NEW PRODUCTS**Mycotoxin Reference Materials (Neats)**

We offer certified reference materials in neat form for the preparation of your own instrumentation calibration solutions. Certificate of Analysis are available for each product.

Description	Cat. No.	Pkg
3-Acetyldeoxynivalenol	32927-5MG	5 mg
15-Acetyldeoxynivalenol	32928-5MG	5 mg
Aflatoxin B ₁	32754-5MG	5 mg
Aflatoxin B ₂	32755-5MG	5 mg
Aflatoxin G ₁	32756-5MG	5 mg
Aflatoxin G ₂	32757-5MG	5 mg
Deoxynivalenol	32943-5MG	5 mg
Fumonisin B ₁	32936-5MG	5 mg
Fusarenon X	33438-5MG	5 mg
Neosolaniol	32932-5MG	5 mg
Nivalenol	32929-5MG	5 mg
Ochratoxin A	32937-5MG	5 mg
Patulin	32759-5MG	5 mg
Sterigmatocystin	32609-5MG	5 mg
T-2 Toxin	33947-5MG	5 mg
Zearalenone	32939-5MG	5 mg

Food & Beverage Standards

Mycotoxins

Mycotoxin mixtures

For a detailed analysis of individual mycotoxins in multi-toxin samples.

Description	Concentration	Cat. No.	Qty
Aflatoxin Mix	in benzene:acetonitrile (98:2) Aflatoxin B ₁ , 1 µg/mL Aflatoxin B ₂ , .3 µg/mL	46300-U Aflatoxin G ₁ , 1 µg/mL Aflatoxin G ₂ , .3 µg/mL	5 × 1 mL
Aflatoxin Mix	in methanol (varied) Aflatoxin B ₁ , 1 µg/mL Aflatoxin B ₂ , .3 µg/mL	46304-U 46303 Aflatoxin G ₁ , 1 µg/mL Aflatoxin G ₂ , .3 µg/mL	5 × 1 mL 5 mL
Aflatoxin Mix 4 solution	2 µg/mL B ₁ and G ₁ in acetonitrile 0.5 µg/mL B ₂ and G ₂ in acetonitrile	34036-1ML-R 34036-2ML-R	1 mL 2 mL
Aflatoxin Mix 4 solution	-	33415-2ML	2 mL
Japanese Aflatoxin Mixture	25 µg/mL each component in acetonitrile Aflatoxin B ₁ Aflatoxin B ₂	40139-U Aflatoxin G ₁ Aflatoxin G ₂	5 × 1 mL
B-Tricothecene mix, (DON, NIV, 3-AcDON, 15-AcDON)	100 µg/mL in acetonitrile (each of DON, NIV, 3-AcDON and 15-AcDON)	34134-2ML	2 mL
Tricothecene Mix solution	-	32926-1ML	1 mL

Single-component solutions (mycotoxins)

For precise quality control of food and feed, we offer both labeled and non-labeled single-component solutions of the most important mycotoxins in a variety of concentrations and different solvents. A Certificate of Analysis is available for each product.

Description	Concentration	Cat. No.	Qty
3-Acetyldeoxynivalenol solution	100 µg/mL in acetonitrile	34132-2ML	2 mL
3-Acetyldeoxynivalenol- ¹³ C ₁₇ solution	25 µg/mL in acetonitrile	32962-1ML	1 mL
3-Acetyl-d ₃ -deoxynivalenol solution	100 µg/mL in acetonitrile	34129-2ML	2 mL
15-Acetyldeoxynivalenol solution	100 µg/mL in acetonitrile	34133-2ML	2 mL
Deepoxy-deoxynivalenol solution	50 µg/mL in acetonitrile	34135-2ML	2 mL
Deoxynivalenol-d ₁ solution	100 µg/mL in acetonitrile	34155-2ML	2 mL
Deoxynivalenol solution	100 µg/mL in acetonitrile	34124-2ML	2 mL
Deoxynivalenol- ¹³ C ₁₅ solution	25 µg/mL in acetonitrile	34128-1ML	1 mL
Fumonisin B ₁ solution	50 µg/mL in acetonitrile: water	34139-2ML	2 mL
Fumonisin B ₁ - ¹³ C ₃₄ solution	25 µg/mL in acetonitrile: water	33621-1ML	1 mL
Fumonisin B ₂ solution	50 µg/mL in acetonitrile: water (50:50)	34142-2ML	2 mL
Fumonisin B ₂ - ¹³ C ₃₄ solution	10 µg/mL in acetonitrile: water	32915-1ML	1 mL
Fumonisin B ₃ - ¹³ C ₃₄ solution	10 µg/mL in acetonitrile: water	32916-1ML	1 mL
Fusarenon X solution	100 µg/mL in acetonitrile	34130-2ML	2 mL
HT-2 Toxin- ¹³ C ₂₂ solution	25 µg/mL in acetonitrile	33842-1ML	1 mL
Mycophenolic acid- ¹³ C ₁₇ solution	25 µg/mL in acetonitrile	32773-1ML	1 mL
Nivalenol solution	100 µg/mL in acetonitrile	34131-2ML	2 mL
Ochratoxin A ¹³ C ₂₀ solution	10 µg/mL in acetonitrile	33416-1ML	1 mL
Patulin solution	100 µg/mL in acetonitrile	34127-2ML	2 mL
T-2 Toxin- ¹³ C ₂₄ solution	25 µg/mL in acetonitrile	33892-1ML	1 mL
Zearalenone solution	100 µg/mL in acetonitrile	34126-2ML	2 mL
Zearalenone- ¹³ C ₁₈ solution	25 µg/mL in acetonitrile	32758-1ML	1 mL
Aflatoxin B ₁ solution	3 µg/mL in benzene:acetonitrile (98:2)	46323-U	1 mL
Aflatoxin B ₁ solution	2 µg/mL in acetonitrile	34029-2ML-R	2 mL
Aflatoxin B ₁ solution	20 µg/mL in methanol	44647-U	1 mL
Aflatoxin B ₁ solution	3.79 µg/g in acetonitrile	ERMAC057-4ML	4 mL
Aflatoxin B ₁ - ¹³ C ₁₇ solution	0.5 µg/mL in acetonitrile	32764-1ML	1 mL
Aflatoxin B ₂ solution	0.5 µg/mL in acetonitrile	34034-2ML-R	2 mL
Aflatoxin B ₂ solution	3 µg/mL in benzene:acetonitrile (98:2)	46324-U	1 mL
Aflatoxin B ₂ solution	3.80 µg/g in acetonitrile	ERMAC058-4ML	4 mL
Aflatoxin B ₂ - ¹³ C ₁₇ solution	0.5 µg/mL in acetonitrile	32771-1ML	1 mL
Aflatoxin G ₁ solution	2 µg/mL in acetonitrile	34032-2ML-R	2 mL
Aflatoxin G ₁ solution	3 µg/mL in benzene:acetonitrile (98:2)	46325-U	1 mL
Aflatoxin G ₁ - ¹³ C ₁₇ solution	0.5 µg/mL in acetonitrile	32772-1ML	1 mL
Aflatoxin G ₂ solution	0.5 µg/mL in acetonitrile	34033-2ML-R	2 mL
Aflatoxin G ₂ solution	3 µg/mL in benzene:acetonitrile (98:2)	46326-U	1 mL
Aflatoxin G ₂ solution	3.80 µg/g in acetonitrile	ERMAC060-4ML	4 mL
Aflatoxin G ₂ - ¹³ C ₁₇ solution	0.5 µg/mL in acetonitrile	32777-1ML	1 mL

Food & Beverage Standards

Mycotoxins

Single-component solutions (mycotoxins) (continued)

Description	Concentration	Cat. No.	Qty
Aflatoxin M ₁ solution	0.5 µg/mL in acetonitrile	34031-2ML-R	2 mL
Aflatoxin M ₁ solution	10 µg/mL in acetonitrile	46319-U	1 mL
Aflatoxin M ₁ standard solution	9.93 µg/mL in chloroform	BCR423RM-2.5ML	2.5 mL
Ochratoxin B solution	10 µg/mL in acetonitrile	32411-2ML	2 mL
Fumonisin B ₃ solution	50 µg/mL in acetonitrile: water	32606-1ML	1 mL
Deoxynivalenol 3-glucoside solution	50 µg/mL in acetonitrile	32911-1ML	1 mL
T-2-Triol solution	50 µg/mL in acetonitrile	32913-1ML	1 mL
T-2-Tetraol solution	50 µg/mL in acetonitrile	32914-1ML	1 mL
Sterigmatocystin solution	50 µg/mL in acetonitrile	32986-1ML	1 mL
Ochratoxin A solution	10 µg/mL in acetonitrile	34037-2ML-R	2 mL
T2-Toxin solution	100 µg/mL in acetonitrile	34071-2ML	2 mL
Neosolaniol solution	100 µg/mL in acetonitrile	34138-2ML	2 mL
α-Zearalenol solution	10 µg/mL in acetonitrile	35405-1ML	1 mL
α-Zearalenol solution	10 µg/mL in acetonitrile	35406-1ML	1 mL
β-Zearalenol solution	10 µg/mL in acetonitrile	35407-1ML	1 mL
β-Zearalenol solution	10 µg/mL in acetonitrile	35409-1ML	1 mL
Paxilline solution	100 µg/mL in acetonitrile	35417-1ML	1 mL
Wortmannin solution	100 µg/mL in acetonitrile	35441-1ML	1 mL
Gliotoxin solution	100 µg/mL in acetonitrile	35598-1ML	1 mL
Moniliformin sodium salt solution	100 µg/mL in acetonitrile: water	37013-1ML	1 mL
Verruculogen solution	100 µg/mL in acetonitrile	37016-1ML	1 mL
Fumagillin solution	100 µg/mL in acetonitrile	37017-1ML	1 mL

Mycotoxin Certified Matrix Reference Materials (CRMs)

CRMs being released from the European Commission's JRC-IRMM organization and distributed by Sigma-Aldrich are produced with raw materials to more accurately resemble actual samples in their natural state. We recommend use of these materials for evaluating sample prep methods.

Description	Cat. No.	Pkg
Compound feed (aflatoxin B ₁ , blank)	BCR375-50G	50 g
Compound feedingstuff (aflatoxins, very low level)	ERMBE375-2X75G	2 × 75 g
Compound feedingstuff (aflatoxins, high level)	ERMBE376-2X75G	2 × 75 g
Maize (very low level ZON)	ERMBE376-60G	60 g
Maize (low level zon)	ERMBE376-60G	60 g
Maize flour (deoxynivalenol, blank)	BCR377-150G	150 g
Peanut butter (aflatoxin low level)	BCR401R-1EA	1 ea
Wheat (ochratoxin A, blank)	BCR471-55G	55 g

Sweeteners

CAS No.	Compound	Cat. No.	Qty
87-99-0	Xylitol, analytical standard	47844	1000 mg
56038-13-2	Sucralose, analytical standard	90984-100MG	100 mg
55589-62-3	Acesulfame K, analytical standard	47134	1000 mg
22839-47-0	Aspartame, analytical standard	47135	500 mg
139-05-9	Sodium Cyclamate, analytical standard	47827	1000 mg
50-99-7	D-(+) Glucose, analytical standard	47829	1000 mg
82385-42-0	Sodium Saccharin, analytical standard	47839	1000 mg
6381-91-5	Saccharin Calcium Salt, analytical standard	47840	1000 mg
50-70-4	D-Sorbitol, analytical standard	47841	1000 mg

Food & Beverage Standards

Vitamins

Vitamins

For use in the retention identification of vitamins when using HPLC and GC. Not intended for use as an activity reference standard. All compounds have been thoroughly evaluated to ensure the utmost quality. Neat, unless otherwise noted. Certificate of Composition provided with each purchase.

Water Soluble Vitamins

CAS No.	Compound	Cat. No.	Qty
68-19-9	Cyanocobalamin (B12), analytical standard	47869	100 mg
59-30-3	Folic acid, analytical standard	47866	500 mg
98-92-0	Nicotinamide (Niacinamide), analytical standard	47865-U	1000 mg
59-67-6	Nicotinic acid, analytical standard	47864	1000 mg
137-08-6	D-Pantothenic acid hemicalcium salt, analytical standard	47867	1000 mg
58-56-0	Pyridoxine Hydrochloride (B6), analytical standard	47862	1000 mg
83-88-5	Riboflavin (B2), analytical standard	47861	1000 mg
67-03-8	Thiamine Hydrochloride (B1), analytical standard	47858	1000 mg

Fat Soluble Vitamins

CAS No.	Compound	Cat. No.	Qty
67-97-0	Cholecalciferol (D3), analytical standard	47763	100 mg
50-14-6	Ergocalciferol (D2), analytical standard	47768	100 mg
58-27-5	Menadione (K3), analytical standard	47775	1000 mg
863-61-6	Menaquinone (K2), analytical standard	47774	100 mg
84-80-0	Phylloquinone (K1), analytical standard	47773	100 mg
79-81-2	Retinol palmitate, analytical standard	46959-U	100 mg
127-47-9	Retinyl acetate, analytical standard	46958	100 mg
10191-41-0	(±)-α-Tocopherol, analytical standard	47783	100 mg
148-03-8	rac-β-Tocopherol solution, 50 mg/mL in hexane, analytical standard	46401-U	1 mL
54-28-4	(+)-γ-Tocopherol, analytical standard	47785	25 mg
119-13-1	δ-Tocopherol, analytical standard	47784	100 mg
7695-91-2	Vitamin E acetate, analytical standard	47786	100 mg
4345-03-3	D-α-Tocopherol succinate, analytical standard	47782	100 mg

Petroleum Standards

ASTM Petroleum Standards

ASTM® D2887

This sample is a petroleum fraction having a boiling range from 250°F to 850°F, evaluated in round-robin studies by the ASTM. Use this sample and the supplied ASTM boiling range consensus values to evaluate system performance.

Description	Concentration	Cat. No.	Qty																				
ASTM® D2887 Reference gas oil sample, Lot - 2		506419 48873	1 mL 6 × 1 mL																				
ASTM® D2887 Quantitative Calibration Solution	0.5 wt. % each component in carbon disulfide (except where noted)	500631 500658	1 mL 6 × 1 mL																				
	<table border="0"> <tr> <td><i>Decane</i></td> <td><i>Octane</i></td> </tr> <tr> <td><i>Dodecane</i></td> <td><i>Pentadecane</i></td> </tr> <tr> <td><i>Eicosane</i></td> <td><i>Pentane</i></td> </tr> <tr> <td><i>Heptadecane</i></td> <td><i>Tetracosane</i></td> </tr> <tr> <td><i>Heptane</i></td> <td><i>Tetradecane</i></td> </tr> <tr> <td><i>Hexacosane</i></td> <td><i>Undecane</i></td> </tr> <tr> <td><i>Hexadecane, 1 % (w/w)</i></td> <td><i>Hexatriacontane</i></td> </tr> <tr> <td><i>Hexane</i></td> <td><i>Triacontane</i></td> </tr> <tr> <td><i>Nonane</i></td> <td><i>Tetracontane</i></td> </tr> <tr> <td><i>Octadecane, 1 % (w/w)</i></td> <td><i>Tetratetracontane</i></td> </tr> </table>	<i>Decane</i>	<i>Octane</i>	<i>Dodecane</i>	<i>Pentadecane</i>	<i>Eicosane</i>	<i>Pentane</i>	<i>Heptadecane</i>	<i>Tetracosane</i>	<i>Heptane</i>	<i>Tetradecane</i>	<i>Hexacosane</i>	<i>Undecane</i>	<i>Hexadecane, 1 % (w/w)</i>	<i>Hexatriacontane</i>	<i>Hexane</i>	<i>Triacontane</i>	<i>Nonane</i>	<i>Tetracontane</i>	<i>Octadecane, 1 % (w/w)</i>	<i>Tetratetracontane</i>		
<i>Decane</i>	<i>Octane</i>																						
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<i>Octadecane, 1 % (w/w)</i>	<i>Tetratetracontane</i>																						
ASTM® D2887/D5307 Column Resolution Test Mix	1 % (w/v) each component in octane	48889	6 × 1 mL																				
	<table border="0"> <tr> <td><i>Hexadecane</i></td> <td><i>Octadecane</i></td> </tr> </table>	<i>Hexadecane</i>	<i>Octadecane</i>																				
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Petroleum Standards

ASTM Petroleum Standards

ASTM® D3710

Boiling Range Distribution of Gasoline (500°F maximum)

These qualitative and quantitative hydrocarbon blends are prepared according to ASTM recommendations. Calibration mixes are either volume/volume or weight/weight formulations as indicated. Nominal concentration of actual values will differ from lot to lot. Qualitative calibration references are prepared to approximate weight/weight ($\pm 10\%$) specifications and, because of the presence of gases, are not intended for quantitative use. All calibration references are accompanied by a data sheet.

Description	Concentration	Cat. No.	Qty
ASTM® D3710 Qualitative Calibration Mix	(each component in the approximate proportions (w/w) indicated)	506427 48884	1 mL 6 × 1 mL
	<i>Butane, 4.5 % (w/w)</i> <i>Butylbenzene, 3.2 % (w/w)</i> <i>Decane, 3.2 % (w/w)</i> <i>2,4-Dimethylpentane, 5.4 % (w/w)</i> <i>Dodecane, 3.2 % (w/w)</i> <i>Heptane, 9.7 % (w/w)</i> <i>Hexane, 5.4 % (w/w)</i> <i>2-Methylbutane, 9.7 % (w/w)</i> <i>2-Methylpentane, 5.4 % (w/w)</i> <i>2-Methylpropane, 1.5 % (w/w)</i>	<i>Octane, 5.4 % (w/w)</i> <i>Pentadecane, 2.2 % (w/w)</i> <i>Pentane, 7.6 % (w/w)</i> <i>Propane, 1.5 % (w/w)</i> <i>Propylbenzene, 4.3 % (w/w)</i> <i>Tetradecane, 2.2 % (w/w)</i> <i>Toluene, 10.8 % (w/w)</i> <i>Tridecane, 2.2 % (w/w)</i> <i>p-Xylene, 13 % (w/w)</i>	
ASTM® D3710 Quantitative Calibration Mix	(each component in the approximate proportions (w/w) indicated)	506435 48879	1 mL 6 × 1 mL
	<i>Butylbenzene, 3.5 % (w/w)</i> <i>Decane, 3.5 % (w/w)</i> <i>2,4-Dimethylpentane, 5.8 % (w/w)</i> <i>Dodecane, 3.5 % (w/w)</i> <i>Heptane, 10.5 % (w/w)</i> <i>Hexane, 5.8 % (w/w)</i> <i>2-Methylbutane, 10.5 % (w/w)</i> <i>2-Methylpentane, 5.8 % (w/w)</i>	<i>Octane, 5.8 % (w/w)</i> <i>Pentadecane, 2.3 % (w/w)</i> <i>Pentane, 8.1 % (w/w)</i> <i>Propylbenzene, 4.7 % (w/w)</i> <i>Tetradecane, 2.3 % (w/w)</i> <i>Toluene, 11.6 % (w/w)</i> <i>Tridecane, 2.3 % (w/w)</i> <i>p-Xylene, 14 % (w/w)</i>	

ASTM® D4815

Determination of Oxygenates (Ethers and Alcohols) in Gasoline by GC

Along with valve timing and peak identification mixes, one set of quantitative calibration mixes are available with the method specified internal standard. All components used in preparing these standards have been analyzed for purity, water content, and the presence of other method components to 0.01%. Blends have been prepared using precise gravimetric techniques exceeding the requirements of ASTM Method D4815. Corrections are made for common impurities. All calibration blends are provided with a chromatogram and data verifying the purity and identity of the raw materials.

Description	Concentration	Cat. No.	Qty
ASTM® D4815 Quantitative Calibration Mixture 1	(each component at the nominal wt% indicated)	47205	1 mL
	<i>tert-Butanol, .095 % (w/w)</i> <i>tert-Butyl methyl ether, 19 % (w/w)</i> <i>1,2-Dimethoxyethane, 5 % (w/w)</i>	<i>Ethanol, 2.85 % (w/w)</i> <i>2-Methyl-2-butanol, 1.19 % (w/w)</i> <i>Isooctanexylene (65:35), 71.87 % (w/w)</i>	
ASTM® D4815 Quantitative Calibration Mixture 2	(each component at the nominal wt% indicated)	47206	1 mL
	<i>tert-Butanol, 2.85 % (w/w)</i> <i>tert-Butyl methyl ether, 14.25 % (w/w)</i> <i>1,2-Dimethoxyethane, 5 % (w/w)</i>	<i>Ethanol, .095 % (w/w)</i> <i>2-Methyl-2-butanol, 4.75 % (w/w)</i> <i>Isooctanexylene (65:35), 73.06 % (w/w)</i>	
ASTM® D4815 Quantitative Calibration Mixture 3	(each component at the nominal wt% indicated)	47207	1 mL
	<i>tert-Butanol, 5.7 % (w/w)</i> <i>tert-Butyl methyl ether, 9.5 % (w/w)</i> <i>1,2-Dimethoxyethane, 5 % (w/w)</i>	<i>Ethanol, 5.7 % (w/w)</i> <i>2-Methyl-2-butanol, 2.38 % (w/w)</i> <i>Isooctanexylene (65:35), 71.73 % (w/w)</i>	
ASTM® D4815 Quantitative Calibration Mixture 4	(each component at the nominal wt% indicated)	47208	1 mL
	<i>tert-Butanol, 7.6 % (w/w)</i> <i>tert-Butyl methyl ether, 4.75 % (w/w)</i> <i>1,2-Dimethoxyethane, 5 % (w/w)</i>	<i>Ethanol, 8.55 % (w/w)</i> <i>2-Methyl-2-butanol, 3.56 % (w/w)</i> <i>Isooctanexylene (65:35), 70.54 % (w/w)</i>	
ASTM® D4815 Quantitative Calibration Mixture 5	(each component at the nominal wt% indicated)	47209	1 mL
	<i>tert-Butanol, 11.4 % (w/w)</i> <i>tert-Butyl methyl ether, .095 % (w/w)</i> <i>1,2-Dimethoxyethane, 5 % (w/w)</i>	<i>Ethanol, 11.4 % (w/w)</i> <i>2-Methyl-2-butanol, .095 % (w/w)</i> <i>Isooctanexylene (65:35), 72.01 % (w/w)</i>	
ASTM® D4815 Valve Timing Mix	(each component at the nominal wt% indicated)	47212	1 mL
	<i>tert-Butyl ethyl ether, 10 % (w/w)</i> <i>tert-Butyl methyl ether, 10 % (w/w)</i> <i>Diisopropyl ether, 10 % (w/w)</i>	<i>Hexane, 60 % (w/w)</i> <i>Methylcyclopentane, 10 % (w/w)</i>	

Petroleum Standards

ASTM Petroleum Standards

Description	Concentration	Cat. No.	Qty
ASTM® D4815 Qualitative ID Mix	(each component at the nominal wt% indicated) <i>tert</i> -Amyl methyl ether, 7.3 % (w/w) Benzene, 5 % (w/w) 1-Butanol, 7.3 % (w/w) 2-Butanol, 7.3 % (w/w) <i>tert</i> -Butanol, 7.3 % (w/w) <i>tert</i> -Butyl ethyl ether, 4 % (w/w) <i>tert</i> -Butyl methyl ether, 4 % (w/w) Diisopropyl ether, 4 % (w/w) 1,2-Dimethoxyethane, 6 % (w/w) Ethanol, 7.3 % (w/w) Methanol, 7.3 % (w/w) 2-Methyl-2-butanol, 7.3 % (w/w) Methylcyclopentane, 4 % (w/w) 2-Methyl-1-propanol, 7.3 % (w/w) 1-Propanol, 7.3 % (w/w) 2-Propanol, 7.3 % (w/w)	47213	1 mL
ASTM® D4815 Quantitative Calibration Kit	- ASTM® D4815 Quantitative Calibration Mixture 1 (Supelco 47205) ASTM® D4815 Quantitative Calibration Mixture 2 (Supelco 47206) ASTM® D4815 Quantitative Calibration Mixture 3 (Supelco 47207) ASTM® D4815 Quantitative Calibration Mixture 4 (Supelco 47208) ASTM® D4815 Quantitative Calibration Mixture 5 (Supelco 47209) ASTM® D4815 Valve Timing Mix (Supelco 47212) ASTM® D4815 Qualitative ID Mix (Supelco 47213)	47211	1 mL

ASTM® D5134

Detailed Analysis of Petroleum Naphthas through n-Nonane.

Description	Concentration	Cat. No.	Qty
ASTM® D5134 Qualitative Column Evaluation Mix	(0.5 - 1.0% by weight in 2-methylpentane) Heptane, 1 % (w/w) 2-Methylheptane, 1 % (w/w) 4-Methylheptane, 1 % (w/w) Octane, 1 % (w/w) Toluene, .5 % (w/w) ASTM® D5134 2,3,3-Trimethylpentane Solution, 1 % (w/w)	502103	1 mL
ASTM® D5134 Splitter Linearity Check Mix	10 % (w/w) each component (no solvent) Benzene 2,4-Dimethylheptane 2,4-Dimethylhexane Heptane Hexane 2-Methylheptane 2-Methylhexane Nonane Octane Toluene	506753	1 mL
ASTM® D5134 2,3,3-Trimethylpentane Solution	-	502081	500 mg

ASTM® D5134 Qualitative Reference Materials

These refinery reference materials are the actual materials used in the ASTM D5134 round-robin method validation stage. They are referred to in the method, and are used for establishing component retention times for identification purposes. Each sample is accompanied by a comprehensive data booklet containing an expanded detailed chromatogram from a Petrocol DH 50.2 column, with identified peaks.

Description	Concentration	Cat. No.	Qty
ASTM® D5134 Qualitative Reference Alkylate Standard	(Approx. 30 identified components. Neat fraction.)	48267-U	6 × 1 mL
ASTM® D5134 Qualitative Reference Naphtha Standard	(Approx. 100 identified components. Neat fraction.)	48265-U	6 × 1 mL
ASTM® D5134 Qualitative Reference Refinery Standard Kit	(2 x 1 mL each of the three standards) ASTM® D5134 Qualitative Reference Alkylate Standard (Supelco 48267-U) ASTM® D5134 Qualitative Reference Reformate Standard (Supelco 48266) ASTM® D5134 Qualitative Reference Naphtha Standard (Supelco 48265-U)	48268	1 kit
ASTM® D5134 Qualitative Reference Reformate Standard	(Approx. 70 identified components. Neat fraction.)	48266	6 × 1 mL

Highly Characterized Reference Materials

The following standards, taken from refinery process streams and exhaustively analyzed by GC/FID and GC-MS, are recommended for evaluating process performance, identifying sources of contamination, PIANO analysis, method development, and training. Each comes with a comprehensive data packet containing quantitative and qualitative data and chromatograms using a 100-meter Petrocol DH column.

Description	Cat. No.	Pkg
Petroleum Refinery Reformate	47489	1 mL
Petroleum Refinery Pyrolyzed Gas (PY GAS)	47490-U	1 mL
Petroleum refinery heavy straight run naphtha	47488	1 mL

Petroleum Standards

ASTM Petroleum Standards

ASTM® D5307

Boiling Range Distribution of Crude Petroleum.

Description	Concentration	Cat. No.	Qty
ASTM® D5307 Crude oil internal standard	(equal weights of the hydrocarbons listed) <i>Heptadecane</i> <i>Hexadecane</i>	<i>Pentadecane</i> <i>Tetradecane</i> 48479	25 mL
ASTM® D5307 Crude oil qualitative standard	(each component in approx proportion indicated) <i>Butane, 15 % (w/w)</i> <i>Heptane, 15 % (w/w)</i> <i>Hexane, 15 % (w/w)</i> <i>Nonane, 15 % (w/w)</i>	<i>Octane, 15 % (w/w)</i> <i>Pentane, 15 % (w/w)</i> <i>Propane, 10 % (w/w)</i> 48182	1 mL
ASTM® D5307 Crude oil quantitative standard	6.25 % (w/w) each component <i>Decane</i> <i>Dodecane</i> <i>Dotriacontane</i> <i>Eicosane</i> <i>Heptadecane</i> <i>Hexadecane</i> <i>Hexatriacontane</i> <i>Octacosane</i>	<i>Octadecane</i> <i>Pentadecane</i> <i>Tetracontane</i> <i>Tetracosane</i> <i>Tetradecane</i> <i>Tetratetracontane</i> <i>Tridecane</i> <i>Undecane</i> 48179	2 mL

High Molecular Weight Hydrocarbon Standards

For high temperature SIMDIS or GC analyses. Polywax materials are polyethylene waxes having average molecular weights of 500 and 655 Daltons, respectively. Ethylene oligomers range in carbon number from approximately C20 to C100+ and are useful for establishing retention times.

Description	Concentration	Cat. No.	Qty
Hexacontane	-	48893	50 mg
Pentacontane	-	48595	50 mg
Polywax® 500	-	48475	5000 mg
Polywax® 655	-	48477	5000 mg
Polywax® 500	10,000 µg/mL in <i>p</i> -xylene	48480-U	6 × 1 mL
Polywax® 655	10,000 µg/mL in <i>p</i> -xylene	48482	6 × 1 mL

ASTM® D5442

Analysis of Petroleum Waxes by GC

Qualitative and quantitative mixes of *n*-paraffins used for determining column resolution, retention times, and response factors.

Description	Concentration	Cat. No.	Qty
ASTM® D5442 C16-C44 Qualitative Retention Time Mix	8.3 % (w/w) each component <i>Docosane</i> <i>Dotriacontane</i> <i>Eicosane</i> <i>Hexacosane</i> <i>Hexadecane</i> <i>Hexatriacontane</i>	<i>Octacosane</i> <i>Octadecane</i> <i>Tetracontane</i> <i>Tetracosane</i> <i>Tetratetracontane</i> <i>Triacontane</i> 502251	500 mg
ASTM® D5442 C12-C60 Qualitative Retention Time Mix	6.25 % (w/w) each component <i>Docosane</i> <i>Dodecane</i> <i>Dotriacontane</i> <i>Eicosane</i> <i>Hexacontane</i> <i>Hexacosane</i> <i>Hexadecane</i> <i>Hexatriacontane</i>	<i>Octacosane</i> <i>Octadecane</i> <i>Pentacontane</i> <i>Tetracontane</i> <i>Tetracosane</i> <i>Tetradecane</i> <i>Tetratetracontane</i> <i>Triacontane</i> 500623	500 mg

ASTM® D5441

Purity of Methyl *tert*-butyl ether (MTBE) by GC.

Note: MTBE quantitative solutions and neat materials for the analyses of oxygenates in gasoline include Cat. No. 506737, 48027, and 48483.

Description	Concentration	Cat. No.	Qty
<i>tert</i> -Amyl methyl ether solution	2000 µg/mL in methanol	506737	1 mL
standard type calibration			
Methyl <i>tert</i> -butyl ether solution	2000 µg/mL in methanol	CRM48483	1 pkg

Petroleum Standards

ASTM Petroleum Standards

Description	Concentration	Cat. No.	Qty
Methyl <i>tert</i> -butyl ether	-	48027	1000 mg
ASTM® D5441 MTBE Contaminants (high) Mix A	1 % (w/w) each component in methyl <i>tert</i> -butyl ether <i>tert</i> -Amyl methyl ether <i>tert</i> -Butanol <i>tert</i> -Butyl ethyl ether Methanol 2-Methylbutane 2-Methyl-2-butene	47942	1 mL
ASTM® D5441 MTBE Contaminants (low) Mix B	0.1 % (w/w) each component in methyl <i>tert</i> -butyl ether <i>tert</i> -Amyl methyl ether <i>tert</i> -Butanol <i>tert</i> -Butyl ethyl ether Methanol 2-Methylbutane 2-Methyl-2-butene	47943	1 mL
		<i>Pentane</i> <i>cis</i> -2-Pentene <i>trans</i> -2-Pentene Triisobutylene 2,4,4-Trimethyl-1-pentene	
		<i>Pentane</i> <i>cis</i> -2-Pentene <i>trans</i> -2-Pentene Triisobutylene 2,4,4-Trimethyl-1-pentene	

Aliphatic Hydrocarbons Kit

Description	Concentration	Cat. No.	Qty
Aliphatic Hydrocarbons Kit	(34 individual ampules of neat plus 6 ampules of solutions) <i>Decane</i> , 1 g <i>1-Decene</i> , .5 g <i>Docosane</i> , .1 g <i>Dodecane</i> , 1 g <i>1-Dodecene</i> , .5 g <i>Dotriacontane</i> , .1 g <i>1-Eicosene</i> , 1 g <i>1-Eicosene</i> , .5 g <i>Heneicosane</i> , .1 g <i>Heptane</i> , 1 g <i>Hexacosane</i> , .1 g <i>Hexadecane</i> , .1 g <i>1-Hexadecene</i> , .5 g <i>Hexane</i> , 1 g <i>Hexatriacontane</i> , .1 g <i>Nonane</i> , 1 g <i>Octacosane</i> , 1 g <i>Octadecane</i> , 1 g <i>1-Octadecene</i> , .5 g <i>Octane</i> , 1 g	44575-U	1 ea
		<i>1-Octene</i> , .5 g <i>Pentacosane</i> , .1 g <i>Pentane</i> , 1 g <i>Squalane</i> , 1 g <i>Squalene</i> , 1 g <i>Tetracontane</i> , .1 g <i>Tetracosane</i> , 1 g <i>Tetradecane</i> , 1 g <i>1-Tetradecene</i> , .5 g <i>Tetratetracontane</i> , .1 g <i>Tetratriacontane</i> , .1 g <i>Triacontane</i> , .1 g <i>Tricosane</i> , .1 g <i>2,2,4-Trimethylpentane</i> , 1 g <i>n-Paraffin Mix C5,C6,C7,C8 (Supelco 47100)</i> <i>n-Paraffin Mix C7,C8,C9,C10 (Supelco 47101)</i> <i>n-Paraffin Mix C10,C12,C14,C16 (Supelco 47102)</i> <i>n-Paraffin Mix C18,C20,C22,C24 (Supelco 47108)</i> <i>n-Paraffin Mix C22,C24,C28,C32 (Supelco 47106)</i> <i>n-Paraffin Mix C24,C28,C32,C36 (Supelco 47107)</i>	

Qualitative n-Paraffin Mixes

For determining retention indices and retention times.

Description	Concentration	Cat. No.	Qty
<i>n</i> -Paraffin Mix C5,C6,C7,C8	(varied conc.)	47100	1 mg
<i>n</i> -Paraffin Mix C7,C8,C9,C10	(varied conc.)	47101	1 mg
<i>n</i> -Paraffin Mix C10,C12,C14,C16	(varied conc.)	47102	1 mg
<i>n</i> -Paraffin Mix C18,C20,C22,C24	2 % (w/w) each component in octane	47108	5 mL
<i>n</i> -Paraffin Mix C22,C24,C28,C32	2 % (w/w) each component in octane	47106	5 mL
<i>n</i> -Paraffin Mix C24,C28,C32,C36	2 % (w/w) each component in octane	47107	5 mL

ASTM® D5501

Use this quantitative calibration standards kit to determine if ethanol and gasoline fuel blends comply with federal and state laws. A certificate of analysis accompanies each kit.

Description	Concentration	Cat. No.	Qty
ASTM® D5501 Denatured Fuel Ethanol Standards Kit	(Seven individual solutions prepared wt/wt.) <i>Sol.#1 Ethanol:Heptane:Methanol</i> (92%, 7.40%, 0.60%) <i>Sol.#2 Ethanol:Heptane:Methanol</i> (93%, 6.50%, 0.50%) <i>Sol.#3 Ethanol:Heptane:Methanol</i> (94%, 5.60%, 0.40%) <i>Sol.#4 Ethanol:Heptane:Methanol</i> (95%, 4.70%, 0.30%) <i>Sol.#5 Ethanol:Heptane:Methanol</i> (96%, 3.80%, 0.20%) <i>Sol.#6 Ethanol:Heptane:Methanol</i> (97%, 2.90%, 0.10%) <i>Sol.#7 Ethanol:Heptane:Methanol</i> (98%, 1.95%, 0.05%)	40361-U	1 kit

Petroleum Standards

ASTM Petroleum Standards

ASTM® D5580

Aromatics in Gasoline

The following standards include calibration blends both with and without internal standard. The internal standard-free blends are packaged in quantities of approximately 9 mL to facilitate reference standard preparation. All calibration blends are provided with a chromatogram and data verifying the purity and identity of the raw material. All raw materials used are fully characterized, as described for ASTM D4815.

Description	Concentration	Cat. No.	Qty
ASTM® D5580 Quantitative Cal Mix 1	(Each component at nominal wt.% indicated.) Benzene, .09 % (w/w) Ethylbenzene, .45 % (w/w) 2-Hexanone, 10 % (w/w) Toluene, 13.5 % (w/w)	1,2,4-Trimethylbenzene, .9 % (w/w) 2,2,4-Trimethylpentane, 74.16 % (w/w) o-Xylene, .9 % (w/w)	47740-U 1 mL
ASTM® D5580 Quantitative Cal Mix 2	(Each component at nominal wt.% indicated.) Benzene, .45 % (w/w) Ethylbenzene, .9 % (w/w) 2-Hexanone, 10 % (w/w) Toluene, 9 % (w/w)	1,2,4-Trimethylbenzene, 9 % (w/w) 2,2,4-Trimethylpentane, 68.4 % (w/w) o-Xylene, 2.25 % (w/w)	47741-U 1 mL
ASTM® D5580 Quantitative Cal Mix 3	(Each component at nominal wt.% indicated.) Benzene, .9 % (w/w) Ethylbenzene, 2.25 % (w/w) 2-Hexanone, 10 % (w/w) Toluene, 4.5 % (w/w)	1,2,4-Trimethylbenzene, .45 % (w/w) 2,2,4-Trimethylpentane, 72.9 % (w/w) o-Xylene, 9 % (w/w)	47742-U 1 mL
ASTM® D5580 Quantitative Cal Mix 4	(Each component at nominal wt.% indicated.) Benzene, 1.8 % (w/w) Ethylbenzene, 4.5 % (w/w) 2-Hexanone, 10 % (w/w) Toluene, 2.25 % (w/w)	1,2,4-Trimethylbenzene, 4.5 % (w/w) 2,2,4-Trimethylpentane, 72.45 % (w/w) o-Xylene, 4.5 % (w/w)	47743-U 1 mL
ASTM® D5580 Calibration Mix 4	(Each component at nominal wt.% indicated.) Benzene, 2 % (w/w) Ethylbenzene, 5 % (w/w) Toluene, 2.5 % (w/w)	1,2,4-Trimethylbenzene, 5 % (w/w) 2,2,4-Trimethylpentane, 80.5 % (w/w) o-Xylene, 5 % (w/w)	47738-U 9 mL
ASTM® D5580 Quantitative Cal Mix 5	(Each component at nominal wt.% indicated.) Benzene, 4.5 % (w/w) Ethylbenzene, 9 % (w/w) 2-Hexanone, 10 % (w/w) Toluene, .9 % (w/w)	1,2,4-Trimethylbenzene, 2.25 % (w/w) 2,2,4-Trimethylpentane, 72.9 % (w/w) o-Xylene, .45 % (w/w)	47744-U 1 mL
ASTM® D5580 Valve Timing Calibration Blend	(Each component at nominal wt.% indicated.) Benzene, 4.5 % (w/w) Ethylbenzene, 9 % (w/w) 2-Hexanone, 10 % (w/w)	Toluene, 4.5 % (w/w) 2,2,4-Trimethylpentane, 63 % (w/w) o-Xylene, 9 % (w/w)	47731-U 1 mL
ASTM® D5580 Selectivity Check Standard	(Each component at nominal wt.% indicated.) Dodecane, 1.5 % (w/w)	2,2,4-Trimethylpentane, 98.5 % (w/w)	47732-U 1 mL
ASTM® D5580 Quantitative Calibration Kit	- Quantitative Calibration Mix 1 (47740-U), 1 mL Quantitative Calibration Mix 2 (47741-U), 1 mL Quantitative Calibration Mix 3 (47442-U), 1 mL Quantitative Calibration Mix 4 (47743-U), 1 mL	Quantitative Calibration Mix 5 (47744-U), 1 mL Valve Timing Calibration Mix (47731-U), 1 mL Selectivity Check Standard (47732-U), 1 mL	47734-U 1 kit
2-Hexanone	-	47733-U	5 mL

ASTM® D5769

Aromatics in Gasoline by GC-MS

Description	Concentration	Cat. No.	Qty
ASTM®/EPA Aromatics Internal Standard Mix	(each component at wt% indicated) Benzene- <i>d</i> ₆ , 40 % (w/w) Ethylbenzene- <i>d</i> ₁₀ , 40 % (w/w)	Naphthalene- <i>d</i> ₈ , 20 % (w/w)	47327 5 mL

ASTM® D6352/D7169

Use this reference material to establish GC detector response factors when determining the boiling point distribution of crude oils, vacuum residues and other petroleum fractions.

Description	Concentration	Cat. No.	Qty
ASTM® D6352/D7169 Reference Material 5010	-	40086-U	2 g

Petroleum Standards

Biofuel Standards

Biofuel Standards

DIN EN 14105

This method provides for the quantitative determination of free and total glycerin in 100% biodiesel fuel (B100 methyl esters) by high temperature gas chromatography after silylating the sample with N-methyl-N-(trimethylsilyl) trifluoroacetamide (MSTFA). EN 14105 method also recommends using a commercial monoglyceride mixture, such as Supelco's Monoglyceride Stock Solution (Cat. No. 49446-U), to aid in peak identification due to the possible overlapping of methyl ester and monoglyceride peaks in the chromatography.

This standard is shipped with a certificate of composition and instructions for sample derivatization.

EN 14105/D6584 Monoglyceride Stock Solution

▶ 10 mg/mL each component in pyridine, analytical standard

Components

Monoolein
Monopalmitin
Monostearin

49446-U

1 mL

ASTM® D6584

Our biodiesel impurities standards have been formulated to meet the requirements of ASTM D6584. This method provide for the quantitative determination of free and total glycerin in 100% biodiesel fuel (B100 methyl esters) by high temperature gas chromatography after silylating the sample with N-methyl-N-(trimethylsilyl) trifluoroacetamide (MSTFA). Each biodiesel standard is shipped with a certificate of composition. Instructions for sample derivatization are included with each kit.

Description	Concentration	Cat. No.	Qty
ASTM® D6584 Glycerin solution	500 µg/mL in pyridine	44892-U	1 mL
ASTM® D6584 Monoolein	5000 µg/mL in pyridine	44893-U	3 mL
ASTM® D6584 1,3-Diolein Solution	5000 µg/mL in pyridine	44894-U	2 mL
Triolein	5000 µg/mL in pyridine	44895-U	2 mL
ASTM® D6584 1,2,4-Butanetriol Solution, Internal Standard #1	1000 µg/mL in pyridine	44896-U	5 mL
ASTM® D6584 Tricaprin Solution, Internal Standard #2	8000 µg/mL in pyridine	44897-U	5 mL
ASTM® D6584 Individual Stock and Internal Standards Mix Kit		44898-U	1 kit
	ASTM® D6584 Glycerin solution (Supelco 44892-U), 1 mL ASTM® D6584 Monoolein (Supelco 44893-U), 3 mL ASTM® D6584 1,3-Diolein Solution (Supelco 44894-U), 2 mL	Triolein (Supelco 44895-U), 2 mL ASTM® D6584 1,2,4-Butanetriol Solution, Internal Standard #1 (Supelco 44896-U), 5 mL ASTM® D6584 Tricaprin Solution, Internal Standard #2 (Supelco 44897-U)	
ASTM® D6584 Standard Solution 1	in pyridine (varied) 1,3-Diolein, 50 µg/mL Glycerol, 5 µg/mL	44899-U	1 mL
		Monoolein, 100 µg/mL Glycerol trioleate, 50 µg/mL	
ASTM® D6584 Standard Solution 2	in pyridine (varied) 1,3-Diolein, 100 µg/mL Glycerol, 15 µg/mL	44914-U	1 mL
		Monoolein, 250 µg/mL Glycerol trioleate, 100 µg/mL	
ASTM® D6584 Standard Solution 3	in pyridine (varied) 1,3-Diolein, 200 µg/mL Glycerol, 25 µg/mL	44915-U	1 mL
		Monoolein, 500 µg/mL Glycerol trioleate, 200 µg/mL	
ASTM® D6584 Standard Solution 4	in pyridine (varied) 1,3-Diolein, 350 µg/mL Glycerol, 35 µg/mL	44916-U	1 mL
		Monoolein, 750 µg/mL Glycerol trioleate, 350 µg/mL	
ASTM® D6584 Standard Solution 5	in pyridine (varied) 1,3-Diolein, 500 µg/mL Glycerol, 50 µg/mL	44917-U	1 mL
		Monoolein, 1000 µg/mL Glycerol trioleate, 500 µg/mL	
ASTM® D6584 Individual Standard Solution & Internal Standards Kit		44918-U	1 kit
	ASTM® D6584 Standard Solution 1 (Supelco 44899-U), 1 mL ASTM® D6584 Standard Solution 2 (Supelco 44914-U), 1 mL ASTM® D6584 Standard Solution 3 (Supelco 44915-U), 1 mL ASTM® D6584 Standard Solution 4 (Supelco 44916-U), 1 mL	ASTM® D6584 Standard Solution 5 (Supelco 44917-U), 1 mL ASTM® D6584 1,2,4-Butanetriol Solution, Internal Standard #1 (Supelco 44896-U), 5 mL ASTM® D6584 Tricaprin Solution, Internal Standard #2 (Supelco 44897-U), 5 mL	

Petroleum Standards

Biofuel Standards

ASTM® D6584 (continued)

Description	Concentration	Cat. No.	Qty
EN 14105/D6584 Monoglyceride Stock Solution	10 mg/mL each component in pyridine	49446-U	1 mL
	<i>Monoolein</i> <i>Monopalmitin</i>		
	<i>Monostearin</i>		
N-Methyl-N-(trimethylsilyl)trifluoroacetamide	-	394866-10X1ML 394866-5ML 394866-25ML	10 × 1 mL 5 mL 25 mL

Fuel Ethanol

High yields of fuel ethanol require optimizing the corn-to-ethanol fermentation process. Proper monitoring of this fermentation process can be accomplished by using our Fuel Ethanol Residual Saccharides calibration standard (listed below) and a Supelcogel C-610H HPLC column. A certificate of analysis is included with each standard purchase.

Description	Concentration	Cat. No.	Qty
Fuel Ethanol Residual Saccharides Mix	in deionized water (varied)	44868-U	10 × 2 mL
	<i>Glycerol, 1 % (w/v)</i> <i>D-(+)-Glucose, 2 % (w/v)</i> <i>Maltotriose (DP₃), 1 % (w/v)</i> <i>Maltose monohydrate, 2 % (w/v)</i>		
	<i>L-(+)-Lactic acid, 3 % (w/v)</i> <i>Acetic acid, 3 % (w/v)</i> <i>Dextrin, 3.25 % (w/v)</i> <i>Ethanol, 12 % (w/v)</i>		

PNA/PONA/P-I-A-N-O Standards

P-I-A-N-O (Paraffins-Isoparaffins-Aromatics-Naphthenes-Olefins) standards are complex mixtures of known quantities of hydrocarbons, accurately prepared by weight to three decimal places. Use these mixes to determine retention times and indices, and to monitor response factors for components of complex hydrocarbon mixtures.

- Formulations are weight percent.
- Each mix includes a detailed data sheet listing components by weight percent, mole percent, liquid volume percent as well as retention times and retention indices for each component.
- A chromatogram from a 100-meter capillary column (including conditions) is provided.
- Products are supplied in a crimp-top vial with hole caps and septa.

Special product note: P-I-A-N-O Mix, Cat.No. 44593-U, contains 139 n-paraffins, isoparaffins, aromatics, naphthenes and olefins. Data sheets for each class of compounds list weight percent, mole percent, and other information for each component.

Description	Concentration	Cat. No.	Qty
n-Paraffins Mix	(typical values shown)	44585-U	0.1 mL
	<i>Pentane, 9.38 wt. %</i> <i>Hexane, 9.508 wt. %</i> <i>Heptane, 9.776 wt. %</i> <i>Octane, 9.544 wt. %</i> <i>Nonane, 9.042 wt. %</i> <i>Decane, 9.245 wt. %</i>		
	<i>Undecane, 9.313 wt. %</i> <i>Dodecane, 9.404 wt. %</i> <i>Tridecane, 8.907 wt. %</i> <i>Tetradecane, 8.792 wt. %</i> <i>Pentadecane, 7.087 wt. %</i>		
Isoparaffins Mix	(typical values shown)	44586-U	0.1 mL
	<i>3,3-Diethylpentane, 1.57 wt. %</i> <i>2,3-Dimethylbutane, .447 wt. %</i> <i>2,3-Dimethylheptane, 1.482 wt. %</i> <i>2,5-Dimethylheptane, 5.619 wt. %</i> <i>3,3-Dimethylheptane, 1.677 wt. %</i> <i>3,4-Dimethylheptane (L), 1.964 wt. %</i> <i>3,5-Dimethylheptane (L), .0001 wt. %</i> <i>3,4-Dimethylheptane (D), 1.707 wt. %</i> <i>3,5-Dimethylheptane (D)</i> <i>2,2-Dimethylhexane, 1.313 wt. %</i> <i>2,3-Dimethylhexane, 1.614 wt. %</i> <i>2,4-Dimethylhexane, 1.646 wt. %</i> <i>2,5-Dimethylhexane, 3.708 wt. %</i> <i>2,2-Dimethyloctane, 3.253 wt. %</i> <i>2,3-Dimethyloctane, 3.838 wt. %</i> <i>3,3-Dimethyloctane, 3.174 wt. %</i> <i>2,2-Dimethylpentane, 1.778 wt. %</i> <i>2,3-Dimethylpentane, 1.781 wt. %</i> <i>2,4-Dimethylpentane, 3.678 wt. %</i>		
	<i>3,3-Dimethylpentane, 1.86 wt. %</i> <i>3-Ethylhexane, .711 wt. %</i> <i>3-Ethylheptane, 3.687 wt. %</i> <i>3-Ethylpentane, .526 wt. %</i> <i>2-Methylbutane, 2.183 wt. %</i> <i>2-Methylheptane, 4.367 wt. %</i> <i>3-Methylheptane, 5.443 wt. %</i> <i>4-Methylheptane, 3.198 wt. %</i> <i>2-Methylhexane, 2.359 wt. %</i> <i>3-Methylhexane, 1.602 wt. %</i> <i>2-Methylnonane, 3.708 wt. %</i> <i>3-Methylnonane, 5.756 wt. %</i> <i>2-Methyloctane, 3.75 wt. %</i> <i>3-Methyloctane, 5.598 wt. %</i> <i>2-Methylpentane, 3.258 wt. %</i> <i>3-Methylpentane, 5.356 wt. %</i> <i>2,2,3-Trimethylbutane, 3.913 wt. %</i> <i>2,2,3-Trimethylpentane, 1.721 wt. %</i>		

Petroleum Standards

PNA/PONA/P-I-A-N-O Standards

Description	Concentration	Cat. No.	Qty	
Aromatics Mix	(typical values shown) Benzene, 7.099 wt. % Butylbenzene, 2.196 wt. % sec-Butylbenzene, 2.238 wt. % tert-Butylbenzene, 4.57 wt. % 1-tert-Butyl-3,5-dimethylbenzene, 2.15 wt. % 1-tert-Butyl-4-ethylbenzene, 2.225 wt. % tert-1-Butyl-2-methylbenzene, .764 wt. % 1,2-Diethylbenzene, 1.088 wt. % 1,2-Dimethyl-3-ethylbenzene, 2.176 wt. % 1,2-Dimethyl-4-ethylbenzene, 2.243 wt. % 1,3-Dimethyl-2-ethylbenzene, 1.138 wt. % 1,3-Dimethyl-5-ethylbenzene, 2.186 wt. % 1,4-Dimethyl-2-ethylbenzene, 2.272 wt. % Ethylbenzene, 6.723 wt. % Hexylbenzene, 4.463 wt. % Isobutylbenzene, 4.39 wt. % Cumene, 2.211 wt. % 2-Methylbutylbenzene, 1.137 wt. % 1-Methyl-2-ethylbenzene, 2.237 wt. %	1-Methyl-3-ethylbenzene, 2.188 wt. % 1-Methyl-4-ethylbenzene, 2.156 wt. % 1-Methyl-2-isopropylbenzene, 1.12 wt. % 1-Methyl-3-isopropylbenzene, 1.102 wt. % 1-Methyl-4-isopropylbenzene, 1.065 wt. % 1-Methyl-2-n-propylbenzene, 2.231 wt. % 1-Methyl-3-n-propylbenzene, 2.1 wt. % 1-Methyl-4-n-propylbenzene, 2.212 wt. % Pentylbenzene, 4.443 wt. % Propylbenzene, 4.532 wt. % 1,2,4,5-Tetramethylbenzene, .238 wt. % Toluene, 4.55 wt. % 1,2,4-Triethylbenzene, 1.107 wt. % 1,3,5-Triethylbenzene, 4.525 wt. % 1,2,4-Trimethylbenzene, 2.523 wt. % 1,3,5-Trimethylbenzene, 1.12 wt. % o-Xylene, 2.245 wt. % m-Xylene, 2.256 wt. % p-Xylene, 4.784 wt. %	44587	0.1 mL
Naphthenes Mix	(typical values shown) n-Butylcyclopentane, 3.724 wt. % Cyclohexane, 5.4 wt. % Cyclopentane, 4.97 wt. % cis-1,2-Dimethylcyclohexane, 3.725 wt. % trans-1,2-Dimethylcyclohexane, 1.669 wt. % trans-1,4-Dimethylcyclohexane, 3.557 wt. % 1,1-Dimethylcyclopentane, 3.483 wt. % trans-1,2-Dimethylcyclopentane, 1.468 wt. % cis-1,3-Dimethylcyclopentane, .604 wt. % trans-1,3-Dimethylcyclopentane, 2.749 wt. % Ethylcyclopentane, 3.575 wt. % 1-Ethyl-1-methylcyclopentane, 1.076 wt. % Isobutylcyclohexane, 5.639 wt. % Isobutylcyclopentane, 3.727 wt. % Isopropylcyclohexane, 5.77 wt. %	Isopropylcyclopentane, 3.511 wt. % Methylcyclohexane, 5.711 wt. % Methylcyclopentane, 3.269 wt. % t-1-Methyl-2-(4MP)cyclopentane, 3.795 wt. % trans-1-Methyl-2-propylcyclohexane, 3.289 wt. % Propylcyclopentane, 3.677 wt. % 1,1,2-Trimethylcyclohexane, 3.371 wt. % 1,1,4-Trimethylcyclohexane, 3.68 wt. % cis,trans,cis-1,2,4-Trimethylcyclohexane, 3.541 wt. % % cis,trans,trans-1,2,4-Trimethylcyclohexane, 3.634 wt. % cis,cis,cis-1,3,5-Trimethylcyclohexane, 3.558 wt. % cis,cis,cis-1,2,3-Trimethylcyclopentane, .808 wt. % cis,trans,cis-1,2,3-Trimethylcyclopentane, 1.586 wt. % cis,trans,cis-1,2,4-Trimethylcyclopentane, 1.673 wt. % cis,trans,trans-1,2,4-Trimethylcyclopentane, 3.76 wt. %	44588	0.1 mL
Olefins Mix	(typical values shown) 1-Decene, 7.348 wt. % 1-Heptene, 7.701 wt. % cis-2-Heptene, 5.821 wt. % trans-2-Heptene, 3.77 wt. % cis-3-Heptene, 5.918 wt. % trans-3-Heptene, 3.725 wt. % 1-Hexene, 7.753 wt. % cis-2-Hexene, 3.962 wt. % trans-2-Hexene, 1.776 wt. % Isoprene, 2.47 wt. % 2-Methyl-1-butene, 1.466 wt. % 3-Methyl-1-butene, 2.015 wt. % 2-Methyl-2-pentene, 3.402 wt. %	4-Methyl-1-pentene, 3.478 wt. % 1-Nonene, 7.778 wt. % cis-2-Nonene, 2.776 wt. % trans-2-Nonene, 1.012 wt. % cis-3-Nonene, 4.074 wt. % trans-3-Nonene, 1.88 wt. % 1-Octene, 7.804 wt. % cis-2-Octene, 3.982 wt. % trans-2-Octene, 2 wt. % 1-Pentene, 4.214 wt. % cis-2-Pentene, 2.023 wt. % trans-2-Pentene, 1.849 wt. %	44589	0.1 mL
P-I-A-N-O Mix	(typical values shown) n-Paraffins, 18.9 % (w/w) Isoparaffins, 18.8 % (w/w) Aromatics, 23.3 % (w/w)	Naphthenes, 20.5 % (w/w) Olefins, 18.5 % (w/w)	44593-U	0.1 mL
P-I-A-N-O Kit	- n-Paraffins Mix (44585-U), 0.1 mL Isoparaffins Mix (44586-U), 0.1 mL Aromatics Mix (44587), 0.1 mL	Naphthenes Mix (44588), 0.1 mL Olefins Mix (44589), 0.1 mL P-I-A-N-O Mix (44593-U), 0.1 mL	44594-U	1 kit

Pharmaceutical Standards

Secondary Pharmaceutical Standards

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Secondary Pharmaceutical Standards

Quality, Performance, Compliance

Certified Fluka pharmaceutical secondary standards offer the pharmaceutical analyst an attractive alternative to traditional reference standards from the Pharmacopoeia's. Compared to and qualified against reference standards from the United States Pharmacopoeia, the European Pharmacopoeia, and the British Pharmacopoeia (where available), compliance with multiple international requirements can be met with one vial. These Standards are Certified under Double Accreditation, ISO/IEC 17025 + ISO Guide 34, "The Gold Standard", representing the highest quality achievement. The FDA, USP and EP all recognize the use of secondary standards or working standards that are established with reference to the corresponding primary standard. See specifics for Regulatory Recognition of Secondary Standards sigma-aldrich.com/pharmastandards. A comprehensive Certificate of Analysis compliant with ISO Guide 31 provides documented traceability and comparison to the pharmacopoeial standards as well certified purity and supporting analytical data.

The product line includes standards for:

- API's
- Impurities
- Excipients
- Residual Solvents
- Melting Point Standards
- Vitamins and Amino Acids

CAS No.	Description	Traceable To USP	Traceable To EP	Traceable To BP	Cat. No.	Qty
188062-50-2	Abacavir sulfate	1000408	Y0001561	-	PHR1256-500MG	500 mg
103-90-2	Acetaminophen	1003009	P030000	371	PHR1005-1G	1 g
103-84-4	Acetanilide melting point standard	1004001	-	-	PHR1086-1G	1 g
616-91-1	N-Acetyl-L-cysteine	1009005	A0150000	-	PHR1098-1G	1 g
1218-34-4	N-Acetyl-L-tryptophan	1700523	A0208000	-	PHR1177-500MG	500 mg
537-55-3	N-Acetyl-L-tyrosine	1010106	-	-	PHR1173-1G	1 g
58-61-7	Adenosine	1012123	A0230200	-	PHR1138-1G	1 g
56-41-7	L-Alanine	1012509	A0325000	-	PHR1110-1G	1 g
51022-70-9	Albuterol sulfate	1012633	S0150000	302	PHR1053-1G	1 g
60-32-2	Aminocaproic acid	1021000	A0420000	-	PHR1224-1G	1 g
121-30-2	4-Amino-6-chloro-1,3-benzendisulfonamide	1057507	-	-	PHR1192-500MG	500 mg
591-27-5	3-Aminophenol	1026004	-	-	PHR1225-500MG	500 mg
123-30-8	4-Aminophenol	1021204	-	-	PHR1148-1G	1 g
19774-82-4	Amiodarone hydrochloride	1027302	A0575000	532	PHR1164-1G	1 g
111470-99-6	Amlodipine besylate	1029501	Y0000049	-	PHR1185-1G	1 g
61336-70-7	Amoxicillin trihydrate	1031503	A0800000	19	PHR1127-1G	1 g
104-46-1	Anethole	1035005	-	-	PHR1218-2.2ML	2.2 mL
100-66-3	Anisole	1037011	-	-	PHR1212-3X1.2ML	3 x 1.2 mL
74-79-3	L-Arginine	1042500	A1270000	-	PHR1106-1G	1 g
50-81-7	L-Ascorbic acid	1043003	A1300000	461	PHR1008-2G	2 g
56-84-8	L-Aspartic acid	1043819	A1330000	-	PHR1104-1G	1 g
50-78-2	Aspirin	1044006	A0200000	617	PHR1003-1G	1 g
70356-09-1	Avobenzene	1045337	-	-	PHR1073-1G	1 g
117772-70-0	Azithromycin dihydrate	1046056	Y0000306	-	PHR1088-1G	1 g
100-52-7	Benzaldehyde	1050905	-	-	PHR1203-3X1ML	3 x 1 mL
94-09-7	Benzocaine	1054000	-	-	PHR1158-1G	1 g
65-85-0	Benzoic acid	1055002	-	-	PHR1050-1G	1 g
119-61-9	Benzophenone	-	Y0000647	-	PHR1204-1G	1 g
106-51-4	1,4-Benzoquinone	1056504	-	-	PHR1028-1G	1 g
100-51-6	Benzyl alcohol	1061901	Y0000167	-	PHR1019-1G	1 g
120-51-4	Benzyl benzoate	1062008	-	-	PHR1213-5G	5 g
58-85-5	Biotin	1071508	B1116000	-	PHR1233-1G	1 g
51333-22-3	Budesonide	1078201	-	-	PHR1178-500MG	500 mg
18010-40-7	Bupivacaine hydrochloride	1078507	B1160000	479	PHR1128-1G	1 g
123-86-4	Butyl acetate	1082606	-	-	PHR1211-3X1.2ML	3 x 1.2 mL
25013-16-5	Butylated hydroxyanisole	-	-	-	PHR1304-1G	1 g
128-37-0	Butylated Hydroxytoluene	1092708	B1215000	-	PHR1117-1G	1 g
121-00-6	3-tert-Butyl-4-hydroxyanisole	1083100	-	-	PHR1306-500MG	500 mg
94-26-8	Butylparaben	1084000	B1217000	-	PHR1022-1G	1 g
58-08-2	Caffeine	1085003	C0100000	766	PHR1009-1G	1 g
58-08-2	Caffeine melting point standard	1086006	-	-	PHR1095-1G	1 g

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CAS No.	Description	Traceable To USP	Traceable To EP	Traceable To BP	Cat. No.	Qty
137-08-6	Calcium-D-pantothenate	1087009	C0400000	-	PHR1232-500MG	500 mg
464-49-3	D-Camphor	1087508	C0405000	-	PHR1119-1G	1 g
124-07-2	Caprylic acid	1091040	C0426000	-	PHR1202-1G	1 g
298-46-4	Carbamazepine	1093001	C0450000	-	PHR1067-1G	1 g
7235-40-7	β-Carotene	1065480	-	-	PHR1239-1G	1 g
36653-82-4	Cetyl Alcohol	1103003	C0990000	-	PHR1133-1G	1 g
6004-24-6	Cetylpyridinium chloride	1104006	C1000000	-	PHR1226-1G	1 g
56-95-1	Chlorhexidine acetate	1111103	C1520000	68	PHR1222-500MG	500 mg
539-03-7	4'-Chloroacetanilide	-	-	-	PHR1149-1G	1 g
106-47-8	p-Chloroaniline	1111908	-	-	PHR1200-1G	1 g
5162-03-8	2-Chlorobenzophenone	-	Y0000279	-	PHR1183-500MG	500 mg
58-94-6	Chlorothiazide	1121005	C1700000	76	PHR1179-500MG	500 mg
113-92-8	(±)-Chlorpheniramine maleate salt	1123102	C1800000	81	PHR1016-500MG	500 mg
67-97-0	Cholecalciferol	1131009	C2100000	787	PHR1237-500MG	500 mg
51481-61-9	Cimetidine	1134062	C2175000	475	PHR1075-1G	1 g
70059-30-2	Cimetidine hydrochloride	1134073	C2175500	-	PHR1089-1G	1 g
85721-33-1	Ciprofloxacin	1134313	-	-	PHR1167-1G	1 g
86393-32-0	Ciprofloxacin hydrochloride monohydrate	1134335	C2190000	-	PHR1044-1G	1 g
77-92-9	Citric acid, Anhydrous	1134368	A1202000	-	PHR1071-1G	1 g
81103-11-9	Clarithromycin	1134379	Y0000320	833	PHR1038-500MG	500 mg
58207-19-5	Clindamycin hydrochloride	1136002	-	-	PHR1159-1G	1 g
24729-96-2	Clindamycin 2-phosphate	1138008	C2269000	-	PHR1021-1G	1 g
23593-75-1	Clotrimazole	1141002	C2430000	379	PHR1058-1G	1 g
98-82-8	Cumene	1151709	-	-	PHR1210-3X1.2ML	3 × 1.2 mL
68-19-9	Cyanocobalamin	1152009	C3000000	466	PHR1234-1G	1 g
59865-13-3	Cyclosporin A	1158504	C2163000	-	PHR1092-500MG	500 mg
7048-04-6	L-Cysteine hydrochloride monohydrate	1161509	C3290000	-	PHR1102-1G	1 g
64-17-5	Dehydrated Alcohol	1012772	-	-	PHR1070-5X1.2ML	5 × 1.2 mL
81-13-0	Dexpanthenol	1179504	D0730000	-	PHR1228-500MG	500 mg
6700-34-1	Dextromethorphan hydrobromide monohydrate	1181007	D0740000	-	PHR1018-500MG	500 mg
109-43-3	Dibutyl sebacate	1187091	-	-	PHR1216-3X1.2ML	3 × 1.2 mL
15307-79-6	Diclofenac sodium salt	118880	S0765000	619	PHR1144-1G	1 g
111-46-6	Diethylene glycol	1193265	Y0000217	-	PHR1045-1G	1 g
120-14-9	3,4-Dimethoxybenzaldehyde	1711439	-	-	PHR1194-500MG	500 mg
93-03-8	3,4-Dimethoxybenzyl alcohol	1711440	-	-	PHR1193-500MG	500 mg
147-24-0	Diphenhydramine hydrochloride	1218005	D2000000	-	PHR1015-1G	1 g
62-31-7	Dopamine hydrochloride	1225204	D2690000	468	PHR1090-1G	1 g
24390-14-5	Doxycycline hyclate	1226003	D3000000	780	PHR1145-1G	1 g
6381-92-6	Edetate disodium dihydrate	1233009	D2900000	-	PHR1068-1G	1 g
50-14-6	Ergocalciferol	1239005	E0900000	788	PHR1238-500MG	500 mg
114-07-8	Erythromycin	1242000	E1305000	794	PHR1039-1G	1 g
107-21-1	Ethylene glycol	1265515	-	-	PHR1046-1G	1 g
120-47-8	Ethylparaben	1267000	E2425000	-	PHR1011-1G	1 g
76824-35-6	Famotidine	1269200	F0050000	653	PHR1055-1G	1 g
49562-28-9	Fenofibrate	1269447	F0048000	-	PHR1246-500MG	500 mg
86386-73-4	Fluconazole	1271700	-	-	PHR1160-1G	1 g
86393-33-1	Fluoroquinolonic acid	1278302	-	-	PHR1174-500MG	500 mg
51-21-8	Fluorouracil	12790000	F0250000	995	PHR1227-500MG	500 mg
59-30-3	Folic acid	1286005	F0300000	-	PHR1035-1G	1 g
57-48-7	D-(-)-Fructose	1286504	F0550000	-	PHR1002-1G	1 g
54-31-9	Furosemide	1287008	F0700000	547	PHR1057-1G	1 g
60142-96-3	Gabapentin	1287303	-	-	PHR1049-1G	1 g
59-23-4	Galactose	1287700	G0050000	-	PHR1206-500MG	500 mg
66-84-2	Glucosamine hydrochloride	1294207	Y0001406	-	PHR1199-500MG	500 mg
50-99-7	D-(+)-Glucose	1181302	G03505000	-	PHR1000-1G	1 g
56-86-0	L-Glutamic acid	1294976	G0355000	-	PHR1107-1G	1 g
56-85-9	L-Glutamine	1294808	-	-	PHR1125-1G	1 g
56-81-5	Glycerin	1295607	G0400000	-	PHR1020-5G	5 g
56-40-6	Glycine	1295800	G0450000	-	PHR1111-1G	1 g
90-05-1	Guaiacol	1300004	Y0000619	-	PHR1136-1.5G	1.5 g
93-14-1	Guaifenesin	1301007	G0700000	-	PHR1027-1G	1 g
73-40-5	Guanine	1302156	-	879	PHR1243-500MG	500 mg

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CAS No.	Description	Traceable To USP	Traceable To EP	Traceable To BP	Cat. No.	Qty
71-00-1	L-Histidine	1308505	H0750000	-	PHR1108-1G	1 g
118-56-9	Homosalate	1311408	-	-	PHR1085-1G	1 g
58-93-5	Hydrochlorothiazide	1314009	H1200000	186	PHR1032-1G	1 g
50-23-7	Hydrocortisone	1316004	H1300000	576	PHR1014-500MG	500 mg
99-96-7	4-Hydroxybenzoic acid	1609013	-	-	PHR1048-1G	1 g
15687-27-1	Ibuprofen	1335508	I0020000	539	PHR1004-1G	1 g
288-32-4	Imidazole	1336500	I0086000	-	PHR1180-500MG	500 mg
53-86-1	Indomethacin	1341001	I0200000	-	PHR1247-500MG	500 mg
38861-78-8	4'-Isobutylacetophenone	1335541	-	-	PHR1146-500MG	500 mg
73-32-5	L-Isoleucine	1349502	I0460000	-	PHR1099-1G	1 g
110-27-0	Isopropyl myristate	1350400	I0750000	-	PHR1123-1G	1 g
142-91-6	Isopropyl palmitate	1350603	I0725000	-	PHR1137-1G	1 g
4759-48-2	Isotretinoin	1353500	I0800000	-	PHR1188-3X100MG	3 × 100 mg
74103-07-4	Ketorolac Tromethamine	1356665	Y0000486	-	PHR1140-500MG	500 mg
50-21-5	Lactic acid	1356734	-	-	PHR1215-3X1.5ML	3 × 1.5 mL
64044-51-5	D-Lactose monohydrate	1356701	L0100000	-	PHR1024-1G	1 g
63-42-3	Lactose, Anhydrous	1356676	A1206000	-	PHR1025-1G	1 g
61-90-5	L-Leucine	1357001	L0375000	-	PHR1105-1G	1 g
137-58-6	Lidocaine	1366002	L0595000	727	PHR1034-1G	1 g
83915-83-7	Lisinopril	1368609	L0702000	695	PHR1143-1G	1 g
34552-83-5	Loperamide hydrochloride	1370000	L0750000	635	PHR1162-1G	1 g
657-27-2	L-Lysine monohydrochloride	1372005	L0900000	-	PHR1101-1G	1 g
57282-49-2	L-Lysine Acetate	1371501	Y0000397	-	PHR1096-1G	1 g
585-88-6	Maltitol	1374907	M0160000	-	PHR1248-500MG	500 mg
69-65-8	D-Mannitol	1375105	M0200000	-	PHR1007-1G	1 g
2216-51-5	L-Menthol	1381709	M0350000	-	PHR1116-1G	1 g
89-57-6	Mesalamine	1392705	Y0000297	-	PHR1060-1G	1 g
1115-70-4	Metformin hydrochloride	1396309	M0605000	-	PHR1084-500MG	500 mg
63-68-3	L-Methionine	1411504	M0960000	-	PHR1241-1G	1 g
693-98-1	2-Methylimidazole	-	Y0001320	-	PHR1181-500MG	500 mg
696-23-1	2-Methyl-5-nitroimidazole	1667530	Y0000087	-	PHR1195-500MG	500 mg
99-76-3	Methylparaben	1432005	M1650000	-	PHR1012-1G	1 g
109-08-0	2-Methylpyrazine	-	Y0001376	-	PHR1223-500MG	500 mg
119-36-8	Methyl salicylate	1537450	-	-	PHR1214-3.2ML	3.2 mL
-	Metoclopramide Hydrochloride	1440808	M1825000	357	PHR1132-1G	1 g
56392-17-7	(±)-Metoprolol (+)-tartrate salt	1441301	M1830000	540	PHR1076-1G	1 g
443-48-1	Metronidazole	1442009	M1850000	603	PHR1052-1G	1 g
22832-87-7	(±)-Miconazole nitrate salt	1443500	M1900000	253	PHR1163-1G	1 g
544-63-8	Myristic acid	1448990	-	-	PHR1124-1G	1 g
22204-53-1	Naproxen	1457301	N0250000	435	PHR1040-500MG	500 mg
26159-34-2	Naproxen sodium	1457403	-	-	PHR1165-1G	1 g
98-92-0	Niacinamide	1462006	N0600000	460	PHR1033-1G	1 g
67-20-9	Nitrofurantoin	1464001	-	-	PHR1191-1G	1 g
59-87-0	Nitrofurazone	1465004	N0950000	-	PHR1196-1G	1 g
100-02-7	4-Nitrophenol	-	-	-	PHR1150-1G	1 g
5466-77-3	Octinoxate	1477900	-	-	PHR1080-1G	1 g
118-60-5	Octisalate	1477943	-	-	PHR1081-1G	1 g
6197-30-4	Octocrylene	1477411	-	-	PHR1083-1G	1 g
5333-42-6	Octyldodecanol	1477808	O0101000	-	PHR1155-1G	1 g
82419-36-1	Ofloxacin	1478108	-	-	PHR1168-1G	1 g
73590-58-6	Omeprazole	1478505	O0150000	765	PHR1059-1G	1 g
103639-04-9	Ondansetron Hydrochloride	1478582	Y0000218	-	PHR1141-1G	1 g
131-57-7	Oxybenzone	1485001	-	-	PHR1074-1G	1 g
57-10-3	Palmitic acid	1492007	P0090000	-	PHR1120-1G	1 g
540-10-3	Palmityl palmitate	1103105	-	-	PHR1166-1G	1 g
61-25-6	Papaverine hydrochloride	1496008	P0270000	76	PHR1182-500MG	500 mg
71-41-0	1-Pentanol	1504955	-	-	PHR1217-3X1.2ML	3 × 1.2 mL
62-44-2	Phenacetin melting point standard	1514008	-	-	PHR1094-1G	1 g
108-95-2	Phenol	1524806	-	-	PHR1047-1G	1 g
122-99-6	2-Phenoxyethanol	1526200	P0950000	-	PHR1121-1.5G	1.5 g
63-91-2	L-Phenylalanine	1530503	P1150000	-	PHR1100-1G	1 g
61-76-7	(R)-(-)-Phenylephrine hydrochloride	1533002	P1250000	284	PHR1017-500MG	500 mg
60-12-8	Phenylethyl Alcohol	1533250	-	-	PHR1122-1.5G	1.5 g

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CAS No.	Description	Traceable To USP	Traceable To EP	Traceable To BP	Cat. No.	Qty
118-55-8	Phenyl salicylate melting point standard	1534209	-	-	PHR1152-1G	1 g
57-41-0	Phenytioin	1535008	P1290000	-	PHR1139-1G	1 g
84-80-0	Phytonadione	1538006	-	-	PHR1078-1G	1 g
299-27-4	Potassium gluconate	1550001	-	-	PHR1130-1G	1 g
24634-61-5	Potassium sorbate	1548407	P2650000	-	PHR1278-1G	1 g
50-24-8	Prednisolone	1555005	P2700000	464	PHR1043-500MG	500 mg
53-03-2	Prednisone	1559006	P2900000	553	PHR1042-1G	1 g
614-39-1	Procainamide hydrochloride	1563502	P3050000	-	PHR1252-500MG	500 mg
51-05-8	Procaine hydrochloride	1564006	-	-	PHR1161-1G	1 g
57-83-0	Progesterone	1568007	P3300000	449	PHR1142-1G	1 g
67-63-0	2-Propanol	1570428	-	-	PHR1072-3X1.2ML	3 × 1.2 mL
57-55-6	Propylene glycol	1576708	-	-	PHR1051-1.5G	1.5 g
121-79-9	Propyl gallate	1576800	P3640000	-	PHR1118-1G	1 g
94-13-3	Propylparaben	1577008	P3650000	-	PHR1010-1G	1 g
9003-39-8	Povidone	1551503	-	-	PHR1250-500MG	500 mg
58-56-0	Pyridoxine hydrochloride	1587001	P4100000	458	PHR1036-500MG	500 mg
66357-59-3	Ranitidine hydrochloride	1598405	R0150000	471	PHR1026-500MG	500 mg
127-47-9	Retinyl acetate	1716002	R0300000	-	PHR1236-1G	1 g
79-81-2	Retinyl palmitate	1602502	-	-	PHR1235-1G	1 g
83-88-5	(-)-Riboflavin	1603006	R060000	-	PHR1054-1G	1 g
69-72-7	Salicylic acid	1609002	S020000	775	PHR1013-1G	1 g
56-45-1	L-Serine	1612506	S0450000	-	PHR1103-1G	1 g
532-32-1	Sodium benzoate	1613564	-	-	PHR1231-1G	1 g
25155-30-0	Sodium dodecylbenzenesulfonate	1623637	-	-	PHR1305-1G	1 g
867-56-1	Sodium L-lactate	1614308	-	-	PHR1113-1G	1 g
50-70-4	D-Sorbitol	1617000	S100000	-	PHR1006-1G	1 g
57-11-4	Stearic Acid	1621008	S1340000	-	PHR1114-1G	1 g
112-92-5	Stearyl Alcohol	1622000	S1350000	-	PHR1115-1G	1 g
57-50-1	Sucrose	1623637	S1600000	-	PHR1001-1G	1 g
723-46-6	Sulfamethoxazole	1631001	S2100000	314	PHR1126-1G	1 g
63-74-1	Sulfanilamide melting point standard	1633007	-	-	PHR1093-1G	1 g
144-83-2	Sulfapyridine melting point standard	1635002	-	-	PHR1087-1G	1 g
107-35-7	Taurine	1643361	-	-	PHR1109-1G	1 g
136-47-0	Tetracaine hydrochloride	1650006	T0500000	-	PHR1129-1G	1 g
64-75-5	Tetracycline hydrochloride	1651009	T060000	480	PHR1041-500MG	500 mg
112-72-1	1-Tetradecanol	1449008	-	-	PHR1135-1G	1 g
58-55-9	Theophylline	1653004	T080000	327	PHR1023-1G	1 g
58-55-9	Theophylline melting point standard	1653117	-	-	PHR1151-1G	1 g
67-03-8	Thiamine hydrochloride	1656002	Y0000467	-	PHR1037-1G	1 g
72-19-5	L-Threonine	1667202	T1340000	-	PHR1242-500MG	500 mg
89-83-8	Thymol	1449008	-	-	PHR1134-1G	1 g
32986-56-4	Tobramycin	1667508	T1500000	333	PHR1079-1G	1 g
10191-41-0	(±)-α-Tocopherol	1667600	T1550000	-	PHR1031-500MG	500 mg
7695-91-2	D,L-α-Tocopherol acetate	1667701	T1600000	-	PHR1030-500MG	500 mg
4345-03-3	D-α-Tocopherol succinate	1667803	T1610000	-	PHR1029-500MG	500 mg
302-79-4	Tretinoin	1674004	T1850000	-	PHR1187-3X100MG	3 × 100 mg
77-90-7	Tributyl 2-acetylcitrate	1009901	Y0001055	-	PHR1156-1G	1 g
77-94-1	Tributyl citrate	1680608	-	-	PHR1154-1G	1 g
126-73-8	Tributyl phosphate	-	Y0000279	-	PHR1205-0.5ML	0.5 mL
101-20-2	3,4,4'-Trichlorocarbaniilide	-	-	-	PHR1303-500MG	500 mg
77-89-4	Triethyl 2-acetylcitrate	1009923	-	-	PHR1157-1G	1 g
77-93-0	Triethyl citrate	1683606	-	-	PHR1153-1G	1 g
738-70-5	Trimethoprim	1692505	T220000	344	PHR1056-1G	1 g
73-22-3	Tryptophan	1700501	-	-	PHR1176-1G	1 g
60-18-4	L-Tyrosine	1705006	T2900000	-	PHR1097-1G	1 g
72-18-4	L-Valine	1708503	-	-	PHR1172-1G	1 g
99-66-1	Valproic acid	1708707	V0033000	-	PHR1061-1G	1 g
121-33-5	Vanillin	1710006	V0050000	-	PHR1245-1G	1 g
121-33-5	Vanillin melting point standard	1711009	-	-	PHR1091-1G	1 g
152-11-4	(±)-Verapamil hydrochloride	1711202	V0100000	-	PHR1131-1G	1 g

Pharmaceutical Standards

USP Residual Solvent Standards

USP Residual Solvent Standards

Sigma-Aldrich now offers Fluka brand Certified Reference Materials (CRMs) for the analysis of Residual Solvents. These CRMs are Secondary Pharmaceutical Reference Standards and are traceable and qualified against the corresponding Pharmacopeial standards. A comprehensive Certificate of Analysis offers details of the methodology and results of the qualification.

Description	Concentration	Cat. No.	Qty
Residual Solvent - Methanol	in DMSO <i>Methanol</i>	PHR1170-3X1.2ML	3 × 1.2 mL
Residual Solvent - Methylene Chloride	in DMSO <i>Dichloromethane</i>	PHR1171-3X1.2ML	3 × 1.2 mL
Residual Solvents Mixture - Class I	in DMSO, Varied concentration <i>Benzene</i> <i>Carbon tetrachloride</i> <i>1,2-Dichloroethane</i>	<i>1,1-Dichloroethene solution</i> <i>1,1,1-Trichloroethane</i>	PHR1063-3X1.2ML 3 × 1.2 mL
Residual Solvents Mixture - Class IIA	in DMSO, Varied concentration <i>Acetonitrile</i> <i>Chlorobenzene</i> <i>trans-1,2-Dichloroethylene</i> <i>cis-1,2-Dichloroethene solution</i> <i>Dichloromethane</i> <i>1,4-Dioxane solution</i> <i>Methanol</i>	<i>Methylcyclohexane</i> <i>Tetrahydrofuran</i> <i>Toluene/acetonitrile solution</i> <i>Ethylbenzene</i> <i>p-Xylene</i> <i>m-Xylene</i> <i>o-Xylene</i>	PHR1064-3X1.2ML 3 × 1.2 mL
Residual Solvents Mixture - Class IIB	in DMSO <i>Chloroform, 60 µg/mL</i> <i>1,2-Dimethoxyethane, 100 µg/mL</i> <i>Hexane, 290 µg/mL</i> <i>3-Methyl-2-pentanone, 50 µg/mL</i>	<i>Nitromethane, 50 µg/mL</i> <i>Pyridine, 200 µg/mL</i> <i>Tetralin, 100 µg/mL</i> <i>Trichloroethylene, 80 µg/mL</i>	PHR1065-3X1.2ML 3 × 1.2 mL
Residual Solvents Mixture - Class IIC	in DMSO <i>N,N-Dimethylacetamide, 5.45 mg/mL</i> <i>N,N-Dimethylformamide, 4.4 mg/mL</i> <i>2-Ethoxyethanol, .8 mg/mL</i> <i>Ethylene glycol, 3.1 mg/mL</i>	<i>Formamide, 1.1 mg/mL</i> <i>2-Methoxyethanol, .25 mg/mL</i> <i>N-Methylpyrrolidone, 2.65 mg/mL</i> <i>Sulfolane, .8 mg/mL</i>	PHR1066-3X1.2ML 3 × 1.2 mL



VIALS & SYRINGES

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Screw Top Glass, Caps, and Septa for large volume vials (7-60 mL)	39	Hamilton GASTIGHT® Syringes, 1700 Series	88
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Vials

Selecting Vials, Inserts, and Closures: *Vial Varieties*

Vials

Selecting Vials, Inserts, and Closures

Vial Varieties

ABC Vial, R.A.M. or Short Thread screw top vials. These vials have a unique 9mm thread design that allows you to screw on the caps, and still use them in a robotic autosampler. This thread is much higher on the top of the vial allowing space between the bottom of the thread and the shoulder of the vial.



LVI, Interlock, or QSertVial. These large opening vials have a coneshaped insert fused into the vial. These 300 μL glass conical insert and 12 x 32 mm vial are one precise integral unit.



LVI Crimp Top Vial, 300 μL

Screw Top Vials. These standard (4.6mm) and large opening (6.0mm) vials are available in both clear and amber glass. They come with a variety of closures and septa.



Certified Vial, Large Opening, 10-425 thread

Crimp Top Vials. These standard (4.6mm) and large opening (6.0mm) vials are used with aluminum seals. The 11 mm aluminum seals have 6 mm openings.



Clear Glass Vial, Crimp finish

Shell Vials. Cylindrical shell vials compatible with plug-style needle closures to make syringe extraction easier.



From left to right: 24727, 24729

Snap Seal vial is made with more glass in the neck area of the vial than the Snap Ring vial. The Poly Crimp Seal, designed for use with the Snap Seal, will fit virtually any crimp finish vial with any liner thickness. The standard aluminum crimp seal can also be used to seal this vial.



Snap Seal vial, clear glass, 29132-U

VersaVial is a shell vial with a vase-like molded neck that allows the vial to be picked up by an autosampler. The 9 mm neck opening provides a large target area for adding or removing the sample to the vial. The variety of snap plug closure materials makes the vial useful for chromatographic samples.



VersaVial, clear glass, 29083-U

Vials

Selecting Vials, Inserts, and Closures: *Insert Varieties*

Insert Varieties

Glass Inserts with Top Springs, Mandrel precision point – With the unique design, the insert is centered in the neck of the vial. The needle extracts nearly all of the sample.



Inserts with top spring

Glass Inserts with Bottom Springs, Mandrel precision point – The unique design allows the insert to be centered in the vial.



Insert with bottom spring

Shell Style Inserts – These economical inserts stand unsupported in the carrier vial. Capacity 0.25-0.35mL.



Shell style inserts

Cap Varieties

Phenolic Hole Cap, Temp. Limit 149°C. Autoclavable.



Phenolic hole cap

Polypropylene Hole Cap, Temp. Limit 135°C. Autoclavable.



Polypropylene hole cap

Melamine Solid Cap w/PTFE liner, Temp. Limit 49°C Not Autoclavable



Solid cap with PTFE liner

Phenolic Solid Cap w/Aluminum, Temp. Limit 135°C. Not Autoclavable



Solid cap with aluminum liner

Selecting Screw Top Vials and Components

Volume	Vial O.D. x Height	Cap Thread (GCM I Spec.)	Septum Diameter
2 mL (0.5 drams)	12 x 32 mm x 4.6 (I.D.) mm	8-425	8 mm
2 mL (0.5 drams)	12 x 32 mm x 6.0 (I.D.) mm	9 mm	9 mm
2 mL (0.5 drams)	12 x 32 mm x 6.0 (I.D.) mm	10-425	10 mm
4 mL (1 dram)	15 x 45 mm	13-425	11 mm
7 mL (2 drams)	17 x 60 mm	15-425	13 mm
15 mL (4 drams)	21 x 70 mm	18-400	16 mm
22 mL (6 drams)	23 x 85 mm	20-400	18 mm
40 mL (10.7 drams)	29 x 81 mm	24-400	22 mm
40 mL (10.7 drams)	28 x 98 mm	24-400	22 mm

Vials

Popular Autosampler Vials by Instrument

Popular Autosampler Vials by Instrument

	Glass	Features	Cat. No.	Pk. Size	Page	Agilent 1050/1090	Agilent 1100	Agilent 7673A, Series I, II	CTC LC PAL	CTC GC PAL	Merck/Hitachi, AS/4000	PerkinElmer Autosystem and Clarus 500	PE ISS-100, 200, Integral 4000 and Series 200	Shimadzu GC Autosamplers
Crimp Top Vials														
6 x 32 mm	clear	tapered bottom	27283	100	17			✓		✓				
7 x 30 mm	amber	conical	27312	200	18			✓						
7 x 32 mm	amber	round bottom	27314	100	18			✓						
7 x 40 mm	amber	conical bottom	24744	100	18									
8 x 40 mm	clear	flat bottom	33321-U	200	19									
12 x 32 mm	clear	PTFE/red rubber	29124-U	100	15	✓	✓	✓	✓	✓	✓	✓	✓	✓
	clear	PTFE/silicone	29125-U	100	15	✓	✓	✓	✓	✓	✓	✓	✓	✓
	amber	PTFE/red rubber	29127-U	100	15	✓	✓	✓	✓	✓	✓	✓	✓	✓
	amber	PTFE/silicone	29128-U	100	15	✓	✓	✓	✓	✓	✓	✓	✓	✓
Screw Thread, 12 x 32 mm														
Certified Vials, 9 mm thread	clear	PTFE/silicone	29381-U	100	4	✓	✓	✓	✓	✓	✓			✓
	clear	PTFE/Silicone w/slit	29384-U	100	4	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/silicone	29386-U	100	4	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/Silicone w/slit	29387-U	100	4	✓	✓	✓	✓	✓	✓			✓
Center Drain Vials	clear	PTFE/silicone	29307-U	100	11	✓	✓	✓	✓	✓	✓			✓
	clear	PTFE/Silicone w/slit	29309-U	100	11	✓	✓	✓	✓	✓	✓			✓
	clear	PTFE/silicone/PTFE	29308-U	100	11	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/silicone	29313-U	100	11	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/Silicone w/slit	29314-U	100	11	✓	✓	✓	✓	✓	✓			✓
Low Adsorption Vials	clear	PTFE/silicone	29651-U	100	4	✓	✓	✓	✓	✓	✓			✓
	clear	PTFE/Silicone w/slit	29652-U	100	4	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/silicone	29653-U	100	4	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/Silicone w/slit	29654-U	100	4	✓	✓	✓	✓	✓	✓			✓
Large Opening, 2 mL	clear	PTFE/red rubber	29116-U	100	15				✓				✓	✓
	amber	PTFE/red rubber	29117-U	100	15				✓				✓	✓
	clear	PTFE/silicone	29432-U	100	31				✓				✓	✓
	amber	PTFE/silicone	29119-U	100	15				✓				✓	✓
	clear	silanized	27060U	100	15				✓		✓		✓	✓
	amber	silanized	27225-U	100	15				✓		✓		✓	✓
Screw Thread, 15 x 45 mm														
13/425 thread	clear	vial only	854190	100	34									✓
	clear	vial only	27111	100	34									✓
	clear	marking spot	27113	1000	34									✓
	amber	marking spot	27116-U	100	34									✓
	amber	vial only	27115-U	100	34									✓
	amber	vial only	854986	100	34									✓
Glass Inserts for 12 x 32 mm Vials														
Glass Inserts for 12 x 32 mm Vials	bottom spring	6 x 28 mm	24721	100	13	✓	✓	✓	✓	✓	✓	✓	✓	✓
	conical	6 x 31 mm	24717	100	13	✓	✓	✓	✓	✓	✓	✓	✓	✓

Vials

Popular Autosampler Vials by Instrument

	Glass	Features	Cat. No.	Pk. Size	Page	Shimadzu LC Autosamplers	Spark Marathon, Midas, Triathlon	Thermo HPLC Spectra System	Thermo GC TRACE/AS3000/AI3000/AS3500	Varian GC Autosamplers 8000/8100/8200/8400/8410	Varian LC Autosamplers 9090, 9095, Marathon	Waters 48, 717, 717 Plus	Waters 96 Autosampler	Waters Alliance
Crimp Top Vials														
6 x 32 mm	clear	tapered bottom	27283	100	17	✓		✓						
7 x 30 mm	amber	conical	27312	200	18									
7 x 32 mm	amber	round bottom	27314	100	18									
7 x 40 mm	amber	conical bottom	24744	100	18			✓						
8 x 40 mm	clear	flat bottom	33321-U	200	19								✓	
12 x 32 mm	clear	PTFE/red rubber	29124-U	100	15	✓	✓	✓	✓	✓	✓			✓
	clear	PTFE/silicone	29125-U	100	15	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/red rubber	29127-U	100	15	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/silicone	29128-U	100	15	✓	✓	✓	✓	✓	✓			✓
Screw Thread, 12 x 32 mm														
Certified Vials, 9 mm thread	clear	PTFE/silicone	29381-U	100	4	✓	✓	✓	✓	✓	✓			✓
	clear	PTFE/Silicone w/slit	29384-U	100	4	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/silicone	29386-U	100	4	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/Silicone w/slit	29387-U	100	4	✓	✓	✓	✓	✓	✓			✓
Center Drain Vials	clear	PTFE/silicone	29307-U	100	11	✓	✓	✓	✓	✓	✓			✓
	clear	PTFE/Silicone w/slit	29309-U	100	11	✓	✓	✓	✓	✓	✓			✓
	clear	PTFE/silicone/PTFE	29308-U	100	11	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/silicone	29313-U	100	11	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/Silicone w/slit	29314-U	100	11	✓	✓	✓	✓	✓	✓			✓
Low Adsorption Vials	clear	PTFE/silicone	29651-U	100	4	✓	✓	✓	✓	✓	✓			✓
	clear	PTFE/Silicone w/slit	29652-U	100	4	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/silicone	29653-U	100	4	✓	✓	✓	✓	✓	✓			✓
	amber	PTFE/Silicone w/slit	29654-U	100	4	✓	✓	✓	✓	✓	✓			✓
Large Opening, 2 mL	clear	PTFE/red rubber	29116-U	100	15	✓								✓
	amber	PTFE/red rubber	29117-U	100	15	✓								✓
	clear	PTFE/silicone	29432-U	100	31	✓								✓
	amber	PTFE/silicone	29119-U	100	15	✓								✓
	clear	silanized	27060-U	100	15	✓								✓
	amber	silanized	27225-U	100	15	✓								✓
Screw Thread, 15 x 45 mm														
13/425 thread	clear	vial only	854190	100	34	✓						✓		
	clear	vial only	27111	100	34	✓						✓		
	clear	marking spot	27113	1000	34	✓						✓		
	amber	marking spot	27116-U	100	34	✓						✓		
	amber	vial only	27115-U	100	34	✓						✓		
	amber	vial only	854986	100	34	✓						✓		
													✓	
Glass Inserts for 12 x 32 mm Vials														
	Style	Dimensions												
	bottom spring	6 x 28 mm	24721	100	13	✓	✓	✓	✓	✓	✓			✓
	conical	6 x 31 mm	24717	100	13	✓	✓	✓	✓	✓	✓			✓

Vials

Vials for Mass Spectrometry

Vials for Mass Spectrometry

NEW PRODUCTS

The products listed in this section have been manufactured with Mass Spectrometry applications in mind. These vials and closures are designed, engineered and manufactured for optimum performance in HPLC, GC/MS, and LC/MS applications.

The chemist spends a great deal of energy, money and precious time on sample preparation. After that, the last thing a chemist needs is for the sample vials to contribute to contamination that may result in complicated data interpretation or complete reanalysis. By using vials certified to be nearly contaminant free the chemist can reduce the risk significantly by using vial products made specifically for these applications.

Certified Low Adsorption (LA) Vials

Certified Vial Kit, Low Adsorption (LA), 2 mL

Supelco's new Low Adsorption (LA) vials are manufactured using a process that decreases the number of hydroxyl groups on the vial's glass surface, significantly reducing surface activity while improving analytical quantitation and minimizing pH shifts in the sample. This same process also removes unwanted surface metals such as sodium and boron that can contaminate samples and interfere with trace analysis. Unlike other methods used to decrease vial surface activity, the elimination of surface activity in LA vials is integral to the manufacturing process and is not a chemical surface treatment.

These vials and closures are designed, engineered, and manufactured for optimum performance in HPLC, GC/MS, and LC/MS applications. All of the parts of the vial system (vial, cap, and septum) can come into contact with the sample and are critical to the outcome of the analysis.

We recommend using LA vials with MSQ polypropylene cap/PTFE silicone septa. This cap and septa combination was purposely designed for use with mass spectrometry. It shows little to no background contamination when compared to other cap and septa products in the marketplace.

light blue polypropylene cap

O.D. × H × I.D. 12 mm × 32 mm × 6.0 mm



Vial, 2 mL

Description	Cat. No.	Qty
2 mL, clear glass (with marking spot), natural PTFE/silicone septa, 9 mm	29651-U	100 ea
2 mL, clear glass (with marking spot), natural PTFE/silicone septa (with slit), 9 mm	29652-U	100 ea
2 mL, amber glass (with marking spot), natural PTFE/silicone septa, 9 mm	29653-U	100 ea
2 mL, amber glass (with marking spot), natural PTFE/silicone septa (with slit), 9 mm	29654-U	100 ea

Certified Vial Kit, Low Adsorption (LA) CD™ (Center Drain) vial

light blue polypropylene cap

O.D. × H × I.D. 12 mm × 32 mm × 6.0 mm



Center Drain (CD) Vial

Description	Cat. No.	Qty
1.5 mL, CD (Center Draining) Vial, clear glass, natural PTFE/silicone septa, 9 mm	29655-U	100 ea
1.5 mL, CD (Center Draining) Vial, clear glass, natural PTFE/silicone septa (with slit), 9 mm	29656-U	100 ea

Certified Vial Kit, Low Adsorption (LA) MRQ30 CD™ vial

light blue polypropylene cap

O.D. × H × I.D. 12 mm × 32 mm × 6.0 mm



MRQ30 CD Vial, 0.2 µL

Description	Cat. No.	Qty
1.2 mL, MRQ30 Vial, clear glass, natural PTFE/silicone septa, 9 mm	29658-U	100 ea
1.2 mL, MRQ30 Vial, clear glass, natural PTFE/silicone septa (with slit), 9 mm	29659-U	100 ea

Certified Vial Kit, Low Adsorption (LA) QsertVial™

light blue polypropylene cap

O.D. × H × I.D. 12 mm × 32 mm × 6.0 mm



Low Adsorption QsertVial

Description	Cat. No.	Qty
0.3 mL, QsertVial, clear glass, natural PTFE/silicone septa, 9 mm	29661-U	100 ea
0.3 mL, QsertVial, clear glass, natural PTFE/silicone septa (with slit), 9 mm	29662-U	100 ea
0.3 mL, QsertVial, amber glass, natural PTFE/silicone septa, 9 mm	29663-U	100 ea
0.3 mL, QsertVial, amber glass, natural PTFE/silicone septa (with slit), 9 mm	29664-U	100 ea

Vials

Vials for Mass Spectrometry: *Certified Low Adsorption (LA) Vials***MSQ™ Caps with septa, Mass Spec Quality**

We recommend using LA Vials with the MSQ polypropylene cap with PTFE/silicone septa. This cap and septa combination was purposely designed for use with mass spectrometry. It shows little to no background contamination when compared to other cap and septa products in the marketplace.

MSQ

light blue polypropylene cap

septum thickness 1.0 mm
 O.D. x H x I.D. 11.5 mm x 6 mm x 9 mm



MSQ Polypropylene Cap with PTFE/silicone septa

Description	Cat. No.	Qty
9 mm, natural PTFE/silicone septa	29665-U	100 ea
9 mm, natural PTFE/silicone septa (with slit)	29666-U	100 ea

Certified Autosampler Vials**Certified screw thread vials, 9 mm thread, 12 x 32 mm, Amber****Autosampler compatibility:**

Agilent

Agilent 1050/1090A

Agilent 1100/1200

Agilent 7673A, 7683

Agilent 5890/7985A/6890

Hitachi

AS-1000, AS-2000, AS-4000

L7200/L7250

LEAP Technologies

CTC LC PAL, GC PAL

CombiPAL

HTC PAL/HTS PAL

PerkinElmer

Autosystem/AS-2000/XL

Clarus 500/600

ISS-100, 200

Shimadzu LC Autosamplers

SIL-HTa/SIL-HTc

SIL-10ADV

SIL-10A/SIL-10Ai/SIL-10Ap

Varian

CP-8410

8100/8200

9100/90950/9095

Waters

Alliance 2690

Acquity

Breeze

717Plus

9 mm

The inside diameter of vials vary with the manufacture. The following insert part numbers are compatible with these large opening vials.

- 29435-U PK100, Certified 200 µL glass inserts, mandrel precision point, 6 X 29mm, with bottom spring
- 29436-U PK100, Certified 250 µL glass insert, conical bottom, 6 x 31 mm
- 29437-U PK100, Certified 300 µL glass inserts, conical bottom, 6 x 30 mm
- 29441-U PK100, Certified 350 µL glass inserts, flat bottom, 6 x 31mm

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm

2 mL, amber glass vial

Vial, 2 mL

29373-U

100 ea

2 mL, amber glass vial (with graduated marking spot)

29376-U

100 ea

Our new certified vial, cap and septa products eliminate "fit" and septa contamination concerns associated with other brands. By taking these extra manufacturing and testing steps, we can ensure the following:

- Caps will thread properly onto vials, providing an air-tight seal
- Syringe needles are not damaged by irregular vial bottom thickness
- Minimal contamination for septa impurities

Quality is built into each component of the Supelco certified vial system. Our certified glass and polypropylene vials are manufactured to the tightest physical specifications possible. Each lot of vials is examined to ensure there are not inconsistencies in the vial height, bottom thickness and neck thread. Glass vials are produced from Type 1 borosilicate glass tubing (clear glass from 33 expansion glass, amber glass from 51 expansion glass), while our polypropylene vials are manufactured from virgin resins to eliminate the possibility of sample contamination.

Septa

The PTFE/silicone and modified PTFE/silicone septa are manufactured, conditioned and then tested by GC/MS to ensure they have the lowest level of extractable in the industry.

Closures/Caps

Plastic components are manufactured using virgin resins to eliminate the possibility of sample contamination. Caps are molded to ensure consistency in fit, thread specification and overall dimensions.

Vials

Vials for Mass Spectrometry: *Certified Autosampler Vials***Certified Kits, screw thread vials, 12 x 32 mm, 9 mm thread, unassembled****Autosampler compatibility:**

Agilent
 Agilent 1050/1090A
 Agilent 1100/1200
 Agilent 7673A, 7683
 Agilent 5890/7985A/6890
 Hitachi
 AS-1000, AS-2000, AS-4000
 L7200/L7250
 LEAP Technologies
 CTC LC PAL, GC PAL
 CombiPAL
 HTC PAL/HTS PAL
 PerkinElmer
 Autosystem/AS-2000/XL
 Clarus 500/600
 ISS-100, 200
 Shimadzu LC Autosamplers
 SIL-HTa/SIL-HTc
 SIL-10ADV
 SIL-10A/SIL-10Ai/SIL-10Ap
 Varian
 CP-8410
 8100/8200
 9100/90950/9095
 Waters
 Alliance 2690
 Acquity
 Breeze
 717Plus
 blue polypropylene cap
 O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm



Certified Vial Kit

Description	Cat. No.	Qty
Certified Kit, clear glass		
2 mL, clear glass vial, PTFE/silicone septum (bonded to cap)	29378-U	100 ea
2 mL, clear glass vial, PTFE/silicone septum (with slit), septa bonded to cap	29379-U	100 ea
Certified Kit, clear glass with marking spot		
2 mL, clear glass vial (with graduated marking spot), PTFE/silicone septum (bonded to cap)	29381-U	100 ea
2 mL, clear glass vial (with graduated marking spot), PTFE/silicone septum (with slit), (septa bonded to cap)	29384-U	100 ea

Description	Cat. No.	Qty
Certified Kit, amber glass		
2 mL, amber glass vial, PTFE/silicone septum (bonded to cap)	29385-U	100 ea
Certified Kit, amber glass with marking spot		
2 mL, amber glass vial (with graduated marking spot), PTFE/silicone septum (bonded to cap)	29386-U	100 ea
2 mL, amber glass vial (with graduated marking spot), PTFE/silicone septum (with slit), (septa bonded to cap)	29387-U	100 ea
Certified Kit, polypropylene		
300 µL, polypropylene vial, PTFE/silicone septum (bonded to cap)	29388-U	100 ea
300 µL, polypropylene vial, PTFE/silicone septum (with slit), (septa bonded to cap)	29389-U	100 ea

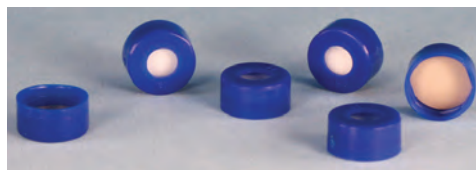
Certified screw thread vials, 9 mm thread, 12 x 32 mm

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm

Description	Cat. No.	Qty
Certified 9 mm vials		
2 mL, clear glass vial	29371-U	100 ea
2 mL, clear glass vial (with graduated marking spot)	29372-U	100 ea
300 µL, polypropylene vial	29377-U	100 ea

Certified polypropylene bonded caps with septa

9 mm
 septum thickness 1.5 mm
 O.D. x H x I.D. 11.5 mm x 6 mm x 9 mm



Certified caps for Snap Ring vials

Description	Cat. No.	Qty
9 mm cap, PTFE/red rubber septum, dark blue polypropylene cap	29315-U	100 ea
9 mm cap, PTFE/silicone septum, dark blue polypropylene cap	29319-U	100 ea
9 mm cap, PTFE/silicone septum (with slit), dark blue polypropylene cap	29320-U	100 ea
9 mm cap, PTFE/silicone/PTFE septum, dark blue polypropylene cap	29321-U	100 ea

Vials

Vials for Mass Spectrometry: *Certified Autosampler Vials*



Pico Pure Plus+ caps

Certified Screw Top Vial Kits with Pico Pure Plus+™ caps

The Pico Pure Plus+ closure was developed for the LC/MS market. It is a one-piece septumless closure system. This closure system does not have the contamination issues that is found in other closures. The impurities of this cap is well below the picogram range of purity for extractables.

- Sealing: This closure seals as well as a vial and cap with a PTFE/silicone septa.
- Puncture ability: This product will puncture with far less force than what is needed to puncture a PTFE/silicone septa.

9 mm

The inside diameter of vials vary with the manufacture. The following insert part numbers are compatible with these large opening vials.

- 29435-U PK100, Certified 200 µL glass inserts, mandrel precision point, 6 X 29mm, with bottom spring
- 29436-U PK100, Certified 250 µL glass insert, conical bottom, 6 x 31 mm
- 29437-U PK100, Certified 300 µL glass inserts, conical bottom, 6 x 30 mm
- 29441-U PK100, Certified 350 µL glass inserts, flat bottom, 6 x 31mm

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm

Description	Cat. No.	Qty
2 mL, clear glass vial, 9 mm thread, polyethylene cap	29422-U	100 ea
2 mL, clear glass vial (with graduated marking spot), 9 mm thread, polyethylene cap	29423-U	100 ea
2 mL, amber glass vial, 9 mm thread, polyethylene cap	29424-U	100 ea
2 mL, amber glass vial (with graduated marking spot), 9 mm thread, polyethylene cap	29425-U	100 ea

Certified screw thread vials, 10-425 thread, 12 x 32 mm

The inside diameter of vials vary with the manufacture. The following insert part numbers are compatible with these large opening vials.

- 29435-U PK100, Certified 200 µL glass inserts, mandrel precision point, 6 X 29mm, with bottom spring
- 29436-U PK100, Certified 250 µL glass insert, conical bottom, 6 x 31 mm
- 29437-U PK100, Certified 300 µL glass inserts, conical bottom, 6 x 30 mm
- 29441-U PK100, Certified 350 µL glass inserts, flat bottom, 6 x 31mm

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm



Clear Glass

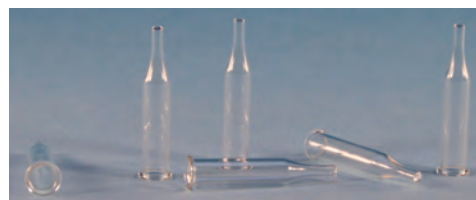
Description	Cat. No.	Qty
2 mL, clear glass vial (vial only)	29430-U	100 ea
2 mL, clear glass vial, PTFE/silicone septum, (convenience kit)	29432-U	100 ea



Certified Glass Insert with bottom spring, 200 µL



Certified Glass Insert, 250 µL



Certified Glass Insert, 300 µL

Certified glass inserts for 12 x 32 mm, large opening vials

insert, for large opening vials (6.0 mm I.D.)

Description	Cat. No.	Qty
200 µL, clear glass insert (with plastic bottom spring), O.D. 6 mm x H 29 mm	29435-U	100 ea
250 µL, clear glass insert (no spring required), conical point, O.D. 6 mm x H 31 mm	29436-U	100 ea
300 µL, clear glass insert, conical point, O.D. 6 mm x H 31 mm	29437-U	100 ea
350 µL, clear glass insert (flat bottom), O.D. 6 mm x H 31 mm	29441-U	100 ea

Certified QSertVial™ (vial with fused-in insert) kit, screw thread, 12 x 32 mm, 300 µL

The QSertVial™ is the ultimate microsampling device. It contains a 300 µL glass insert that is fused to the vial to form one precise integral unit. The rim of the insert is positioned slightly above the top of the vial so the septum can make a secure seal with the closure, eliminating evaporation and cross contamination. The insert is centered into the vial, 2 mm from the bottom, allowing for consistent sample recovery and eliminating problems caused by variation in insert depth. It is compatible with the majority of autosamplers in the market. It is available in a variety of kit configurations.

- Evaporation and cross contamination between insert and vial is eliminated
- Higher sample recovery with either bottom loading or side loading needles (point style #2 and #5). Residual dead volume can be as low as 4 µL, depending on precision adjustment of the instrument.
- Consistent sample recovery from vial to vial because the insert is always at the same precise depth within the vial.

Vials

Vials for Mass Spectrometry: *Certified Autosampler Vials***Certified QSertVial™ (vial with fused-in insert) kit, screw thread, 12 x 32 mm, 300 µL** (continued)

- Wide mouth opening has larger target area reducing the possibility of bent needles.
- Easy sample identification of white mat finish marking panel.
- Available in clear or amber glass.

blue polypropylene cap

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm



QSertVials with 0.3 mL fused-in inserts

Description	Cat. No.	Qty
300 µL, clear glass vial, PTFE/silicone septum (bonded), thread, 9 mm	29391-U	100 ea
300 µL, clear glass vial, PTFE/silicone septum (bonded with slit), thread, 9 mm	29392-U	100 ea
300 µL, amber glass vial, PTFE/silicone septum (bonded), thread, 9 mm	29398-U	100 ea
300 µL, amber glass vial, PTFE/silicone septum (bonded with slit), thread, 9 mm	29401-U	100 ea

Certified QSertVial™ kit with cap and septa, snap top vial, 12 x 32 mm**Autosampler compatibility:**

Agilent
 Agilent 1050/1090A
 Agilent 1100/1200
 Agilent 7673A, 7683
 Agilent 5890/7985A/6850/6890
 LEAP Technologies
 CTC LC PAL, GC PAL
 CombiPAL
 HTC PAL/HTS PAL
 Shimadzu LC Autosamplers
 SIL-HTa/SIL-HTc
 SIL-10ADvp
 SIL-10A/SIL-10Ai/SIL-10AP
 Varian
 CP-9010
 8000/8035/8100/8200
 9100/9090/9095
 Vista
 Waters
 Alliance 2690/2695
 Alliance 2790/2795
 Acquity
 Snap top/crimp top
 for 11 mm snap ring

O.D. x H x I.D. 12 mm x 32 mm x 6 mm

Description	Cat. No.	Qty
300 µL, clear glass vial (with fused insert), PTFE/silicone septum	29428-U	100 ea
300 µL, clear glass vial (with fused insert), PTFE/silicone septum (with slit)	29429-U	100 ea

Certified crimp top vials, 12 x 32 mm**Autosampler compatibility:**

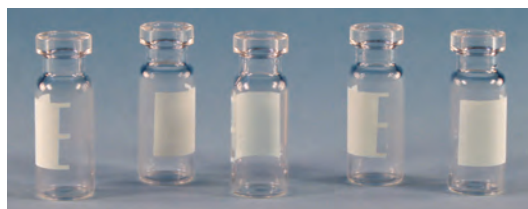
Agilent
 Agilent 1050/1090A
 Agilent 1100/1200
 Agilent 7673A, 7683
 Agilent 5890/7985A/6890
 Hitachi
 AS-1000, AS-2000, AS-4000
 L7200/L7250
 LEAP Technologies
 CTC LC PAL, GC PAL
 CombiPAL
 HTC PAL/HTS PAL
 PerkinElmer
 Autosystem/AS-2000/XL
 Clarus 500/600
 ISS-100, 200
 Varian
 CP-8410
 8100/8200
 9100/90950/9095

crimp top
 for 11 mm crimp

The inside diameter of vials vary with the manufacture. The following insert part numbers are compatible with these large opening vials.

- 29435-U PK100, Certified 200 µL glass inserts, mandrel precision point, 6 X 29mm, with bottom spring
- 29436-U PK100, Certified 250 µL glass insert, conical bottom, 6 x 31 mm
- 29437-U PK100, Certified 300 µL glass inserts, conical bottom, 6 x 30 mm
- 29441-U PK100, Certified 350 µL glass inserts, flat bottom, 6 x 31mm

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm



Certified Vial, Crimp Top, 2 mL

Description	Cat. No.	Qty
2 mL, clear glass vial	29403-U	100 ea
2 mL, clear glass vial (with graduated marking spot)	29404-U	100 ea
2 mL, amber glass vial	29407-U	100 ea
2 mL, amber glass vial (with graduated marking spot)	29408-U	100 ea

Vials

Vials for Mass Spectrometry: *Certified Autosampler Vials*

Certified Kit, snap ring vials, 12 x 32 mm, 6.0 mm I.D.

for 11 mm snap ring

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm



Description	Cat. No.	Qty
2 mL, Snap top/crimp top, clear glass vial, PTFE/silicone septum, clear polyethylene cap	29421-U	100 ea
300 µL, polypropylene vial, snap ring, PTFE/silicone septum (bonded)	29412-U	100 ea
300 µL, polypropylene vial, snap ring, PTFE/silicone septum (bonded with slit)	29413-U	100 ea

Certified snap ring vials, 12 x 32 mm, 6.0 mm I.D.

for 11 mm snap ring

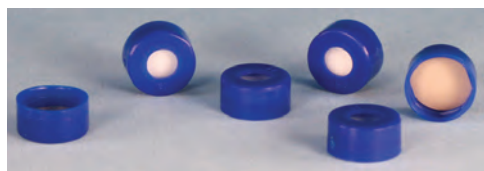
Description	Cat. No.	Qty
2 mL, clear glass vial	29417-U	100 ea
2 mL, clear glass vial (with graduated marking spot)	29418-U	100 ea
2 mL, amber glass vial	29419-U	100 ea
2 mL, amber glass vial (with graduated marking spot)	29420-U	100 ea
300 µL, polypropylene vial	29409-U	100 ea

Certified polypropylene caps with septa

for 11 mm snap ring

blue polypropylene cap

O.D. x H x I.D. 11.5 mm x 6 mm x 9 mm



Certified caps for Snap Ring vials

Description	Cat. No.	Qty
snap cap, PTFE septum	29304-U	100 ea
snap cap, PTFE/silicone septum	29305-U	100 ea
snap cap, PTFE/silicone septum (with slit)	29306-U	100 ea

Certified glass inserts for 12 x 32 mm, large opening vials

insert, for large opening vials (6.0 mm I.D.)

Description	Cat. No.	Qty
200 µL, clear glass insert (with plastic bottom spring), O.D. 6 mm x H 29 mm	29435-U	100 ea
250 µL, clear glass insert (no spring required), conical point, O.D. 6 mm x H 31 mm	29436-U	100 ea

Description	Cat. No.	Qty
300 µL, clear glass insert, conical point, O.D. 6 mm x H 31 mm	29437-U	100 ea
350 µL, clear glass insert (flat bottom), O.D. 6 mm x H 31 mm	29441-U	100 ea

Certified CD™ (Center Drain) Vials



Center Drain (CD) Vial

Certified CD™ Vial (Center Draining) Kit with 9 mm thread with cap/septa, unassembled

9 mm

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm
feature cap is bonded to septa to prevent fallout

Description	Cat. No.	Qty
1.5 mL, clear glass, 9 mm thread, PTFE/silicone	29307-U	100 ea
1.5 mL, clear glass, 9 mm, PTFE/silicone (with slit)	29309-U	100 ea
1.5 mL, clear glass, 9 mm, PTFE/silicone/PTFE	29308-U	100 ea
1.5 mL, amber glass, 9 mm, PTFE/silicone	29313-U	100 ea
1.5 mL, amber glass, 9 mm, PTFE/silicone (with slit)	29314-U	100 ea

Certified CD™ vial kit, with Pico Pure Plus+™ cap, unassembled

Description	Cat. No.	Qty
1.5 mL, clear glass, 9 mm thread, white polyethylene cap, for use with LC/MS applications	29322-U	100 ea



MRQ30 CD Vial, 0.2 µL

MRQ30 Clear CD Vial™, Blue cap, Pre-slit TEF/Silicone septa

Certified CD™ Vial (Center Draining) Kit with 9 mm thread with cap/septa, unassembled

Description	Cat. No.	Qty
1.2 mL, clear glass, 9 mm, O.D. 12 mm x H 32 mm x I.D. 6.0 mm, dead volume 2 mL	23187-U	100 ea

Vials

Vials for Mass Spectrometry: *Certified CD™ (Center Drain) Vials*

Certified CD™ vials (Center Drain), 12 x 32mm (vial only)



Center Drain (CD) Vials

Description	Cat. No.	Qty
Certified Crimp top		
1.5 mL, crimp top, clear glass	29298-U	100 ea
Certified Snap top		
1.5 mL, snap ring, clear glass	29299-U	100 ea

Certified Snap Ring CD™ vial kit with cap/septa, unassembled

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm

Description	Cat. No.	Qty
1.5 mL, clear glass, snap top, PTFE septa (0.010" thick)	29301-U	100 ea
1.5 mL, clear glass, snap top, PTFE/silicone	29302-U	100 ea
1.5 mL, clear glass, snap top, PTFE/silicone (with slit)	29303-U	100 ea

Autosampler Vials with 9 mm Thread

ABC Vial™ (9 mm thread), Large Opening, Pre-Assembled

ABC Vials™, 2 mL, polypropylene cap, PTFE/silicone septum

clear polypropylene hole cap

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm



Description	Cat. No.	Qty
2 mL, clear glass, 9 mm thread, PTFE/silicone septum	27487-U 27542	100 ea 1000 ea
2 mL, clear glass (with marking spot), 9 mm thread, PTFE/silicone septum	27490-U 27548-U	100 ea 1000 ea
2 mL, amber glass, 9 mm thread, PTFE/silicone septum	27493	100 ea
2 mL, amber glass (with marking spot), 9 mm thread, PTFE/silicone septum	27496 27549-U	100 ea 1000 ea

ABC Vial™, 2 mL, polypropylene cap, PTFE/rubber septum

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm

Description	Cat. No.	Qty
clear glass, PTFE/rubber septum	27488-U 27544-U	100 ea 1000 ea
clear glass (with marking spot), PTFE/red rubber septum	27491-U 27550-U	100 ea 1000 ea
amber glass, PTFE/rubber septum	27494	100 ea
amber glass (with marking spot), PTFE/rubber septum	27497-U 27551	100 ea 1000 ea

ABC Vial™, 2 mL, polypropylene cap, PTFE/silicone/PTFE septum

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm

Description	Cat. No.	Qty
clear glass, PTFE/silicone/PTFE septum	27489 27546-U	100 ea 1000 ea
clear glass (with marking spot), PTFE/silicone/PTFE septum	27492-U 27552	100 ea 1000 ea
amber glass, PTFE/silicone/PTFE septum	27495	100 ea
amber glass (with marking spot), PTFE/silicone/PTFE septum	27498	100 ea

ABC Vial™, 2 mL (vial only)

These vials have a 9mm thread that allows them to be used with robotic systems. Use with autosamplers that require 12 x 32 mm screw top or crimp top vials.

- 40% wider opening than standard screw cap vials
- Superior thread design ensures a secure seal
- Compatible with most GC autosamplers that accept crimp top vials

Caps and septa are not included. Please order separately.

9 mm

The diameter of inserts varies between manufacturers. Only the following insert part numbers are compatible with these large opening vials.

- 24719, 24720 Glass insert, conical bottom, 6 x 29mm
- 24721 Glass insert with bottom spring, 6 x 29mm
- 24722 Polypropylene insert with bottom spring, 6 x 29mm
- 24717, 24718 Glass insert, conical bottom, 6 x 31mm
- 24715, 24716 Glass insert, flat bottom, 6 x 31mm

volume 2 mL

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm

large opening, (6 mm)



9mm vials, clear glass

Description	Cat. No.	Qty
clear glass	27329 27554	100 ea 1000 ea
clear glass (with marking spot)	27330 27556	100 ea 1000 ea
amber glass	27331 27555-U	100 ea 1000 ea
amber glass (with marking spot)	27332 27557	100 ea 1000 ea

Vials

Autosampler Vials with 9 mm Thread: ABC Vial™ (9 mm thread), Large Opening, Pre-Assembled

Screw cap (open-top), 9 mm thread, with liner

Pre-assembled 9 mm polypropylene hole-cap, with septum.

9 mm

O.D. x H x I.D. 11.5 mm x 6 mm x 9 mm

Description	Cat. No.	Qty
Clear cap		
clear cap, PTFE/silicone septum	27326	100 ea
	27558	1000 ea
clear cap, PTFE/red rubber septum	27327	100 ea
	27559	1000 ea
clear cap, PTFE/silicone/PTFE septum	27328	100 ea
	27560-U	1000 ea
Black cap		
black cap, red PTFE/silicone septum	507393	100 ea
black cap, PTFE/silicone/PTFE septum	507407	100 ea
Red cap		
red cap, red PTFE/silicone septum	507423	100 ea
red cap, tan PTFE/silicone septum	507415	100 ea
Yellow cap		
yellow cap, tan PTFE/silicone septum	507458	100 ea

Inserts for 2 mL large opening vials, 6.0 mm I.D.

Description	Cat. No.	Qty
0.15 mL, glass conical (with top spring), O.D. 6 mm x H 29 mm	24719	100 ea
	24720	500 ea
0.20 mL, glass conical (with bottom spring), O.D. 6 mm x H 29 mm	24721	100 ea
0.20 mL, polypropylene conical (with bottom spring), O.D. 6 mm x H 29 mm	24722	100 ea
0.25 mL, pulled point precision point, glass conical, O.D. 6 mm x H 31 mm	24717	100 ea
	24718	1000 ea
0.25 mL, glass (with glass flange), for use with Step Vials	27407	100 ea
0.25 mL, polypropylene (with plastic flange), O.D. 6 mm x H 31 mm	27409	100 ea
0.35 mL, glass (shell style), O.D. 6 mm x H 31 mm	24715	100 ea
	24716	1000 ea

Short thread vials (9 mm thread), large opening**Short thread autosampler vial, (9 mm thread), 11.6 x 32 mm**

These vials are designed to work on almost all autosamplers. They offer the convenience of screw thread vials for instruments that were originally designed for crimp top vials. They are made with a 6.0 mm opening. They are available in both clear and amber glass.

Autosampler compatibility:

Agilent
 Agilent 1050/1090A
 Agilent 1100/1200
 Agilent 7673A, 7683
 Agilent 5890/7985A/6890
 Hitachi
 AS-1000, AS-2000, AS-4000
 L7200/L7250
 LEAP Technologies
 CTC LC PAL, GC PAL
 CombiPAL
 HTC PAL/HTS PAL
 PerkinElmer
 Autosystem/AS-2000/XL
 Clarus 500/600
 ISS-100, 200
 Shimadzu LC Autosamplers
 SIL-HTa/SIL-HTc
 SIL-10ADVP
 SIL-10A/SIL-10Ai/SIL-10Ap
 Varian
 CP-8410
 8100/8200
 9100/90950/9095
 Waters
 Alliance 2690
 Acquity
 Breeze
 717Plus
 9 mm

Description	Cat. No.	Qty
1.5 mL, clear glass, PTFE/silicone septum, unassembled	SU860009	1000 ea
1.5 mL, clear glass (with marking spot)	854165	100 ea
1.5 mL, amber glass (with marking spot)	SU860033	100 ea

Caps with septa for short thread vials

Description	Cat. No.	Qty
blue polypropylene cap, PTFE/red rubber septum, septum diam. 9 mm x thickness 1.0 mm	854161	100 ea
blue polypropylene cap (with 6mm center hole), red PTFE/white silicone septum, septum diam. 9 mm x thickness 1.0 mm	SU860092	100 ea
	SU860019	1000 ea
blue polypropylene cap, red PTFE/silicone/red PTFE septum, septum diam. 9 mm x thickness 1.0 mm	SU860079	100 ea
	SU860020	1000 ea

Vials

Autosampler Vials with 9 mm Thread: R.A.M.™ vials (9 mm thread), large opening, 12 x 32 mm

R.A.M.™ vials (9 mm thread), large opening, 12 x 32 mm

Vials, screw top, R.A.M.™ (9 mm thread), large opening, 12 x 32 mm

- Compatible with robotic arm autosamplers
- Replaces crimp top autosampler vials
- Large target area for needle
- Utilizes Step Vial design to center insert

The R.A.M.™ (robotic arm machine) vial is specifically designed to work with a robotic arm autosampler. This 12 x 32 mm vial has a shortened screw thread area (9 mm), providing a larger space between the edge of the cap and the shoulder of the vial to be grasped by the robotic arm. This feature makes the vial an excellent alternative to crimp cap autosampler vials. The R.A.M.vial incorporates a Step Vial design inside the vial neck that allows precise centering of limited volume inserts in the vial, another plus for automated system use. The wide mouth opening is 40% larger than standard crimp style vials. This larger opening provides a larger target area for needle penetration and helps prevent bent needles.

These vials function similarly to the Kimble ROBO Vial, National's Target DP, Sun 1, and Wheaton's ABC vial.

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm



R.A.M. Vial, clear glass, 2 mL

Description	Cat. No.	Qty
2 mL, clear glass	29000-U	100 ea
	29001-U	1000 ea
2 mL, clear glass (with graduated marking spot)	29007-U	100 ea
	29009-U	1000 ea
2 mL, amber glass (with graduated marking spot)	29010-U	100 ea
	29011-U	1000 ea

Vials, screw top, polypropylene

with molded conical insert



Polypropylene Vial

Description	Cat. No.	Qty
0.1 mL, natural polypropylene, 9 mm, diam. 12 mm x H 32 mm	29016-U	100 ea
0.5 mL, natural polypropylene, 9 mm, diam. 12 mm x H 32 mm	29018-U	100 ea

Vials, 2 mL, open-top screw cap, R.A.M.™ (9 mm) convenience kit with closures with septa, unassembled

black cap

polypropylene cap

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm



Description	Cat. No.	Qty
Screw thread, clear glass		
2 mL, clear glass vial, PTFE/rubber septum	29056-U	100 ea
2 mL, clear glass vial, PTFE/silicone septum	29057-U	100 ea
2 mL, clear glass vial, PTFE/silicone/PTFE septum	29058-U	100 ea
Screw thread, clear glass with marking spot		
2 mL, clear glass vial (with graduated marking spot), PTFE/red rubber septum	29064-U	100 ea
2 mL, clear glass vial (with graduated marking spot), PTFE/silicone septum	29065-U	100 ea
Screw thread, amber glass		
2 mL, amber glass vial, PTFE/red rubber septum	29061-U	100 ea
2 mL, amber glass vial, PTFE/silicone septum	29062-U	100 ea
2 mL, amber glass vial, PTFE/silicone/PTFE septum	29063-U	100 ea
Screw thread, amber glass with marking spot		
2 mL, amber glass vial (with graduated marking spot), PTFE/red rubber septum	29067-U	100 ea
2 mL, amber glass vial (with graduated marking spot), PTFE/silicone septum	29068-U	100 ea

Vials

Autosampler Vials with 9 mm Thread: R.A.M.™ vials (9 mm thread), large opening, 12 x 32 mm

Caps with septa for R.A.M.™ vials



Description	Cat. No.	Qty
PTFE/red rubber		
black polypropylene cap, red rubber/PTFE septum	29043-U	100 ea
blue polypropylene cap, red rubber/PTFE septum	29044-U	100 ea
PTFE/silicone		
black polypropylene cap, PTFE/silicone septum	29046-U	100 ea
blue polypropylene cap, PTFE/silicone septum	29047-U	100 ea
natural polypropylene cap, PTFE/silicone septum	29048-U	100 ea
PTFE/silicone with slit		
black polypropylene cap, PTFE/silicone septum (with slit)	29049-U	100 ea
blue polypropylene cap, PTFE/silicone septum (with slit)	29051-U	100 ea
natural polypropylene cap, PTFE/silicone septum (with slit)	29052-U	100 ea
PTFE/silicone/PTFE		
black polypropylene cap, PTFE/silicone/PTFE septum	29053-U	100 ea
blue polypropylene cap, PTFE/silicone/PTFE septum	29054-U	100 ea

Septa for 9 mm caps

Description	Cat. No.	Qty
PTFE/red rubber, diam. 9 mm × thickness 1.0 mm	29038-U	100 ea
red PTFE/silicone, diam. 9 mm × thickness 1.0 mm	29039-U	100 ea
red PTFE/silicone/red PTFE, diam. 9 mm × thickness 1.0 mm	29041-U	100 ea

Vials to fit Waters Alliance

Vials (12 x 32 mm), closures, and septa to use with Waters Alliance

Description	Cat. No.	Qty
Crimp top, silanized		
2 mL, silanized, clear glass, crimp top, O.D. 12 mm × H 32 mm × I.D. 6.0 mm, vial only	27060-U 27061	100 ea 1000 ea
2 mL, silanized, amber glass, crimp top, O.D. 12 mm × H 32 mm × I.D. 6.0 mm, vial only	27225-U 27216	100 ea 1000 ea
Crimp top		
2 mL, clear glass vial, PTFE/red rubber septum	29124-U	100 ea
2 mL, clear glass vial, PTFE/silicone septum	29125-U	100 ea
2 mL, amber glass vial, PTFE/rubber septum	29127-U	100 ea
2 mL, amber glass vial, PTFE/silicone septum	29128-U	100 ea
Screw thread, ABC vial		
2 mL, clear glass, 9 mm thread, PTFE/silicone septum	27487-U 27542	100 ea 1000 ea
2 mL, clear glass (with marking spot), 9 mm thread, PTFE/silicone septum	27490-U 27548-U	100 ea 1000 ea
2 mL, amber glass, 9 mm thread, PTFE/silicone septum	27493	100 ea
2 mL, amber glass (with marking spot), 9 mm thread, PTFE/silicone septum	27496 27549-U	100 ea 1000 ea
Screw thread, clear glass		
2 mL, clear glass vial, PTFE/rubber septum	29056-U	100 ea
2 mL, clear glass vial, PTFE/silicone septum	29057-U	100 ea
Screw thread, amber glass		
2 mL, amber glass vial, PTFE/red rubber septum	29061-U	100 ea
2 mL, amber glass vial, PTFE/silicone septum	29062-U	100 ea
Screw thread, 10-425		
2 mL, clear glass, thread, 10-425, polypropylene cap, PTFE/rubber septa, unassembled	29116-U	100 ea
2 mL, clear glass, thread, 10-425, polypropylene cap, PTFE/silicone septa, unassembled	29118-U	100 ea
2 mL, amber glass, thread, 10-425, polypropylene cap, PTFE/rubber septa, unassembled	29117-U	100 ea
2 mL, amber glass, thread, 10-425, polypropylene cap, PTFE/silicone septa, unassembled	29119-U	100 ea
Snap Seal		
2 mL, clear glass, PTFE/rubber septum	29141-U	100 ea
2 mL, clear glass, PTFE/silicone septum	29142-U	100 ea
2 mL, amber glass, PTFE/rubber septum	29144-U	100 ea
2 mL, amber glass, PTFE/silicone septum	29145-U	100 ea

Vials

Autosampler Vials with fused-in 0.3 mL Insert: *Certified QSertVial™ kits (with fused-in insert)*

Autosampler Vials with fused-in 0.3 mL Insert

Certified QSertVial™ kits (with fused-in insert)

Certified QSertVial™ (vial with fused-in insert) kit, screw thread, 12 x 32 mm, 300 µL

The QSertVial™ is the ultimate microsampling device. It contains a 300 µL glass insert that is fused to the vial to form one precise integral unit. The rim of the insert is positioned slightly above the top of the vial so the septum can make a secure seal with the closure, eliminating evaporation and cross contamination. The insert is centered into the vial, 2 mm from the bottom, allowing for consistent sample recovery and eliminating problems caused by variation in insert depth. It is compatible with the majority of autosamplers in the market. It is available in a variety of kit configurations.

- Evaporation and cross contamination between insert and vial is eliminated
- Higher sample recovery with either bottom loading or side loading needles (point style #2 and #5). Residual dead volume can be as low as 4 µL, depending on precision adjustment of the instrument.
- Consistent sample recovery from vial to vial because the insert is always at the same precise depth within the vial.
- Wide mouth opening has larger target area reducing the possibility of bent needles.
- Easy sample identification of white mat finish marking panel.
- Available in clear or amber glass.

blue polypropylene cap

O.D. × H × I.D. 12 mm × 32 mm × 6.0 mm



QsertVials with 0.3 mL fused-in inserts

Description	Cat. No.	Qty
Certified Qsert Kits, 300 µL		
300 µL, clear glass vial, PTFE/silicone septum (bonded), thread, 9 mm	29391-U	100 ea
300 µL, clear glass vial, PTFE/silicone septum (bonded with slit), thread, 9 mm	29392-U	100 ea
300 µL, amber glass vial, PTFE/silicone septum (bonded), thread, 9 mm	29398-U	100 ea
300 µL, amber glass vial, PTFE/silicone septum (bonded with slit), thread, 9 mm	29401-U	100 ea

Certified QSertVial™ kit with cap and septa, snap top vial, 12 x 32 mm

Autosampler compatibility:

Agilent
 Agilent 1050/1090A
 Agilent 1100/1200
 Agilent 7673A, 7683
 Agilent 5890/7985A/6850/6890
 LEAP Technologies
 CTC LC PAL, GC PAL
 CombiPAL
 HTC PAL/HTS PAL
 Shimadzu LC Autosamplers
 SIL-HTa/SIL-HTc
 SIL-10ADvp
 SIL-10A/SIL-10Ai/SIL-10AP
 Varian
 CP-9010
 8000/8035/8100/8200
 9100/9090/9095
 Vista
 Waters
 Alliance 2690/2695
 Alliance 2790/2795
 Acquity
 Snap top/crimp top
 for 11 mm snap ring

O.D. × H × I.D. 12 mm × 32 mm × 6 mm

Description	Cat. No.	Qty
300 µL, clear glass vial (with fused insert), PTFE/silicone septum	29428-U	100 ea
300 µL, clear glass vial (with fused insert), PTFE/silicone septum (with slit)	29429-U	100 ea

ABC Vial™, 0.3 mL LVI™

These ABC Vials contain a Low Volume Insert; can be used either as crimp seal or with screw cap.

O.D. × H × I.D. 12 mm × 32 mm × 6 mm

Description	Cat. No.	Qty
Vial only		
clear glass (vial only), thread, 9 mm	27562-U	100 ea
amber glass (vial only), thread, 9 mm	27563-U	100 ea
Vial Kit		
clear glass, PTFE/red rubber septum, clear polypropylene cap, thread, 9 mm	27564-U	100 ea
clear glass, natural PTFE/silicone septum, clear polypropylene cap, thread, 9 mm	27565-U	100 ea
clear glass, PTFE/silicone/PTFE septum, clear polypropylene cap, thread, 9 mm	27566-U	100 ea
clear glass, PTFE liner (no septum), clear polypropylene cap, thread, 9 mm	27567-U	100 ea

Vials

Autosampler Vials with fused-in 0.3 mL Insert: *Certified QSertVial™ kits (with fused-in insert)***Certified Vials, crimp top with fused glass liner, 12 x 32 mm**

for 11 mm crimp



LVI Crimp Top Vial, 300 µL

Description	Cat. No.	Qty
300 µL, clear glass (with fused-in insert), crimp top, O.D. 12 mm × H 32 mm × I.D. 6.0 mm, large opening	24714	100 ea
300 µL, amber glass (with fused-in insert), crimp top, O.D. 12 mm × H 32 mm × I.D. 6 mm, large opening	27561-U	100 ea

*Interlocked™ Vials, 300 µL, 12 x 32 mm, 6.0 mm I.D.***Interlocked™ Vials, 300 µL**

The new Interlock Vial/Insert limited volume vial is a 300 µL flange top glass insert permanently fused into 12 x 32 mm glass vials. This product provides the user with the convenience and performance of a one piece microvial at a fraction of the cost.

- The flange top centers the inserts into the vial
- Glass to glass fusion eliminates concerns about contaminants
- Vials are made of borosilicate, Type 1 glass with a choice of clear or amber glass



Interlock Vial, 9mm thread



Interlock Vial, crimp style

Description	Cat. No.	Qty
8-425 thread, 300 µL		
300 µL, clear glass, Interlocked vial (with fused-in insert), thread, 8-425	29109-U	100 ea
300 µL, amber glass, Interlocked vial (with fused-in insert), thread, 8-425	29111-U	100 ea

Description	Cat. No.	Qty
9 mm thread		
300 µL, clear glass, Interlocked vial (with fused-in insert), thread, 9 mm	29081-U	100 ea
300 µL, amber glass, Interlocked vial (with fused-in insert), thread, 9 mm	29082-U	100 ea
10-425 thread		
300 µL, clear glass, Interlocked vial (with fused-in insert), thread, 10-425	29122-U	100 ea
300 µL, amber glass, Interlocked vial (with fused-in insert), thread, 10-425	29123-U	100 ea
Snap Seal		
300 µL, clear glass, interlocked vial (with fused-in insert), Snap Seal, 11 mm	29147-U	100 ea
Crimp top		
300 µL, clear glass, Interlocked vial (with fused-in insert), crimp top	29130-U	100 ea
300 µL, amber glass, Interlocked vial (with fused-in insert), crimp top, 11 mm	29131-U	100 ea

Crimp top vials taking 8 mm seals**Vials, 6 x 32 mm**

Use with: Waters 96-Position Autosampler



27283 (vial only, order crimp seals separately)

Description	Cat. No.	Qty
0.2 mL, clear glass (tapered bottom), vial O.D. 6 mm × H 32 mm	27283	200 ea
0.2 mL, clear glass (tapered bottom), O.D. 6 mm × H 32 mm	27284	1000 ea
0.3 mL, clear glass (round bottom), O.D. 5.5 mm × H 31.5 mm	SU860056	100 ea

Vials

Crimp top vials taking 8 mm seals

Vials, 7 x 30 mm, 7 x 32 mm

Use with:

Agilent/HP (not 1090A)
 Autometric 4100
 Beckman 501/502/507
 Dani ALS 86.80
 LDC Marathon, Promis
 PerkinElmer Integral 4000
 PU 4247
 Shimadzu AOC-14/1400
 SIL 68/9A/LC-1
 Spark Promis
 Spectra-Physics



27314



From left to right: 27312, 27312 inside 27316 (sleeve)

Description	Cat. No.	Qty
0.6 mL, amber glass (conical), O.D. 7 mm x H 30 mm	27312 27313	200 ea 1000 ea
0.8 mL, amber glass (round bottom), O.D. 7 mm x H 32 mm	27314	100 ea
PTFE (non-disposable sleeve), O.D. 12 mm x H 32 mm	27316	40 ea

Vials, 7 x 40 mm

Use with:

Beckman 504
 Carlo Erba AS200S, A200S
 Du Pont
 Finnigan A200S
 Gilson 231-401, 232-401 (Rack 9) (not ASPEC)
 ICI LC1600
 Phillips 54, 58, 4700LC/GC
 SGE LS-3200



From left to right: 24738-U, 24742, and 24744

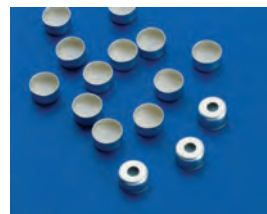
Description	Cat. No.	Qty
0.7 mL, clear glass (conical), O.D. 7 mm x H 40 mm	24742 24743	200 ea 1000 ea
0.7 mL, amber glass (conical), O.D. 7 mm x H 40 mm	24744	200 ea
0.7 mL, amber glass (flat bottom), O.D. 7 mm x H 40 mm	SU860061	100 ea
0.8 mL, clear glass (flat bottom), O.D. 7 mm x H 40 mm	24738-U 24739	200 ea 2000 ea

Crimp seals, 8 mm diameter x 1 mm thickness

Description	Cat. No.	Qty
silver aluminum seal, PTFE/red rubber septum (polybutyl isoprene)	33135-U 33136	200 ea 1000 ea
silver aluminum seal, red PTFE/silicone septum, diam. 8 mm x thickness 1.0 mm, opening 3.2 mm	27359 27372	100 ea 1000 ea
diam. 8 mm x thickness 1.0 mm, silver aluminum seal, PTFE/silicone, hardness (Durometer: shore A) 30	508748	100 ea
diam. 8 mm x thickness 1.0 mm, silver aluminum seal, red PTFE/silicone, hardness (Durometer: shore A) 57	508829	100 ea
diam. 8 mm, silver aluminum seal, PTFE septum	508764	100 ea
polyethylene, Snap-Cap, diam. 8 mm x thickness 1.0 mm	508845	100 ea

Wheaton open-top seals

With PTFE-faced septum.



Description	Cat. No.	Qty
size 8 mm, aluminum cap, PTFE/silicone septum	Z114170-20EA Z114170-200EA	20 ea 200 ea

Vials

Vials to fit Waters® 96 Autosampler

Vials to fit Waters® 96 Autosampler

Certified vials, 8 x 40 mm (caps included)

for 8 mm crimp



Certified: Clear glass (29433-U), Amber glass (29434-U)
 Non-Certified: Clear glass, 33321-U (Pk/200), 33326 (Pk/1000)

Description	Cat. No.	Qty
1 mL, clear glass vial, clear polyethylene cap (with starburst interior)	29433-U	250 ea
1 mL, amber glass vial, clear polyethylene cap (with starburst interior)	29434-U	250 ea

Certified glass inserts for 8 x 40 mm shell vials

Description	Cat. No.	Qty
100 µL, clear glass insert (with plastic bottom spring), O.D. 5 mm x H 30 mm	29445-U	100 ea
200 µL, clear glass insert (requires metal spring 24735), O.D. 6 mm x H 29 mm, Mandrel precision point	29442-U	100 ea
200 µL, clear glass insert (with plastic bottom spring), O.D. 6 mm x H 29 mm	29443-U	100 ea
200 µL, clear glass insert (with plastic bottom spring), O.D. 5 mm x H 36 mm	29444-U	100 ea

Vials, 8 x 40 mm

Use with:

Shimadzu 10A Autosampler
 Waters 96-Position Autosampler



27537

Description	Cat. No.	Qty
0.7 mL, polypropylene vial (with polyethylene closure), vial O.D. 8 mm x H 40 mm, recessed starburst conical snap plug included	27537	100 ea

Description	Cat. No.	Qty
1 mL, clear glass (without closure), O.D. 8 mm x H 40 mm	33320-U 33325-U	200 ea 1000 ea
1 mL, clear glass vial (with polyethylene starburst closure)	33321-U 33326	200 ea 1000 ea
1 mL, amber glass (with starburst closure)	27290 27291	250 ea 1000 ea
1 mL, clear glass (with LDPE closure)	Z291994-1PAK	250 ea

Snap plug closures, 8 mm for shell vials

Description	Cat. No.	Qty
natural polyethylene (starburst design)	33322-U 33327	200 ea 1000 ea

Vials for Waters® 96-position carousel, 8 x 40 mm

Description	Cat. No.	Qty
1 mL, clear glass, conical bottom, crimp top	508896	125 ea

Clear glass 1.2 mL crimp top vial, flat bottom, 8 x 40 mm

Vials for Waters® 96-position carousel, 8 x 40 mm

Description	Cat. No.	Qty
1.2 mL, clear glass, crimp top	508888	125 ea

Crimp Top Vials, 11 mm, standard opening, 12 x 32 mm, 4.6 mm opening



Clear Glass Vial, Crimp finish

Use with:

Agilent/HP 7673 series I/II, 7670A, 7671A, 1042, 1090, 8042, 1050, 1082, 1080, 1084, 7683, AIM C x PS-200, A.I. (42 vial tray), Alcott 738, Altex, AMS 42, Antek 736, ASC, Beckman 501, 507, Carlo Erba AS V42, AS 105, Carnegie CMA 230/200, Chrompack, Dani 39.80, ALS 39.80, Dynatech 42, Finnigan 2005, Gilson (Rack 30P), Gynkotek, Hitachi AS-2000, AS-4000, IBM, Infochroma, Kipp, Kontron 360, Packard, PerkinElmer Autosystem, ISS 100, 200, 400, LC600 (42), 4900, 420B, Phillips LC-XP, Precision Sampling GC111, GC311, LC241, Shimadzu AOC-14/1400, SIL-68/9A, Spark, Spectra-Physics 7110, 8110, Talbot, TosoH TSK-6080, United Technologies, Varian 8100, 8200, Marathon, LC 9100/9095

Vials, 2 mL crimp top, clear glass, 12 x 32 mm

Description	Cat. No.	Qty
clear glass, standard opening	27068-U 27069	100 ea 1000 ea

Vials

Crimp Top Vials, 11 mm, standard opening, 12 x 32 mm, 4.6 mm opening

Vials, 2 mL crimp top, amber glass, 12 x 32 mm



Amber Glass Vial

Description	Cat. No.	Qty
amber glass, standard opening	27070-U	100 ea
	27071-U	1000 ea

Autosampler vials 12 x 32mm standard opening

for for 11mm crimp

O.D. 12 mm
volume 2 mL

Description	Cat. No.	Qty
clear glass vial	Z291579-1PAK	100 ea
amber glass vial	Z291587-1PAK	100 ea

Insert for 2 mL standard opening vial, 4.6 mm I.D.

Description	Cat. No.	Qty
0.05 mL, clear glass conical, bottom spring, O.D. 4 mm x H 25 mm	27400-U	100 ea
0.10 mL, clear glass conical, O.D. 5 mm x H 31 mm, spring required	24703	200 ea
0.15 mL, bottom spring, O.D. 5 mm x H 30 mm	24707	1000 ea
0.15 mL, polypropylene conical (with bottom spring), O.D. 5 mm x H 30 mm	24708	100 ea
0.20 mL, glass (conical with polyspring), O.D. 5 mm x H 30 mm	Z291730-1PAK	100 ea
0.25 mL, clear glass (shell style), O.D. 5 mm x H 31 mm	24701	200 ea
	24702	1000 ea

Wheaton PP autosampler vials

0.1mL vol., 12 x 32mm. Lightweight, nonbreakable, high chemical resistance. Compatible with Beckman®, Agilent®, PerkinElmer®, Spectra-Physics® autosamplers.

1PAK = 1,000 vials

0.1PAK = 100 vials

Description	Cat. No.	Qty
5 x 11 serum finish, for 11 mm Snap Ring	Z162515-1PAK	100 ea
	Z162515-1PAK	1000 ea
	Z162515-0.1PAK	0.1 pkg

Crimp top vials, special varieties, 12 x 32 mm, standard opening

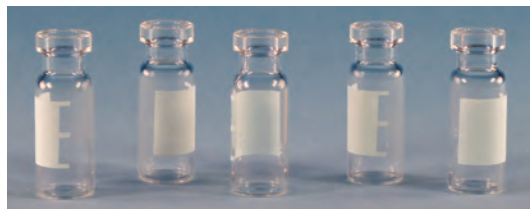


Vial with Conical Bottom, 27333

Description	Cat. No.	Qty
0.1 mL, clear glass, vial type one-piece glass conical insert, O.D. 12 mm x H 32 mm x I.D. 4.6 mm	33208	12 ea
	33232	144 ea
0.1 mL, plastic (with glass inner cone), vial type conical, Snap Ring/Crimp top, for 11 mm crimp	27074-U	100 ea
0.9 mL, conical bottom, O.D. 10 mm x H 32 mm	27333	125 ea
1.1 mL, clear glass, vial type tapered bottom, O.D. 12 mm x H 32 mm	27310	100 ea

Crimp top vials, 11 mm, large opening, 12 x 32 mm, 6.0 mm opening

Certified 11 mm Crimp Top Vials, 12 x 32 mm, large opening (6.0 mm I.D.)



Certified Vial, Crimp Top, 2 mL

Description	Cat. No.	Qty
Certified Crimp top vials		
2 mL, clear glass vial	29403-U	100 ea
2 mL, clear glass vial (with graduated marking spot)	29404-U	100 ea
2 mL, amber glass vial	29407-U	100 ea
2 mL, amber glass vial (with graduated marking spot)	29408-U	100 ea

2 mL, 12 x 32 mm, crimp top vials, large opening (6.0 mm)

Crimp top

Description	Cat. No.	Qty
2 mL, clear glass	27058	100 ea
	27059	1000 ea
2 mL, clear glass (with graduated marking spot)	27062-U	100 ea
	27063	1000 ea
2 mL, amber glass	27064	100 ea
	27065	1000 ea
2 mL, amber glass (with graduated marking spot)	27066-U	100 ea
	27067-U	1000 ea

Vials

Crimp top vials, 11 mm, large opening, 12 x 32 mm, 6.0 mm opening: *Certified 11 mm Crimp Top Vials, 12 x 32 mm, large opening (6.0 mm I.D.)*

Vials, crimp top, silane-treated

Description	Cat. No.	Qty
2 mL, silanized, clear glass, crimp top, O.D. 12 mm x H 32 mm x I.D. 6.0 mm, vial only	27060-U 27061	100 ea 1000 ea
2 mL, silanized, amber glass, crimp top, O.D. 12 mm x H 32 mm x I.D. 6.0 mm, vial only	27225-U 27216	100 ea 1000 ea

Vials, crimp top, convenience pack, 12 x 32 mm, large opening

unassembled
for 11 mm crimp
aluminum seal

The diameter of inserts varies between manufacturers. Only the following insert part numbers are compatible with these large opening vials.

- 24719, 24720 Glass insert, conical bottom, 6 x 29mm
- 24721 Glass insert with bottom spring, 6 x 29mm
- 24722 Polypropylene insert with bottom spring, 6 x 29mm
- 24717, 24718 Glass insert, conical bottom, 6 x 31mm
- 24715, 24716 Glass insert, flat bottom, 6 x 31mm

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm
volume 2 mL



Description	Cat. No.	Qty
2 mL, clear glass vial, PTFE/red rubber septum	29124-U	100 ea
2 mL, clear glass vial, PTFE/silicone septum	29125-U	100 ea
2 mL, clear glass vial, PTFE/silicone/PTFE septum	29126-U	100 ea
2 mL, amber glass vial, PTFE/rubber septum	29127-U	100 ea
2 mL, amber glass vial, PTFE/silicone septum	29128-U	100 ea
2 mL, amber glass vial, PTFE/silicone/PTFE septum	29129-U	100 ea

Crimp top vial convenience kit with PTFE/red rubber septa

for 11 mm crimp
silver aluminum seal
seal diam. 11 mm

Description	Cat. No.	Qty
2 mL, clear glass, vial O.D. 12 mm x H 32 mm x I.D. 6.0 mm, PTFE/red rubber aluminum seal	27239 27240-U	100 ea 1000 ea
2 mL, amber glass, PTFE/red rubber aluminum seal, vial O.D. 12 mm x H 32 mm x I.D. 6.0 mm	27241 27242-U	100 ea 1000 ea



Clear Glass Vial with Conical Insert

Certified glass inserts for 12 x 32 mm, large opening vials

insert, for large opening vials (6.0 mm I.D.)

Description	Cat. No.	Qty
200 µL, clear glass insert (with plastic bottom spring), O.D. 6 mm x H 29 mm	29435-U	100 ea
250 µL, clear glass insert (no spring required), conical point, O.D. 6 mm x H 31 mm	29436-U	100 ea
300 µL, clear glass insert, conical point, O.D. 6 mm x H 31 mm	29437-U	100 ea
350 µL, clear glass insert (flat bottom), O.D. 6 mm x H 31 mm	29441-U	100 ea

Inserts for 2 mL large opening vials, 6.0 mm I.D.

Description	Cat. No.	Qty
0.15 mL, glass conical (with top spring), O.D. 6 mm x H 29 mm	24719 24720	100 ea 500 ea
0.20 mL, glass conical (with bottom spring), O.D. 6 mm x H 29 mm	24721	100 ea
0.20 mL, polypropylene conical (with bottom spring), O.D. 6 mm x H 29 mm	24722	100 ea
0.25 mL, pulled point precision point, glass conical, O.D. 6 mm x H 31 mm	24717 24718	100 ea 1000 ea
0.25 mL, glass (with glass flange), for use with Step Vials	27407	100 ea
0.25 mL, polypropylene (with plastic flange), O.D. 6 mm x H 31 mm	27409	100 ea
0.30 mL, glass (conical with polyspring), O.D. 6 mm x H 30 mm	Z291803-1PAK	100 ea
0.35 mL, glass (shell style), O.D. 6 mm x H 31 mm	24715 24716	100 ea 1000 ea

Vials

Crimp top vials, 11 mm, large opening, 12 x 32 mm, 6.0 mm opening: *Certified 11 mm Crimp Top Vials, 12 x 32 mm, large opening (6.0 mm I.D.)*

Crimp top vials, large opening, with 300 µL insert

The 300 µL glass vial is a one-piece glass design with a conical bottom for complete sample recovery. This vial can be used to perform reactions and concentrations directly. This will eliminate the need for sample transfer to another vial or container. The vials are large opening (6.0mm) for 11 mm crimp



LVI Crimp Top Vial, 300 µL

Description	Cat. No.	Qty
300 µL, clear glass (with fused-in insert), crimp top, O.D. 12 mm × H 32 mm × I.D. 6.0 mm, large opening	24714	100 ea
300 µL, amber glass (with fused-in insert), crimp top, O.D. 12 mm × H 32 mm × I.D. 6 mm, large opening	27561-U	100 ea

Vials, crimp top, 1.5 mL, large opening (6 mm), 11.6 x 32 mm

Autosampler compatibility:

Agilent
Agilent 1050/1090A
Agilent 1100/1200
Agilent 7673A, 7683
Agilent 5890/7985A/6890
Hitachi
AS-1000, AS-2000, AS-4000
L7200/L7250
LEAP Technologies
CTC LC PAL, GC PAL
CombiPAL
HTC PAL/HTS PAL
PerkinElmer
Autosystem/AS-2000/XL
Clarus 500/600
ISS-100, 200
Varian
CP-8410
8100/8200
9100/90950/9095



Clear Glass Vial, Crimp finish

Description	Cat. No.	Qty
1.5 mL, clear glass	SU860055 854964	100 ea 1000 ea
1.5 mL, amber glass	854981	1000 ea
1.5 mL, amber glass (with marking spot)	854998	100 ea

Inserts for 1.5 mL large opening vials

Description	Cat. No.	Qty
0.10 mL, glass conical, O.D. 6 mm × H 31 mm	SU860067 854988	100 ea 1000 ea
0.10 mL, vial insert, glass conical (with bottom spring), O.D. 6 mm × H 29 mm	SU860066 854110	100 ea 1000 ea

Crimp seals, 11 mm (for 12 x 32 mm vials)

Crimp seals, 11 mm, with PTFE/rubber septa



11 mm Crimp Seals, red/rubber septa

Description	Cat. No.	Qty
Crimp seal with PTFE/red rubber		
silver aluminum seal, 11 mm × thickness 1.0 mm, opening 4.8 mm	27102-U 33233-U	100 ea 1000 ea
red aluminum seal, 11 mm × thickness 1.0 mm	27103 27473	100 ea 1000 ea
gold aluminum seal, 11 mm × thickness 1.0 mm	27105 27474	100 ea 1000 ea
blue aluminum seal, 11 mm × thickness 1.0 mm	27104 27381	100 ea 1000 ea
Crimp seals with TFE/butyl/red rubber		
silver aluminum seal, 11 mm × thickness 1.0 mm, septum (TFE/butyl/red rubber), opening 5.5 mm	854140 854980-U	100 ea 1000 ea
gold aluminum seal, 11 mm × thickness 1.0 mm, septum (TFE/butyl/red rubber)	854188	100 ea
green aluminum seal, 11 mm × thickness 1.0 mm, septum (TFE/butyl/red rubber)	854142	1000 ea
red aluminum seal, 11 mm × thickness 1.0 mm, septum (TFE/butyl/red rubber)	854144	1000 ea

Crimp seals with PTFE/silicone septa

Description	Cat. No.	Qty
silver aluminum seal, 11 mm × thickness 1.0 mm, red PTFE/silicone septum	27360-U 27373	100 ea 1000 ea
silver aluminum seal, 11 mm × thickness 1.0 mm, white PTFE/silicone septum	27214-U 27215	100 ea 1000 ea
silver aluminum seal, diam. 11 mm × thickness 1.0 mm, Seal 2000, PTFE/silicone	29149-U 29151-U	100 ea 1000 ea

Aluminum cap and red PTFE/silicone septum, for autosampler vials 12 x 32 mm standard opening

Crimp seals with PTFE/silicone septa

Description	Cat. No.	Qty
silver aluminum seal, O.D. 11 mm, red PTFE/silicone septa	Z291595-1PAK	100 ea

Vial crimp seals with PTFE/silicone/PTFE septa

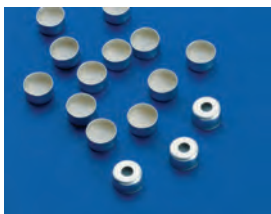
Description	Cat. No.	Qty
silver aluminum seal, seal diam. 11 mm × thickness 1.0 mm, red PTFE/silicone/red PTFE septum	27108 27109-U	100 ea 1000 ea

Vials

Crimp top vials, 11 mm, large opening, 12 x 32 mm, 6.0 mm opening: *Crimp seals, 11 mm (for 12 x 32 mm vials)*

Wheaton open-top seals

With PTFE-faced septum.



Description	Cat. No.	Qty
size 11 mm, PTFE/silicone septum	Z114189-10EA	10 ea
	Z114189-100EA	100 ea
size 11 mm, PTFE/red rubber septum	Z114154-100EA	100 ea

Vial crimp seals for SPME, 11 mm

Description	Cat. No.	Qty
silver aluminum seal (with 5.6mm center hole), red PTFE/white silicone septum, septum diam. 11 mm x thickness 1.3 mm	SU860094 SU860016	100 ea 1000 ea
gold seal, magnetic (with 5mm center hole), red PTFE/silicone/red PTFE septum, septum diam. 11 mm x thickness 1.0 mm, for use with CTC PAL and TriPlus autosamplers	SU860095	100 ea
gold seal, magnetic (with 5mm center hole), red PTFE/white silicone septum, septum diam. 11 mm x thickness 1.3 mm, for use with CTC PAL and TriPlus autosamplers	SU860096	100 ea

Aluminum crimp seal (without septum)

Description	Cat. No.	Qty
seal diam. 11 mm, open center	27099-U	100 ea

Crimp seals with Viton® septa



Description	Cat. No.	Qty
silver aluminum seal, seal diam. 11 mm, black Viton® septum, septum thickness 30 mil	27107	100 ea

Stoppers



Description	Cat. No.	Qty
seal diam. 11 mm, butyl rubber septum, for use with 2mL-2.5mL standard opening crimp top vials	27100-U	100 ea

Snap Ring Vials

Certified Snap Ring Vials, 12 x 32 mm

Certified Kit, snap ring vials, 12 x 32 mm, 6.0 mm I.D.

for 11 mm snap ring
O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm



Description	Cat. No.	Qty
2 mL, Snap top/crimp top, clear glass vial, PTFE/silicone septum, clear polyethylene cap	29421-U	100 ea
300 µL, polypropylene vial, snap ring, PTFE/silicone septum (bonded)	29412-U	100 ea
300 µL, polypropylene vial, snap ring, PTFE/silicone septum (bonded with slit)	29413-U	100 ea

Certified snap ring vials, 12 x 32 mm, 6.0 mm I.D.

for 11 mm snap ring

Description	Cat. No.	Qty
2 mL, clear glass vial	29417-U	100 ea
2 mL, clear glass vial (with graduated marking spot)	29418-U	100 ea
2 mL, amber glass vial	29419-U	100 ea
2 mL, amber glass vial (with graduated marking spot)	29420-U	100 ea
300 µL, polypropylene vial	29409-U	100 ea

Certified polypropylene caps with septa

for 11 mm snap ring
blue polypropylene cap

O.D. x H x I.D. 11.5 mm x 6 mm x 9 mm



Certified caps for Snap Ring vials

Description	Cat. No.	Qty
snap cap, PTFE septum	29304-U	100 ea
snap cap, PTFE/silicone septum	29305-U	100 ea
snap cap, PTFE/silicone septum (with slit)	29306-U	100 ea

Vials

Snap Ring Vials: *Certified Snap Ring Vials, 12 x 32 mm***Snap Ring vial, 2 mL, 12 x 32 mm, large opening (6.0 mm)**

Snap-Ring vials have two glass rings at the neck of the vial that allows the use of a plastic snap cap or aluminum seal. While aluminum seals can be used, a polyethylene Snap Ring cap eliminates the need for crimping which saves time in the lab. When using volatile liquids, we suggest the use of polypropylene GC Snap Top caps to provide an airtight seal.

The diameter of inserts varies between manufacturers. Only the following insert part numbers are compatible with these large opening vials.

- 24719, 24720 Glass insert, conical bottom, 6 x 29mm
- 24721 Glass insert with bottom spring, 6 x 29mm
- 24722 Polypropylene insert with bottom spring, 6 x 29mm
- 24717, 24718 Glass insert, conical bottom, 6 x 31mm
- 24715, 24716 Glass insert, flat bottom, 6 x 31mm

Description	Cat. No.	Qty
2 mL, clear glass	24750-U	100 ea
	24751	2000 ea
2 mL, amber glass	24752	100 ea
	24753	2000 ea
2 mL, clear glass (with marking spot)	27249	100 ea
	27250-U	1000 ea
2 mL, amber glass (with marking spot)	27251	100 ea
	27252	1000 ea

Inserts for 2 mL large opening vials, 6.0 mm I.D.

Description	Cat. No.	Qty
0.15 mL, glass conical (with top spring), O.D. 6 mm x H 29 mm	24719	100 ea
	24720	500 ea
0.20 mL, glass conical (with bottom spring), O.D. 6 mm x H 29 mm	24721	100 ea
0.20 mL, polypropylene conical (with bottom spring), O.D. 6 mm x H 29 mm	24722	100 ea
0.25 mL, pulled point precision point, glass conical, O.D. 6 mm x H 31 mm	24717	100 ea
	24718	1000 ea
0.25 mL, glass (with glass flange), for use with Step Vials	27407	100 ea
0.25 mL, polypropylene (with plastic flange), O.D. 6 mm x H 31 mm	27409	100 ea
0.35 mL, glass (shell style), O.D. 6 mm x H 31 mm	24715	100 ea
	24716	1000 ea

Snap Ring vials, 1.5 mL, 12 x 32 mm

The inside diameter of vials vary with the manufacture. Only the following insert part numbers are compatible with these large opening vials.

- SU860067 Pk 100, 0.1mL Glass Conical Insert, 6 X 31 mm
- 854988 Pk 1000, 0.1mL Glass Conical Insert, 6 X 31mm
- SU860066 Pk 100, 0.1mL Glass Conical Insert with Bottom Spring, 6 X 28 mm
- 854110 Pk 1000, 0.1mL Glass Conical Insert with Bottom Spring, 6 X 28 mm

Description	Cat. No.	Qty
1.5 mL, clear glass	854974	1000 ea
1.5 mL, clear glass (with marking spot)	SU860081	100 ea

Inserts for 1.5 mL large opening vials

Description	Cat. No.	Qty
0.10 mL, glass conical, O.D. 6 mm x H 31 mm	SU860067	100 ea
	854988	1000 ea
0.10 mL, vial insert, glass conical (with bottom spring), O.D. 6 mm x H 29 mm	SU860066	100 ea
	854110	1000 ea

Closures for Snap Ring vials

for 11 mm snap ring

for use with Large Opening Crimp/Snap Seal Vials

Description	Cat. No.	Qty
snap cap, polyethylene seal, PTFE/red rubber	SU860090	100 ea
snap cap, polyethylene seal, red PTFE/silicone	SU860093	100 ea

Snap Ring polypropylene autosampler microvial

for 11 mm Snap Cap/Crimp seal

configured for 11 mm crimp cap or 11 mm snap top seal large opening, (6 mm)



27253

Description	Cat. No.	Qty
0.10 mL, polypropylene, O.D. 12 mm x H 32 mm x I.D. 6.0 mm, Snap Ring	27423	100 ea
0.50 mL, polypropylene, O.D. 12 mm x H 32 mm x I.D. 6.0 mm, Snap Ring	27422	100 ea
0.75 mL, polypropylene, O.D. 12 mm x H 32 mm x I.D. 6.0 mm, Snap Ring	27253	100 ea
	27254	1000 ea

Closures for Snap Ring vials

for 11 mm snap ring

Description	Cat. No.	Qty
PTFE/red rubber, polypropylene seal	24756	100 ea
	24757	1000 ea
PTFE/silicone (with starburst), polypropylene seal	27427	100 ea
PTFE/silicone, polypropylene seal	24758	100 ea
	24759	1000 ea
PTFE/silicone (with slit), polypropylene seal	27426	100 ea
PTFE septum (liner), polypropylene seal	24754	100 ea
	24755	1000 ea
polyethylene (linerless), diam. 11 mm	508357	100 ea
PTFE/silicone/PTFE (with starburst), polypropylene seal	27428	100 ea
	24760-U	100 ea

GC Snap Top caps, polypropylene, 11 mm

These were developed to handle the most volatile samples, providing a liquid airtight seal to the vial.

for 11 mm snap ring

for use with Large Opening Crimp/Snap Seal Vials

Description	Cat. No.	Qty
polypropylene seal, PTFE/rubber septum	27430-U	100 ea
polypropylene seal, PTFE/silicone/PTFE septum	27432	100 ea

Vials

Snap Seal™ Vials

Snap Seal™ Vials

Snap Seal and Snap Ring vials can use either a plastic snap cap or a metal closure for sealing the contents of the vial. The choice is dependent upon the contents and the user preference.



Snap Seal vial, clear glass, 29132-U

Snap Seal™ vials (step), 12 x 32 mm, large opening, 11 mm seal

Autosampler compatibility:

- Agilent
- Agilent 1050/1090A
- Agilent 1100/1200
- Agilent 7673A, 7683
- Agilent 5890/7985A/6890
- Hitachi
- AS-1000, AS-2000, AS-4000
- L7200/L7250
- LEAP Technologies
- CTC LC PAL, GC PAL
- CombiPAL
- HTC PAL/HTS PAL
- PerkinElmer
- Autosystem/AS-2000/XL
- Clarus 500/600
- ISS-100, 200
- Varian
- CP-8410
- 8100/8200
- 9100/90950/9095

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm

Description	Cat. No.	Qty
2 mL, clear glass, large opening, (6 mm)	29132-U	100 ea
2 mL, clear glass (with white graduation spot), large opening, (6 mm)	29134-U	100 ea
2 mL, amber glass, large opening, (6 mm)	29133-U	100 ea

Snap Seal™ vials, Convenience Pack, unassembled

polypropylene cap

O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm

large opening, (6 mm)



Description	Cat. No.	Qty
2 mL, clear glass, PTFE/rubber septum	29141-U	100 ea
2 mL, clear glass, PTFE/silicone septum	29142-U	100 ea
clear glass, PTFE/silicone/PTFE septum	29143-U	100 ea
2 mL, amber glass, PTFE/rubber septum	29144-U	100 ea
2 mL, amber glass, PTFE/silicone septum	29145-U	100 ea
2 mL, amber glass, PTFE/silicone/PTFE septum	29146-U	100 ea

Closures for 11 mm Crimp top, Snap Ring, and Snap Seal™ vials

Crimp seals, 11 mm, with PTFE/rubber septa



11 mm Crimp Seals, red/rubber septa

Description	Cat. No.	Qty
silver aluminum seal, 11 mm x thickness 1.0 mm, opening 4.8 mm	27102-U 33233-U	100 ea 1000 ea
red aluminum seal, 11 mm x thickness 1.0 mm	27103 27473	100 ea 1000 ea
gold aluminum seal, 11 mm x thickness 1.0 mm	27105 27474	100 ea 1000 ea
blue aluminum seal, 11 mm x thickness 1.0 mm	27104 27381	100 ea 1000 ea

Vials

Closures for 11 mm Crimp top, Snap Ring, and Snap Seal™ vials

Crimp seals with PTFE/silicone septa

Description	Cat. No.	Qty
silver aluminum seal, 11 mm × thickness 1.0 mm, red PTFE/silicone septum	27360-U 27373	100 ea 1000 ea
silver aluminum seal, 11 mm × thickness 1.0 mm, white PTFE/silicone septum	27214-U 27215	100 ea 1000 ea

Versa Vial™

Versa Vial™

Compatible with most autosamplers

- Shell vial ease-of-use
- Sample security
- Increased safety when emptying

Versa Vials™ combine the ease-of-use associated with shell vials and the instrument compatibility of 12 × 32 mm screw-cap and crimp-seal autosampler vials. They can be used with most autosamplers, including those from Agilent, CTC, Finnegan, PerkinElmer, Varian, and the Waters Alliance instruments.

The elongated vase-like neck of the Versa Vial accommodates variations in robotic arm settings while providing an exceptionally wide, 9 mm opening. This wide opening provides the largest target area of any autosampler vial and makes it easy to add samples to the vials using pipette tips.

O.D. × H × I.D. 12 mm × 32 mm × 9.3 mm



VersaVial, clear glass, 29083-U



Description	Cat. No.	Qty
2 mL, clear glass	29083-U	100 ea
2 mL, clear glass, marking spot	29085-U	100 ea
2 mL, amber glass, marking spot	29086-U	100 ea
1.5 mL, polypropylene	29087-U	100 ea

Versa Vial™ closures, 12 mm diameter

The new 12mm Polyethylene green plug (29088-U) is designed to work with the Versa Vial where a tight seal is required. The conical starburst design of this plug provides self-centering needle penetration, and an extended tab facilitates easy insertion and removal from the vial.

The soft plugs for the Versa Vial are designed to press-fit securely into the neck opening of the vial and are available in several materials to provide maximum sample compatibility when used for autosampler systems.

The chlorobutyl and PTFE/silicone plugs are autoclavable.

O.D. × H × I.D. 12 mm × 5.4 mm × 10 mm



Description	Cat. No.	Qty
gray plug (chlorobutyl/siliconized)	29089-U	100 ea
white PTFE/silicone plug	29091-U	100 ea
white PTFE/silicone plug (with slit)	29092-U	100 ea

Polypropylene vials and inserts

Polypropylene vials are available in a wide range of volumes and configurations. Breakage is not an issue with plastic vials, and they are non-reactive with most sample chemistries.

- Compatible with many solvents
- Optimal choice when working with proteins
- Ideal for IC applications
- Suitable for insert-free microsampling
- An excellent choice for storing pH sensitive samples
- Economical to purchase



27537



27253

Vials

Polypropylene vials and inserts



24722

Polypropylene vials

Description	Cat. No.	Qty
8 x 40 mm		
0.7 mL, polypropylene vial (with polyethylene closure), vial O.D. 8 mm x H 40 mm, recessed starburst conical snap plug included	27537	100 ea
Crimp top		
0.1 mL, polypropylene, vial type conical, O.D. 12 mm x H 32 mm x I.D. 4.6 mm	27075-U 33217-U	100 ea 1000 ea
8-425 thread, polypropylene		
100 µL, natural polypropylene, thread, 8-425, O.D. 12 mm x H 32 mm x I.D. 4.6 mm	24712 24713	200 ea 1000 ea
750 µL, polypropylene, thread: 8-425, O.D. 12 mm x H 32 mm	24709 24710	100 ea 1000 ea
9 mm threaded vial		
0.1 mL, natural polypropylene, 9 mm, diam. 12 mm x H 32 mm	29016-U	100 ea
0.5 mL, natural polypropylene, 9 mm, diam. 12 mm x H 32 mm	29018-U	100 ea
10-425 thread, large opening		
0.5 mL, polypropylene, conical bottom, large opening, thread, 10-425, diam. 12 mm x H 32 mm x I.D. 6 mm	27410	100 ea
0.75 mL, O.D. 12 mm x H 32 mm x I.D. 6 mm, thread, 10-425	27411	100 ea
1 mL, O.D. 12 mm x H 32 mm, thread, 10-425	27269 27270-U	100 ea 1000 ea
Snap Ring		
0.10 mL, polypropylene, O.D. 12 mm x H 32 mm x I.D. 6.0 mm, Snap Ring	27423	100 ea
0.50 mL, polypropylene, O.D. 12 mm x H 32 mm x I.D. 6.0 mm, Snap Ring	27422	100 ea
0.75 mL, polypropylene, O.D. 12 mm x H 32 mm x I.D. 6.0 mm, Snap Ring	27253 27254	100 ea 1000 ea
13-425 thread, polypropylene		
2.5 mL, polypropylene, O.D. 15 mm x H 45 mm x I.D. 8 mm, thread: 13-425	27435	100 ea
15 x 45 mm shell vial		
3 mL, polypropylene vial, Starburst conical snap plug included, diam. 15 mm x H 45 mm	27538	100 ea
Standard opening insert		
0.15 mL, polypropylene conical (with bottom spring), O.D. 5 mm x H 30 mm	24708	100 ea
Large opening insert		
0.20 mL, polypropylene conical (with bottom spring), O.D. 6 mm x H 29 mm	24722	100 ea
0.25 mL, polypropylene (with plastic flange), O.D. 6 mm x H 31 mm	27409	100 ea

Crimp Top Vials and Accessories, 13 mm

Vials, crimp top, requiring a 13 mm seal

Description	Cat. No.	Qty
2.5 mL, clear glass, O.D. 17.5 mm x H 34.5 mm	33121	288 ea

Crimp Seals, 13 mm

Aluminum crimp seal (without septum)

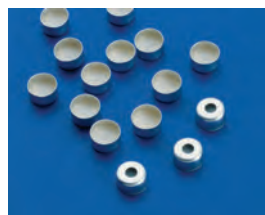
Description	Cat. No.	Qty
seal diam. 13 mm x opening 6.4 mm, removable center	27222-U	100 ea

Crimp seals with PTFE/silicone septa

Description	Cat. No.	Qty
seal diam. 13 mm, silver aluminum seal (open center), PTFE/silicone septum	27452	100 ea

Wheaton open-top seals

With PTFE-faced septum.



Description	Cat. No.	Qty
size 13 mm, rubber septum	Z166006-100EA Z166006-1000EA	100 ea 1000 ea

Crimp seals with PTFE/rubber septa

Description	Cat. No.	Qty
seal diam. 13 mm, removable center	27223 27451	100 ea 1000 ea

Wheaton closed-top seals (removable center)



Description	Cat. No.	Qty
size 13 mm, PTFE-faced rubber septa	Z114197-20EA Z114197-200EA	20 ea 200 ea
size 13 mm, Tear-off seals only	Z114138-100EA	100 ea

Vials

Crimp Top Vials and Accessories, 13 mm: *Septa for 13 mm Crimp Seals*

Septa for 13 mm Crimp Seals

Septa, PTFE/red rubber

temperature limit 120 °C



PTFE/Rubber Septa

Description	Cat. No.	Qty
PTFE/red rubber, diam. 13 mm x thickness 0.050 in., for use with 7 mL vials	27156	100 ea

Septa for 13 mm Aluminum Seals

Description	Cat. No.	Qty
silicone septa	Z184934-1PAK	100 ea
size 13 mm, PTFE/silicone septa	Z114103-10EA	10 ea
	Z114103-100EA	100 ea

Stoppers

for use with 7 mL screw top vials



Description	Cat. No.	Qty
septum diam. 13 mm, butyl rubber	27224	100 ea
septum diam. 13 mm, red rubber	27226	100 ea

12 x 30 mm Autosampler Vials for PerkinElmer® Clarus 600

Vials, screw top, clear glass (vial only)

Description	Cat. No.	Qty
1.5 mL, clear glass, O.D. 12 mm x H 30 mm x I.D. 4.6 mm, 8-425, for Autosampler	507369	100 ea
PerkinElmer Clarus 600 GC	507377	1000 ea

Vials, caps and septa for 12 x 30 mm vials

Description	Cat. No.	Qty
Solid cap, green melamine resin, F217/PTFE liner		
green melamine resin cap solid, F217/PTFE liner, for use with 2 mL vial (standard opening with 8-425 thread)	27091-U	100 ea
Solid caps, 8-425 thread		
black phenolic cap solid, aluminum liner, for use with 2 mL vial (standard opening), thread: 8-425	27092-U	100 ea
Hole caps, 8-425 thread		
black polypropylene hole cap, large opening in top of cap, no septum, thread: 8-425	27401	100 ea

Description	Cat. No.	Qty
black polypropylene hole cap, PTFE/silicone, Top Hat (septum and closure designed to fit together tightly)	27261-U	100 ea
black polypropylene, PTFE/silicone, septum thickness 1.5 mm, thread: 8-425	27262	100 ea
Septa		
black Viton®, diam. 8 mm x thickness 0.060 in., for use with 2 mL vial, standard opening	27350-U	100 ea
white PTFE, diam. 9 mm x thickness 0.010 in., for use with 2 mL vial, standard opening	27133	100 ea
PTFE/red rubber, diam. 8 mm x thickness 0.050 in., for use with screw cap, 8-425	27132	100 ea

12 x 32mm Screw Top Vials, Standard Opening



Screw top vials, 8-425 thread, 11.6 mm O.D. x 32 mm H x 4.6 mm I.D.

Vials, screw top, clear glass, 1.5 mL

Description	Cat. No.	Qty
1.5 mL, clear glass (with marking spot), O.D. 11.6 mm x H 32 mm x I.D. 4.6 mm, thread, 8-425	854171	100 ea

Vials, screw top, amber glass, 1.5 mL, 8-425 thread

Description	Cat. No.	Qty
1.5 mL, amber glass, O.D. 11.6 mm x H 32 mm x I.D. 4.6 mm, thread, 8-425	SU860083	100 ea
	854983	1000 ea
1.5 mL, amber glass (with marking spot)	854172	100 ea

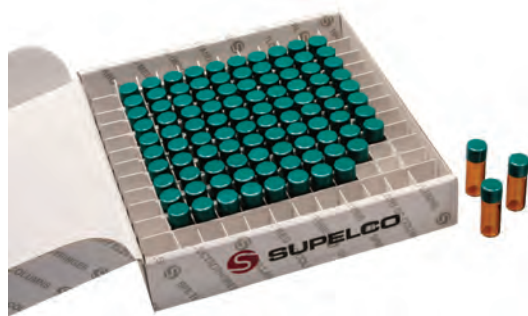
Assembled screw cap with hole and PTFE/silicone septum

for use with 2 mL vial (standard opening)

Description	Cat. No.	Qty
black polypropylene, PTFE/silicone (red PTFE/white silicone), septum thickness 1.3 mm, thread: 8-425	SU860076	100 ea
black polypropylene, PTFE/silicone (red PTFE/creme silicone), thread: 8-425, septum thickness 1.5 mm	854985	100 ea

Vials

12 x 32mm Screw Top Vials, Standard Opening: *Screw top vials, 8-425 thread, 11.6 mm O.D. x 32 mm H x 4.6 mm I.D.*



2 mL Screw top vials, standard opening (4.6 mm), 8-425 thread

Vials, 2 mL standard opening, pre-assembled with cap/septa, 8-425 thread

Description	Cat. No.	Qty
Phenolic hole cap, PTFE/silicone septa		
2 mL, clear glass (standard opening - 4.6 mm), red PTFE/white silicone septum	27124-U	100 ea
2 mL, amber glass (standard opening - 4.6 mm), red PTFE/silicone septum	27005	100 ea
Phenolic hole cap, PTFE/rubber septa		
2 mL, clear glass (standard opening - 4.6 mm), PTFE/red rubber septum	27123-U	100 ea
2 mL, amber glass (standard opening - 4.6 mm), PTFE/red rubber septum	27011	100 ea
Polypropylene hole cap, PTFE/silicone septa		
2 mL, clear glass (standard opening - 4.6 mm), red PTFE/silicone septum	27208-U	100 ea
2 mL, amber glass (standard opening - 4.6 mm), PTFE/silicone septum	27046-U	100 ea
Polypropylene hole cap, PTFE/rubber septa		
2 mL, clear glass (standard opening - 4.6 mm), PTFE/red rubber septum	27202-U	100 ea
2 mL, amber glass (standard opening - 4.6 mm), PTFE/red rubber septum	27040-U	100 ea
Solid Green Melamine cap, PTFE liner		
2 mL, clear glass (standard opening - 4.6 mm), PTFE liner	27134	100 ea
2 mL, amber glass (standard opening - 4.6 mm), PTFE liner	27000	100 ea
Solid cap, aluminum liner		
2 mL, clear glass (standard opening - 4.6 mm), aluminum liner	27125-U	100 ea
2 mL, amber glass (standard opening - 4.6 mm), aluminum liner	27468-U	100 ea

Vials, open-top screw cap, 2 mL standard opening with closures, convenience pack, unassembled

Autosampler compatibility:

Agilent
 Agilent 1050
 Hitachi
 AS-1000, AS-2000, AS-4000
 L7200/L7250
 LEAP Technologies
 CTC LC PAL, GC PAL
 CombiPAL
 HTC PAL/HTS PAL
 PerkinElmer
 Autosystem/AS-2000/XL
 Clarus 500/600
 Varian
 CP-8410
 8100/8200
 9100/9090/9095
 8-425

O.D. x H x I.D. 12 mm x 32 mm x 4.6 mm



Description	Cat. No.	Qty
clear glass, polypropylene cap, PTFE/silicone	29104-U	100 ea
clear glass, polypropylene cap, PTFE/silicone/PTFE	29107-U	100 ea
amber glass, polypropylene cap, PTFE/silicone	29106-U	100 ea
amber glass, polypropylene cap, PTFE/silicone/PTFE	29108-U	100 ea

12 x 32 mm standard autosampler vials with cap and septa, 8-425 thread

► pre-assembled convenience pack, clear glass

Contains 2 mL clear glass vials, PTFE/silicone septa, and caps already assembled.

8-425

PTFE/silicone septa

polypropylene cap

O.D. x H x I.D. 12 mm x 32 mm x 4.6 mm
 volume 2 mL

[Z291706-1PAK](#) 100 ea

Vials

12 x 32mm Screw Top Vials, Standard Opening: 12 x 32 mm screw top vials, standard opening, 4.6 mm (vial only)

12 x 32 mm screw top vials, standard opening, 4.6 mm (vial only)

Description	Cat. No.	Qty
Clear glass		
2 mL, clear glass, O.D. 12 mm × H 32 mm × I.D. 4.6 mm, thread, 8-425	27078	100 ea
	27079	1000 ea
2 mL, clear glass, O.D. 12 mm × H 32 mm × I.D. 4.6 mm/ft, 8-425, product of Chromacol, 2-SV	507601	100 ea
2 mL, clear glass vial (standard opening), 8-425	Z291633-1PAK	100 ea
2 mL, clear glass (with graduated marking spot), 8-425	27080-U	100 ea
	27081-U	1000 ea
Clear glass with graduations		
2 mL, clear glass, graduated, O.D. 12 mm × H 32 mm × I.D. 4.6 mm, thread, 8-425	27023	100 ea
Amber glass		
2 mL, amber glass (standard opening), thread, 8-425	27083-U	100 ea
	27087-U	1000 ea
2 mL, amber glass (with graduated marking spot), 8-425	27084-U	100 ea
	27085-U	1000 ea
2 mL, amber glass vial (standard opening), thread: 8-425	Z291641-1PAK	100 ea
2 mL, amber glass, product of Chromacol, 2-SV (A), 8-425	507628	100 ea
Pre-cleaned vials		
2 mL, clear glass, pre-cleaned	27339	100 ea
2 mL, amber glass, pre-cleaned	27344	100 ea
Silane-treated		
2 mL, silanized, clear glass, thread, 8-425	27029-U	100 ea
	27030	1000 ea
2 mL, silanized, amber glass, thread, 8-425	27238	100 ea
	27219	1000 ea
8-425 thread, 300 µL		
300 µL, clear glass, Interlocked vial (with fused-in insert), thread, 8-425	29109-U	100 ea
300 µL, amber glass, Interlocked vial (with fused-in insert), thread, 8-425	29111-U	100 ea
8-425 thread, polypropylene		
100 µL, natural polypropylene, thread, 8-425, O.D. 12 mm × H 32 mm × I.D. 4.6 mm	24712	200 ea
	24713	1000 ea
Polypropylene		
300 µL, polypropylene, thread, 8-425, O.D. 12 mm × H 32 mm	Z162523-1PAK	100 ea
8-425 thread, polypropylene		
750 µL, polypropylene, thread: 8-425, O.D. 12 mm × H 32 mm	24709	100 ea
	24710	1000 ea
Micro-Vials, 12 x 32 mm screw top (vials only), 8-425 thread		
cap not included		
Description	Cat. No.	Qty
0.1 mL, clear glass (solid one-piece vial with interior glass cone), thread, 8-425	33206-U	12 ea
	33241	144 ea
1.1 mL, clear glass, conical, thread, 8-425	27317	100 ea
	27318	1000 ea

Closures for 2 mL vials, 12 x 32 mm, 8 x 425 thread



Solid cap with PTFE liner

Description	Cat. No.	Qty
green melamine resin cap solid, F217/PTFE liner, for use with 2 mL vial (standard opening with 8-425 thread)	27091-U	100 ea
black phenolic cap solid, aluminum liner, for use with 2 mL vial (standard opening), thread: 8-425	27092-U	100 ea

Black plastic caps

These autoclavable caps are designed to ensure the ultimate in product safety. The liners are white styrene-butadiene rubber faced with PTFE.

Description	Cat. No.	Qty
Solid-top, white rubber liner, black phenolic cap, thread, 8-425	Z188808-1PAK	100 ea
	Z188808-10PAK	1000 ea

Hole caps for 2 mL vials, 8-425 thread, pre-assembled with septa



Description	Cat. No.	Qty
black phenolic, PTFE/silicone, septum thickness 1.5 mm, thread, 8-425	27093-U	100 ea
	33242	1000 ea
black polypropylene, PTFE/silicone, septum thickness 1.5 mm, thread: 8-425	27262	100 ea
black polypropylene hole cap, PTFE/silicone, Top Hat (septa and closure designed to fit together tightly)	27261-U	100 ea
black polypropylene, PTFE/silicone (red PTFE/white silicone), septum thickness 1.3 mm, thread: 8-425	SU860076	100 ea
black polypropylene, PTFE/silicone (red PTFE/creme silicone), thread: 8-425, septum thickness 1.5 mm	854985	100 ea
black polypropylene, septum (TEF/red rubber), septum thickness 1.3 mm, thread: 8-425	SU860091	100 ea
	854984	1000 ea

Vials

12 x 32mm Screw Top Vials, Standard Opening: 12 x 32 mm screw top vials, standard opening, 4.6 mm (vial only)

Hole caps, no septum, for 12 x 32 mm vials, 8 x 425 mm

Description	Cat. No.	Qty
black phenolic hole cap, thread: 8-425, no septum	27094-U	100 ea
black phenolic cap, cut-out top, without septum, thread, 8-425	Z162531-200EA	200 ea
black polypropylene hole cap, large opening in top of cap, no septum, thread: 8-425	27401	100 ea
black polypropylene hole cap, thread, 8-425	27052 24764	100 ea 1000 ea
black polypropylene, open-top, thread: 8-425	Z291668-1PAK	100 ea

Septa for 2 mL Standard Opening Vial, 8 mm diameter

Septa for 2 mL standard opening vial, 8 mm diameter

Description	Cat. No.	Qty
PTFE/red rubber, diam. 8 mm x thickness 0.050 in., for use with screw cap, 8-425	27132	100 ea
white tan PTFE/silicone, diam. 8 mm x thickness 0.060 in., for use with 2 mL vial, standard opening	27095-U 33213	100 ea 1000 ea
red PTFE/white silicone, red PTFE face, white silicone body, diam. 8 mm x thickness 0.060 in., for use with 2mL standard opening vial	27097-U 23243	100 ea 1000 ea
red PTFE/white silicone, with slit, diam. 8 mm x thickness 0.060 in., for use with 2 mL vial, standard opening	27098-U 24881	100 ea 1000 ea
red PTFE/silicone/red PTFE, diam. 8 mm x thickness 0.040 in., for use with 2 mL vial, standard opening	27096-U 23182-U	100 ea 1000 ea
black Viton®, diam. 8 mm x thickness 0.060 in., for use with 2 mL vial, standard opening	27350-U	100 ea
aluminum/silicone, diam. 8 mm x thickness 0.060 in., for use with 2 mL vial, standard opening	24882-U	100 ea
white PTFE, diam. 9 mm x thickness 0.010 in., for use with 2 mL vial, standard opening	27133	100 ea
white PTFE, diam. 8 mm, thickness 0.01 in.	Z291684-1PAK	1000 ea
red PTFE/white silicone, diam. 8 mm, thickness 0.065 in.	Z291676-1PAK	100 ea

Insert for 2 mL standard opening vial, 4.6 mm I.D.

Description	Cat. No.	Qty
0.05 mL, clear glass conical, bottom spring, O.D. 4 mm x H 25 mm	27400-U	100 ea
0.10 mL, clear glass conical, O.D. 5 mm x H 31 mm, spring required	24703 24704	200 ea 1000 ea
0.15 mL, polypropylene conical (with bottom spring), O.D. 5 mm x H 30 mm	24708	100 ea
0.20 mL, glass (conical with polyspring), O.D. 5 mm x H 30 mm	Z291730-1PAK	100 ea
0.25 mL, clear glass (shell style), O.D. 5 mm x H 31 mm	24701 24702	200 ea 1000 ea

Self-centering support for 5 x 31 mm inserts

► Self-centering support for 5 x 32 mm insert, for use with conical insert (Cat. No. 24703 and 24704)

product of Chromacol, MTS-1

27338 500 ea

12 x 32 mm Screw Top Vials, Large Opening

Vials, screw top, clear glass, 1.5 mL

Description	Cat. No.	Qty
1.5 mL, clear glass, O.D. 11.6 mm x H 32 mm x I.D. 6.0 mm, thread, 10-425	854743	1000 ea

Certified Screw Top Vials with 10/425 thread



Certified Vial, Large Opening, 10-425 thread

Description	Cat. No.	Qty
2 mL, clear glass vial (vial only)	29430-U	100 ea
2 mL, clear glass vial, PTFE/silicone septum, (convenience kit)	29432-U	100 ea

2 mL Screw Top Vials, large opening

Vials, screw top, clear glass (vial only)

Description	Cat. No.	Qty
2 mL, clear glass (large opening), O. D. 12 mm x H 32 mm x I.D. 6.0 mm, thread, 10-425	27265 27266	100 ea 2000 ea

Vials, screw top, amber glass (vial only)

Description	Cat. No.	Qty
2 mL, amber glass (large opening), O.D. 12 mm x H 32 mm x I.D. 6.0 mm, thread, 10-425	27267-U	100 ea

Vials

12 x 32 mm Screw Top Vials, Large Opening: 2 mL Screw Top Vials, large opening



Vials, screw top with black polypropylene hole cap (10-425 thread), large opening, pre-assembled

The diameter of inserts between manufacturers. Only the following insert part numbers are compatible with these large opening vials.

- 24719, 24720 Glass insert, conical bottom, 6 x 29mm
- 24721 Glass insert with bottom spring, 6 x 29mm
- 24722 Polypropylene insert with bottom spring, 6 x 29mm
- 24717, 24718 Glass insert, conical bottom, 6 x 31mm
- 24715, 24716 Glass insert, flat bottom, 6 x 31mm

Description	Cat. No.	Qty
2 mL, clear glass, red PTFE/silicone, black polypropylene cap, thread: 10-425	27531	100 ea
2 mL, clear glass, PTFE/silicone (with slit)	27534	100 ea
2 mL, clear glass, PTFE/silicone/PTFE	27533	100 ea
2 mL, amber glass, red PTFE/silicone, black polypropylene cap, thread: 10-425	27532	100 ea
2 mL, amber glass, PTFE/silicone (with slit)	27536	100 ea
2 mL, amber glass, PTFE/silicone/PTFE	27535	100 ea

Vials, open-top screw cap, 2 mL large opening with closures, unassembled convenience packs

Autosampler compatibility:

PerkinElmer Autosystem
 PE ISS-100, 200, Integral 4000 and Series 200
 Shimadzu GC and LC Autosamplers
 Spark Marathon, Midas, Triathlon
 Thermo HPLC Spectra System
 Waters Alliance
 O.D. x H x I.D. 12 mm x 32 mm x 6.0 mm

Description	Cat. No.	Qty
2 mL, clear glass, thread, 10-425, polypropylene cap, PTFE/rubber septa, unassembled	29116-U	100 ea
2 mL, clear glass, thread, 10-425, polypropylene cap, PTFE/silicone septa, unassembled	29118-U	100 ea
2 mL, clear glass, PTFE/silicone/PTFE septa, polypropylene cap, thread, 10-425	29120-U	100 ea
2 mL, amber glass, thread, 10-425, polypropylene cap, PTFE/rubber septa, unassembled	29117-U	100 ea
2 mL, amber glass, thread, 10-425, polypropylene cap, PTFE/silicone septa, unassembled	29119-U	100 ea
2 mL, amber glass, PTFE/silicone/PTFE septa, polypropylene cap, thread, 10-425	29121-U	100 ea

12 x 32 mm Screw Top vials, limited volume step vial

Vial incorporates the unique StepVial design that precisely centers a limited volume insert in the vial neck. The interior finish of the top of the vial is recessed to allow the top of the insert to rest correctly in the vial.

thread, for cap 10-425
 glass insert lips on vial



Clear Glass with insert

Description	Cat. No.	Qty
250 µL, clear glass, step vial, large opening (with glass insert)	27418	100 ea
250 µL, amber glass, step vial, large opening (with glass insert)	27419	100 ea

Vials

12 x 32 mm Screw Top Vials, Large Opening: 2 mL Polypropylene screw top vials

2 mL Polypropylene screw top vials

Vials, screw top, polypropylene



Polypropylene Vial

Description	Cat. No.	Qty
0.5 mL, polypropylene, conical bottom, large opening, thread, 10-425, diam. 12 mm x H 32 mm x I.D. 6 mm	27410	100 ea
0.75 mL, O.D. 12 mm x H 32 mm x I. D. 6 mm, thread, 10-425	27411	100 ea
1 mL, O.D. 12 mm x H 32 mm, thread, 10-425	27269 27270-U	100 ea 1000 ea

Closures for 2 mL large opening vials, 10 x 425 mm

Assembled screw cap with hole and PTFE/silicone septum

Description	Cat. No.	Qty
black polypropylene, thread: 10-425, PTFE/silicone, thickness 1.5 mm, for use with 2 mL vial (large opening)	27273	100 ea

Inter-Seal™ bonded caps (inseparable caps and liner)

Inter-Seal™ bonded caps eliminate expensive and time consuming hand assembly while preventing liner fallout. They are made by a bonding process that bonds PTFE/silicone into polypropylene closures without using adhesives. The bonding properly seats and secures the septa within the vial opening. This integrated one piece system withstands multiple injections, making it very cost effective.

Benefits include:

- Significant bond strength
- Withstands multiple injections
- Resistant to coring
- Excellent resealability
- Broad chemical resistance



Description	Cat. No.	Qty
black cap, PTFE/silicone septa, thread, 10-425	29112-U	100 ea
black cap, PTFE/silicone septa (with slit), thread, 10-425	29113-U	100 ea

Screw cap (open-top), polypropylene

These hole caps do not come with septa.

autoclavable
temp. limit 135 °C



Polypropylene hole cap

Description	Cat. No.	Qty
black polypropylene cap, for use with 2 mL large opening (6.0 mm) vial with 10-425 thread	27271 27272-U	100 ea 1000 ea
white polypropylene hole cap, thread, 10-425, for use with 2 mL large opening vial (6.0 mm)	27414	100 ea
yellow polypropylene hole cap, thread, 10-425, for use with 2 mL large opening vial (6.0 mm)	27413	100 ea

Septa, 10 mm, for 2 mL large opening vials

Description	Cat. No.	Qty
red PTFE/white silicone, diam. 10 mm x thickness 0.040 in., for use with 2 mL large opening vials	27279 27280-U	100 ea 1000 ea
red PTFE/white silicone, diam. 10 mm x thickness 0.060 in., for use with 2 mL large opening vials	27277 27278	100 ea 1000 ea
red PTFE/silicone/red PTFE, diam. 10 mm x thickness 0.040 in., for use with 2 mL large opening vials	27275 27276	100 ea 1000 ea
white PTFE, diam. 11 mm x thickness 0.010 in., for use with 2 mL large opening vials	27281 27282	100 ea 1000 ea

Inserts for 12 x 32 mm vials

Insert for 2 mL standard opening vial, 4.6 mm I.D.

Description	Cat. No.	Qty
0.05 mL, clear glass conical, bottom spring, O.D. 4 mm x H 25 mm	27400-U	100 ea
0.10 mL, clear glass conical, O.D. 5 mm x H 31 mm, spring required	24703 24704	200 ea 1000 ea
0.15 mL, bottom spring, O.D. 5 mm x H 30 mm	24707	100 ea
0.15 mL, polypropylene conical (with bottom spring), O.D. 5 mm x H 30 mm	24708	100 ea
0.20 mL, glass (conical with polyspring), O.D. 5 mm x H 30 mm	Z291730-1PAK	100 ea
0.25 mL, clear glass (shell style), O.D. 5 mm x H 31 mm	24701 24702	200 ea 1000 ea

Inserts for 1.5 mL large opening vials

Description	Cat. No.	Qty
0.10 mL, glass conical, O.D. 6 mm x H 31 mm	SU860067 854988	100 ea 1000 ea
0.10 mL, vial insert, glass conical (with bottom spring), O.D. 6 mm x H 29 mm	SU860066 854110	100 ea 1000 ea

Vials

Inserts for 12 x 32 mm vials

Inserts for 2 mL large opening vials, 6.0 mm I.D.

Description	Cat. No.	Qty
0.15 mL, glass conical (with top spring), O.D. 6 mm x H 29 mm	24719 24720	100 ea 500 ea
0.20 mL, glass conical (with bottom spring), O.D. 6 mm x H 29 mm	24721	100 ea
0.20 mL, polypropylene conical (with bottom spring), O.D. 6 mm x H 29 mm	24722	100 ea
0.25 mL, pulled point precision point, glass conical, O.D. 6 mm x H 31 mm	24717 24718	100 ea 1000 ea
0.25 mL, glass (with glass flange), for use with Step Vials	27407	100 ea
0.25 mL, polypropylene (with plastic flange), O.D. 6 mm x H 31 mm	27409	100 ea
0.35 mL, glass (shell style), O.D. 6 mm x H 31 mm	24715 24716	100 ea 1000 ea

4 mL Screw Top Vials



4 mL screw top vials, 15 X 45 mm, 13-425 thread

Description	Cat. No.	Qty
Screw thread, clear glass		
4 mL, clear glass, graduated, O.D. 15 mm x H 45 mm x I.D. 8 mm, thread, 13-425	27024	100 ea
4 mL, clear glass vial, O.D. 15 mm x H 45 mm x I.D. 8 mm, thread, 13-425	27111 27031	100 ea 1000 ea
4 mL, clear glass vial, O.D. 14.75 mm x H 45 mm x I.D. 8 mm, thread, 13-425	854190	100 ea
4 mL, clear glass vial, marking spot, O.D. 15 mm x H 45 mm x I.D. 8 mm, thread, 13-425	27113	1000 ea
4 mL, clear glass, precleaned	27340	100 ea
4 mL, silanized, clear glass vial, O.D. 15 mm x H 45 mm x I.D. 8 mm, thread, 13-425	27114 27220-U	100 ea 1000 ea
Screw thread, amber glass		
4 mL, amber glass vial, O.D. 15 mm x H 45 mm () x I.D. 8 mm, thread, 13-425	27115-U 27032	100 ea 1000 ea
4 mL, amber glass vial, marking spot, O.D. 15 mm x H 45 mm x I.D. 8 mm, thread, 13-425	27116-U 27117-U	100 ea 1000 ea
4 mL, amber glass vial, O.D. 14.75 mm x H 45 mm x I.D. 8 mm, thread, 13-425	854986	100 ea
4 mL, amber glass, precleaned	27345	100 ea

Description	Cat. No.	Qty
4 mL, silanized, amber glass vial, O.D. 15 mm x H 45 mm x I.D. 8 mm, thread, 13-425	27217	100 ea
13-425 thread, polypropylene		
2.5 mL, polypropylene, O.D. 15 mm x H 45 mm x I.D. 8 mm, thread: 13-425	27435	100 ea

Closures for 4 mL vials, 13 x 425

Closures for 4 mL vials, 13 x 425 mm



Polypropylene hole cap

Description	Cat. No.	Qty
Hole caps, 13-425 thread		
black phenolic cap, for use with 4 mL vial with 13-425 thread	27120-U	100 ea
black polypropylene cap, for use with 4 mL vial with 13-425 thread	27053	100 ea
black polypropylene (Top Hat), PTFE/silicone, for use with 4 mL vial with 13-425 thread	27439	100 ea
black polypropylene, PTFE/silicone, septum thickness 1.5 mm, for use with 4 mL vial with 13-425 thread	27018	100 ea
black polypropylene, red PTFE/silicone, thickness 1.5 mm, for use with 4 mL vial with 13-425 thread	SU860078	100 ea
black polypropylene, septum thickness 1.3 mm, for use with 4 mL vials with 13-425 thread	854987	100 ea
Solid cap, green melamine resin, F217/PTFE liner		
green melamine resin cap solid, F217/PTFE liner, for use with 4 mL vial with 13-425 thread	27141	100 ea
Solid top caps, 13-425 thread		
black phenolic cap, aluminum liner, for use with 4 mL vial with 13-425 thread	27142	100 ea
Black Phenolic, PTFE/styrene-butadiene		
Solid-top, PTFE-faced rubber liner, thread, 13-425	Z106429-200EA	200 ea
Black Phenolic with 14B white rubber liner		
Solid-top, white rubber liner, thread, 13-425	Z106402-200EA	200 ea

Inserts for 15 x 45 mm vials

Description	Cat. No.	Qty
0.15 mL, glass insert (with bottom spring), O.D. 6 mm x H 38 mm	24748	100 ea
0.15 mL, polypropylene conical (with bottom spring), O.D. 6 mm x H 38 mm	24749	100 ea
0.25 mL, glass, insert style conical (spring required), O.D. 6 mm x H 39 mm	27118-U 27076	100 ea 1000 ea
spring for 0.25mL conical insert (27118-U, 27076)	27086-U	100 ea

Vials

4 mL Screw Top Vials: Closures for 4 mL vials, 13 x 425

Springs for vial inserts

Description	Cat. No.	Qty
spring for 0.25mL conical insert (27118-U, 27076)	27086-U	100 ea

Septa for 4 mL vials, 11 mm diameter

Description	Cat. No.	Qty
white tan PTFE/silicone, diam. 11 mm x thickness 0.060 in., for use with 4 mL vial	27144	100 ea
white PTFE/silicone, diam. 11 mm x thickness 0.075 in., for use with 4 mL vial	27356 27369-U	100 ea 1000 ea
red PTFE/silicone/red PTFE, septum diam. 11 mm x thickness 0.040 in., for use with 4mL vial	27122-U	100 ea
PTFE/red rubber, diam. 11 mm x thickness 0.050 in., for use with 4 mL vial	27145	100 ea
white PTFE, diam. 13 mm x thickness 0.010 in., for use with 4 mL vial	27146	100 ea
black Viton®, diam. 11 mm x thickness 0.060 in., for use with 4 mL vial	27351	100 ea

Vials to fit Waters® 48, 717. 717 Plus



27538

Polypropylene Limited Volume Shell Vials With Starburst Conical Snap Plugs

These polypropylene limited volume shell vials, with uniquely designed conical interior, eliminate the need for glass vials and inserts. No tedious laboratory assembly is required. These vials work in 48-position autosamplers. Precise conical design permits maximum sample evacuation. They are more effective and cost efficient than standard glass vials and inserts. The starburst design in the snap plug allows easy penetration.

Shell vial for Waters Wisp 48 Position Carousel

Autosampler compatibility:

Agilent 7673A, Series I, II
Shimadzu LC Autosamplers
Waters 48, 717, 717 Plus

Description	Cat. No.	Qty
3 mL, polypropylene vial, Starburst conical snap plug included, diam. 15 mm x H 45 mm	27538	100 ea
4 mL, glass vial (with polyethylene closure), O.D. 14.65 mm x H 44.6 mm	854189	100 ea

2.5 mL polypropylene limited volume vial

Limited Volume Screw Thread Vials

Description	Cat. No.	Qty
2.5 mL, polypropylene, O.D. 15 mm x H 45 mm x I.D. 8 mm, thread: 13-425	27435	100 ea



WISP™ 48-position autosampler vials

Constructed of borosilicate glass. Screw-thread vials use 11 mm septa and 13-425 threaded screw-caps.

Autosampler compatibility:

Agilent 7673A, Series I, II
Shimadzu LC Autosamplers
Waters 48, 717, 717 Plus

volume 4 mL
size 15 mm x 45 mm

Description	Cat. No.	Qty
clear screw-thread vials	Z291811-1PAK	200 ea
Polypropylene cap convenience pack, PTFE liner	Z291927-1PAK	200 ea
PP caps preassembled pack, PTFE liner	Z291935-1PAK	100 ea

Vials, screw top vial & insert kit

Pre-Assembled Vials Kit

4 mL clear glass vials with 0.30 mL inserts
Includes each of the following:

- screw top vials, 15 x 45 mm, 4 mL (27111)
- glass inserts, 0.30 mL clear glass, conical (27118-U)
- bottom springs for inserts (27086-U)
- closures, open top, phenolic, black (27120-U)
- septa, red PTFE/red rubber (27101)



27110

Description	Cat. No.	Qty
clear glass vial	27110	100 ea

Vials

Snap-Ring vials, 15 x 45 mm

Snap-Ring vials, 15 x 45 mm

Snap Seal™ vial, 4 mL

Description	Cat. No.	Qty
clear glass, O.D. 15 mm x H 45 mm x I.D. 8 mm	27440-U	100 ea

Closures for Snap Ring vials

Description	Cat. No.	Qty
polypropylene seal, PTFE/silicone septa, diam. 13 mm, starburst cap	27449	100 ea

Pre-assembled Sampling Vials



From left to right: Phenolic Cap, PTFE/Silicone septum; Phenolic Cap, PTFE/red rubber septum; Polypropylene Cap, PTFE/Silicone septum; Polypropylene Cap, PTFE/Red rubber septum.

Vials with phenolic open-top screw cap, PTFE/silicone septum

Description	Cat. No.	Qty
2 mL, clear glass (standard opening - 4.6 mm), red PTFE/white silicone septum	27124-U	100 ea
4 mL, clear glass, O.D. 15 mm x H 45 mm, tan PTFE/silicone septum	27136	100 ea
7 mL, clear glass, O.D. 17 mm x H 60 mm, tan PTFE/silicone septum	27148	100 ea
15 mL, clear glass, O.D. 21 mm x H 70 mm, tan PTFE/silicone septum	27159	100 ea
22 mL, clear glass, O.D. 23 mm x H 85 mm, tan PTFE/silicone septum	27170	100 ea
40 mL, clear glass, O.D. 29 mm x H 82 mm, tan PTFE/silicone septum	27180	100 ea
40 mL, clear glass, O.D. 27.5 mm x H 95 mm, tan PTFE/silicone septum	27089-U	100 ea
2 mL, amber glass (standard opening - 4.6 mm), red PTFE/silicone septum	27005	100 ea
4 mL, amber glass, O.D. 15 mm x H 45 mm, tan PTFE/silicone septum	27006	100 ea
7 mL, amber glass, O.D. 17 mm x H 60 mm, tan PTFE/silicone septum	27007	100 ea
15 mL, amber glass, O.D. 21 mm x H 70 mm, tan PTFE/silicone septum	27008	100 ea
22 mL, amber glass, O.D. 23 mm x H 85 mm, tan PTFE/silicone septum	27009-U	100 ea
40 mL, amber glass, O.D. 29 mm x H 82 mm, tan PTFE/silicone septum	27010-U	100 ea
40 mL, amber glass, O.D. 27.5 mm x H 95 mm, tan PTFE/silicone septum	27121-U	100 ea

Vials with phenolic open-top screw cap, PTFE/red rubber septum

Description	Cat. No.	Qty
2 mL, clear glass (standard opening - 4.6 mm), PTFE/red rubber septum	27123-U	100 ea
4 mL, clear glass, O.D. 15 mm x H 45 mm, PTFE/red rubber septum	27135	100 ea
7 mL, clear glass, O.D. 17 mm x H 60 mm, PTFE/red rubber septum	27147	100 ea
15 mL, clear glass, O.D. 21 mm x H 70 mm, PTFE/red rubber septum	27158	100 ea
2 mL, amber glass (standard opening - 4.6 mm), PTFE/red rubber septum	27011	100 ea
4 mL, amber glass, O.D. 15 mm x H 45 mm, PTFE/red rubber septum	27012	100 ea
7 mL, amber glass, O.D. 17 mm x H 60 mm, PTFE/red rubber septum	27013	100 ea
15 mL, amber glass, O.D. 21 mm x H 70 mm, PTFE/red rubber septum	27014-U	100 ea
22 mL, amber glass, O.D. 23 mm x H 85 mm, PTFE/red rubber septum	27015	100 ea

Vials with polypropylene open-top screw cap, PTFE/silicone septum

Description	Cat. No.	Qty
2 mL, clear glass (standard opening - 4.6 mm), red PTFE/silicone septum	27208-U	100 ea
4 mL, clear glass, O.D. 15 mm x H 45 mm, tan PTFE/silicone septum	27209-U	100 ea
7 mL, clear glass, O.D. 17 mm x H 60 mm, tan PTFE/silicone septum	27210	100 ea
15 mL, clear glass, O.D. 21 mm x H 70 mm, tan PTFE/silicone septum	27211	100 ea
22 mL, clear glass, H 85 mm x W 23 mm, tan PTFE/silicone septum	27212	100 ea
40 mL, clear glass, O.D. 29 mm x H 82 mm, tan PTFE/silicone septum	27213	100 ea
2 mL, amber glass (standard opening - 4.6 mm), PTFE/silicone septum	27046-U	100 ea
4 mL, amber glass, O.D. 15 mm x H 45 mm, tan PTFE/silicone septum	27047	100 ea
7 mL, amber glass, O.D. 17 mm x H 60 mm, PTFE/silicone septum	27048-U	100 ea
15 mL, amber glass, O.D. 21 mm x H 70 mm, PTFE/silicone septum	27049	100 ea
22 mL, amber glass, H 85 mm x W 23 mm, PTFE/silicone septum	27050-U	100 ea
40 mL, amber glass, O.D. 29 mm x H 82 mm, tan PTFE/silicone septum	27051	100 ea

Vials with polypropylene open-top screw cap, PTFE/red rubber septum

Description	Cat. No.	Qty
2 mL, clear glass (standard opening - 4.6 mm), PTFE/red rubber septum	27202-U	100 ea
4 mL, clear glass, O.D. 15 mm x H 45 mm, PTFE/red rubber septum	27203-U	100 ea
7 mL, clear glass, O.D. 17 mm x H 60 mm, PTFE/red rubber septum	27204	100 ea
15 mL, clear glass, O.D. 21 mm x H 70 mm, PTFE/red rubber septum	27205	100 ea
2 mL, amber glass (standard opening - 4.6 mm), PTFE/red rubber septum	27040-U	100 ea

Vials

Pre-assembled Sampling Vials

Description	Cat. No.	Qty
4 mL, amber glass, O.D. 15 mm x H 45 mm, PTFE/red rubber septum	27041	100 ea
7 mL, amber glass, O.D. 17 mm x H 60 mm, PTFE/red rubber septum	27042-U	100 ea
22 mL, amber glass, O.D. 23 mm x H 85 mm, PTFE/red rubber septum	27044-U	100 ea

Vials, screw top with solid green Melamine cap with PTFE liner, preassembled

F217/PTFE cap liner



Description	Cat. No.	Qty
2 mL, clear glass (standard opening - 4.6 mm), PTFE liner	27134	100 ea
4 mL, clear glass, O.D. 15 mm x H 45 mm, PTFE liner	27138	100 ea
7 mL, clear glass, O.D. 17 mm x H 60 mm, PTFE liner	27150-U	100 ea
15 mL, clear glass, O.D. 21 mm x H 70 mm, PTFE liner	27161	100 ea
22 mL, clear glass, O.D. 23 mm x H 85 mm, PTFE liner	27172-U	100 ea
40 mL, clear glass, O.D. 29 mm x H 82 mm, PTFE liner	27181	100 ea
2 mL, amber glass (standard opening - 4.6 mm), PTFE liner	27000	100 ea
4 mL, amber glass, O.D. 15 mm x H 45 mm, PTFE liner	27001-U	100 ea
7 mL, amber glass, O.D. 17 mm x H 60 mm, PTFE liner	27002-U	100 ea
15 mL, amber glass, H 70 mm x W 21 mm, PTFE liner	27003	100 ea
22 mL, amber glass, O.D. 23 mm x H 85 mm, PTFE liner	27004	100 ea
40 mL, amber glass, O.D. 29 mm x H 82 mm, PTFE liner	27182	100 ea

Vials with phenolic solid-top screw cap, aluminum liner

Description	Cat. No.	Qty
2 mL, clear glass (standard opening - 4.6 mm), aluminum liner	27125-U	100 ea
4 mL, clear glass, O.D. 15 mm x H 45 mm, aluminum liner	27137	100 ea
7 mL, clear glass, O.D. 17 mm x H 60 mm, aluminum liner	27149	100 ea
15 mL, clear glass, O.D. 21 mm x H 70 mm, aluminum liner	27160-U	100 ea

Description	Cat. No.	Qty
22 mL, clear glass, O.D. 23 mm x H 85 mm, aluminum liner	27171	100 ea
2 mL, amber glass (standard opening - 4.6 mm), aluminum liner	27468-U	100 ea
7 mL, amber glass, O.D. 17 mm x H 60 mm, aluminum liner	27470-U	100 ea
22 mL, amber glass, O.D. 23 mm x H 85 mm, aluminum liner	27472	100 ea

Sample Vials in Lab-File®

Sample vials in Lab-File® are packaged in corrugated trays with partitions. Black phenolic screw caps are attached to vials with rubber lined caps. Vials and caps are autoclavable.

Wheaton sample vials with rubber lined caps

Caps have white styrene-butadiene rubber liner and are packed in Lab-File® cases. Clear Wheaton-33, low extractable borosilicate glass or amber Wheaton-320 glass. Can be sterilized and stored at low temperatures.



Description	Cat. No.	Qty
clear glass, volume 2 mL, cap: 8-425	Z256056-1PAK	288 ea
clear glass, volume 4 mL, cap, 13-425	Z256064-1PAK	144 ea
clear glass (white marking area), volume 4 mL, cap, 13-425	Z256250-1PAK	144 ea
clear glass, volume 8 mL, cap, 15-425	Z256161-1PAK	144 ea
clear glass (white marking area), volume 8 mL, cap, 15-425	Z256269-1PAK	144 ea
clear glass, volume 12 mL, cap, 15-425	Z256188-1PAK	144 ea
clear glass, volume 16 mL, cap, 18-400	Z256196-1PAK	144 ea
clear glass, volume 20 mL, cap, 24-400	Z256218-1PAK	72 ea
clear glass, volume 24 mL, cap, 20-400	Z256226-1PAK	144 ea
clear glass, volume 25 mL, cap, 24-400	Z256234-1PAK	72 ea
clear glass, volume 40 mL, cap, 24-400	Z256242-1PAK	72 ea
amber glass, volume 2 mL, cap: 8-425	Z256277-1PAK	288 ea
amber glass, volume 4 mL, cap, 13-425	Z256285-1PAK	144 ea
amber glass, volume 8 mL, cap, 15-425	Z256293-1PAK	144 ea

Vials

Pre-assembled Vials with Graduations

Pre-assembled Vials with Graduations

Graduated vials with open-top cap & PTFE/silicone septum

Hole caps are black phenolic.
Septa are blue PTFE on white silicone.



Description	Cat. No.	Qty
2 mL, clear glass (standard opening), PTFE/silicone septum	27516	100 ea
4 mL, clear glass, PTFE/silicone septum	27517	100 ea
7 mL, clear glass, PTFE/silicone septum	27518	100 ea
15 mL, clear glass, PTFE/silicone septum	27519	100 ea
22 mL, clear glass, PTFE/silicone septum	27520-U	100 ea
40 mL, clear glass, O.D. 29 mm × H 82 mm, PTFE/silicone septum	27521	100 ea

Graduated vials with open-top cap & ThermoSeal® septum

Description	Cat. No.	Qty
4 mL, clear glass, THERMOSEAL® septum	27500-U	100 ea

Graduated vials with solid cap and PTFE liner

Description	Cat. No.	Qty
2 mL, clear glass (standard opening), PTFE liner	27505-U	100 ea
4 mL, clear glass, PTFE liner	27506-U	100 ea
7 mL, clear glass, PTFE liner	27507	100 ea
15 mL, clear glass, PTFE liner	27508	100 ea
22 mL, clear glass, PTFE liner	27509	100 ea

Graduated vials with open-top cap & barrier septum

Hole cap is black phenolic.
Septum is silicone bonded to aluminum.

Description	Cat. No.	Qty
7 mL, clear glass, barrier septum	27524	100 ea
22 mL, clear glass, barrier septum	27526	100 ea
40 mL, clear glass, O.D. 29 mm × H 82 mm, barrier septum	27527	100 ea

Vials Only



Vials, screw top, clear glass, 1.5 mL

Description	Cat. No.	Qty
1.5 mL, clear glass (with marking spot), O.D. 11.6 mm × H 32 mm × I.D. 4.6 mm, thread, 8-425	854171	100 ea
1.5 mL, clear glass, O.D. 11.6 mm × H 32 mm × I.D. 6.0 mm, thread, 10-425	854743	1000 ea

Vials, screw top, amber glass, 1.5 mL, 8-425 thread

Description	Cat. No.	Qty
1.5 mL, amber glass, O.D. 11.6 mm × H 32 mm × I.D. 4.6 mm, thread, 8-425	SU860083	100 ea
	854983	1000 ea

Vials, screw top, clear glass (vial only)

Description	Cat. No.	Qty
1.5 mL, clear glass, O.D. 12 mm × H 30 mm × I.D. 4.6 mm, 8-425, for PerkinElmer Clarus 600 GC Autosampler	507369	100 ea
	507377	1000 ea
2 mL, clear glass, O.D. 12 mm × H 32 mm × I.D. 4.6 mm, thread, 8-425	27078	100 ea
	27079	1000 ea
2 mL, clear glass (large opening), O.D. 12 mm × H 32 mm × I.D. 6.0 mm, thread, 10-425	27265	100 ea
	27266	2000 ea
4 mL, clear glass vial, O.D. 15 mm × H 45 mm × I.D. 8 mm, thread, 13-425	27111	100 ea
	27031	1000 ea
4 mL, clear glass vial, O.D. 14.75 mm × H 45 mm × I.D. 8 mm, thread, 13-425	854190	100 ea
7 mL, clear glass, O.D. 17 mm × H 60 mm × I.D. 9.5 mm, thread, 15-425	27151	100 ea
15 mL, clear glass, O.D. 21 mm × H 70 mm × I.D. 12 mm, thread, 18-400	27162	100 ea
22 mL, clear glass, O.D. 23 mm × H 85 mm × I.D. 18 mm, thread, 20-400	27173	100 ea
40 mL, clear glass, O.D. 29 mm × H 82 mm × I.D. 17 mm, thread, 24-400	27184	100 ea
40 mL, clear glass, O.D. 27.5 mm × H 95 mm, thread, 24-400	27379	100 ea
40 mL, clear glass, O.D. 27.5 mm × H 95 mm, thread, 24-400	SU860001	100 ea

Vials

Vials Only

Screw top vials, amber glass (vial only)

Description	Cat. No.	Qty
2 mL, amber glass (standard opening), thread, 8-425	27083-U 27087-U	100 ea 1000 ea
2 mL, amber glass (with graduated marking spot), 8-425	27084-U 27085-U	100 ea 1000 ea
2 mL, amber glass (large opening), O.D. 12 mm × H 32 mm × I.D. 6.0 mm, thread, 10-425	27267-U	100 ea
4 mL, amber glass vial, O.D. 15 mm × H 45 mm () × I.D. 8 mm, thread, 13-425	27115-U 27032	100 ea 1000 ea
4 mL, amber glass vial, O.D. 14.75 mm × H 45 mm × I.D. 8 mm, thread, 13-425	854986	100 ea
7 mL, amber glass, O.D. 17 mm × H 60 mm × I.D. 9.5 mm, thread, 15-425	27072-U	100 ea
15 mL, amber glass, O.D. 21 mm × H 70 mm × I.D. 12 mm, thread, 18-400	27088-U	100 ea
20 mL, amber glass, O.D. 27.5 mm × H 57 mm, thread, 24-400	854991	1000 ea
22 mL, amber glass, O.D. 23 mm × H 85 mm × I.D. 18 mm, thread, 20-400	27073-U	100 ea
40 mL, amber glass, O.D. 29 mm × H 82 mm × I.D. 17 mm, thread, 24-400	27185-U	100 ea
40 mL, amber glass, O.D. 27.5 mm × H 95 mm × I.D. 17 mm, thread, 24-400	27382	100 ea
40 mL, amber glass, O.D. 27.5 mm × H 95 mm × I.D. 17 mm, thread: 24-400	23702-U	100 ea

Sample vials in Lab-File® without caps

Wheaton sample vials

Vials are packaged in corrugated trays with partitions then shrink-wrapped to reduce particulate contamination.

Autoclavable borosilicate USP Type 1 glass. Order caps separately.



Description	Cat. No.	Qty
clear, volume 2 mL, screw-cap size: 8-425, diam. 12 mm × H 36 mm	Z188697-1PAK	200 ea
clear, volume 4 mL, screw-cap size: 13-425, diam. 15 mm × H 46 mm	Z188700-1PAK	200 ea
clear, volume 8 mL, screw-cap size: 15-425, diam. 17 mm × H 61 mm	Z188719-1PAK	200 ea
clear, volume 12 mL, screw-cap size: 15-425, diam. 19 mm × H 66 mm	Z188727-1PAK	200 ea
clear, volume 16 mL, screw-cap size: 18-400, diam. 21 mm × H 71 mm	Z188735-1PAK	200 ea
clear, volume 24 mL, screw-cap size: 20-400, diam. 23 mm × H 86 mm	Z188743-1PAK	200 ea
amber, volume 2 mL, screw-cap size: 8-425, diam. 12 mm × H 36 mm	Z188778-1PAK	200 ea
amber, volume 4 mL, screw-cap size: 13-425, diam. 15 mm × H 46 mm	Z188786-1PAK	200 ea
amber, volume 8 mL, screw-cap size: 15-425, diam. 17 mm × H 61 mm	Z188794-1PAK	200 ea

Vials, clear glass, screw top, graduated (vial only)

cap not included



Description	Cat. No.	Qty
2 mL, clear glass, graduated, O.D. 12 mm × H 32 mm × I.D. 4.6 mm, thread, 8-425	27023	100 ea
4 mL, clear glass, graduated, O.D. 15 mm × H 45 mm × I.D. 8 mm, thread, 13-425	27024	100 ea
7 mL, clear glass, graduated, O.D. 17 mm × H 60 mm, thread, 15-425	27025	100 ea
15 mL, clear glass, graduated, O.D. 21 mm × H 70 mm, thread, 18-400	27026	100 ea
22 mL, clear glass, graduated, O.D. 23 mm × H 85 mm, thread, 20-400	27027-U	100 ea
40 mL, clear glass, graduated, O.D. 29 mm × H 82 mm, thread, 24-400	27028-U	100 ea

Screw Top Glass, Caps, and Septa for large volume vials (7-60 mL)



7 mL (17 x 60 mm) Screw Top Vials

7 mL screw top vials

Description	Cat. No.	Qty
7 mL, clear glass, O.D. 17 mm × H 60 mm × I.D. 9.5 mm, thread, 15-425	27151	100 ea
7 mL, clear glass, graduated, O.D. 17 mm × H 60 mm, thread, 15-425	27025	100 ea
7 mL, amber glass, O.D. 17 mm × H 60 mm × I.D. 9.5 mm, thread, 15-425	27072-U	100 ea

Vials

Screw Top Glass, Caps, and Septa for large volume vials (7-60 mL): 7 mL (17 x 60 mm) Screw Top Vials

Septa for 7mL vials

Description	Cat. No.	Qty
white tan PTFE/silicone, diam. 13 mm x thickness 0.060 in., for use with 7 mL vial	27155	100 ea
blue PTFE/white silicone, diam. 13 mm x thickness 0.060 in., for use with 7 mL vial	27512	100 ea
High temperature PTFE/silicone, diam. 13 mm x thickness 0.060 in., for use with 7mL vial	27193	100 ea
PTFE/red rubber, diam. 13 mm x thickness 0.050 in., for use with 7 mL vials	27156	100 ea
white PTFE, diam. 15 mm x thickness 0.010 in., for use with 7 mL vial	27157	100 ea
aluminum/silicone, diam. 13 mm x thickness 0.060 in., for use with 7 mL vial	24884	100 ea
black Viton®, diam. 13 mm x thickness 0.060 in., for use with 7 mL vial	27352	100 ea

Caps for 7 mL vials

Description	Cat. No.	Qty
black phenolic hole cap, for use with 7 mL vial with 15-425 thread	27154	100 ea
black polypropylene hole cap, for use with 7 mL vial with 15-425 thread	27054	100 ea
green melamine resin solid cap, F217/PTFE liner, for use with 7 mL vial with 15-425 thread	27152	100 ea
black phenolic solid cap, aluminum liner, for use with 7 mL vial with 15-425 thread, thread: 15-425	27153	100 ea

15 mL (21 x 70 mm) Screw Top Vials

15 mL screw top vials

Description	Cat. No.	Qty
15 mL, clear glass, O.D. 21 mm x H 70 mm x I.D. 12 mm, thread, 18-400	27162	100 ea
15 mL, clear glass, graduated, O.D. 21 mm x H 70 mm, thread, 18-400	27026	100 ea
15 mL, amber glass, O.D. 21 mm x H 70 mm x I.D. 12 mm, thread, 18-400	27088-U	100 ea

Septa for 15mL vials

Description	Cat. No.	Qty
white tan PTFE/silicone, diam. 16 mm x thickness 0.090 in., for use with 15 mL vial	27166	100 ea
blue PTFE/white silicone, diam. 16 mm x thickness 0.060 in., for use with 15 mL vial	27513	100 ea
High temperature PTFE/silicone, diam. 16 mm x thickness 0.100 in., for use with 15mL vial	27194	100 ea
PTFE/red rubber, diam. 16 mm x thickness 0.060 in., for use with 15 mL vial	27167	100 ea

Description	Cat. No.	Qty
white PTFE liner, diam. 18 mm x thickness 0.010 in., for use with 15 mL vial	27168	100 ea
aluminum/silicone, diam. 16 mm x thickness 0.060 in., for use with 15 mL vial	24885-U	100 ea

Septa, tan PTFE/silicone

temp. limit 250 °C

Description	Cat. No.	Qty
tan PTFE/silicone, diam. 16 mm x thickness 0.060 in., for use with 15 mL vial	27380-U	100 ea

Caps for 15 mL vials

Description	Cat. No.	Qty
black phenolic hole cap, for use with 15 mL vial with 18-400 thread	27165	100 ea
green melamine resin solid cap, F217/PTFE liner, for use with 15 mL vial with 18 mm thread	27163	100 ea
black phenolic solid cap, aluminum liner, thread: 18-400, for use with 15 mL vial	27164	100 ea

20 mL (27.5 x 57 mm) Screw Top Vials

20 mL screw top vials

Description	Cat. No.	Qty
20 mL, clear glass, vials only, O.D. 28 mm x H 57.5 mm, thread, 22-400	Z253081-1PAK	500 ea
20 mL, amber glass, O.D. 27.5 mm x H 57 mm, thread, 24-400	854991	1000 ea

Septa for 20 mL vials

temp. limit 250 °C

Description	Cat. No.	Qty
white tan PTFE/silicone, diam. 22 mm x thickness 0.100 in., for use with 20, 40 or 60 mL vial	27188-U	100 ea
white tan PTFE/silicone, diam. 22 mm x thickness 0.125 in., for use with 20, 40 or 60 mL vial	23193-U	100 ea
tan PTFE/silicone, diam. 22 mm x thickness 3.2 mm, for use with 20, 40, 60mL vial	SU860007	100 ea
blue PTFE/white silicone, diam. 22 mm x thickness 0.060 in., for use with 20, 40, 60 mL vial	27515	100 ea
High temperature PTFE/silicone, diam. 22 mm x thickness 0.100 in., for use with 20, 40, or 60 mL vial	27196	100 ea
aluminum/silicone, diam. 22 mm x thickness 0.100 in., for use with 20, 40, or 60 mL vial	27190-U	100 ea
black Viton®, diam. 22 mm x thickness 0.060 in., for use with 20, 40, or 60 mL vial	27355	100 ea

Vials

Screw Top Glass, Caps, and Septa for large volume vials (7-60 mL): 20 mL (27.5 x 57 mm) Screw Top Vials

Caps for 20 mL vials

Description	Cat. No.	Qty
black phenolic hole cap, for use with 20 or 40 mL vial with 24-400 thread	27187	100 ea
black polypropylene hole cap, for use with 20, 40, or 60 mL vial with 24-400 thread	27057	100 ea
green melamine resin solid cap, F217/PTFE liner, for use with 20 or 40 mL vial with 24-400 thread	27186	100 ea
white polypropylene cap (solid), tan PTFE/silicone (EPA Quality), thickness 3.2 mm, thread: 24-400, for use with 20 or 40mL vial	SU860006	100 ea

22 mL (23 x 85 mm) Screw Top Vials

22 mL screw top vials

Description	Cat. No.	Qty
22 mL, clear glass, O.D. 23 mm x H 85 mm x I.D. 18 mm, thread, 20-400	27173	100 ea
22 mL, clear glass, graduated, O.D. 23 mm x H 85 mm, thread, 20-400	27027-U	100 ea
22 mL, amber glass, O.D. 23 mm x H 85 mm x I.D. 18 mm, thread, 20-400	27073-U	100 ea

Septa for 22 mL vials

Description	Cat. No.	Qty
white tan PTFE/silicone, diam. 18 mm x total thickness 0.060 in. x PTFE thickness 5 mil, for use with 22 mL vial	27177	100 ea
blue PTFE/white silicone, diam. 18 mm x thickness 0.060 in., for use with 22 mL vial	27514	100 ea
High temperature PTFE/silicone, diam. 18 mm x thickness 0.060 in., for use with 22mL vial	27195	100 ea
PTFE/red rubber, diam. 18 mm x thickness 0.050 in., for use with 22 mL vial	27178	100 ea
white PTFE, diam. 21 mm x thickness 0.010 in., for use with 22 mL vial	27179	100 ea
aluminum/silicone, diam. 18 mm x thickness 0.060 in., for use with 22 mL vial	24886-U	100 ea
black Viton®, diam. 18 mm x thickness 0.060 in., for use with 22 mL vial	27354	100 ea

Caps for 22 mL vials

Description	Cat. No.	Qty
black phenolic hole cap, for use with 22 mL vial with 20-400 thread	27176	100 ea
black polypropylene hole cap, for use with 22 mL vial with 20-400 thread	27056	100 ea
green melamine resin solid cap, F217/PTFE liner, for use with 22 mL vial with 20 mm thread	27174-U	100 ea
black phenolic solid cap, aluminum liner, for use with 22 mL vial (with 20 mm thread), thread: 20-400	27175-U	100 ea

40 mL Screw Top Vials

40 mL screw top vials

Description	Cat. No.	Qty
40 mL, clear glass, O.D. 29 mm x H 82 mm x I.D. 17 mm, thread, 24-400	27184	100 ea
40 mL, clear glass, O.D. 27.5 mm x H 95 mm, thread, 24-400	27379	100 ea
40 mL, clear glass, O.D. 27.5 mm x H 95 mm, thread, 24-400	SU860001	100 ea
40 mL, clear glass, graduated, O.D. 29 mm x H 82 mm, thread, 24-400	27028-U	100 ea
40 mL, amber glass, O.D. 29 mm x H 82 mm x I.D. 17 mm, thread, 24-400	27185-U	100 ea
40 mL, amber glass, O.D. 27.5 mm x H 95 mm x I.D. 17 mm, thread, 24-400	27382	100 ea
40 mL, amber glass, O.D. 27.5 mm x H 95 mm x I.D. 17 mm, thread: 24-400	23702-U	100 ea

Septa for 40 mL vials

Description	Cat. No.	Qty
white tan PTFE/silicone, diam. 22 mm x thickness 0.100 in., for use with 20, 40 or 60 mL vial	27188-U	100 ea
white tan PTFE/silicone, diam. 22 mm x thickness 0.125 in., for use with 20, 40 or 60 mL vial	23193-U	100 ea
tan PTFE/silicone, diam. 22 mm x thickness 3.2 mm, for use with 20, 40, 60mL vial	SU860007	100 ea
blue PTFE/white silicone, diam. 22 mm x thickness 0.060 in., for use with 20, 40, 60 mL vial	27515	100 ea
High temperature PTFE/silicone, diam. 22 mm x thickness 0.100 in., for use with 20, 40, or 60 mL vial	27196	100 ea
aluminum/silicone, diam. 22 mm x thickness 0.100 in., for use with 20, 40, or 60 mL vial	27190-U	100 ea
black Viton®, diam. 22 mm x thickness 0.060 in., for use with 20, 40, or 60 mL vial	27355	100 ea
PTFE/silicone, septum diam. 22 mm x thickness 0.100 in.	23245-U	144 ea

Caps for 40 mL vials

Description	Cat. No.	Qty
black phenolic hole cap, for use with 20 or 40 mL vial with 24-400 thread	27187	100 ea
black polypropylene hole cap, for use with 20, 40, or 60 mL vial with 24-400 thread	27057	100 ea
green melamine resin solid cap, F217/PTFE liner, for use with 20 or 40 mL vial with 24-400 thread	27186	100 ea
white polypropylene cap (solid), tan PTFE/silicone (EPA Quality), thickness 3.2 mm, thread: 24-400, for use with 20 or 40mL vial	SU860006	100 ea

Vials

Septa for Screw Top Vials

Septa for Screw Top Vials

Compatibility/Incompatibility of Septa

Barrier (maximum temp. 350 °C)

Silicone bonded to aluminum. Use in sealing applications where non-permeability and low volatility are required at temperatures above 177 °C. Affected by many organic solvents (see examples under Silicone).

Butyl (maximum temp. 200 °C)

Use with many organic solvents: acetic acid (<50%), acetonitrile, acetone, alcohols, DMSO, phenol. Not compatible with alkanes, benzene, carbon disulfide, chlorinated solvents, cyclohexane.

Red rubber (maximum temp. 100 °C)

Use with many hydrocarbons, acetonitrile, alcohols, cyclohexane. Not compatible with chlorinated solvents.

Silicone (maximum temp. 250 °C)

Use with acetone, alcohols, DMSO, ether, aqueous samples. Affected by many organic solvents: acetonitrile, benzene, chloroform, hexane, pyridine, tetrahydrofuran, toluene.

Teflon/Rubber (maximum temp. 100 °C)

Use with most organics (until pierced). Resistant to chlorosilanes.

PTFE/Silicone (maximum temp. 250 °C)

Use with most organics (until pierced). Not recommended for use with chlorosilanes.

PTFE/Thermoseal (maximum temp. 300 °C)

An improved grade of silicone septa that can be used at higher temperatures. Affected by many organic solvents (see examples under Silicone).

Viton (maximum temp. 260 °C)

Resists mineral oil, aliphatic and aromatic hydrocarbons, high concentrations of acids, high temperatures. Not compatible with strong bases, ketones, low molecular weight ester

Septa, Blue PTFE/white silicone

temp. limit 250 °C



Description	Cat. No.	Qty
diam. 8 mm × thickness 0.060 in., for use with 2 mL vial - standard opening	27510-U	100 ea
for use with 2 mL vial - standard opening, diam. 8 mm	507768	100 ea
for use with 2 mL vial - standard opening, diam. 8 mm, durometer: 30	507741	100 ea
diam. 11 mm × thickness 0.060 in., for use with 4 mL vial	27511	100 ea
blue PTFE/white silicone, diam. 13 mm × thickness 0.060 in., for use with 7 mL vial	27512	100 ea
blue PTFE/white silicone, diam. 16 mm × thickness 0.060 in., for use with 15 mL vial	27513	100 ea
blue PTFE/white silicone, diam. 18 mm × thickness 0.060 in., for use with 22 mL vial	27514	100 ea
blue PTFE/white silicone, diam. 22 mm × thickness 0.060 in., for use with 20, 40, 60 mL vial	27515	100 ea

Septa, tan PTFE/white silicone

Septa are sized to fit screw top vials.

temp. limit 250 °C



Tan PTFE/white silicone

Description	Cat. No.	Qty
white tan PTFE/silicone, diam. 8 mm × thickness 0.060 in., for use with 2 mL vial, standard opening	27095-U 33213	100 ea 1000 ea
white tan PTFE/silicone, diam. 11 mm × thickness 0.060 in., for use with 4 mL vial	27144	100 ea
white tan PTFE/silicone, diam. 13 mm × thickness 0.060 in., for use with 7 mL vial	27155	100 ea
tan PTFE/silicone, diam. 16 mm × thickness 0.060 in., for use with 15 mL vial	27380-U	100 ea
white tan PTFE/silicone, diam. 16 mm × thickness 0.090 in., for use with 15 mL vial	27166	100 ea
white tan PTFE/silicone, diam. 18 mm × total thickness 0.060 in. × PTFE thickness 5 mil, for use with 22 mL vial	27177	100 ea
tan PTFE/silicone, diam. 22 mm × thickness 3.2 mm, for use with 20, 40, 60 mL vial	SU860007	100 ea
white tan PTFE/silicone, diam. 22 mm × thickness 0.100 in., for use with 20, 40 or 60 mL vial	27188-U	100 ea
white tan PTFE/silicone, diam. 22 mm × thickness 0.125 in., for use with 20, 40 or 60 mL vial	23193-U	100 ea

Septa, red PTFE/Silicone

temp. limit 250 °C



Description	Cat. No.	Qty
red PTFE/white silicone, red PTFE face, white silicone body, diam. 8 mm × thickness 0.060 in., for use with 2mL standard opening vial	27097-U 23243	100 ea 1000 ea
red PTFE/white silicone, diam. 10 mm × thickness 0.060 in., for use with 2 mL large opening vials	27277 27278	100 ea 1000 ea

Septa, white PTFE/silicone

temp. limit 250 °C

Description	Cat. No.	Qty
PTFE/silicone, diam. 8 mm × thickness 0.060 in., durometer 20, for use with 2 mL vial - standard opening	507784	100 ea

Vials

Septa for Screw Top Vials

Description	Cat. No.	Qty
white PTFE/silicone, diam. 11 mm × thickness 0.075 in., for use with 4 mL vial	27356 27369-U	100 ea 1000 ea
white PTFE/silicone, diam. 20 mm × thickness 0.125 in. × PTFE thickness 0.005 in.	27361 27374	100 ea 1000 ea

Septa, PTFE/silicone with slit

temp. limit 250 °C



Description	Cat. No.	Qty
red PTFE/white silicone, with slit, diam. 8 mm × thickness 0.060 in., for use with 2 mL vial, standard opening	27098-U 24881	100 ea 1000 ea
red PTFE/white silicone, diam. 10 mm × thickness 0.040 in., for use with 2 mL large opening vials	27279 27280-U	100 ea 1000 ea

Septa, PTFE/silicone/PTFE



Description	Cat. No.	Qty
red PTFE/silicone/red PTFE, diam. 9 mm × thickness 1.0 mm	29041-U	100 ea
red PTFE/silicone/red PTFE, septum diam. 11 mm × thickness 0.040 in., for use with 4mL vial	27122-U	100 ea
red PTFE/silicone/red PTFE, diam. 10 mm × thickness 0.040 in., for use with 2 mL large opening vials	27275 27276	100 ea 1000 ea

Septa, Barrier

aluminum/silicone

septum type Barrier

temperature limit 250 °C



Description	Cat. No.	Qty
aluminum/silicone, diam. 8 mm × thickness 0.060 in., for use with 2 mL vial, standard opening	24882-U	100 ea
aluminum/silicone, diam. 11 mm × thickness 0.060 in., for use with 4 mL vial	24883	100 ea
aluminum/silicone, diam. 13 mm × thickness 0.060 in., for use with 7 mL vial	24884	100 ea
aluminum/silicone, diam. 16 mm × thickness 0.060 in., for use with 15 mL vial	24885-U	100 ea
aluminum/silicone, diam. 18 mm × thickness 0.060 in., for use with 22 mL vial	24886-U	100 ea

Description	Cat. No.	Qty
barrier (aluminum faced silicone), diam. 20 mm × thickness 0.100 in.	27189	100 ea
aluminum/silicone, diam. 22 mm × thickness 0.100 in., for use with 20, 40, or 60 mL vial	27190-U	100 ea

Septa, Thermoseal®

temperature limit 260 °C



Description	Cat. No.	Qty
High temperature PTFE/silicone, diam. 8 mm × thickness 0.060 in., for use with 2mL standard opening vial	27191	100 ea
High temperature PTFE/silicone, diam. 11 mm × thickness 0.060 in., for use with 4mL vial	27192	100 ea
High temperature PTFE/silicone, diam. 13 mm × thickness 0.060 in., for use with 7mL vial	27193	100 ea
High temperature PTFE/silicone, diam. 16 mm × thickness 0.100 in., for use with 15mL vial	27194	100 ea
High temperature PTFE/silicone, diam. 18 mm × thickness 0.060 in., for use with 22mL vial	27195	100 ea
High temperature PTFE/silicone, diam. 20 mm × thickness 0.060 in.	27540-U	100 ea
High temperature PTFE/silicone, diam. 22 mm × thickness 0.100 in., for use with 20, 40, or 60 mL vial	27196	100 ea

Septa, PTFE/red rubber

temperature limit 120 °C



PTFE/Rubber Septa

Description	Cat. No.	Qty
PTFE/red rubber, diam. 8 mm × thickness 0.050 in., for use with screw cap, 8-425	27132	100 ea
PTFE/red rubber, diam. 9 mm × thickness 1.0 mm	29038-U	100 ea
PTFE/red rubber, diam. 11 mm × thickness 0.050 in., for use with 4 mL vial	27145	100 ea
PTFE/red rubber, diam. 13 mm × thickness 0.050 in., for use with 7 mL vials	27156	100 ea
PTFE/red rubber, diam. 16 mm × thickness 0.060 in., for use with 15 mL vial	27167	100 ea
PTFE/red rubber, diam. 18 mm × thickness 0.050 in., for use with 22 mL vial	27178	100 ea
PTFE/red rubber, diam. 20 mm × thickness 0.125 in., for use with 20 mm crimp seal, 22 mm screw cap	27233	100 ea

Vials

Septa for Screw Top Vials

Cap liner, PTFE

Oversized for better sealing ability.

temp. limit 225 °C



Description	Cat. No.	Qty
white PTFE, diam. 8 mm, for use with 2 mL vial - standard opening	507806	100 ea
white PTFE, diam. 9 mm × thickness 0.010 in., for use with 2 mL vial, standard opening	27133	100 ea
white PTFE, diam. 13 mm × thickness 0.010 in., for use with 4 mL vial	27146	100 ea
white PTFE, diam. 15 mm × thickness 0.010 in., for use with 7 mL vial	27157	100 ea
white PTFE liner, diam. 18 mm × thickness 0.010 in., for use with 15 mL vial	27168	100 ea
white PTFE, diam. 21 mm × thickness 0.010 in., for use with 22 mL vial	27179	100 ea

Septa, Viton®

temperature limit 260 °C



Description	Cat. No.	Qty
black Viton®, diam. 8 mm × thickness 0.060 in., for use with 2 mL vial, standard opening	27350-U	100 ea
black Viton®, diam. 11 mm × thickness 0.060 in., for use with 4 mL vial	27351	100 ea
black Viton®, diam. 13 mm × thickness 0.060 in., for use with 7 mL vial	27352	100 ea
black Viton®, diam. 18 mm × thickness 0.060 in., for use with 22 mL vial	27354	100 ea
black Viton®, diam. 22 mm × thickness 0.060 in., for use with 20, 40, or 60 mL vial	27355	100 ea

Septum, PTFE/Butyl

Septa, PTFE faced butyl



PTFE faced butyl

Description	Cat. No.	Qty
PTFE/rubber (butyl (Pharma-Fix)), diam. 20 mm × thickness 0.135 in.	27201	100 ea

Septa for open top caps

For use with cut-out top caps and Wheaton vials.



Description	Cat. No.	Qty
for cap size: 8 mm, red PTFE/silicone	Z162558-100EA	100 ea
for cap size: 8 mm, tan PTFE/silicone	Z162566-100EA	100 ea
for cap size: 13 mm, PTFE/silicone	Z106496-100EA	100 ea
for cap size: 13 mm, PTFE-faced styrene-butadiene rubber	Z106526-100EA	100 ea
for cap size: 15 mm, PTFE/silicone	Z106518-100EA	100 ea
for cap size: 15 mm, PTFE/red rubber	Z106534-100EA	100 ea
for cap size: 18 mm, PTFE/silicone	Z188859-1PAK	100 ea
for cap size: 20 mm, PTFE/silicone	Z127302-100EA	100 ea
for cap size: 20 mm, PTFE/red rubber	Z127310-100EA	100 ea
for cap size: 22 mm, PTFE/silicone, for Wheaton vial	Z253111-1PAK	100 ea

Screw Caps

Screw cap, phenolic, with open center

autoclavable
temp. limit 149 °C



Phenolic hole cap

Description	Cat. No.	Qty
black phenolic hole cap, thread: 8-425, no septum	27094-U	100 ea
black phenolic cap, for use with 4 mL vial with 13-425 thread	27120-U	100 ea
black phenolic hole cap, for use with 7 mL vial with 15-425 thread	27154	100 ea
black phenolic hole cap, for use with 15 mL vial with 18-400 thread	27165	100 ea
black phenolic hole cap, for use with 22 mL vial with 20-400 thread	27176	100 ea
black phenolic cap, configured for 10 mL SPME vial with 22-400 thread	23236	144 ea
black phenolic hole cap, for use with 20 or 40 mL vial with 24-400 thread	27187	100 ea

Vials

Screw Caps

Screw cap (open-top), polypropylene

These hole caps do not come with septa.

autoclavable
temp. limit 135 °C



Polypropylene hole cap

Description	Cat. No.	Qty
black polypropylene hole cap, thread, 8-425	27052 24764	100 ea 1000 ea
black polypropylene cap, for use with 2 mL large opening (6.0 mm) vial with 10-425 thread	27271 27272-U	100 ea 1000 ea
black polypropylene cap, for use with 4 mL vial with 13-425 thread	27053	100 ea
black polypropylene hole cap, for use with 7 mL vial with 15-425 thread	27054	100 ea
black polypropylene hole cap, for use with 22 mL vial with 20-400 thread	27056	100 ea
black polypropylene hole cap, for use with 20, 40, or 60 mL vial with 24-400 thread	27057	100 ea
black polypropylene, open-top, thread: 8-425	Z291668-1PAK	100 ea

Wheaton black phenolic open top screw cap (without septa)

Description	Cat. No.	Qty
black phenolic cap, cut-out top, without septum, thread, 8-425	Z162531-200EA	200 ea
Cut-out top, without septum, thread, 13-425	Z106445-200EA	200 ea
Cut-out top, without septum, thread, 15-425	Z106453-200EA	200 ea
Cut-out top, without septum, thread, 18-400	Z188840-1PAK	200 ea
Cut-out top, without septum, thread, 20-400	Z127299-200EA	200 ea
Cut-out top, without septum, thread, 22-400	Z253103-1PAK	200 ea

Screw cap, solid top with PTFE liner

Solid caps with F217/PTFE liner. F217 is a triple layer liner that consists of a foamed polyethylene core between two layers of virgin low-density polyethylene. This liner is faced with another layer of PTFE (polytetrafluoroethylene).

temp. limit 49 °C



Solid cap with PTFE liner

For Use With	Cat. No.	Qty
green melamine resin cap solid liner F217/PTFE		
2 mL vial (standard opening with 8-425 thread)	27091-U	100 ea
4 mL vial with 13-425 thread	27141	100 ea
green melamine resin solid cap liner F217/PTFE		
7 mL vial with 15-425 thread	27152	100 ea
15 mL vial with 18 mm thread	27163	100 ea
22 mL vial with 20 mm thread	27174-U	100 ea
20 or 40 mL vial with 24-400 thread	27186	100 ea

Screw cap, solid top with aluminum liner

temp. limit 135 °C



Solid cap with aluminum liner

Description	Cat. No.	Qty
black phenolic cap solid, aluminum liner, for use with 2 mL vial (standard opening), thread: 8-425	27092-U	100 ea
black phenolic cap, aluminum liner, for use with 4 mL vial with 13-425 thread	27142	100 ea
black phenolic solid cap, aluminum liner, for use with 7 mL vial with 15-425 thread, thread: 15-425	27153	100 ea
black phenolic solid cap, aluminum liner, thread: 18-400, for use with 15 mL vial	27164	100 ea
black phenolic solid cap, aluminum liner, for use with 22 mL vial (with 20 mm thread), thread: 20-400	27175-U	100 ea

Wheaton phenolic solid top screw cap

Black plastic caps

These autoclavable caps are designed to ensure the ultimate in product safety. The liners are white styrene-butadiene rubber faced with PTFE.

Description	Cat. No.	Qty
Solid-top, white rubber liner, black phenolic cap, thread, 8-425	Z188808-1PAK Z188808-10PAK	100 ea 1000 ea
Solid-top, white rubber liner, thread, 13-425	Z106402-200EA	200 ea
Solid-top, white rubber liner, thread, 15-425	Z106410-200EA	200 ea
Solid-top, white rubber liner, thread, 18-400	Z188816-1PAK	500 ea
Solid-top, white rubber liner, thread, 20-400	Z188824-1PAK	500 ea
Solid-top, PTFE-faced rubber liner, thread, 13-425	Z106429-200EA	200 ea
Solid-top, PTFE-faced rubber liner, thread, 15-415	Z203610-200EA	200 ea
Solid-top, PTFE-faced rubber liner, thread, 15-425	Z106437-200EA	200 ea
Solid-top, PTFE-faced rubber liner, thread, 18-400	Z188832-1PAK	200 ea
Solid-top, PTFE-faced rubber liner, thread, 20-400	Z164313-100EA	100 ea

Vials

Screw Caps: *Wheaton phenolic solid top screw cap*

Inter-Seal™ bonded caps (inseparable caps and liner)

Inter-Seal™ bonded caps eliminate expensive and time consuming hand assembly while preventing liner fallout. They are made by a bonding process that bonds PTFE/silicone into polypropylene closures without using adhesives. The bonding properly seats and secures the septa within the vial opening. This integrated one piece system withstands multiple injections, making it very cost effective.

Benefits include:

- Significant bond strength
- Withstands multiple injections
- Resistant to coring
- Excellent resealability
- Broad chemical resistance

Description	Cat. No.	Qty
Interseal cap, 8-425 thread		
white cap, PTFE/silicone, thread, 8-425	29099-U	100 ea
black cap, PTFE/silicone, thread, 8-425	29102-U	100 ea
black cap, PTFE/silicone (with slit), thread, 8-425	29103-U	100 ea
Interseal cap, 10-425 thread		
black cap, PTFE/silicone septa, thread, 10-425	29112-U	100 ea
black cap, PTFE/silicone septa (with slit), thread, 10-425	29113-U	100 ea
white cap, PTFE/silicone septa, thread, 10-425	29114-U	100 ea
Interseal cap, 13-425 thread		
black cap, PTFE/silicone, thread, 13-425	29153-U	100 ea
white cap, PTFE/silicone, thread, 13-425	29157-U	100 ea
Interseal cap, 24-400 thread		
white polypropylene cap (15mm center hole), tan PTFE/silicone, thickness 3.2 mm, thread: 24-400, for use with 20 or 40 mL vial	SU860005	1000 ea
white polypropylene cap (solid), tan PTFE/silicone (EPA Quality), thickness 3.2 mm, thread: 24-400, for use with 20 or 40mL vial	SU860006	100 ea



Assembled screw cap with hole and PTFE/silicone septum

Description	Cat. No.	Qty
Hole caps, 8-425 thread		
black phenolic, PTFE/silicone, septum thickness 1.5 mm, thread, 8-425	27093-U 33242	100 ea 1000 ea
black polypropylene hole cap, PTFE/silicone, Top Hat (septa and closure designed to fit together tightly)	27261-U	100 ea
black polypropylene, PTFE/silicone, septum thickness 1.5 mm, thread: 8-425	27262	100 ea
black polypropylene, PTFE/silicone (red PTFE/white silicone), septum thickness 1.3 mm, thread: 8-425	SU860076	100 ea

Description	Cat. No.	Qty
black polypropylene, PTFE/silicone (red PTFE/creme silicone), thread: 8-425, septum thickness 1.5 mm	854985	100 ea
Hole caps, 10-425 thread		
black polypropylene, thread: 10-425, PTFE/silicone, thickness 1.5 mm, for use with 2 mL vial (large opening)	27273	100 ea
Hole caps, 13-425 thread		
black polypropylene, PTFE/silicone, septum thickness 1.5 mm, for use with 4 mL vial with 13-425 thread	27018	100 ea
black polypropylene, red PTFE/silicone, thickness 1.5 mm, for use with 4 mL vial with 13-425 thread	SU860078	100 ea
Hole caps, 15-425 thread		
black polypropylene, thread: 15-425, septum thickness 1.5 mm, for use with 7 mL vial	27019	100 ea
Hole caps, 18-400 thread		
black polypropylene, thread: 18-400, septum thickness 1.5 mm, for use with 15 mL vial	27020	100 ea
Hole caps, 20-400 thread		
black polypropylene, thread: 20-400, septum thickness 1.9 mm, for use with 22 mL vial	27021	100 ea
Hole caps, 24-400 thread		
black polypropylene, thread: 24-400, septum thickness 1.5 mm, for use with 20, 40, or 60 mL vial	27022	100 ea

Assembled screw cap with hole and TFE/rubber septum

hardness (Durometer: shore A) 60

Description	Cat. No.	Qty
black polypropylene, septum (TEF/red rubber), septum thickness 1.3 mm, thread: 8-425	SU860091 854984	100 ea 1000 ea
black polypropylene, septum thickness 1.3 mm, for use with 4 mL vials with 13-425 thread	854987	100 ea

Closures with Pre-Cut Septa for HPLC Applications

Closures with pre-cut septa

Pre-cut septa: The silicone material is cut through in Y-form while the PTFE layer remains uncut. The silicone layer represents 95% of the total septa thickness while the PTFE layer is only 5% or less.

The Y-form shape of the cut was chosen for several reasons. Since the PTFE layer is uncut, this product provides protection against contamination until the needle pierces through it. The needle can easily penetrate through the Y-slit of the septa material (only the thickness of the PTFE layer needs to be penetrated by the needle). Less pressure is required for the autosampler needle to penetrate the pre-cut septa, resulting in fewer bent and/or broken needles.

Vials

Closures with Pre-Cut Septa for HPLC Applications

The uncut PTFE layer provides a better seal than other commercially solid slitted septa until the needle punctures the septa. The Y-shaped cut allows air to enter the vial eliminating vacuum formation. The design provides the needle with a larger target area for penetration even when the needle doesn't come down in the center of the septa.



9 mm blue polypropylene hole cap with pre-cut septa

Description	Cat. No.	Qty
Snap cap		
11 mm, Snap cap, soft version, blue polyethylene, red PTFE/silicone, thickness 1.0 mm	29491-U	100 ea
11 mm, Snap cap, soft version, transparent polyethylene, red PTFE/silicone, thickness 1.0 mm	29492-U	100 ea
11 mm, Snap cap, blue polyethylene, red PTFE/silicone, thickness 1.0 mm	29493-U	100 ea
11 mm, Snap cap, transparent polyethylene, red PTFE/silicone, thickness 1.0 mm	29494-U	100 ea
Magnetic cap		
20 mm, Magnetic cap, UltraClean, transparent PTFE/silicone, thickness 3.0 mm	29495-U	100 ea
20 mm, Magnetic cap, UltraClean, red PTFE/silicone, thickness 1.5 mm	29496-U	100 ea
18 mm, Magnetic screw thread cap, UltraClean, red PTFE/silicone, thickness 1.5 mm	29497-U	100 ea
9 mm thread		
9 mm, blue polypropylene, red PTFE/silicone, x thickness 1.0 mm	29498-U	100 ea
9 mm, transparent polypropylene, red PTFE/silicone, thickness 1.0 mm	29499-U	100 ea

Silane-Treated Vials and Accessories

Vials, screw top, silane-treated

Cap not included.

Features and Benefits

- Proprietary silane treatment shields active silanol groups on untreated glass surfaces.
- Improved recovery of submicrogram polar compounds.
- Save time and money.

Description	Cat. No.	Qty
2 mL, silanized, clear glass, thread, 8-425	27029-U 27030	100 ea 1000 ea
2 mL, silanized, amber glass, thread, 8-425	27238 27219	100 ea 1000 ea
2 mL, silanized, amber glass, thread size 9 mm	28304-U	100 ea
4 mL, silanized, clear glass vial, O.D. 15 mm x H 45 mm x I.D. 8 mm, thread, 13-425	27114 27220-U	100 ea 1000 ea
4 mL, silanized, amber glass vial, O.D. 15 mm x H 45 mm x I.D. 8 mm, thread, 13-425	27217	100 ea

Vials, crimp top, silane-treated

Description	Cat. No.	Qty
2 mL, silanized, clear glass, crimp top, O.D. 12 mm x H 32 mm x I.D. 6.0 mm, vial only	27060-U 27061	100 ea 1000 ea
2 mL, silanized, amber glass, crimp top, O.D. 12 mm x H 32 mm x I.D. 6.0 mm, vial only	27225-U 27216	100 ea 1000 ea

Please note: To obtain a quote on silane treatment for other glassware, please contact your Sigma-Aldrich Technical Service representative at techservice@sial.com.

Precleaned Sampling Containers

Features and Benefits

Cleaned for water sampling according to US EPA 40 CFR 136, *Guidelines for Establishing Test Procedures for the Analysis of Pollutants*. These vials are assembled with open-top screw caps and specially designed septa.

EPA Vials, white polypropylene screw top with hole cap, pre-cleaned and assembled

Each of the vials is cleaned according to US EPA Protocol B: The cleaning procedure is as follows:

1. Wash containers in hot water using laboratory grade non-phosphate detergent.
2. Rinse three times with copious amounts of tap water to remove detergent.
3. Rinse three times with ASTM Type I organic-free water.
4. Oven-dry containers.
5. Allow containers to cool to room temperature in an enclosed contaminant-free environment.
6. Cap the containers.

After being cleaned these vials are assembled with the following materials: Type 1 borosilicate glass, PTFE/silicone septa, and a polypropylene cap. The vials are available in either clear or amber glass. All of the vials are packaged with an open top cap and a tan/white PTFE/silicone septa.

The 40 mL EPA vials are supplied with a Certificate of Analysis and a package of labels to use to identify the contents of your sample. The package of vials is shrink wrapped after cleaning to make sure that the vials arrive to you as clean as possible.

PTFE/silicone septa (Thickness: 0.125")

white polypropylene cap

closure type Hole cap



Precleaned Vials, 40 mL

Description	Cat. No.	Qty
40 mL, clear glass	23188	72 ea
40 mL, amber glass	23189	72 ea

Vials

Pre-cleaned Sampling Containers

Vials, black polypropylene screw top with hole cap, pre-cleaned and assembled

The 2-22 mL vials are supplied with a Certificate of Conformity and a package of 100 labels.

Description	Cat. No.	Qty
2 mL, clear glass, precleaned	27339	100 ea
4 mL, clear glass, precleaned	27340	100 ea
7 mL, clear glass, precleaned	27341	100 ea
15 mL, clear glass, precleaned	27342	100 ea
22 mL, clear glass, precleaned	27343	100 ea
2 mL, amber glass, precleaned	27344	100 ea
4 mL, amber glass, precleaned	27345	100 ea
7 mL, amber glass, precleaned	27346	100 ea
15 mL, amber glass, precleaned	27347	100 ea
22 mL, amber glass, precleaned	27348	100 ea

Containers, precleaned

The following containers are cleaned according to US EPA protocol B. Black polypropylene cap with 0.030" PTFE liner.

Description	Cat. No.	Qty
4 oz, clear glass vial, tall, wide mouth, cap: 48-400	24551-U	24 ea
4 oz, amber glass vial, short, wide mouth, cap: 38-400	24555	12 ea
8 oz, clear glass vial, tall, wide mouth, cap: 58-400	24552	24 ea
8 oz, amber glass vial, short, wide mouth, cap: 45-400	24556	12 ea

Wheaton Shorty vials

Shorty Vials®

Vial only. Autoclavable borosilicate USP Type 1 glass. Select caps and septa according to application.



Description	Cat. No.	Qty
capacity 2 mL, neck thread: 13-425, diam. 15 mm x H 28 mm	Z106372-200EA	200 ea
capacity 4 mL, neck thread: 15-425, diam. 17 mm x H 38 mm	Z106380-200EA	200 ea
capacity 6 mL, neck thread: 15-425, diam. 19 mm x H 40 mm	Z106399-200EA	200 ea

Scintillation vials

Liquid scintillation vials (with screw cap attached)

Reliable Wheaton "180" brand low-potassium glass. White 22 mm caps have tops suitable for writing. Vials with caps attached are packed in individual cells in trays of 100.

thread, 22-400

glass vial

size 28 mm x 61 mm
volume 20 mL



Description	Cat. No.	Qty
polypropylene cap, foamed PE liner	Z190527-1PAK	500 ea
polypropylene cap, metal foil liner	Z190535-1PAK	500 ea
urethane foam-filled high-density polyethylene cap, metal foil liner	Z190519-1PAK	500 ea
urethane foam-filled high-density polyethylene cap, liner (Poly-Seal cone)	Z190543-1PAK	500 ea

Liquid scintillation vials, glass

Wheaton 180 brand low-potassium glass yielding consistent low backgrounds and high UV transmission. White caps fit tightly and can be written on.

glass



Description	Cat. No.	Qty
volume 6 mL, Minivial, Cap: 13mm urea with metal foil liner.	M1152-1000EA	1000 ea
volume 6 mL, Minivial, Cap: 15mm urea with metal foil liner.	M1901-1000EA	1000 ea
volume 20 mL, Cap: 22mm urea with Poly-Seal cone liner. (caps packed separately)	V7005-500EA	500 ea
volume 20 mL, Cap: 22mm urea with metal foil liner. (caps packed separately)	V8255-500EA	500 ea
volume 20 mL, Cap: 22mm urea with Poly-Seal liner.	V7130-500EA	500 ea

Liquid scintillation vials

▶ 20 mL, clear glass, vials only, O.D. 28 mm x H 57.5 mm, thread, 22-400

Z253081-1PAK 500 ea

Vials

Scintillation vials

Liquid scintillation vials, plastic

Polyethylene with light-weight walls for increased counting efficiency.



Description	Cat. No.	Qty
volume 6 mL, Minivial, cap 18 mm, polyethylene without liner	M2026-1000EA	1000 ea
volume 20 mL, cap 22 mm, polypropylene with metal foil liner	V6880-500EA	500 ea
volume 20 mL, cap 24 mm, polyethylene without liner	V6755-1000EA	1000 ea

SPME Vials



The extraction of organic compounds from a sample matrix usually consists of purge-and-trap or headspace methods for concentrating volatiles; and liquid-liquid extraction, solid phase extraction, or supercritical fluid extraction for semivolatiles and nonvolatiles. These methods have various drawbacks, including high cost and excessive preparation time. A unique sample preparation technique, SPME¹, eliminates most drawbacks to extracting organics.

SPME requires no solvents or complicated apparatus. It can concentrate volatile and nonvolatile compounds, in both liquid and gaseous samples, for analysis by GC, GC-MS, or HPLC.

SPME offers some important advantages:

- Fast – reduces sample preparation time by 70%
- Solvent reduction – minimizes the use of solvents, and their disposal
- Economical and reusable – more than 50 extractions per fiber on average
- Versatile – adapts to any GC or HPLC system, can be automated

An SPME unit consists of a length of fused silica fiber coated with a polymer material, in some cases mixed with a solid adsorbent (e.g., a divinylbenzene polymer or porous carbon). The fiber is attached to a stainless steel plunger sheathed by a protective needle.

For more information on SPME, go to the Solid Phase Microextraction section in the catalog.

2 mL crimp top vials (12 x 32 mm, 6.0 mm opening) for SPME

Description	Cat. No.	Qty
2 mL, clear glass	27058	100 ea
	27059	1000 ea

Vial crimp seals for SPME, 11 mm

hardness (Durometer: shore A) 45

Description	Cat. No.	Qty
silver aluminum seal (with 5.6mm center hole), red PTFE/white silicone septum, septum diam. 11 mm x thickness 1.3 mm	SU860094 SU860016	100 ea 1000 ea
gold seal, magnetic (5mm center hole), red PTFE/silicone/red PTFE septa, diam. 11 mm x thickness 1.0 mm	SU860095	100 ea
gold seal, magnetic (with 5mm center hole), red PTFE/white silicone septum, septum diam. 11 mm x thickness 1.3 mm, for use with CTC PAL and TriPlus autosamplers	SU860096	100 ea

Headspace vials, screw top for SPME

Description	Cat. No.	Qty
round bottom		
10 mL, clear glass, thread: 18, O.D. 22.5 mm x H 46 mm	SU860099	100 ea
10 mL, amber glass, thread: 18, O.D. 22.5 mm x H 46 mm	SU860100	100 ea
20 mL, clear glass, thread: 18, O.D. 22.5 mm x H 75.5 mm	SU860097	100 ea
20 mL, amber glass, thread: 18, O.D. 22.5 mm x H 75.5 mm	SU860098	100 ea

Caps, septa, and vial rack for SPME screw cap vials

The magnetic screw cap has been developed for the CTC instrument. The vial has a precision thread with numerous threads to force the septa against the vial to seal it to be gas tight. The center hole is designed to be used for SPME as well as standard Headspace Analysis, but still offers enough surface for the magnet to transport a completely filled vial.



Magnetic Caps (stainless steel), 18 mm thread

Description	Cat. No.	Qty
stainless steel screw cap (magnetic, open-top (8 mm center hole)), thread, 18, PTFE/silicone septum (white PTFE/transparent blue silicone), septum thickness 1.3 mm	SU860101	100 ea
stainless steel screw cap (magnetic, open-top (8 mm center hole)), thread, 18, PTFE/silicone septum (white PTFE/blue silicone), septum thickness 1.5 mm	SU860103	100 ea
stainless steel screw cap (magnetic, open-top (8 mm center hole)), thread, 18, PTFE-faced butyl septum (grey PTFE/red Butyl), septum thickness 1.6 mm	SU860102	100 ea
Acrylic Vial Rack for SPME Vial, L 160 mm x W 160 mm x H 30 mm, 25 cavities, cavity diam. 24 mm	SU860107	1 ea

Vials

SPME Vials

Vials, caps, and septa for Varian® 8200 autosampler



Description	Cat. No.	Qty
Screw thread - 2 mL		
2 mL, clear glass, red PTFE/silicone, black polypropylene cap, thread: 10-425	27531	100 ea
2 mL, amber glass, red PTFE/silicone, black polypropylene cap, thread: 10-425	27532	100 ea
Screw thread - 10 mL		
10 mL, clear glass, pre-assembled, PTFE/silicone septum, O.D. 24.5 mm x H 52 mm, closure type hole cap, phenolic, thread 22-400	27529	100 ea
10 mL, amber glass, pre-assembled, PTFE/silicone septum, O.D. 24.5 mm x H 52 mm, closure type hole cap, phenolic, thread 22-400	27530	100 ea
10 mL, clear glass, O.D. 24.5 mm x H 52 mm, thread, 22-400	27388	144 ea
Screw caps		
black phenolic cap, configured for 10 mL SPME vial with 22-400 thread	23236	144 ea
black phenolic solid cap (with polyseal liner), thread, 22-400	23240-U	144 ea
PTFE/silicone		
tan PTFE/silicone septa, diam. 20 mm x total thickness 0.125 in. x PTFE thickness 2 mil	27236	100 ea
blue PTFE/white silicone, O.D. 20 mm x thickness 0.75 mm	27539	100 ea
Crimp top - 10 mL		
volume 10 mL, clear glass (Thin seal vial for thin septa), O.D. 24.5 mm x H 50 mm x I.D. 12.7 mm, crimp top (0.125 in. thick) for thin septa	27385 27386	36 ea 144 ea
Aluminum crimp seal		
silver aluminum seal, open center (8 mm center hole), diam. 20 mm x thickness 0.76 mm, black Viton® septum, septum thickness 0.75 mm	33146-U 27245 28298-U 27246	36 ea 100 ea 288 ea 1000 ea

Vials, crimp top, for Thin Seal

Thin Seal vials are specialty vials made with a thicker lip. The lip of the vial is larger to accommodate thinner septa required in SPME applications. This vial allows you to use 20 mm thin septa (<0.030 in.) and still make a good seal. For our selection of closures, see the SPME vial section: *Closures for Thin Seal Crimp Top Vials*.



Thin Seal vials

Description	Cat. No.	Qty
20 mL, clear glass (flat top), crimp top (0.125 in. thick) for thin septa, O.D. 22.5 mm x H 75.5 mm	SU860104	100 ea

Seals and septa for Thin Seal vials

Description	Cat. No.	Qty
silver aluminum seal, open center (8 mm center hole), diam. 20 mm x thickness 0.76 mm, black Viton® septum, septum thickness 0.75 mm	33146-U 27245 28298-U 27246	36 ea 100 ea 288 ea 1000 ea
gold seal (magnetic with 8 mm center hole), black Viton® septum, diam. 20 mm x thickness 1.0 mm	SU860106	100 ea
gold seal (magnetic, with 8 mm center hole), PTFE/silicone (blue PTFE/white silicone), diam. 20 mm x thickness 1.5 mm, open center	SU860053	100 ea
blue PTFE/white silicone, O.D. 20 mm x thickness 0.75 mm	27539	100 ea

Vials, screw top with phenolic open-top cap, pre-assembled

black phenolic cap (open-top)



Description	Cat. No.	Qty
4 mL, clear glass, O.D. 15 mm x H 45 mm, tan PTFE/silicone septum	27136	100 ea
15 mL, clear glass, O.D. 21 mm x H 70 mm, tan PTFE/silicone septum	27159	100 ea
40 mL, clear glass, O.D. 29 mm x H 82 mm, tan PTFE/silicone septum	27180	100 ea
4 mL, amber glass, O.D. 15 mm x H 45 mm, tan PTFE/silicone septum	27006	100 ea
15 mL, amber glass, O.D. 21 mm x H 70 mm, tan PTFE/silicone septum	27008	100 ea
40 mL, amber glass, O.D. 29 mm x H 82 mm, tan PTFE/silicone septum	27010-U	100 ea

Vials

SPME Accessories

SPME Accessories



Hand crimper, adjustable

The adjustable hand crimper is ideal if you use varying thickness of septa in your analysis. This product has the ability to be adjusted for changes in septa thickness.

This product is very useful in SPME applications recommending the use of a thinner septa (1.0-1.5mm thickness).

Description	Cat. No.	Qty
Hand crimper, adjustable, for use with 20 mm crimp seals	22316-U	1 ea

Crimp seals (magnetic) with PTFE/silicone septa



Magnetic Crimp Seal, 20 mm

Description	Cat. No.	Qty
gold seal (magnetic with 8 mm center hole), (Silicone blue transparent/PTFE transparent), diam. 20 mm x thickness 3.0 mm, open center	SU860105	100 ea
gold seal (magnetic, with 5 mm center hole), (silicone blue transparent/PTFE transparent), diam. 20 mm x thickness 3.0 mm, open center	854179-U	100 ea

Crimp seal with PTFE/butyl septum (Pharma-Fix)

for 20 mm crimp seal
hardness (Durometer: shore A) 50

Description	Cat. No.	Qty
aluminum seal (with 10 mm center hole), PTFE-faced butyl septum, diam. 20 mm x thickness 3.0 mm	SU860011	100 ea
gold seal (magnetic with 5 mm center hole), PTFE-faced butyl septum, diam. 20 mm x thickness 3.0 mm	854178-U	100 ea

Heater block for 28 mm diameter vials

Heater block
L x W x H 3.75 in. x 2.9 in. x 2.0 in.

Description	Cat. No.	Qty
for use with 28 mm diameter vials	33313-U	1 ea

Headspace Vials

Headspace vial, screw top, rounded bottom (vial only)

Headspace vial, screw top, rounded bottom (vial only)

These vials require a special cap with an 18 mm thread. The standard 18-400 threaded caps will not fit this vial. The part numbers for caps that are available for these vials are SU860101 (with PTFE/silicone, 1.3 mm thick), SU860102 (with PTFE/butyl, 1.6 mm thick), and SU860103 (with PTFE/silicone, 1.5 mm thick). These caps are made from stainless steel and are magnetic.

round bottom 18 mm x 11 mm



Description	Cat. No.	Qty
10 mL, clear glass, thread: 18, O.D. 22.5 mm x H 46 mm	SU860099	100 ea
10 mL, amber glass, thread: 18, O.D. 22.5 mm x H 46 mm	SU860100	100 ea
20 mL, clear glass, thread: 18, O.D. 22.5 mm x H 75.5 mm	SU860097	100 ea
20 mL, amber glass, thread: 18, O.D. 22.5 mm x H 75.5 mm	SU860098	100 ea

Magnetic Screw Cap for Headspace Vials

This magnetic screw cap has been developed for the CTC instrument. The vial has a precision thread with numerous threads to force the septa against the vial to seal it to be gas tight. The center hole is designed to be used for SPME as well as standard Headspace analysis, but still offers enough surface for the magnet to transport a completely filled vial.

O.D. x H 18 mm x 11 mm



Magnetic Caps (stainless steel), 18 mm thread

Description	Cat. No.	Qty
stainless steel screw cap (magnetic, open-top (8 mm center hole)), thread, 18, PTFE/silicone septum (white PTFE/transparent blue silicone), septum thickness 1.3 mm	SU860101	100 ea
stainless steel screw cap (magnetic, open-top (8 mm center hole)), thread, 18, PTFE-faced butyl septum (grey PTFE/red Butyl), septum thickness 1.6 mm	SU860102	100 ea
stainless steel screw cap (magnetic, open-top (8 mm center hole)), thread, 18, PTFE/silicone septum (white PTFE/blue silicone), septum thickness 1.5 mm	SU860103	100 ea

Vials

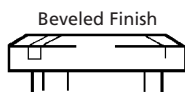
Headspace Vials: *Headspace vial, screw top, rounded bottom (vial only)*



Headspace vial, beveled top, flat bottom

Description	Cat. No.	Qty
6 mL, O.D. 22 mm × H 38 mm	27292	100 ea
	27293	1000 ea
6 mL, clear glass beveled finish, flat bottom, O.D. 23 mm × H 38 mm	27197	100 ea
10 mL, clear glass beveled finish, flat bottom, O.D. 23 mm × H 46 mm × I.D. 12.5 mm	27198	100 ea
20 mL, clear glass beveled finish, flat bottom, O.D. 23 mm × H 75 mm × I.D. 12.5 mm	27199	100 ea
27 mL, clear glass beveled finish, flat bottom, O.D. 30 mm × H 60 mm	27298	100 ea
	27299	1000 ea
20 mL, clear glass beveled finish, flat bottom, O.D. 23 mm × H 75 mm × I.D. 12.5 mm	854977	100 ea
6 mL, O.D. 22 mm × L 38 mm, for use with PerkinElmer®	Z292001-1PAK	100 ea
20 mL, O.D. 23 mm × L 75 mm × I.D. 12.5 mm, for use with A.I., Dani Headspace, Dani Purge and Trap, Hewlett-Packard™, PerkinElmer®, Tekmar®, Varian® Genesis	Z292036-1PAK	100 ea

Headspace vial, beveled top, rounded bottom (requires 20 mm crimp seal)



Description	Cat. No.	Qty
10 mL, clear glass beveled finish, round bottom, O.D. 22.6 mm × H 46 mm	27294	100 ea
	27295	1000 ea
10 mL, clear glass, O.D. 22 mm × H 45 mm × I.D. 12.5 mm	508438	100 ea
12 mL, clear glass, O.D. 18 mm × H 65 mm	508446	100 ea
20 mL, clear glass beveled finish, round bottom, O.D. 22.6 mm × H 75 mm	27296	100 ea
	27297	1000 ea
20 mL, clear glass, O.D. 23 mm × H 75.5 mm × I.D. 12.5 mm, for use with PerkinElmer	SU860049	100 ea
20 mL, clear glass beveled finish, round bottom, O.D. 22.6 mm × H 75 mm × I.D. 12.5 mm	854978	100 ea
20 mL, clear glass, round bottom, O.D. 22.7 mm × H 75 mm × I.D. 12.5 mm	508454	100 ea

Headspace Vials Convenience Kit, bevel top, round bottom, pressure release aluminum seals

Description	Cat. No.	Qty
10 mL, clear glass, PTFE/silicone, vial O.D. 23 mm × H 46 mm × I.D. 12.5 mm	27303-U	100 ea
10 mL, clear glass, PTFE/butyl rubber septum, vial O.D. 23 mm × H 46 mm × I.D. 12.5 mm	27304-U	100 ea
20 mL, septum (PTFE/grey butyl molded rubber), clear glass, vial O.D. 23 mm × H 75 mm	27305-U	100 ea
20 mL, clear glass, PTFE/silicone septum, vial O.D. 23 mm × H 75 mm	27306	100 ea
20 mL, clear glass, PTFE/butyl rubber septum, silver aluminum seal (pressure release), O.D. 23 mm × H 75 mm	27307	100 ea

Headspace Vials, flat top, rounded bottom

Description	Cat. No.	Qty
10 mL, clear glass, O.D. 22.5 mm × H 46 mm	854180-U	100 ea
20 mL, clear glass, O.D. 22.5 mm × H 75.5 mm, long neck	854181-U	100 ea

Headspace Vial, flat top, flat bottom

Description	Cat. No.	Qty
10 mL, clear glass (flat top), flat bottom, O.D. 22.5 mm × H 46 mm × I.D. 12.5 mm, long neck	SU860029	100 ea
10 mL, clear glass (flat top), flat bottom, O.D. 20 mm × H 54.5 mm × I.D. 12.5 mm, for Varian	854151	100 ea
20 mL, clear glass, O.D. 22.5 mm × H 75.5 mm × I.D. 12.5 mm, long neck	SU860030	100 ea

Vials, crimp top, for Thin Seal

Thin Seal vials are speciality vials made with a thicker lip. The lip of the vial is larger to accommodate thinner septa required in SPME applications. This vial allows you to use 20 mm thin septa (<0.030 in.) and still make a good seal. For our selection of closures, see the SPME vial section: *Closures for Thin Seal Crimp Top Vials*.



Thin Seal vials

Description	Cat. No.	Qty
20 mL, clear glass (flat top), crimp top (0.125 in. thick) for thin septa, O.D. 22.5 mm × H 75.5 mm	SU860104	100 ea

Vials

Headspace Vials: *Headspace Vial, flat top, flat bottom*

Seals and septa for Thin Seal vials

Description	Cat. No.	Qty
silver aluminum seal, open center (8 mm center hole), diam. 20 mm x thickness 0.76 mm, black Viton® septum, septum thickness 0.75 mm	33146-U 27245 28298-U 27246	36 ea 100 ea 288 ea 1000 ea
gold seal (magnetic with 8 mm center hole), black Viton® septum, diam. 20 mm x thickness 1.0 mm	SU860106	100 ea
gold seal (magnetic, with 8 mm center hole), PTFE/silicone (blue PTFE/white silicone), diam. 20 mm x thickness 1.5 mm, open center	SU860053	100 ea
blue PTFE/white silicone, O.D. 20 mm x thickness 0.75 mm	27539	100 ea

Headspace vials for CTC autosampler (Combi PAL), clear glass, beveled top, flat bottom

for 20 mm crimp



Description	Cat. No.	Qty
10 mL, clear glass beveled finish, flat bottom, O.D. 23 mm x H 46 mm x I. D. 12.5 mm	27198	100 ea
20 mL, clear glass beveled finish, flat bottom, O.D. 23 mm x H 75 mm x I. D. 12.5 mm	27199	100 ea

Headspace vials, for CTC autosampler (Combi PAL), rounded bottom



Description	Cat. No.	Qty
Screw thread		
10 mL, clear glass, thread: 18, O.D. 22.5 mm x H 46 mm	SU860099	100 ea
10 mL, amber glass, thread: 18, O.D. 22.5 mm x H 46 mm	SU860100	100 ea
20 mL, clear glass, thread: 18, O.D. 22.5 mm x H 75.5 mm	SU860097	100 ea
20 mL, amber glass, thread: 18, O.D. 22.5 mm x H 75.5 mm	SU860098	100 ea

Description	Cat. No.	Qty
Crimp top		
10 mL, clear glass, O.D. 22.5 mm x H 46 mm	854180-U	100 ea
20 mL, clear glass, O.D. 22.5 mm x H 75.5 mm, long neck	854181-U	100 ea
10 mL, clear glass beveled finish, round bottom, O.D. 22.6 mm x H 46 mm	27294 27295	100 ea 1000 ea
20 mL, clear glass beveled finish, round bottom, O.D. 22.6 mm x H 75 mm	27296 27297	100 ea 1000 ea
20 mL, clear glass, O.D. 23 mm x H 75.5 mm x I.D. 12.5 mm, for use with PerkinElmer	SU860049	100 ea
20 mL, clear glass beveled finish, round bottom, O.D. 22.6 mm x H 75 mm x I.D. 12.5 mm	854978	100 ea

Headspace vials for PerkinElmer®

round bottom

Description	Cat. No.	Qty
20 mL, clear glass, O.D. 23 mm x H 75.5 mm x I.D. 12.5 mm, for use with PerkinElmer	SU860049	100 ea
20 mL, clear glass (flat top), crimp top (0.125 in. thick) for thin septa, O. D. 22.5 mm x H 75.5 mm	SU860104	100 ea

Serum Bottles

Supelco glass serum bottles, 5 - 100 mL

Vials, crimp top, serum bottle

These vials are constructed of clear, borosilicate glass; closure not included. autoclavable



Description	Cat. No.	Qty
5 mL, clear glass, O.D. 25 mm x H 40 mm	33102-U 33103	36 ea 288 ea
10 mL, clear glass, O.D. 25 mm x H 50 mm	33104 33105-U	36 ea 288 ea
10 mL, amber glass, O.D. 25 mm x H 50 mm	33143 33144	36 ea 288 ea
30 mL, clear glass, O.D. 36.6 mm x H 62.8 mm	33106 33107	36 ea 288 ea
50 mL, clear glass, O.D. 43 mm x H 73 mm	33108-U 33109-U	36 ea 272 ea
100 mL, clear glass, O.D. 51.7 mm x H 94.5 mm	33110-U 33111-U	36 ea 144 ea

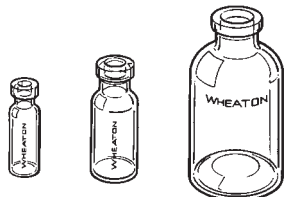
Vials

Serum Bottles: *Wheaton glass serum bottles*

Wheaton glass serum bottles

Wheaton glass serum bottle

USP Type I
borosilicate glass
autoclavable



Description	Cat. No.	Qty
Clear glass		
capacity 1.5 mL, clear, O.D. 11 mm, diam. 12 mm x H 32 mm	Z113948-100EA Z113948-1000EA	100 ea 1000 ea
capacity 5 mL, clear, O.D. 20 mm, diam. 23 mm x H 47 mm	Z113964-24EA Z113964-288EA	24 ea 288 ea
capacity 10 mL, clear, O.D. 20 mm, diam. 25 mm x H 54 mm	Z113972-24EA Z113972-288EA	24 ea 288 ea
capacity 30 mL, clear, O.D. 20 mm, diam. 37 mm x H 63 mm	Z113980-12EA Z113980-288EA	12 ea 288 ea
capacity 50 mL, clear, O.D. 20 mm, diam. 43 mm x H 73 mm	Z113999-12EA Z113999-288EA	12 ea 288 ea
capacity 100 mL, clear, O.D. 20 mm, diam. 52 mm x H 95 mm	Z114006-12EA Z114006-144EA	12 ea 144 ea
capacity 125 mL, clear, O.D. 20 mm, diam. 54 mm x H 107 mm	Z114014-12EA Z114014-144EA	12 ea 144 ea
Amber glass		
capacity 5 mL, amber, O.D. 20 mm, diam. 23 mm x H 47 mm	Z114022-288EA	288 ea
capacity 10 mL, amber, O.D. 20 mm, diam. 23 mm x H 47 mm	Z114030-12EA Z114030-288EA	12 ea 288 ea
capacity 30 mL, amber, O.D. 20 mm, diam. 37 mm x H 63 mm	Z114049-12EA Z114049-288EA	12 ea 288 ea
capacity 50 mL, amber, O.D. 20 mm, diam. 43 mm x H 73 mm	Z114057-12EA Z114057-288EA	12 ea 288 ea
capacity 100 mL, amber, O.D. 20 mm, diam. 52 mm x H 95 mm	Z114065-12EA Z114065-144EA	12 ea 144 ea

Closures, Septa, and Crimpers for 20 mm Crimp Top Vials



Removable Center



Open Center



Tear Away



Pressure Release - Open Center

20 mm crimp seals

Crimp seals, 20 mm, without septum

Description	Cat. No.	Qty
Open center		
open center 9.5 mm opening, silver aluminum seal, diam. 20 mm x	27230-U	100 ea
Removable center		
removable center, silver aluminum seal, diam. 20 mm	27227-U	100 ea
Tear-away		
tear-away, silver aluminum seal, diam. 20 mm	27016	100 ea
Open center		
open center, aluminum seal, product of Chromacol, 20-ACB	508500	100 ea
open center 9.5 mm opening, silver aluminum, For autosampler headspace analysis	Z292044-1PAK	1000 ea
Tear-off		
Tear-off seals only, diam. 20 mm, (no septa)	Z114146-100EA	100 ea
Pressure release		
pressure release 8 mm opening, silver aluminum seal, diam. 20 mm	27200	100 ea

Vials

Closures, Septa, and Crimpers for 20 mm Crimp Top Vials: *Crimp Seals with Septa**Crimp Seals with Septa*

Crimp Seal with PTFE/silicone septa, 20 mm

Crimp seals with PTFE/silicone septa

Description	Cat. No.	Qty
silver aluminum seal (10mm opening), diam. 20 mm × total thickness 3 mm × PTFE thickness 5 mil, open center, (silicone blue transparent/PTFE transparent)	SU860010	1000 ea
silver aluminum seal, open center (10 mm opening), diam. 20 mm × thickness 3.25 mm, tan PTFE/silicone	854996	100 ea
silver aluminum seal, open center, diam. 20 mm × total thickness 3.2 mm × PTFE thickness 5 mil, white PTFE/silicone	27362 27375	100 ea 1000 ea
silver aluminum seal, open center, diam. 20 mm × total thickness 3.2 mm × PTFE thickness 2 mil, white PTFE/silicone	27229	100 ea
silver aluminum seal, pressure release (open center), PTFE/silicone, diam. 20 mm × total thickness 2.5 mm × PTFE thickness 5 mil	27455-U	100 ea

Crimp seals and septa, PTFE/butyl (Pharma-Fix)

for 20 mm crimp seal
hardness (Durometer: shore A) 20



PTFE faced butyl

Description	Cat. No.	Qty
aluminum seal (with 10 mm center hole), PTFE-faced butyl septum, diam. 20 mm × thickness 3.0 mm	SU860011	100 ea
gold seal (magnetic with 5 mm center hole), PTFE-faced butyl septum, diam. 20 mm × thickness 3.0 mm	854178-U	100 ea

Crimp seals with PTFE/rubber septa

for use with 20mm crimp top vial
for use with 6mL, 10mL, 20mL headspace vials
silver aluminum seal

Description	Cat. No.	Qty
seal diam. 20 mm × thickness 3.0 mm, pressure release (open center), PTFE/rubber septum	27454-U	100 ea
seal diam. 20 mm × thickness 3.2 mm, removable center, PTFE/red rubber septum	27228	100 ea

Crimp seal with PTFE/butyl septa

Description	Cat. No.	Qty
aluminum seal, open center (10mm opening), gray PTFE/butyl rubber, diam. 20 mm × thickness 0.118 in.	854979	100 ea
silver steel seal (magnetic), open center (8mm opening), diam. 20 mm × thickness 3 mm, PTFE/butyl rubber septum	27301-U	100 ea

Crimp seals with Viton® septa

for 20 mm crimp seal



Description	Cat. No.	Qty
silver aluminum seal, open center (8 mm center hole), diam. 20 mm × thickness 0.76 mm, black Viton® septum, septum thickness 0.75 mm	33146-U 27245 28298-U 27246	36 ea 100 ea 288 ea 1000 ea
gold seal (magnetic with 8 mm center hole), black Viton® septum, diam. 20 mm × thickness 1.0 mm	SU860106	100 ea

Push-On Caps for 20 mm headspace vials

These caps can be used for washer bottles with a 20 mm crimp seal. They can also be used as an intermediate closure if a metallic crimp seal is not available.

Description	Cat. No.	Qty
Snap-cap, diam. 20 mm, polyethylene, product of Chromacol, 20-PEPC5	508624	100 ea

*Magnetic crimp seals***Vial crimp seals, BiMetal (magnetic), 20 mm, with PTFE/silicone septa**

The BiMetal caps are made of both tin and aluminum and are easier to crimp than tin 20mm seals. The sealing surface is aluminum and the inner diameter is made of tin to add the magnetic surface. These caps are available in a variety of colors.

for use with 20mm crimp seal vial

We recommend using the plier-type decapper (part number 33283) to remove the bi-metal crimp seal. Due to the mechanics of the decapper, the plier-type decapper is less expensive and works better than the Hand Decapper (p/n 33183) for this application.



BiMetal crimp seals

Vials

Closures, Septa, and Crimpers for 20 mm Crimp Top Vials: *Magnetic crimp seals*

Vial crimp seals, BiMetal (magnetic), 20 mm, with PTFE/silicone septa (continued)

Description	Cat. No.	Qty
red seal, PTFE/silicone septa, diam. 20 mm × thickness 3 mm	29169-U	100 ea
red seal, septa (blue PTFE/white silicone), diam. 20 mm × thickness 3 mm	29171-U	100 ea
gold seal, PTFE/silicone septa, diam. 20 mm × thickness 3 mm	29175-U	100 ea
blue seal, PTFE/silicone septa, diam. 20 mm × thickness 3 mm	29176-U	100 ea
green seal, PTFE/silicone septa, diam. 20 mm × thickness 3 mm	29178-U	100 ea

Crimp seals (magnetic) with PTFE/silicone septa



Magnetic Crimp Seal, 20 mm

Description	Cat. No.	Qty
For use with CTC CombiPAL		
gold seal (magnetic, with 8 mm center hole), PTFE/silicone (blue PTFE/white silicone), diam. 20 mm × thickness 1.5 mm, open center	SU860053	100 ea
gold seal (magnetic, with 8 mm center hole), (silicone blue transparent/PTFE transparent), open center (8 mm opening), diam. 20 mm × thickness 3.0 mm	SU860015	100 ea
gold seal (magnetic with 8 mm center hole), (Silicone blue transparent/PTFE transparent), diam. 20 mm × thickness 3.0 mm, open center	SU860105	100 ea
For use with CE HS500, HS800		
silver steel (magnetic), open center (5 mm opening), PTFE/silicone, seal diam. 20 mm × total thickness 3 mm	27300	100 ea
gold seal (magnetic, with 5 mm center hole), (silicone blue transparent/PTFE transparent), diam. 20 mm × thickness 3.0 mm, open center	854179-U	100 ea

Stoppers

Stoppers



Description	Cat. No.	Qty
gray butyl rubber, diam. 20 mm	27232	100 ea
red rubber (Isoprene rubber), diam. 20 mm	27234	100 ea
silicone, diam. 20 mm	27235-U	100 ea

Rubber stoppers



Description	Cat. No.	Qty
gray butyl rubber, 20 mm	Z166065-100EA	100 ea
clear silicone, 20 mm	Z166081-100EA	100 ea

Septa for 20 mm crimp seals

Septa, 20 mm



PTFE faced butyl

Description	Cat. No.	Qty
PTFE/silicone		
blue PTFE/silicone, diam. 20 mm × thickness 0.045 in., hardness (Durometer: shore A) 30	508616	100 ea
blue PTFE/white silicone, O.D. 20 mm × thickness 0.75 mm	27539	100 ea
blue PTFE/silicone, diam. 20 mm × thickness 0.105 in., hardness (Durometer: shore A) 45	508608	100 ea
gray PTFE/silicone, diam. 20 mm × total thickness 0.060 in. × PTFE thickness 0.010 in.	27541	100 ea
transparent PTFE/silicone, diam. 20 mm × total thickness 0.100 in. × PTFE thickness 10 mil	27237-U	100 ea
tan PTFE/silicone septa, diam. 20 mm × total thickness 0.125 in. × PTFE thickness 2 mil	27236	100 ea
white PTFE/silicone, diam. 20 mm × thickness 0.125 in. × PTFE thickness 0.005 in.	27361 27374	100 ea 1000 ea
High temperature PTFE/silicone, diam. 20 mm × thickness 0.060 in.	27540-U	100 ea
tan PTFE/silicone septa, size 20 mm × total thickness 0.130 in. × PTFE thickness 0.005 in., for use with tear-off seals	Z114111-10EA Z114111-100EA	10 ea 100 ea
Silicone		
silicone, diam. 20 mm	Z184942-1PAK	100 ea
Aluminum/silicone		
barrier (aluminum faced silicone), diam. 20 mm × thickness 0.100 in.	27189	100 ea
PTFE/rubber		
PTFE/red rubber, diam. 20 mm × thickness 0.125 in., for use with 20 mm crimp seal, 22 mm screw cap	27233	100 ea
PTFE/butyl		
PTFE/rubber (butyl (Pharma-Fix)), diam. 20 mm × thickness 0.135 in.	27201	100 ea
PTFE/butyl rubber septa	Z292052-1PAK	100 ea

Vials

Closures, Septa, and Crimpers for 20 mm Crimp Top Vials: *Septa for 20 mm crimp seals*

Description	Cat. No.	Qty
PTFE/chlorobutyl		
PTFE/rubber (chlorobutyl), diam. 20 mm x thickness 0.150 in., hardness (Durometer: shore A) 52	508578	100 ea
Viton		
black Viton®, diam. 20 mm x thickness 0.030 in.	27247	100 ea

Mininert® Valves

These valves are very easy to use.

1. Push the green button to open the valve
2. Insert the needle through the septum and take sample
3. Remove the needle and push to close

Benefits include:

- PTFE construction for inertness. PTFE is useful when working with acids and organic solvents.
- Good sealing ability for containing most volatile liquids and gases at low pressures
- Mininert valves can be used at temperatures up to 105 °F.
- 0.036 in. (0.9 mm) opening accepts up to 20-gauge needle



Description	Cat. No.	Qty
for use with 13/425 mm thread	33300	12 ea
for use with 15/425 mm thread	33301	12 ea
for use with 18/400 mm thread	33302	12 ea
for use with 20/400 mm thread	33303	12 ea
for use with 24/400 mm thread	33304	12 ea
for use with 20 mm crimp seal	33305	12 ea
Replacement Mininert Septa, L 0.308 in. x O.D. 0.125 in.	33310-U	50 ea
Tool for inserting septa	33311	1 ea

Center Drain (CD) Vials, 3.8 to 60 mL

Center Drain (CD) screw thread vials with hole caps and PTFE/silicone septa

- Library sample storage
- Lyophilize
- Centrifugation
- Micro mixing
- Extraction
- Concentrations
- Derivatization
- Small scale reactions

The CD™ Vial (Center Draining) has a unique conical interior bottom that promotes draining of the contents into the center bottom of the vial, where virtually all of it can be extracted. Maximum extraction of the contents can be done utilizing either a micropipette or syringe.

The sturdy CD Vial with the patented design is ideal for many micro applications. The conical well, located in the exact center of the vial bottom, features a smooth transition from sidewall into the well, and the bottom thickness dimension is the same in each vial.

The vials are manufactured from Borosilicate Type 1 glass to safeguard against a change in the pH of the contents.

Description	Cat. No.	Qty
3.8 mL, clear glass, O.D. 14.75 mm x H 45 mm, PTFE/silicone septa (bonded)	29327-U	100 ea
3.8 mL, clear glass, O.D. 14.75 mm x H 45 mm, PTFE/silicone (with slit (bonded))	29328-U	100 ea
3.8 mL, amber glass, O.D. 14.75 mm x H 45 mm, PTFE/silicone (bonded)	29330-U	100 ea
3.8 mL, amber glass, O.D. 14.75 mm x H 45 mm, PTFE/silicone (with slit (bonded))	29331-U	100 ea
4 mL, clear glass, O.D. 15 mm x H 51 mm, PTFE/silicone	29332-U	100 ea
5 mL, clear glass, O.D. 15 mm x H 51 mm, PTFE/silicone	29335-U	100 ea
10 mL, clear glass, O.D. 20.75 mm x H 61 mm, PTFE/silicone	29339-U	100 ea
20 mL, clear glass, O.D. 27.75 mm x H 67 mm, PTFE/silicone	29341-U	50 ea
40 mL, clear glass, O.D. 27.75 mm x H 103 mm, PTFE/silicone	29343-U	50 ea
60 mL, clear glass, O.D. 27.75 mm x H 143 mm, PTFE/silicone	29354-U	50 ea

Center Drain (CD) screw thread vials, vial only

The larger volume CD vials (3.8 to 60 mL) have a conical bottom finish. We recommend that a storage rack be used to support the vials. Three different size racks are available.

Description	Cat. No.	Qty
3.8 mL, clear glass, O.D. 14.75 mm x H 45 mm, 13-425	29326-U	100 ea
3.8 mL, amber glass, O.D. 14.75 mm x H 45 mm, 13-425	29329-U	100 ea
4 mL, clear glass, O.D. 15 mm x H 51 mm, 13-425	29334-U	100 ea
5 mL, clear glass, O.D. 15 mm x H 51 mm, 15-425	29336-U	100 ea
10 mL, clear glass, O.D. 20.75 mm x H 61 mm, 18-400	29340-U	100 ea
20 mL, clear glass, O.D. 27.75 mm x H 67 mm, 24-414	29342-U	50 ea
40 mL, clear glass, O.D. 27.75 mm x H 103 mm, 24-414	29344-U	50 ea
60 mL, clear glass, O.D. 27.75 mm x H 143 mm, 24-414	29355-U	50 ea

Vials

Center Drain (CD) Vials, 3.8 to 60 mL

Space Saver storage racks

Economical and convenient storage for samples in your screw cap and crimp seal vials. Can be stacked when empty or full. Autoclavable, 120°C. Each case contains 5 racks.



Description	Cat. No.	Qty
for use with 15-16 mm diameter vial (48 vials per rack), well opening 15.5 mm	23205-U	5 ea
for use with 21-23 mm diameter vial (36 vials per rack), well opening 23.1 mm	23201	5 ea
for use with 29 mm diameter vial (50 vials per rack), well opening 30.0 mm	23206	5 ea

Clear Heavy Wall CD Vials

NEW PRODUCTS

The heavy wall CD vials are supplied with a black cap and PTFE/silicone septa. The cap and septa is assembled unto the vial. The amount of sample that is not removable is less than 4 µL.

Clear Heavy Wall CD vials with graduations

Center Drain (CD) screw thread vials, heavy wall, with caps and PTFE/silicone septa

- Library sample storage
- Lyophilize
- Centrifugation
- Micro mixing
- Extraction
- Concentrations
- Derivatization
- Small scale reactions

The CD™ Vial (Center Draining) has a unique conical interior bottom that allows the contents to completely drain to the center bottom of the vial. Maximum extraction of the contents can be done utilizing either a micropipette or syringe. The heavy wall Center Drain vials are an excellent choice of vials for analysts seeking to increase sample recovery. These vials are manufactured from 2.5 mm wall borosilicate glass tubing that provides a more durable vessel than standard wall vials for lyophilization, derivatization and other small-scale reactions. The sturdy CD Vial with the patented unique conical interior bottom is ideal for many micro applications.

Benefits:

- Greater sample recovery
- Economically priced
- Autoclaveable
- Temperature range of -70° C to 160° C
- Vial, cap and septa are pre-assembled

Note: The vials are manufactured from Borosilicate Type 1 glass to safeguard against a change in the pH of the contents.

with graduations

PTFE/silicone septum

black polypropylene hole cap

wall thickness 2.5 mm



Heavy Wall CD Vials

Description	Cat. No.	Qty
1 mL, clear glass, O.D. 13 mm × H 41 mm	29362-U	12 ea
2 mL, clear glass, O.D. 16 mm × H 58 mm	29363-U	12 ea
2 mL, clear glass, O.D. 20 mm × H 40 mm	29364-U	12 ea
3 mL, clear glass, O.D. 20 mm × H 46 mm	29365-U	12 ea
5 mL, clear glass, O.D. 20 mm × H 61 mm	29366-U	12 ea

Heavy Wall CD vials without graduations

Description	Cat. No.	Qty
1 mL, clear glass, without graduations, O.D. 13 mm × H 41 mm	29356-U	12 ea
2 mL, clear glass, without graduations, O.D. 16 mm × H 58 mm	29357-U	12 ea
2 mL, clear glass, without graduations, O.D. 20 mm × H 40 mm	29358-U	12 ea
3 mL, clear glass, without graduations, O.D. 20 mm × H 46 mm	29359-U	12 ea
5 mL, clear glass, without graduations, O.D. 20 mm × H 61 mm	29361-U	12 ea
1 mL, amber glass, O.D. 13 mm × H 41 mm	29367-U	12 ea
2 mL, amber glass, O.D. 20 mm × H 40 mm	29368-U	12 ea
3 mL, amber glass, O.D. 20 mm × H 46 mm	29369-U	12 ea
5 mL, amber glass, O.D. 20 mm × H 61 mm	29370-U	12 ea

Vials

Micro Reaction Vessels: *Supelco Micro Reaction Vessels*

Micro Reaction Vessels

*Supelco Micro Reaction Vessels***Micro Reaction vessel, clear glass, hole cap**

Micro Reaction Vessels are cone shaped inside for easy removal of small samples. They are made of heavy-wall borosilicate glass and are supplied with PTFE-faced red rubber septum and cap. This glassware can be autoclaved or centrifuged. The septa material can not be autoclaved. The maximum temperature of the septa is less than 121°C.

Clear Micro Reaction Vessels: Height with cap; depth from septum to bottom of cone.

Amber Micro Reaction Vessels: The height measurement is without the cap. The amber version is not graduated.

Depth from septum to bottom of cone:

Size	Depth
0.3 mL	29 mm
1.0 mL	37 mm
2.0 mL	53 mm
3.0 mL	43 mm
5.0 mL	58 mm

Replacement caps and septa for the Micro Reaction Vessel (clear glass):

- 0.3-2.0mL: Caps 27154, Septa 27156
- 3-5mL: Caps 27176, Septa 27178

Replacement caps and septa for the Micro Reaction Vessel (amber glass)

- 1mL: Caps 27120-U, Septa 27145
- 2-5mL: Caps 27176, Septa 27178



From left to right: 33297, 33295, 33291, 33289

Description	Cat. No.	Qty
0.3 mL, clear glass, closure type hole cap, PTFE/red rubber septum, O.D. 16 mm × H 32 mm, 15-425	33291	12 ea
1 mL, clear glass, closure type hole cap, PTFE/red rubber septum, O.D. 16 mm × H 40 mm, 15-425	33293	12 ea
2 mL, clear glass, closure type hole cap, PTFE/red rubber septa, O.D. 16 mm × H 56 mm, 15-425	33295	12 ea
3 mL, clear glass, closure type hole cap, PTFE/red rubber septum, O.D. 20 mm × H 47 mm, 20-400	33297	12 ea
5 mL, clear glass, closure type hole cap, PTFE/red rubber septum, O.D. 20 mm × H 62 mm, 20-400	33299	12 ea
10 mL, clear glass, O.D. 26 mm × H 72 mm, 24-400, graduations No	27479	12 ea

Micro Reaction vessel, clear glass, solid cap

Description	Cat. No.	Qty
0.3 mL, clear glass, closure type solid cap, styrene-butadiene septum, O.D. 16 mm × H 32 mm, 15-425	27035	12 ea

Description	Cat. No.	Qty
1 mL, clear glass, closure type solid top cap, styrene-butadiene septum, O.D. 16 mm × H 40 mm, 15-425	27036	12 ea
2 mL, clear glass, closure type solid top cap, styrene-butadiene septum, O.D. 16 mm × H 56 mm, 15-425	27037	12 ea
3 mL, clear glass, closure type solid top cap, styrene-butadiene septum, O.D. 20 mm × H 47 mm, 20-400	27038-U	12 ea
5 mL, clear glass, closure type solid top cap, styrene-butadiene septum, O.D. 20 mm × H 62 mm, 20-400	27039	12 ea

*Wheaton V-Vials®***Vials, screw top V-Vials® with open-top cap**

Graduated. Autoclavable borosilicate USP Type 1 glass. PTFE faced rubber septum.



Description	Cat. No.	Qty
capacity 0.3 mL, screw-cap size: 13-425, diam. 13 mm × H 35 mm	Z115126-12EA	12 ea
capacity 1.0 mL, screw-cap size: 13-425, diam. 13 mm × H 44 mm	Z115134-12EA	12 ea
capacity 3.0 mL, screw-cap size: 20-400, diam. 20 mm × H 50 mm	Z115142-12EA	12 ea
capacity 5.0 mL, screw-cap size: 20-400, diam. 20 mm × H 65 mm	Z115150-12EA	12 ea

Vials, screw-top V-Vials® with solid-top cap

Graduated. Autoclavable borosilicate USP Type 1 glass. Styrene-butadiene rubber liner. PTFE-coated



Description	Cat. No.	Qty
capacity 0.3 mL, screw-cap size: 13-425, diam. 13 mm × H 35 mm	Z115053-12EA	12 ea
capacity 1.0 mL, screw-cap size: 13-425, diam. 13 mm × H 44 mm	Z115061-12EA	12 ea
capacity 2.0 mL, screw-cap size: 15-415, diam. 17 mm × H 61 mm	Z115088-12EA	12 ea
capacity 3.0 mL, screw-cap size: 20-400, diam. 20 mm × H 50 mm	Z115096-12EA	12 ea
capacity 5.0 mL, screw-cap size: 20-400, diam. 20 mm × H 65 mm	Z115118-12EA	12 ea

Vials

Micro Reaction Vessels: *Wheaton V-Vials®*

Micro Reaction vessel, clear glass, crimp top

Description	Cat. No.	Qty
capacity 0.1 mL, mouth O.D. 11 mm, diam. 12 mm × H 32 mm	Z115029-12EA	12 ea
capacity 1.0 mL, mouth O.D. 13 mm, diam. 13 mm × H 41 mm	Z115045-12EA	12 ea
capacity 2.0 mL, mouth O.D. 20 mm, O.D. 20 mm × H 40 mm	Z7377	12 ea
capacity 3.0 mL, mouth O.D. 20 mm, diam. 20 mm × H 46 mm	Z183016-12EA	12 ea
capacity 5.0 mL, mouth O.D. 20 mm, O.D. 20 mm × H 61 mm	Z7378	12 ea

Micro Reaction vessel, amber glass, (vial only)

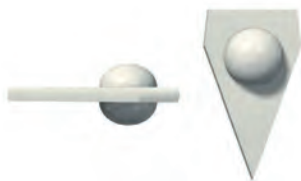
closure type screw cap



Micro Reaction Vessel, amber glass

Description	Cat. No.	Qty
1 mL, O.D. 13 mm × H 41 mm, 13-425	Z7475-U	12 ea
2 mL, O.D. 20 mm × H 41 mm, 20-400	Z7476	12 ea
3 mL, O.D. 20 mm × H 47 mm, 20-400	Z7477-U	12 ea
5 mL, O.D. 20 mm × H 62 mm, 20-400	Z7478-U	12 ea

Magnetic Stir Bar



Description	Cat. No.	Qty
Magnetic Stir Bar, for use with For 0.1-2.0mL vessels, PTFE	Z3226	6 ea
Magnetic Stir Bar, for use with For 3.0-5.0mL vessels, PTFE	Z3227	6 ea

Crimpers and Decappers

Crimpers

The Supelco hand held crimper provides a consistent and dependable seal that allows secure vial closure each and every time. The high quality construction is engineered for durability and long life to provide a smooth and simple operation.



Description	Cat. No.	Qty
Hand crimper, for use with 8mm seals	33272-U	1 ea
Hand crimper, for use with 11mm crimp seals	33195	1 ea
Hand crimper, for use with 13mm seals	33279-U	1 ea
Hand crimper, for use with 20mm seals	33280-U	1 ea

Hand crimper, adjustable

The adjustable hand crimper is ideal if you use varying thickness of septa in your analysis. This product has the ability to be adjusted for changes in septa thickness.

This product is very useful in SPME applications recommending the use of a thinner septa (1.0-1.5mm thickness).

Description	Cat. No.	Qty
Hand crimper, adjustable, for use with 11mm crimp top vials	22313-U	1 ea
Hand crimper, adjustable, for use with 20 mm crimp seals	22316-U	1 ea

Hand-operated aluminum cap crimper

Attaches aluminum seals to serum bottles and vials.

Description	Cat. No.	Qty
O.D. 8 mm	Z114219-1EA	1 ea
O.D. 11 mm	Z114227-1EA	1 ea
O.D. 13 mm	Z114235-1EA	1 ea
O.D. 20 mm	Z114243-1EA	1 ea

Hand Decapper

Description	Cat. No.	Qty
for use with 8mm crimp seals	33180-U	1 ea
for use with 11 mm crimp seals	33181-U	1 ea
for use with 13mm crimp seals	33182-U	1 ea
for use with 20mm crimp seals	33183	1 ea

Decapper

For aluminum seal vials



Vials

Crimpers and Decappers

Description	Cat. No.	Qty
O.D. 8 mm	Z292117-1EA	1 ea
O.D. 11 mm	Z292133-1EA	1 ea
O.D. 20 mm	Z292168-1EA	1 ea

Vial Decapper, pliers-type

Decapper, pliers style



Description	Cat. No.	Qty
for use with 8mm crimp seals	33284	1 ea
for use with 11 mm crimp seals	33281	1 ea
for use with 13mm crimp seals	33282	1 ea
for use with 20mm crimp seals	33283	1 ea

Plier-type decapper

Removes aluminum seals from serum bottles and vials.

Description	Cat. No.	Qty
O.D. 8 mm	Z225355-1EA	1 ea
O.D. 13 mm	Z114251-1EA	1 ea
O.D. 20 mm	Z114278-1EA	1 ea

Sampling and Storage Containers

Large amber screw top septum bottle, 30 mL

Large Amber Screw Top Septum Bottles
Protect your sample from sunlight. Only glass and PTFE contact

Description	Cat. No.	Qty
Assembled bottle kit		
30 mL, amber glass, PTFE/silicone septum, O.D. 32 mm x H 80 mm, thread: 20-400	23228	12 ea
Bottle only		
30 mL, amber glass, O.D. 32 mm x H 80 mm, thread, 20-400	23232	12 ea
Screw caps		
black phenolic (with polyseal liner), thread, 20-400	23238	144 ea
black phenolic hole cap, for use with 22 mL vial with 20-400 thread	27176	100 ea
Septa		
tan PTFE/silicone septum, septum diam. 18 mm x total thickness 0.060 in. x PTFE thickness 2 mil	23242-U	144 ea

Large amber screw top septum bottle, 60 mL

Description	Cat. No.	Qty
Assembled bottle kit		
60 mL, amber glass, PTFE/silicone septum, O.D. 38 mm x H 95 mm, thread: 20-400	23229	12 ea
Bottle only		
60 mL, amber glass, O.D. 38 mm x H 95 mm, thread, 20-400	23233	12 ea
Screw caps		
black phenolic (with polyseal liner), thread, 20-400	23238	144 ea
black phenolic hole cap, for use with 22 mL vial with 20-400 thread	27176	100 ea
Septa		
white tan PTFE/silicone, diam. 18 mm x total thickness 0.060 in. x PTFE thickness 5 mil, for use with 22 mL vial	27177	100 ea
tan PTFE/silicone septum, septum diam. 18 mm x total thickness 0.060 in. x PTFE thickness 2 mil	23242-U	144 ea

Large amber screw top septum bottle, 120 mL

Description	Cat. No.	Qty
Assembled bottle kit		
120 mL, amber glass, PTFE/silicone septum, O.D. 49 mm x H 114 mm, thread: 22-400	23230-U	12 ea
Bottle only		
120 mL, amber glass, O.D. 49 mm x H 114 mm, thread, 22-400	23234	12 ea
Screw caps		
black phenolic solid cap (with polyseal liner), thread, 22-400	23240-U	144 ea
black phenolic cap, configured for 10 mL SPME vial with 22-400 thread	23236	144 ea
PTFE/silicone		
tan PTFE/silicone septa, diam. 20 mm x total thickness 0.125 in. x PTFE thickness 2 mil	27236	100 ea
transparent PTFE/silicone, diam. 20 mm x total thickness 0.100 in. x PTFE thickness 10 mil	27237-U	100 ea

Large amber screw top septum bottle, 240 mL

Description	Cat. No.	Qty
Assembled bottle kit		
240 mL, amber glass, PTFE/silicone septum, O.D. 61 mm x H 143 mm, thread: 24-400	23231	12 ea
Bottle only		
240 mL, amber glass, O.D. 61 mm x H 143 mm, thread, 24-400	23235	12 ea
Screw cap		
black phenolic (no septum), thread: 24-400	23237	144 ea
Septa		
PTFE/silicone, septum diam. 22 mm x thickness 0.100 in.	23245-U	144 ea

Vials

Sampling and Storage Containers

Screw Top Mini Flask with Hole Cap and Septum

Features and Benefits

Heat resistant borosilicate glass flasks provide an inert seal when used with a hole cap and PTFE silicone septum (included) or a Mininert valve. Excellent for liquid-liquid extraction of trihalomethanes from drinking water. Also useful for sample collection, solution preparations, derivatization reactions, extractions, and many other applications.

Replacement cap for the Mini Flask is part number 27176, the replacement septa is part number 27177.



Left to right: 64715, 64716-U

Description	Cat. No.	Qty
10 mL	64715	12 ea
25 mL	64716-U	12 ea

Vial Accessories

Space Saver storage racks

Economical and convenient storage for samples in your screw cap and crimp seal vials. Can be stacked when empty or full. Autoclavable, 120°C. Each case contains 5 racks.



For Use With	Cat. No.	Qty
6-8 mm diameter vial (96 vials per rack)	23204-U	5 ea
11-12 mm diameter vial (50 vials per rack)	23207	5 ea
15-16 mm diameter vial (48 vials per rack)	23205-U	5 ea
17 mm diameter vial (90 vials per rack)	23202	5 ea
21-23 mm diameter vial (36 vials per rack)	23201	5 ea
29 mm diameter vial (50 vials per rack)	23206	5 ea

CERTAN® capillary bottle

Capillary bottle CERTAN®

HINT: To extract a solution from CERTAN® capillary vials use a syringe with a needle diameter of 0.8 mm or smaller and a minimum 70 mm length.

These vials provide the advantage of a sealed ampule with the flexibility of a screw cap bottle or a septum vial. These unique, screw-cap sample containers with a 1.2 × 28mm height capillary opening are designed for the storage of volatile samples and reference standards.

Advantages:

- No appreciable change in concentration -even when open
- Secure storage, minimal evaporation
- Minimizes contamination risk
- Sample filling and removal using a standard GC syringe
- Essentially spillproof
- PTFE-lined screw-cap

Applications:

- Storage of liquids removed from conventional glass ampules
- Storage of stock and standard solutions
- Storage of difficult samples such as volatile halogen compounds or BTEX aromatics
- Archiving of production or QC samples and extracts



Description	Cat. No.	Qty
1.5 mL bottle	44419-1EA 44419-10EA	1 ea 10 ea
4.5 mL bottle	44420-1EA 44420-5EA	1 ea 5 ea
10 mL bottle	44421-1EA 44421-5EA	1 ea 5 ea

Vials

Vial Accessories: Block Heater

Block Heater



Talboys block heater

- Each block has a thermometer well for measuring block temperature
- Heats from ambient to 150°C with two temperature adjustments, low range ambient to 100°C/high range 75°C to 150°C.
- Heating blocks are sold separately

Features and Benefits

- Compact design takes up little bench space
- Interchangeable heating blocks for maximum versatility

product of Troemner, 94951X

Description	Cat. No.	Qty
110 V, US 2-pin plug	Z673641-1EA	1 ea
230 V, UK plug	Z673404-1EA	1 ea
230 V, Schuko plug	Z673668-1EA	1 ea

Heater block for 28 mm diameter vials

Heater block
L x W x H 3.75 in. x 2.9 in. x 2.0 in.

Description	Cat. No.	Qty
for use with 28 mm diameter vials	33313-U	1 ea

Block #1

Heater block
L x W x H 3.75 in. x 2.9 in. x 2.0 in.

Description	Cat. No.	Qty
number of holes: 8, for use with Supelco 3 and 5 mL reaction vessels	33316	1 ea

Block #2

Heater block
L x W x H 3.75 in. x 2.9 in. x 2.0 in.

Description	Cat. No.	Qty
number of holes: 12, for use with 16 mm tubes and 0.1 to 2.0 mL reaction vessels	33317-U	1 ea

Glass Magnet™

Our Glass Magnet Sheet prevents your glass apparatus from being knocked over accidentally. This 2' x 2' sheet (61 cm x 61 cm), with its tacky surface, effectively secures the vessels in place. It can be cut with a razor blade or utility knife to fit strategically on counter tops or in drawers containing fragile glassware. Add it to carts when transporting glass to another lab or into the field. The Glass Magnet Vial Holder keeps individual vials, ampoules, and other vessels in place.



Mat (in.)	Cat. No.	Qty
W x L x thickness 24 x 24 x 3/16	57269	1 ea
diam. x thickness 4 x 3/16	57270	2 ea

Adjustable Single Port Mini-Vap Evaporator/Concentrator

- ▶ Mini-Vap 1mv ea
Mini-Vap 1½ in. x 8½ in., adjustable, single unit

The Mini-Vap includes a needle valve for fine metering of air or nitrogen drying gas. Ideal for a wide variety of needs in evaporation or concentration.

The adjustable Mini-Vap (22970) is a versatile concentrator/evaporator that can be used with a single container. The unique design allows for any size container, from the smallest vial to a 250 mL beaker.



22970

1 ea

Vials

Vial Accessories: *Block Heater*

Six Port Mini-Vap Evaporator/Concentrator

The Mini-Vap includes a needle valve for fine metering of air or nitrogen drying gas. Ideal for a wide variety of needs in evaporation or concentration.

The **6-Port Mini-Vap** (22971) concentrator/evaporator processes six miniature vials or containers at one time. Comes with six stainless steel needles, fine control needle valve, and three feet (0.9m) of plastic tubing.

The **adjustable Mini-Vap** (22970) is a versatile concentrator/evaporator that can be used with a single container. The unique design allows for any size container, from the smallest vial to a 250 mL beaker.

▶ **Mini Vap 6mv ea**
Mini-Vap L 7½ in. (19 cm) × W 1½ in. (4 cm), for use with 1-250mL containers

The Mini-Vap includes a needle valve for fine metering of air or nitrogen drying gas. Ideal for a wide variety of needs in evaporation or concentration.

The **6-Port Mini-Vap** (22971) concentrator/evaporator processes six miniature vials or containers at one time. Comes with six stainless steel needles, fine control needle valve, and three feet (0.9m) of plastic tubing.
 base H ¾ in. (2 cm)



22971

1 ea

Replacement needles for 6 port Mini-Vap

23029-U

6 ea

Syringes



From Left to Right. KH, TLL, N or LTN, LT, RN, WG, and CH.

Syringe Selection

If you want reproducible injections at an economical price: Choose a fixed needle syringe (N or LTN suffix). N denotes an epoxy cemented 304 stainless steel needle inserted in the syringe barrel to a depth corresponding exactly to the zero graduation. LTN denotes a cemented Luer tip needle. Fixed needle syringes should not be heated above 50 °C.

If you like the simplicity of a fixed-needle syringe, but want to replace damaged needles, or change gauges to suit your applications: Select a syringe with a removable needle (RN). RN syringes allow easy replacement of damaged needles in the field. The needle seats to the zero graduation mark, providing the same characteristics as cemented needles. RN syringes should not be heated above 115 °C.

If you need a knurled hub: A knurled hub (KH) syringe creates a leak-tight seal between barrel and needle and may be retightened to compensate for wear. The male Luer accommodates a spacer for defined depth insertions. Exclusive to Series 7000 syringes.

If you want an autoclavable syringe with easy, fast needle replacement: Choose a syringe with a Luer tip (LT). LT denotes a ground glass Luer tip suitable for mounting chromatographic needles. Order needles separately. Metal hubbed needles are not recommended. LT syringes can be autoclaved at 121 °C. Remove the plunger during sterilization.

If you like the Luer needle attachment, but need the security of a locked needle attachment: It is available with PTFE Luer lock syringes (TLL). PTFE Luer lock has a screwable PTFE center male Luer to hold your needle tightly in place. TLL used with 1000 Series provides an essentially inert syringe. Order needles separately. Metal or PCTFE hubbed needles can be used. Syringes with TLL connections should not be heated above 50°C.

If you have problems with bent plungers: Plunger guides (WG suffix) reduce the expense of replacing or repairing syringes with bent plungers. Especially useful on syringes with small diameter plungers.

If you require precise control of sample size: Chaney adapters (CH suffix) ensure consistent sample delivery. You will know the sample size is right every time.

Syringes

Syringe Selection

Note: Hamilton uses the most chemically resistant adhesive available to cement the needles into these syringes. Prolonged contact with some solvents, however, can cause the adhesive to deteriorate. After making your injections, thoroughly rinse the syringe with distilled water and allow it to air dry. Do not soak your syringe with any solvent for more than three minutes. In cases where prolonged use of strong solvents is necessary, you may wish to use an RN syringe.

Syringe Care

Proper Syringe Care Ensures Consistent Injections and Long Syringe Life

Syringes are precision instruments. The care you take in using, handling, and storing them is key to consistent injections, quality chromatograms, and long syringe life.

- Generally, for consistently accurate injections, the sample size should not be less than 10% or more than 80% of the syringe capacity.
- Temperatures above 50 °C can damage most fixed-needle syringes, due to expansion of the metallic needle.
- Routinely inspect your syringe for damage. Look for hairline cracks, and discard any syringe with a potentially unsafe barrel. The needle tip must be free of barbs. Barbs will tear the septum, creating particles that can clog the needle or deposit in your chromatographic system.
- Never store a syringe without cleaning it. Use caution when cleaning syringes containing epoxy glue or PTFE materials. Epoxy glue is not completely resistive to every solvent. A solvent such as methanol, methylene chloride, acetonitrile, acetone, or butyl amine (and others) can result in a contaminated plunger, adherence of the plunger into the barrel, a loose needle, or a clogged needle.
- If your syringe contains a PTFE tip, be sure to replace the plunger and tip assembly immediately if metal is exposed. The exposed metal plunger scrapes the glass of the syringe barrel, producing glass fragments that cut grooves in the PTFE tip. These grooves allow sample to leak past the tip. Caustic samples or cleaning solutions that seep under the PTFE tip destroy the sharp barb that holds the PTFE tip on the plunger. The tip, when loosened, could slip off during sample aspiration.

Guiding the selection of syringe parameters are three user-related areas:

Type of Sample

- Syringes suitable for both gas and liquid applications typically have a PTFE plunger tip that forms a gas tight fit with the syringe barrel. The PTFE tip scrapes sample from the barrel.
- Syringes for liquid samples only are manufactured using a hand-fitted plunger and a barrel with tight tolerances for inside diameter.
- For viscous or heterogenous samples, Hamilton GASTIGHT® and SGE Gas Tight syringes are recommended to avoid seizing a fitted plunger.

Sample Volume

- Although syringe designs differ, it is recommended that the smallest injectable volume from a syringe be no less than 20% of its total volume. The smallest dispensing volume should be no less than 10% of the total volume.
- Refer to the sections in this catalog that describe the analytical syringes carried by Hamilton, SGE, and Valco VICI. these sections list volume ranges for each syringe model.

Application: It is impossible to recommend syringes for all analytical applications. Some general guidelines follow:

- Headspace sampling for Environmental sample collection and storage. Use SampleLock or are ideal
- Extremely small samples (<1µL). Choose from Hamilton's Series 7000 or SGE Plunger-in-Needle syringes.
- Teaching laboratories or new users. Use economical syringes with ruggedness as a design feature. SGE design has a flexible plunger.
- Multiple, rapid manual injections. Select syringes with guides or reinforced plungers. SGE guided plunger or plunger protection syringes are recommended.

The termination is the interface, or connection, between the syringe barrel and the needle. The choice depends on the application.

Fixed (cemented needle). Economical, reproducible injections, for autosamplers, one syringe-one method. Do not heat above 50 °C.

Removable needle. One syringe-many methods, simplicity of fixed needle, but needle can be replaced if damaged or clogged. Do not heat about 115 °C.

Knurled hub. Creates a leak tight seal that can be retightened to compensate for wear.

Luer tip. Easy, fast needle replacement, syringe filter or pump priming. Luer tip is ground glass suitable for mounting chromatographic or PTFE needles. Syringes can be autoclaved (without plunger or needle).

Luer-Lok. Security of a locked needle, syringe filter or pump priming. PTFE/male Luer taper with nickel-plated brass locking hub for use with KEL-F or metal hub needles and universal connectors.

Syringe Valves. Syringe with on-off valves provide the ability to collect and store volatile samples for headspace applications. Examples are SampleLock (Hamilton) or Pressure-Lok (VICI).

Description of Gauge Sizes

Gauge	O.D. × I.D.	Length	Dead/Volume
26s	0.019 × 0.005 in.	2 in.	0.52 µL
26	0.018 × 0.010 in.	2 in.	2.5 µL
25s	0.020 × 0.006 in.	1.97 in.	1.26 µL
22s	0.028 × 0.006 in.	2 in.	0.9 µL
22	0.028 × 0.016 in.	2 in.	6.7 µL



Point Style #1: Cone Tip

Recommended for use with pre-drilled septa. The shape of this needle has been developed for multi-injections on the Agilent/HP 7673A autosampler.



Point Style #2: Bevel Tip

The bevel tip (22° on Hamilton syringes, 20° on SGE syringes) is designed for optimum septum penetration and to prevent septum coring.



Point Style #3: Blunt Tip

The 90° blunt tip has chamfered and polished edges that eliminate damage to the valve's rotor seal and stator face. This style also can be used for pipetting of liquids.



Point Style #5: Cone Tip, Side-port hole

Liquid samples can be filled and dispensed through the side hole, and septum damage is minimized by the solid domed tip.

Syringes

Sample Injectors: *eVol® Hand-Held Automated Analytical Syringe*

Sample Injectors

eVol® Hand-Held Automated Analytical Syringe

NEW PRODUCTS

The eVol® Analytical Syringe combines a digitally controlled electronic drive with precision analytical syringes using the patent pending XCHANGE® interface. The result is a positive-displacement dispensing system that is easily programmed to perform a variety of liquid handling procedures both accurately and reproducibly.

Key Benefits

- User-independent precision and accuracy
- Intuitive user interface
- Dedicated syringes prevent cross contamination
- Gravimetric calibration by user

The ease of use and programmability of the eVol Hand-held Automated Analytical Syringe makes anyone using it an expert in fluid handling. All aspects of volumetric fluid transfer, including aspiration rate, dispensing rate and sample volume are controlled by the digital drive. This decreases the possibility of variation from one user to another and eliminates concern over pipetting technique when making dilutions. Workflow scheduling issues related to operator expertise are eliminated. Additionally, fewer errors in sample processing reduce the number of samples that must be re-analyzed.

Compliance with laboratory standards such as GLP, GMP, and FDA requires regular calibration of liquid measuring devices. Calibration is typically done outside the laboratory, resulting in additional cost and a loss in productivity. The eVol Analytical Syringe can be calibrated using only a liquid of known density and an analytical balance. Microsoft® Excel worksheets provide a mechanism for calculating the required calibration factor and recording calibration records to document compliance. Calibration factors can be stored for up to 10 XCHANGE syringes and can be quickly loaded when the syringe is changed.



eVol Analytical Syringe Kit

eVol® Analytical Electronic Syringe

Description	Cat. No.	Qty
eVol Kit (includes digital drive, stand, charger with adapters, and three syringes (5, 50 and 500 µL).	29841-U	1 ea



eVol Analytical Syringe

eVol® Components

	Cat. No.	Qty
eVol Electronic syringe		
Electronic Syringe with programmable digital drive	29842-U	1 ea
eVol Charger with adapters		
Universal charger for worldwide use	29844-U	1 ea
eVol Stand		
Support stand	29843-U	1 ea
eVol Single Changing Stand with adapters		
Single charging stand with adapters	29845-U	1 ea
Battery for eVol		
Replacement battery for eVol electronic syringe	29846-U	1 ea

Syringes for eVol®



eVol Syringes

Description	Cat. No.	Qty
Syringe, 0.2-5 µL, Pk/1		
volume 0.2-5 µL, size 25 ga (bevel tip), needle L 50 mm × O.D. 0.5 mm × I.D. 0.2 mm, stainless steel bevel tip	29847-U	1 ea
Syringe, 0.2-5 µL, Pk/3		
volume 0.2-5.0 µL, size 25 ga (bevel tip), needle L 50 mm × O.D. 0.5 mm × I.D. 0.2 mm, stainless steel, pack of 3	29853-U	3 ea
Syringe, 2-50 µL, Pk/1		
volume 2-50 µL, size 25 ga (bevel tip), L 50 mm × O.D. 0.5 mm × I.D. 0.2 mm, stainless steel bevel tip	29849-U	1 ea
Syringe, 2-50 µL, Pk/3		
volume 2-50 µL, size 25 ga (bevel tip), L 50 mm × O.D. 0.5 mm × I.D. 0.2 mm, stainless steel, pack of 3	29854-U	3 ea
Syringe, 20-500 µL, Pk/1		
volume 20-500 µL, size 23 ga (bevel tip), L 50 mm × O.D. 0.63 mm × I.D. 0.32 mm, stainless steel bevel tip	29851-U	1 ea
Syringe, 20-500 µL, Pk/3		
volume 20-500 µL, size 23 ga (bevel tip), L 50 mm × O.D. 0.63 mm × I.D. 0.32 mm, stainless steel, pack of 3	29855-U	3 ea

Syringes

Sample Injectors: *Syringes for eVol®*

Description	Cat. No.	Qty
Syringe, without needle		
volume 0.2-5 µL, (syringe supplied without needle)	29848-U	1 ea
volume 2-50 µL, (syringe supplied without needle)	29850-U	1 ea
volume 20-500 µL, (syringe supplied without needle)	29852-U	1 ea

Needles for 5 µL eVol® Syringe

Description	Cat. No.	Qty
volume 5 µL, needle size 25 ga (bevel tip), needle L 50 mm × O.D. 0.5 mm × I.D. 0.2 mm	29859-U	5 ea
volume 5 µL, needle size 22 ga (blunt tip), needle L 51 mm × O.D. 0.71 mm × I.D. 0.17 mm	29860-U	5 ea
volume 5 µL, needle size 23 ga (cone tip), needle L 50 mm × O.D. 0.63 mm × I.D. 0.11 mm	29861-U	5 ea
volume 5 µL, needle size 25 ga (bevel tip), needle L 70 mm × O.D. 0.5 mm × I.D. 0.11 mm	29862-U	5 ea
volume 5 µL, needle size 26 ga (cone tip), needle L 70 mm × O.D. 0.47 mm × I.D. 0.11 mm	29863-U	5 ea

Needles for 50 µL eVol® Syringe

Description	Cat. No.	Qty
volume 25-500 µL, needle size 25 ga (bevel tip), needle L 50 mm × O.D. 0.50 mm	24447	5 ea

Needles for 500 µL eVol® Syringe

Description	Cat. No.	Qty
volume 500 µL, needle size 23 ga (bevel tip), needle L 50 mm × O.D. 0.63 mm × I.D. 0.32 mm	29864-U	5 ea

Plungers for eVol® Syringes

Description	Cat. No.	Qty
for use with SGE 5 µL eVol syringe	29856-U	1 ea
for use with SGE 50 µL eVol syringe	29857-U	1 ea
for use with SGE 500 µL eVol syringe	29858-U	1 ea

Merlin MicroShot™

NEW PRODUCTS

The Merlin MicroShot Injector delivers fast and reproducible manual syringe injections for gas chromatography. Using a ball-end gas chromatography autosampler syringe, the unique trigger mechanism of the Merlin MicroShot makes each injection automatic when the needle is inserted into the injection port. The plunger displacement is fixed for precise volume delivery, confirming reproducibility with each and every injection, and reducing dwell time in the injection port that will minimize sample discrimination. Each MicroShot Injector is calibrated to deliver a stroke of the plunger slide within +/- 0.0025 mm on nominal.

The syringe is not included with the Merlin MicroShot. Please order the syringe separately.

Benefits:

- Convenient to use.
- Plunger support eliminates bent plungers.
- Simple motion triggers injection.
- Improved injection reproducibility.
- Short needle residence time in injection port.

Merlin MicroShot™ Injector

Improve your manual syringe technique instantly. The Merlin MicroShot Injector makes manual syringe injections convenient and reproducible using readily available chromatography syringes. The unique trigger mechanism makes each injection automatic when the needle is inserted into the injection port. The plunger displacement is fixed for precise volume delivery confirming reproducibility.

Features and Benefits

- Fixed volume to eliminate sampling error
- Five injection volumes available from 0.1µL to 2.0µL
- Calibrated to NIST reference standards for traceable displacement accuracy
- Quick and easy syringe replacement
- One year warranty



Description	Cat. No.	Qty
volume 0.1 µL	29464-U	1 ea
volume 0.2 µL	29466-U	1 ea
volume 0.5 µL	29468-U	1 ea
volume 1.0 µL	29471-U	1 ea
volume 2.0 µL	29472-U	1 ea

Syringes

Autosampler Syringes

Autosampler Syringes



Autosampler Syringe for Agilent 7673/7683

Hamilton autosampler syringes are available in three different needle gauge styles to suit your particular application. The needles are constructed of narrow-bore stainless steel to minimize liquid dead volume, and have a special conical point that reduces the pressure needed to penetrate the autosampler septum.

- 23s gauge needles – for standard injections.
- 26s gauge needles – for on-column and split/splitless injections.
- 23s-26s dual gauge needles – allow you to perform all your applications without the need to change syringes.

Microliter syringes and GASTIGHT® syringes are available in both Autosampler Needle (ASN) or Autosampler Removable needle (ASRN) styles. Dual gauge (23s-26s gauge, 1.7 inch length, point style #1) syringes combine the durability of a 23s-gauge needle with the performance capability of a 26s-gauge needle in split/splitless and on-column injection.

Available in two styles, the GASTIGHT® syringes are made with PTFE-tipped plungers.

SGE syringes are designed and tested to meet critical autosampler specifications. These syringes are designed with a unique plunger to eliminate bending and seizing. The needle point style withstands multiple and fast septum injections, making it one of the most trouble-free autosampler syringes available.

Hamilton Syringes for Agilent/HP 7673 & 7683

Hamilton® 700 Series Microliter™ Syringe, Fixed Needle

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
5	75 ASN	23s ga (cone tip)	43 (1.71 in.)	87987	21311	1 ea
5	75 ASN	23s ga (cone tip)	43 (1.71 in.)	87990	21315	6 ea
5	75 ASN	26s ga (cone tip)	43 (1.71 in.)	87989	21314	6 ea
5	75 ASN	23s-26s ga (cone tip)	43 (1.71 in.)	87993	24570-U	1 ea
5	75 ASN	23s-26s ga (cone tip)	43 (1.71 in.)	87994	24571	6 ea
10	701 ASN	23s ga (cone tip)	43 (1.71 in.)	80387	21313	1 ea
10	701 ASN	23s ga (cone tip)	43 (1.71 in.)	80390	21317	6 ea
10	701 ASN	26s ga (cone tip)	43 (1.71 in.)	80388	21312	1 ea
10	701 ASN	26s ga (cone tip)	43 (1.71 in.)	80389	21316	6 ea
10	701 ASN	23s-26s ga (cone tip)	43 (1.71 in.)	80393	24573	1 ea
10	701 ASN	23s-26s ga (cone tip)	43 (1.71 in.)	80391	24574	6 ea

Hamilton® 700 Series Microliter™ Syringe, Removable Needle

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
5	75 ASRN	23s ga (cone tip)	43 (1.71 in.)	87957	21321	1 ea
10	701 ASRN	23s ga (cone tip)	43 (1.71 in.)	80357	21323-U	1 ea
10	701 ASRN	26s ga (cone tip)	43 (1.71 in.)	80358	21322-U	1 ea
10	701 ASRN	23s-26s ga (cone tip)	43 (1.71 in.)	80359	24575	1 ea

Hamilton® 700 Series Microliter™ Syringe, 22° bevel

stainless steel needle bevel tip (point style 2)

needle type ASN (fixed)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
5	75 ASN	23s ga (bevel tip)	43 (1.71 in.)	87991	26714	1 ea
5	75 ASN	26s ga (bevel tip)	43 (1.71 in.)	87992	26721	1 ea
10	701 ASN	23s ga (bevel tip)	43 (1.71 in.)	80398	26715	1 ea
10	701 ASN	26s ga (bevel tip)	43 (1.71 in.)	80399	26722	1 ea

Hamilton® 7000 Series Modified Microliter™ Syringe

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
0.5	7000.5 ASRN	23s ga (cone tip)	43 (1.71 in.)	86276	26214	1 ea
0.5	7000.5 ASRN	26s ga (cone tip)	43 (1.71 in.)	86274	26215	1 ea

Syringes

Autosampler Syringes: Hamilton Syringes for Agilent/HP 7673 & 7683

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
1	7001 ASRN	23s ga (cone tip)	43 (1.71 in.)	80176	26216	1 ea
1	7001 ASRN	26s ga (cone tip)	43 (1.71 in.)	80175	26217	1 ea

Hamilton® 1700 Series GASTIGHT® Syringe, Fixed Needle

stainless steel needle cone tip (point style 1)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	1701 ASN	23s ga (cone tip)	43 (1.71 in.)	80080	26719	1 ea
10	1701 ASN	23s ga (cone tip)	43 (1.71 in.)	80094	26701	6 ea
10	1701 ASN	23s-26s ga (cone tip)	43 (1.71 in.)	80079	24579	1 ea
10	1701 ASN	23s-26s ga (cone tip)	43 (1.71 in.)	80096	24580	6 ea

Hamilton® 1700 Series GASTIGHT® Syringe, Removable Needle

stainless steel needle cone tip (point style 1)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	1701 ASRN	23s ga (cone tip)	43 (1.71 in.)	80087	21325-U	1 ea
10	1701 ASRN	26s ga (cone tip)	43 (1.71 in.)	80088	21324	1 ea
10	1701 ASRN	23s-26s ga (cone tip)	43 (1.71 in.)	80089	24581	1 ea

Hamilton Syringe Needles for Agilent/HP 7673 & 7683

Needles for Hamilton® RN Syringes, Point Style #1 (Cone Tip)

Volume (µL)	Description	Needle	Needle L × O.D. (mm)	Hamilton No.	Cat. No.	Qty
5-10	ASRN	23s ga (cone tip)	43 × 0.64	7786-01	21327-U	6 ea
5-10	ASRN	26s ga (cone tip)	43 × 0.47	7786-02	21326	6 ea
5-10	ASRN	23s-26s ga (cone tip)	43 × 0.47-0.63	7785-01	24582	6 ea

SGE Syringes



SGE Syringe for Agilent

SGE Gas Tight syringe

Color-Coded Syringes

SGE has implemented significant changes to their chromatographic syringe line to make it easier to distinguish between the different volumes of syringes while experiencing improved technical performance. The glass barrels of SGE autosampler syringes are now according to volume to make it easier and faster for an analyst to select the proper volume of syringe for different applications. This color-coding also makes it easier for quick volume identification of syringes already installed in an autosampler.

Tighter Specifications

Newly introduced tighter physical specifications and design changes have greatly reduced or eliminated common problems including syringe adhesive contamination of the sample, sample carryover, and mechanical problems with the needle, plunger and barrel. These improvements provide superior technical performance for the analysts and have the added benefit of extending the life of the syringe.

Longer Life

Modifications to the inner surface finish of the syringe glass barrel and the design of the syringe components provide greater solvent resistance, a wider working-temperature range and improved operational smoothness. As a result of these modifications, the lifetime of the syringe can be as much as ten times greater when compared to SGE's current syringes.

Superior Performance

Elimination of syringe adhesive from the fluid path removes the possibility of the sample being contaminated by adhesive, sampler carryover, or the possibility of the sample matrix dissolving the adhesive that holds syringe components together. This is accomplished by the addition of a press fit PTFE seal that fits tightly against the inner walls of the syringe and is flush to the end of the needle leaving no gaps and preventing contact of the sample with the syringe adhesive.

Additionally, the use of a new adhesive chemistry in the manufacturing of SGE syringes allows the syringe to be operated over a wider temperature range. Improvements have also been made to the needle design. The needle and hub are permanently fused together, increasing the strength of the parts.

Reduced Carryover

Design improvements in the PTFE plunger tips and the PTFE seal inserts mentioned previously create a much tighter fit between the plunger tip of the barrel and the PTFE seal. A smoother glass surface ensures that the fluid is flushed out and no carryover occurs.

Superior Plunger Tip

Significant changes have also been made to the SGE plunger tip so that it sits flush against the syringe insert, minimizing any potential carryover.

Syringes

Autosampler Syringes: SGE Syringes for Agilent/HP 7673 & 7683

SGE Syringes for Agilent/HP 7673 & 7683

SGE Standard Syringe, Fixed Needle

Volume (µL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
5	SK-5F-HP-0.47	26 ga (cone tip)	42	001804	21910	6 ea
5	5F-HP-0.63 color (lime)	23 ga (cone tip)	42	001810 001814	21542 21911	1 ea 6 ea
5	5F-HP-0.63/0.47	23-26 ga (cone tip)	42	001822	26887-U	6 ea
10	10F-HP-0.47 color (dark orange)	26 ga (cone tip)	42	002804 002800	21541 21912	1 ea 6 ea
10	10F-HP-0.63 color (dark orange)	23 ga (cone tip)	42	002810 002814	21543 21544	1 ea 6 ea
10	10F-HP-0.63/0.47 color (dark orange)	23-26 ga (cone tip)	42	002821	29616-U	1 ea
10	10F-HP-0.63/0.47	23-26 ga (cone tip)	42	002822	26889-U	6 ea

SGE Standard Syringe, Removable Needle

stainless steel needle cone tip (point style 1)

Volume (µL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
0.5	0.5BR-HP-0.63 color (light orange)	23 ga (cone tip)	42	000410	24403	1 ea
10	10R-HP-0.47 color (dark orange)	26 ga (cone tip)	42	002805	24417	1 ea
10	10R-HP-0.63 color (dark orange)	23 ga (cone tip)	42	002815	24416	1 ea
25	25R-HP-0.63 color (green)	23 ga (cone tip)	42	003665	509701	1 ea

SGE Needles for Removable Needle Syringes

stainless steel needle cone tip (point style 1)

Volume (µL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
10	10R-HP-0.47	26 ga (cone tip)	42 × 0.47	037715	24440-U	2 ea
10	10R-HP-0.63	23 ga (cone tip)	42 × 0.63	037717	24439	2 ea
25	25R-HP-0.63	23 ga (cone tip)	42 × 0.63	038717	509728	2 ea

SGE Gas Tight Syringe, Fixed Needle, Dual Gauge

Volume (µL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
10	10F-HP-GT-0.63/0.47 color (dark orange)	23-26 ga (cone tip)	42	002826 002827	26890-U 26891-U	1 ea 6 ea
25	25F-HP-GT-0.63/0.47 color (green)	23-26 ga (cone tip)	42	003668	26892-U	1 ea
50	50F-HP-GT-0.63/0.47 color (purple)	23-26 ga (cone tip)	42	004668	26893-U	1 ea
100	100F-HP-GT-0.63/ 0.47 color (purple)	23-26 ga (cone tip)	42	005668	26894-U	1 ea

SGE SuperfleX™ Syringe, Fixed Needle

Volume (µL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
5	5FX-C	26 ga (cone tip)	50 × 0.47	001105	26242	1 ea
10	10FX-FC	26 ga (cone tip)	50 × 0.47	002105	26243	1 ea
10	10FX-5/0.63C	23 ga (cone tip)	50 × 0.63	002108 002135	26244 26247	1 ea 6 ea

Syringes

Autosampler Syringes: SGE Syringes for Agilent/HP 7673 & 7683

SGE SuperfleX™ Syringe, Removable Needle

Volume (µL)	Description	Size	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
5	5RX-HP-0.47 color (lime)	26 ga (cone tip)	42 × 0.47	001805	23963	1 ea
5	5RX-HP-0.63 color (lime)	23 ga (cone tip)	42 × 0.63	001815	23962	1 ea

Hamilton Syringes for Agilent/HP 7670, 7671, & 7672



700 Series Six Pack

Hamilton® syringe, 700 series, fixed needle

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	701N	26s ga (bevel tip)	51 (2 in.)	80300	20734	1 ea
10	701N	26s ga (bevel tip)	51 (2 in.)	80366	20779	6 ea

Hamilton® syringes, 700 series, removable needle

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	701RN	26s ga (bevel tip)	51 (2 in.)	80338	21357	1 ea

Hamilton® GASTIGHT® Syringe, 1700 series

PTFE plunger tip

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	1701N	26s ga (bevel tip)	51 (2 in.)	80000	20972	1 ea

Hamilton® Syringe, 7000 Series, Knurled Hub

- Rapid injection of minute volumes
- Eliminates dead volume by placing the sample in the needle
- Leak-proof at injection pressures up to 6000psi

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
1.0	7001KH	25s ga (bevel tip)	70 (2.75 in.)	80135	20750	1 ea

Hamilton® needles for RN syringes

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
2.5-100	bevel tip (stainless steel)	26s ga	51 (2 in.)	7758-02	19131-U	6 ea

Syringes

Autosampler Syringes: Hamilton Syringes for CTC/LEAP Technologies

Hamilton Syringes for CTC/LEAP Technologies



Hamilton CTC syringe

GC Sampling Syringes (cemented needle), PAL Instruments

C-Line: The NEW generation of Hamilton syringes for CTC Analytics includes the following improvements:

- Zero carry over
- An innovative, cemented needle design that eliminates all interaction between the sample and the glued surface.
- Adjustable plunger protects plunger tip from squeezing
- A unique flange design that aligns the syringe in the proper position every time
- A more chemically resistant and temperature tolerant PTFE/polymer sealant for the plunger tip.

Volume (μL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
1.2	7701.2	26s ga (cone tip)	51 (2 in.)	203185	28617-U	1 ea
5	75N	26s ga (cone tip)	51 (2 in.)	203189	28613-U	1 ea
10	701N	23s ga (cone tip)	51 (2 in.)	203361	29603-U	1 ea
10	701N	23s ga (bevel tip)	51 (2 in.)	203363	29606-U	1 ea
10	701N	26s ga (cone tip)	51 (2 in.)	203205	28615-U	1 ea
10	Slim Line	26s ga (bevel tip)	51 (2 in.)	203072	28614-U	1 ea
10	701N	23s-26s ga (cone tip)	51 (2 in.)	203362	29604-U	1 ea
25	1702N	26s ga (cone tip)	51 (2 in.)	203043	28649-U	1 ea
25	1702CTC Slim Line	26s ga (cone tip)	51 (2 in.)	203074	29608-U	1 ea
100	1710N Slim Line	26s ga (cone tip)	51 (2 in.)	203076	28651-U	1 ea
250	1725N	26s ga (cone tip)	51 (2 in.)	203078	28652-U	1 ea
500	1750N	26s ga (cone tip)	51 (2 in.)	203080	28653-U	1 ea

GC Headspace Sampling: Combi PAL/GC PAL

feature GASTIGHT® Syringe, Fixed Needle

Volume (mL)	Description	Needle	Needle L (mm)	Hamilton® No.	Cat. No.	Qty
1	1000LTN	23 ga (cone tip, side port)	51 (2 in.)	203082	28621-U	1 ea
1	1001LTN	26 ga (cone tip, side port)	51 (2 in.)	203141	28622-U	1 ea
2.5	1002LTN	23 ga (cone tip, side port)	51 (2 in.)	203084	28626-U	1 ea
2.5	1002LTN	26 ga (cone tip, side port)	51 (2 in.)	203181	28627-U	1 ea
5	1005LTN	23 ga (cone tip, side port)	51 (2 in.)	203086	28628-U	1 ea

HPLC Sampling: CTC LC Autosamplers

Volume	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10 μL	701N	22s ga (blunt tip)	51 (2 in.)	203073	28618-U	1 ea
10 μL	1701N Slim Line	22s ga (blunt tip)	51 (2 in.)	203194	28632-U	1 ea
25 μL	1702N Slim Line	22s ga (blunt tip)	51 (2 in.)	203075	28633-U	1 ea
100 μL	1710N Slim Line	22 ga (blunt tip)	51 (2 in.)	203235	28635-U	1 ea
100 μL	1710N Slim Line	22s ga (blunt tip)	51 (2 in.)	203077	28634-U	1 ea
250 μL	1725N	22 ga (blunt tip)	51 (2 in.)	203079	28636-U	1 ea
500 μL	1750N	22 ga (blunt tip)	51 (2 in.)	203349	29609-U	1 ea
1 mL	1001LTN	22 ga (blunt tip)	51 (2 in.)	203081	28637-U	1 ea
2.5 mL	1002LTN	22 ga (blunt tip)	51 (2 in.)	203083	28638-U	1 ea
5 mL	1005LTN	22 ga (blunt tip)	51 (2 in.)	203085	28639-U	1 ea

Syringes

Autosampler Syringes: Hamilton Syringe Plungers for CTC/Leap Technologies

Hamilton Syringe Plungers for CTC/Leap Technologies

Replacement Plungers for CTC GC PAL and Headspace Syringes

Volume	Description	Hamilton® No.	Cat. No.	Qty
10 µL	1701CTC	203239	28641-U	10 ea
25 µL	1702CTC	203245	28642-U	10 ea
100 µL	1710CTC	203246	28643-U	10 ea
1.0 mL	1001CTC	203255	28646-U	1 ea
2.5 mL	1002CTC	203256	28647-U	1 ea
5.0 mL	1005CTC	203066	28648-U	1 ea

Hamilton Syringes for CTC A200S

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	1701	22s ga (blunt tip)	51 (2 in.)	203560	29612-U	1 ea
25	1702	22s ga (blunt tip)	51 (2 in.)	203563	29613-U	1 ea
100	1710	22s ga (blunt tip)	51 (2 in.)	203566	29614-U	1 ea

SGE Syringes for CTC Analytics

SGE autosampler syringes, fixed needle, for CTC/LEAP

point style



SGE Gas Tight syringe

Volume (µL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
5	5F-C/F-5/0.63 Slim line, fixed needle color (lime)	23 ga (cone tip)	50	001981	29622-U	1 ea
5	5F-C/F-5/0.47 Slim line, fixed needle color (lime)	26 ga (cone tip)	50	001982	29623-U	1 ea
10	10F-C/F-0.63 Slim line, fixed needle color (dark orange)	23 ga (cone tip)	50	002981	29624-U	1 ea
10	10F-C/F-5/0.47C Slim line, fixed needle color (dark orange)	26 ga (cone tip)	50	002980	29625-U	1 ea
10	SK-10F-C/F-5/0.47C Slim line, fixed needle	26 ga (cone tip)	50	002986	29626-U	6 ea
10	10F-C/F-GT-0.63 Slim line, Gas tight color (dark orange)	23 ga (cone tip)	50	002987	29627-U	1 ea
25	25F-C/F-0.47C Slim line, fixed needle color (green)	26 ga (cone tip)	50	003980	29628-U	1 ea
25	25F-C/F-GT-0.63 Slim line, Gas tight color (green)	23 ga (cone tip)	50	003987	29629-U	1 ea
100	100F-C/F-GT-0.63 Slim line, Gas tight color (aqua)	23 ga (cone tip)	50	005335	29631-U	1 ea

Syringes

Autosampler Syringes: SGE Syringes for CTC Analytics

SGE autosampler syringes, removable needle, for CTC Analytics

Volume (μL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
0.5	0.5BNR-C/F-0.63 Slim line, Removable needle color (light orange)	23 ga (cone tip)	50	000492	29633-U	1 ea
10	10R-C/F-5/0.47C Slim line, Removable needle color (dark orange)	26 ga (cone tip)	50	002982	29634-U	1 ea
10	10R-C/F-0.63 Slim line, Removable needle color (dark orange)	23 ga (cone tip)	50	002984	29635-U	1 ea
10	10R-C/T-GT-5/0.47C Slim line, Removable needle color (dark orange)	26 ga (cone tip)	50	002985	29636-U	1 ea
100	100R-C/F-GT-LC Slim line, Removable needle color (aqua)	22 ga (blunt tip)	51	005330	29637-U	1 ea
100	100R-C/F-GT-0.47C Slim line, Gas tight color (aqua)	26 ga (cone tip)	50	005333	29632-U	1 ea

Hamilton Syringes for PerkinElmer®



Volume (μL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
Hamilton® Syringes for PerkinElmer® GC Autosystem and Clarus 500						
5	75 ASN/PE GC	26s ga (blunt tip)	70	88040	24522	1 ea
5	75 ASN/PE GC	23s ga (blunt tip)	70	88035	24523	1 ea

SGE Syringes for PerkinElmer® Autosystem

Volume (μL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
SGE Syringes for PerkinElmer® Autosystem						
0.5	0.5BR-PE-0.47 color (light orange)	26 ga (cone tip)	70	000475	24406	1 ea
0.5	0.5BR-PE-0.63 color (light orange)	23 ga (cone tip)	70	000478	24407	1 ea
5	5F-PE-0.47 color (lime)	26 ga (cone tip)	70	001953	509736	1 ea
5	5F-PE-0.63 color (lime)	23 ga (cone tip)	70	001954	509744	1 ea
5	5F-PE-GT-0.47 color (lime)	26 ga (cone tip)	70	001955	21930-U	1 ea
5	5F-PE-GT-0.63 color (lime)	23 ga (cone tip)	70	001957	21929-U	1 ea

Syringes for Phillips/Unicam

Syringe for Phillips/Unicam S8 and 4700 GC Autosystem

Volume (μL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
1	1BR-7	23 ga (cone tip)	70 × 0.63	000505	24408	1 ea

Syringes

Autosampler Syringes: Syringes for Shimadzu™ Instruments

Syringes for Shimadzu™ Instruments

Syringes for Shimadzu™ AOC14, AOC17 and AOC20 GC Autosamplers						
Volume (µL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
5	5F-S-0.47 color (lime)	26 ga (cone tip)	42	001987	29619-U	1 ea
5	5F-S-0.63 color (lime)	23 ga (cone tip)	42	001988	29618-U	1 ea
10	10R-S-0.63 color (dark orange)	23 ga (cone tip)	42	002898	24419	1 ea
10	10R-S-0.47 color (dark orange)	26 ga (cone tip)	42	002897	24418	1 ea
10	10R-S-GT-0.63 color (dark orange)	23 ga (cone tip)	42	002902	29621-U	1 ea

Syringes for Shimadzu™ AOC9 GC Autosamplers						
Volume (µL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
10	10R-S(9)-0.47 color (dark orange)	26 ga (cone tip)	50	002885	509760	1 ea

Hamilton Syringes for Thermo Finnigan

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
Hamilton® syringe, 700 series, fixed needle						
10	701N	26s ga (bevel tip)	51 (2 in.)	80300	20734	1 ea
10	701N	26s ga (bevel tip)	51 (2 in.)	80366	20779	6 ea
Hamilton® syringes, 700 series, removable needle						
10	701RN	26s ga (bevel tip)	51 (2 in.)	80338	21357	1 ea
Hamilton® syringe, 700 series, cemented needle, pt.#5						
10	701N	26s ga (cone tip, side-port)	51 (2 in.)	80339	24532	1 ea

Syringes for Varian® 8400/8410, CP-9010/9050

Volume (µL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
10	10F-V-5/0.47A color (dark orange)	26 ga (bevel tip)	50 × 0.5	002950	29617-U	1 ea

Syringes for Varian® 8035, 8100 and 8200 Series

Syringe for Varian® 8035, 8100, and 8200 GC Autosamplers						
SGE Syringes for Other Autosamplers						
SYRINGE SGE 10R-VA8X-2						
▶ volume 10 µL, color (dark orange)						
10R-VA8X						
needle size 25 ga (side hole)						
for use with Varian 8035, 8100, and 8200 GC Autosamplers						
stainless steel needle cone tip, side port (point style 5)						
product of SGE, 002924						
needle L × O.D. 53 mm × 0.5 mm						
24421						1 ea
Volume (µL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
Syringe for Varian® 8035, 8100, and 8200 GC Autosamplers						
10	10R-VA8X color (dark orange)	25 ga (side hole)	53 × 0.5	002924	24421	1 ea

Syringes

Autosampler Syringes: SGE Syringes for General Use

SGE Syringes for General Use

Syringes for General Use						
Volume (µL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
10	10FX	26 ga (bevel tip)	50 × 0.47	002130	23944	1 ea
				002100	23966	6 ea

SGE Replacement Needles and Plungers

SGE Replacement Needles						
Volume (µL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
1	1B-7C	23 ga (cone tip)	70 × 0.63	034057	24432	1 ea
10	10R-S-0.63	23 ga (cone tip)	42 × 0.63	037747	24442	2 ea
10	N10-VA8X00H-II	25 ga (cone tip side-port)	53 × 0.50	037777	24445	1 ea
10	for 10R-VA8X, 8035	25 ga (bevel tip)	50 × 0.50	037776	24444	2 ea

SGE Replacement Plunger - for Varian® 10µL syringe

Volume (µL)	Description	SGE No.	Cat. No.	Qty
10	for 10R-VA8	031218	21924	1 ea

HPLC Syringes

Hamilton HPLC Syringes



From left to right; 58390-U, 20885, 58380-U

Hamilton® HPLC Syringes, 800 Series (Removable needle) - For Waters U6K Loop Injector

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	801RNW	25s ga (blunt tip)	50 (1.97 in.)	84815	58390-U	1 ea
25	802RNW	25s ga (blunt tip)	50 (1.97 in.)	84816	58391	1 ea
50	805RNW	25s ga (blunt tip)	50 (1.97 in.)	84817	58392	1 ea
100	810RNW	25s ga (blunt tip)	50 (1.97 in.)	84818	58393	1 ea
250	825RNW	25s ga (blunt tip)	50 (1.97 in.)	84819	58394	1 ea

Hamilton® HPLC Syringes, 700 Series (Fixed needle) - For Rheodyne®, Valco® VISF-2, Altex and SSI Injection Valves

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	7015NR	22s ga (blunt tip)	51 (2 in.)	80365	58380-U	1 ea
25	7025NR	22s ga (blunt tip)	51 (2 in.)	80465	58381	1 ea
50	7055NR	22s ga (blunt tip)	51 (2 in.)	80565	58382	1 ea
100	7105NR	22s ga (blunt tip)	51 (2 in.)	80665	58383	1 ea
250	7255NR	22 ga (blunt tip)	51 (2 in.)	80765	58384	1 ea
500	7505NR	22 ga (blunt tip)	51 (2 in.)	80865	26222-U	1 ea

Syringes

HPLC Syringes: Hamilton HPLC Syringes

Hamilton® HPLC Syringes, 1700 Series (Removable needle) - For Rheodyne®, Valco® VISF-2, Altex and SSI Injection Valves

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	1701RNR	22s ga (blunt tip)	51 (2 in.)	80065	20885	1 ea
25	1702RNR	22s ga (blunt tip)	51 (2 in.)	80265	20886	1 ea
50	1705RNR	22s ga (blunt tip)	51 (2 in.)	80965	20887	1 ea
100	1710RNR	22s ga (blunt tip)	51 (2 in.)	81065	20888	1 ea
250	1725RNR	22 ga (blunt tip)	51 (2 in.)	81165	20889	1 ea
500	1750RNR	22 ga (blunt tip)	51 (2 in.)	81265	20890-U	1 ea

Hamilton® HPLC syringes for Agilent® 1090 and 1100 LC autosamplers

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
25	1702RN	22s ga (bevel tip)	51 (2 in.)	80230	20781	1 ea
250	1725RN	22s ga (bevel tip)	51 (2 in.)	81130	20784	1 ea

Hamilton® LC syringe for Waters WISP®

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
25	1702	(n/a)	n/a	80020	29601-U	1 ea
250	1725	(n/a)	n/a	80024	29602-U	1 ea

Needles for RN Syringes

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
2.5-100	blunt tip (stainless steel)	25s ga (Waters)	50 (1.97 in.)	8647-01	58398	6 ea
250-10000	blunt tip (stainless steel)	25s ga (Waters)	50 (1.97 in.)	8648-01	58399	6 ea
250-10000	blunt tip (PEEK)	16 ga	51 (2 in.)	8650-01	26710-U	6 ea
250-10000	blunt tip (stainless steel)	22s ga	51 (2 in.)	7780-03	19142-U	6 ea
250-10000	blunt tip (stainless steel)	26s ga	51 (2 in.)	7780-01	19140-U	6 ea
250-10000	blunt tip (stainless steel)	26 ga	51 (2 in.)	7780-02	19141-U	6 ea

SGE HPLC Syringes



SGE Microvolume Syringes for HPLC Valves, Fixed Needle

Volume (µL)	Description	Needle	Needle L × O.D. (in.)	SGE No.	Cat. No.	Qty
5	5F-LC	22 ga (blunt tip)	2 × 0.028	001301	509779	1 ea
10	10F-LC	22 ga (blunt tip)	2 × 0.028	002301	509787	1 ea
25	25F-LC	22 ga (blunt tip)	2 × 0.028	003300	509795	1 ea
100	100F-LC	22 ga (blunt tip)	2 × 0.028	005300	509817	1 ea
250	250F-LC	22 ga (blunt tip)	2 × 0.028	006300	509825	1 ea
500	500F-LC	22 ga (blunt tip)	2 × 0.028	007300	509833	1 ea

Syringes

HPLC Syringes: SGE HPLC Syringes

SGE Microvolume Syringes for HPLC Valves, Removable Needle

Volume	Description	Needle	Needle L × O.D. (in.)	SGE No.	Cat. No.	Qty
10 µL	10R-LC	22 ga (blunt tip)	2 × 0.028	002310	509868	1 ea
25 µL	25R-GT-LC	22 ga (blunt tip)	2 × 0.028	003312	509876	1 ea
50 µL	50R-GT-LC	22 ga (blunt tip)	2 × 0.028	004312	509884	1 ea
100 µL	100R-GT-LC	22 ga (blunt tip)	2 × 0.028	005312	509892	1 ea
250 µL	250R-GT-LC	22 ga (blunt tip)	2 × 0.028	006312	509906	1 ea
500 µL	500R-GT-LC	22 ga (blunt tip)	2 × 0.028	007312	509914	1 ea
1 mL	1MR-LC-GT	22 ga (blunt tip)	2 × 0.028	008105	509922	1 ea
2.5 mL	2.5MDR-LC-GT	22 ga (blunt tip)	2 × 0.028	008505	509930	1 ea

SGE SuperfleX™ Syringes for HPLC Valves

Volume (µL)	Description	Needle	Needle L × O.D. (in.)	SGE No.	Cat. No.	Qty
10	10FX-LC (Fixed needle)	22 ga (blunt tip)	2 × 0.028	002300	23946	1 ea

SGE Needles for HPLC Valves

stainless steel needle blunt tip (point style 3)

Volume	Description	Size	Needle L × O.D. (in.)	SGE No.	Cat. No.	Qty
25-500 µL	N25/500-LC	22 ga (blunt tip)	2 × 0.028	038250	509949	5 ea
1-2.5 mL	NM1/2.5-LC	22 ga (blunt tip)	2 × 0.028	039250	509957	5 ea

Hamilton MICROLITER™ Syringes (600, 700 Series)

600 Series Syringes, 2.5 to 5.0 mL

Volume (µL)	Description	Size	Needle L (mm)	Hamilton No.	Cat. No.	Qty
2.5	62RNR	22s ga (blunt tip)	51 (2 in.)	87942	26702	1 ea
5.0	62RNR	22s ga (blunt tip)	51 (2 in.)	87943	26703	1 ea

700 Series Syringes, 5 µL to 500 µL

700 series six packs

The most popular syringes are available in convenient multi-unit packages, at considerable cost savings. Accurate to ± 1%. Temperature limit: 50°C for cemented needles, 115°C for revolvable needle.

10µL capacity, 26s gauge, 51mm length, point style #2, in packs of 6.
stainless steel needle (point style 2)



700 Series Six Pack

Syringes

Hamilton MICROLITER™ Syringes (600, 700 Series): 700 Series Syringes, 5 µL to 500 µL

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	701N	26s ga (bevel tip)	51 (2 in.)	80366	20779	6 ea
10	701RN	26 ga (bevel tip)	51 (2 in.)	80336	20793	6 ea



Removable needle syringe, 700 series



Luer Tip syringe, 700 series

700 Series, N (Cemented Needle)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
5	75N	26s ga (bevel tip)	51 (2 in.)	87900	26200-U	1 ea
10	701N	26s ga (bevel tip)	51 (2 in.)	80300	20734	1 ea
25	702N	22s ga (bevel tip)	51 (2 in.)	80400	20735	1 ea
50	705N	22s ga (bevel tip)	51 (2 in.)	80500	20736	1 ea
100	710N	22s ga (bevel tip)	51 (2 in.)	80600	20737	1 ea
250	725N	22s ga (bevel tip)	51 (2 in.)	80700	20738	1 ea
500	750N	22 ga (bevel tip)	51 (2 in.)	80800	20739	1 ea

700 Series, SN (Special Needle)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	701SN	26s ga (blunt tip)	51 (2 in.)	80383	20682	1 ea
10	701SN	26s ga (bevel tip)	76 (3 in.)	80384	21572	1 ea
10	701SN	26s ga (bevel tip)	101 (4 in.)	80382	21573	1 ea
10	701SN	26s ga (bevel tip)	152 (6 in.)	80385	21574	1 ea

700 Series, SN (Special Needle) for Rheodyne® Injectors

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	701SNR	22s ga (blunt tip)	51 (2 in.)	80365	58380-U	1 ea
25	702SNR	22s ga (blunt tip)	51 (2 in.)	80465	58381	1 ea
50	705SNR	22s ga (blunt tip)	51 (2 in.)	80565	58382	1 ea
100	710SNR	22s ga (blunt tip)	51 (2 in.)	80665	58383	1 ea
250	725SNR	22 ga (blunt tip)	51 (2 in.)	80765	58384	1 ea
500	750SNR	22 ga (blunt tip)	51 (2 in.)	80865	26222-U	1 ea

700 Series, NWG (Cemented Needle with Guide)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	701NWG	26s ga (bevel tip)	51 (2 in.)	80307	20753	1 ea
25	702NWG	22s ga (bevel tip)	51 (2 in.)	80407	20754	1 ea

700 Series, NCH (Cemented Needle with Chaney Adapter)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	701NCH	26s ga (bevel tip)	51 (2 in.)	80304	20747	1 ea

700 Series, RN (Removable Needle)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
5	75RN	26s ga (bevel tip)	51 (2 in.)	87930	20919	1 ea
10	701RN	26s ga (bevel tip)	51 (2 in.)	80330	20697	1 ea
25	702RN	22s ga (bevel tip)	51 (2 in.)	80430	20787	1 ea
50	705RN	22s ga (bevel tip)	51 (2 in.)	80530	20788	1 ea
100	710RN	22s ga (bevel tip)	51 (2 in.)	80630	20790-U	1 ea

Syringes

Hamilton MICROLITER™ Syringes (600, 700 Series): 700 Series Syringes, 5 µL to 500 µL

700 Series, RN (Removable Needle) (continued)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
250	725RN	22s ga (bevel tip)	51 (2 in.)	80730	24538-U	1 ea
500	750RN	22 ga (bevel tip)	51 (2 in.)	80830	24539	1 ea

700 Series, RNWG (Removable Needle with Guide)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	701RNWG	26s ga (bevel tip)	51 (2 in.)	80337	20698	1 ea

700 Series, RNCH (Removable Needle with Chaney Adapter)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	701RNCH	26s ga (bevel tip)	51 (2 in.)	80334	20699	1 ea

700 Series, N (Cemented Needle), Pt Style #5

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	701N	26s ga (cone tip, side-port)	51 (2 in.)	80339	24532	1 ea
25	702N	22s ga (cone tip, side-port)	51 (2 in.)	80439	24533-U	1 ea
50	705N	22s ga (cone tip, side-port)	51 (2 in.)	80539	24534-U	1 ea
100	710N	22s ga (cone tip, side-port)	51 (2 in.)	80639	24535	1 ea
250	725N	22s ga (cone tip, side-port)	51 (2 in.)	80739	24536	1 ea
500	750N	22 ga (cone tip, side-port)	51 (2 in.)	80839	24537	1 ea

700 Series, SN (Use with Merlin Microseal™, Manual Injection with Agilent® autosamplers)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	701SN	23s ga (cone tip)	43 (1.71 in.)	80395	26228	1 ea

700 Series, LT (Luer Tip)

Volume (µL)	Description	Needle	Needle L	Hamilton No.	Cat. No.	Qty
10	701LT	(not included)	(n/a)	80301	24530	1 ea
25	702LT	(not included)	(n/a)	80401	24531	1 ea
50	705LT	(not included)	(n/a)	80501	20701	1 ea
100	710LT	(not included)	(n/a)	80601	20702	1 ea
250	725LT	(not included)	(n/a)	80701	20703	1 ea
500	750LT	(not included)	(n/a)	80801	20704	1 ea

Needles for Hamilton® RN Syringes, Point Style #2 (Bevel Tip)



Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
2.5-100	bevel tip (stainless steel)	22s ga	51 (2 in.)	7758-03	19133-U	6 ea
2.5-100	bevel tip (stainless steel)	26s ga	51 (2 in.)	7758-02	19131-U	6 ea
250-10000	bevel tip (stainless steel)	22 ga	51 (2 in.)	7779-01	19137-U	6 ea
250-10000	bevel tip (stainless steel)	22s ga	51 (2 in.)	7779-03	19136-U	6 ea

Syringes

SGE Plunger-protected Syringes

SGE Plunger-protected Syringes

Extended protection tube from top of the flange helps prevent plunger bending during injection.



SGE Plunger Protection syringe

SGE Plunger Protection Syringes, Fixed Needle

Volume (µL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
5	5F	26 ga (bevel tip)	50	001000	26235-U	1 ea
10	10F	26 ga (bevel tip)	50	002000	21933-U	1 ea
				002030	21934-U	6 ea
				002033	26239	10 ea

SGE Plunger Protection Syringes, Removable Needle

Volume (µL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
5	5R	26 ga (bevel tip)	50	001050	26236	1 ea
10	10R	26 ga (bevel tip)	50	002050	24413	1 ea

SGE syringes with SuperfleX™ flexible plunger

SGE Autosampler Syringe, SuperfleX™ Syringe

Volume (µL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
10	SK-10FX-HP-0.63	23 ga (cone tip)	42	002838	23972	6 ea

The plunger is rugged enough to withstand repeated injections without breaking. Made from a titanium/nickel alloy, it is nearly indestructible and ideal for novices.

SGE SuperfleX™ Syringe

Made from elastic alloy plunger that will not bend or kink.

Volume (µL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
5	5FX	26 ga (bevel tip)	50 × 0.47	001100	23950-U	1 ea
5	5FX-C	26 ga (cone tip)	50 × 0.47	001105	26242	1 ea
10	10FX	26 ga (bevel tip)	50 × 0.47	002130	23944	1 ea
				002100	23966	6 ea
10	10FX-5/0.63C	23 ga (cone tip)	50 × 0.63	002135	26244	1 ea
				002108	26247	6 ea
10	10FX-FC	26 ga (cone tip)	50 × 0.47	002105	26243	1 ea
5	5RX	26 ga (bevel tip)	50 × 0.47	001150	23953-U	1 ea
10	10RX	26 ga (bevel tip)	50 × 0.47	002150	23947	1 ea

SGE MicroVolume syringes, standard plunger

SGE MicroVolume syringes with standard plunger, fixed needle

stainless steel needle bevel tip (point style 2)



SGE Standard Syringe

Volume (µL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
25	25F	25 ga (bevel tip)	50	003000	26248	1 ea
50	50F	25 ga (bevel tip)	50	004000	26249-U	1 ea
100	100F	25 ga (bevel tip)	50	005000	26250-U	1 ea
250	250F	25 ga (bevel tip)	50	006000	26251-U	1 ea
500	500F	25 ga (bevel tip)	50	007000	26252	1 ea

Syringes

SGE MicroVolume syringes, standard plunger

SGE MicroVolume syringes with standard plunger, removable needle

Volume (μL)	Description	Needle	Needle L (mm)	SGE No.	Cat. No.	Qty
100	100R	25 ga (bevel tip)	50	005050	24423	1 ea

SGE Needles for RN syringes

Volume (μL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
0.5	NP 0.5BN-5C	23 ga (cone tip)	50 × 0.63	033010	24424	1 ea
0.5	NP 0.5B-7C	23 ga (cone tip)	70 × 0.63	033057	24425	1 ea
1	1B-5C	23 ga (cone tip)	50 × 0.63	034055	509248	1 ea
1	1B-7C	23 ga (cone tip)	70 × 0.63	034057	24432	1 ea
5	N5-5	26 ga (bevel tip)	50 × 0.47	036110	24436	5 ea
5	NP5B-7C	23 ga (cone tip)	70 × 0.63	035057	24435	1 ea
10	10R-S-0.63	23 ga (cone tip)	42 × 0.63	037747	24442	2 ea
10	N10-VA8X00H-II	25 ga (cone tip side-port)	53 × 0.50	037777	24445	1 ea
10	N10-5	26 ga (bevel tip)	50 × 0.47	037110	24437	5 ea
10	10R-HP-0.63	23 ga (cone tip)	42 × 0.63	037717	24439	2 ea
10	for 10R-VA8X, 8035	25 ga (bevel tip)	50 × 0.50	037776	24444	2 ea
25	25R-HP-0.63	23 ga (cone tip)	42 × 0.63	038717	509728	2 ea
25-500	N25/500-5	25 ga (bevel tip)	50 × 0.50	038110	24447	5 ea

Hamilton MICROLITER™ Syringes (800, 900 Series)

800 Series Syringes



Fixed needle syringe, 800 series



Removable needle syringe, 800 series

- Same quality performance as 700 series, with additional benefits
- The extended metal handle is removable and field repairable
- The plunger stem resists bending
- Accurate to within ±1% of the total volume
- Temperature limit: 50 °C for cemented needles, 115 °C for removable needle

Hamilton® Microliter™ Syringes, 800 Series, Fixed Needle

Volume (μL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
5	85N	26s ga (bevel tip)	51 (2 in.)	84850	20835-U	1 ea
10	801N	26s ga (bevel tip)	51 (2 in.)	84852	20795-U	1 ea
25	802N	22s ga (bevel tip)	51 (2 in.)	84854	21492	1 ea
50	805N	22s ga (bevel tip)	51 (2 in.)	84856	24544	1 ea
100	810N	22s ga (bevel tip)	51 (2 in.)	84858	21497-U	1 ea

Hamilton® Microliter™ Syringes, 800 Series, Removable Needle for Waters

Volume (μL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	801RNW	25s ga (blunt tip)	50 (1.97 in.)	84815	58390-U	1 ea
25	802RNW	25s ga (blunt tip)	50 (1.97 in.)	84816	58391	1 ea
50	805RNW	25s ga (blunt tip)	50 (1.97 in.)	84817	58392	1 ea
100	810RNW	25s ga (blunt tip)	50 (1.97 in.)	84818	58393	1 ea
250	825RNW	25s ga (blunt tip)	50 (1.97 in.)	84819	58394	1 ea

Syringes

Hamilton MICROLITER™ Syringes (800, 900 Series): 800 Series Syringes

Hamilton® Microliter™ Syringes, 800 Series, Removable Needle

- Same quality performance as 700 series, with additional benefits
- The extended metal handle is removable and field repairable
- The plunger stem resists bending
- Accurate to within $\pm 1\%$ of the total volume
- Temperature limit: 50°C for cemented needles, 115°C for removable needle

Volume (μL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
5	85RN	26s ga (bevel tip)	51 (2 in.)	84851	26201	1 ea
10	801RN	26s ga (bevel tip)	51 (2 in.)	84853	20797	1 ea
25	802RN	22s ga (bevel tip)	51 (2 in.)	84855	21493	1 ea
50	805RN	22s ga (bevel tip)	51 (2 in.)	84857	21496	1 ea
100	810RN	22s ga (bevel tip)	51 (2 in.)	84859	21498	1 ea
250	825RN	22s ga (bevel tip)	51 (2 in.)	84861	24546	1 ea

Hamilton® needles for 800 series syringes

Volume (μL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
2.5-100	blunt tip (stainless steel)	25s ga (Waters)	50 (1.97 in.)	8647-01	58398	6 ea
250-10000	blunt tip (stainless steel)	25s ga (Waters)	50 (1.97 in.)	8648-01	58399	6 ea
2.5-100	bevel tip (stainless steel)	22s ga	51 (2 in.)	7758-03	19133-U	6 ea
2.5-100	bevel tip (stainless steel)	26s ga	51 (2 in.)	7758-02	19131-U	6 ea
250-10000	bevel tip (stainless steel)	22s ga	51 (2 in.)	7779-03	19136-U	6 ea

900 Series Syringes

Economical version of 800 series syringes.

Volume (μL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
5	95N	26s ga (bevel tip)	51 (2 in.)	87920	20906-U	1 ea
10	901N	26s ga (bevel tip)	51 (2 in.)	80360	20908-U	1 ea
5	95RN	26s ga (bevel tip)	51 (2 in.)	87925	20907-U	1 ea
10	901RN	26s ga (bevel tip)	51 (2 in.)	80370	20909-U	1 ea

SGE Syringes with extended glass barrel

Extended barrel guides the plunger during injection and is suitable for training and student use.

SGE Guided Plunger syringes

stainless steel needle bevel tip (point style 2)



From top to bottom: SGE Plunger Protection Syringe (21933-U), SGE Guided Plunger Syringe (24414)

Volume (μL)	Description	Needle	Needle L \times O.D. (mm)	SGE No.	Cat. No.	Qty
5	5F-GP (fixed needle)	26 ga (bevel tip)	50 \times 0.47	001400	21521	1 ea
10	10F-GP (fixed needle)	26 ga (bevel tip)	50 \times 0.47	002400	26240-U	1 ea
5	5R-GP (removable needle)	26 ga (bevel tip)	50 \times 0.47	001450	24412	1 ea
10	10R-GP (removable needle)	26 ga (bevel tip)	50 \times 0.47	002450	24414	1 ea

Syringes

SGE Syringes with extended glass barrel

SGE Needles for RN syringes

Description	Cat. No.	Qty
volume 10 µL, needle L 50 mm x O.D. 0.47 mm, needle size 26 ga (bevel tip)	24437	5 ea

7000 Series Modified Microliter™ Syringes

- Rapid injection of minute volumes
- Eliminates dead volume by placing the sample in the needle
- Leak-proof at injection pressures up to 6000psi



Order Spacer Separately

7000 Series Needle Specifications

	Syringe Capacity and Model				
	0.5 µL 7000.5	1 µL 7001	1 µL 7101	2 µL 7002	5 µL 7105
Gauge:	25	25s	22s	25	24
Length (cm):	7	7	7	7	7
O.D. (in.):	0.020	0.019	0.028	0.020	0.022
I.D. (in.):	0.004	0.006	0.006	0.008	0.013
Taper (in.):	none	0.019	none	0.020	none

7000 Series, KH (Knurled Hub)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
0.5	7000.5	25 ga (bevel tip)	70 (2.75 in.)	86259	22185-U	1 ea
0.5	7000.5	25 ga (blunt tip)	70 (2.75 in.)	86250	22184-U	1 ea
1.0	7001KH	25s ga (bevel tip)	70 (2.75 in.)	80135	20750	1 ea
1.0	7001	25s ga (blunt tip)	70 (2.75 in.)	80100	20731	1 ea
1.0	7101	22s ga (bevel tip)	70 (2.75 in.)	86211	20979	1 ea
1.0	7101	22s ga (blunt tip)	70 (2.75 in.)	86200	20733	1 ea
2.0	7002	25 ga (bevel tip)	70 (2.75 in.)	88411	20751	1 ea
2.0	7002	25 ga (blunt tip)	70 (2.75 in.)	88400	20732	1 ea
2.0	7102	23 ga (bevel tip)	70 (2.75 in.)	88511	24592	1 ea
2.0	7102	23 ga (blunt tip)	70 (2.75 in.)	88500	24593	1 ea
5.0	7105	24 ga (bevel tip)	70 (2.75 in.)	88011	20980-U	1 ea
5.0	7105	24 ga (blunt tip)	70 (2.75 in.)	88000	20728	1 ea

7000 Series, KHWG (Knurled Hub with Guide)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
0.5	7000.5	25 ga (blunt tip)	70 (2.75 in.)	86254	24596	1 ea
1.0	7001	25s ga (blunt tip)	70 (2.75 in.)	80107	20944	1 ea
1.0	7101	22s ga (blunt tip)	70 (2.75 in.)	86207	20726	1 ea
2.0	7002	25 ga (blunt tip)	70 (2.75 in.)	88407	20744	1 ea
5.0	7105	24 ga (blunt tip)	70 (2.75 in.)	88007	24598	1 ea

7000 Series, KHCH (Knurled Hub with Chaney Adapter)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
0.5	7000.5	25 ga (blunt tip)	70 (2.75 in.)	86252	24594	1 ea
1.0	7001	25s ga (blunt tip)	70 (2.75 in.)	80104	20743	1 ea
5.0	7105	24 ga (blunt tip)	70 (2.75 in.)	88004	20755	1 ea

Syringes

7000 Series Modified Microliter™ Syringes

7000 Series Repair Kits

Volume (μL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
1.0	7001KH	25s ga (bevel tip)	70 (2.75 in.)	17888	26733	1 ea
1.0	7101KH	22s ga (bevel tip)	70 (2.75 in.)	17890	26736	1 ea
1.0	7001KH	25s ga (blunt tip)	70 (2.75 in.)	17188	26732-U	1 ea
1.0	7101KH	22s ga (blunt tip)	70 (2.75 in.)	17190	26735-U	1 ea
2.0	7002KH	25 ga (bevel tip)	70 (2.75 in.)	17891	26739	1 ea
5.0	7105KH	24 ga (bevel tip)	70 (2.75 in.)	17893	26745-U	1 ea
5.0	7000,5KH	25 ga (blunt tip)	70 (2.75 in.)	17187	26729	1 ea

SGE Microvolume Syringe (Plunger-in-needle), 0.5 μL- 5 μL

A sample as small as 0.1 μL is contained in the needle.



Volume (μL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
SGE Microvolume Syringe						
0.5	0.5BNR-5	23 ga (cone tip)	50 × 0.63	000300	24400	1 ea
0.5	0.5BR-7	23 ga (cone tip)	70 × 0.63	000310	24401	1 ea
0.5	0.5BNR-5BV	23 ga (bevel tip)	50 × 0.63	000301	509140	1 ea
0.5	0.5BNR-OC-5/0.47	26 ga (cone tip)	50 × 0.47	000303	509167	1 ea
1	1BR-7	23 ga (cone tip)	70 × 0.63	000505	24408	1 ea
1	1BR-5	23 ga (cone tip)	50 × 0.63	000500	509221	1 ea
1	1BR-5BV	23 ga (bevel tip)	50 × 0.63	000501	29639-U	1 ea
1	1BR-7BV	23 ga (bevel tip)	70 × 0.63	000506	509256	1 ea
1	1BNR-OC-7/0.47	26 ga (cone tip)	70 × 0.47	000570	509272	1 ea
5	5BR-7	23 ga (cone tip)	70 × 0.63	000802	24411	1 ea
5	5BR-7BV	23 ga (bevel tip)	70 × 0.63	000803	509310	1 ea

Hamilton GASTIGHT® Syringes, 1000 Series

1000 Series GASTIGHT Syringes

Suitable for applications requiring corrosive fluid transfers, pipetting, and sample preparation. Glass and PTFE construction provide an inert flow path for demanding applications. Leaktight PTFE plunger tip. Point style 2 needles included with cemented and removable needle syringes. Order needles separately for Luer tip and PTFE Luer lock syringes.

- For larger volumes
- PTFE plunger tip gives an inert, leak-tight seal for corrosive gases and liquids, radioactive materials, and sterile solutions
- Accurate to within ±1% of the total volume
- Temperature limit 115 °C for removable needle



20723



20740-U



26210-U

1000 Series, LTN (Fixed Needle)

Volume (mL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
1.0	1001LTN	22 ga (bevel tip)	51 (2 in.)	81317	20740-U	1 ea
1.25	1001.25LTN	22 ga (bevel tip)	51 (2 in.)	82017	24589	1 ea
2.5	1002LTN	22 ga (bevel tip)	51 (2 in.)	81417	20691	1 ea
5.0	1005LTN	22 ga (bevel tip)	51 (2 in.)	81517	20692	1 ea
10.0	1010LTN	22 ga (bevel tip)	51 (2 in.)	81617	20693	1 ea

Syringes

Hamilton GASTIGHT® Syringes, 1000 Series: 1000 Series GASTIGHT Syringes

1000 Series, LTN (Fixed Needle), Pt. #5 (Side Port)

Volume (mL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
1.0	1001LTN	22 ga (cone tip, side-port)	51 (2 in.)	81343	20709	1 ea
2.5	1002LTN	22 ga (cone tip, side-port)	51 (2 in.)	81443	20710-U	1 ea
5.0	1005LTN	22 ga (cone tip, side-port)	51 (2 in.)	81543	24590	1 ea
10.0	1010LTN	22 ga (cone tip, side-port)	51 (2 in.)	81643	24591	1 ea

1000 Series, RN (Removable Needle)

Volume (mL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
1	1001RN	22 ga (bevel tip)	51 (2 in.)	81330	22192-U	1 ea
2.5	1002RN	22 ga (bevel tip)	51 (2 in.)	81430	22193-U	1 ea
5.0	1005RN	22 ga (bevel tip)	51 (2 in.)	81530	22194-U	1 ea
10.0	1010RN	22 ga (bevel tip)	51 (2 in.)	81630	22195	1 ea

1000 Series, LT (Luer Tip)

Volume (mL)	Description	Needle	Needle L	Hamilton No.	Cat. No.	Qty
1.0	1001LT	(not included)	(n/a)	81301	20720	1 ea
1.25	1001.25LT	(not included)	(n/a)	82001	24588	1 ea
2.5	1002LT	(not included)	(n/a)	81401	20721	1 ea
5.0	1005LT	(not included)	(n/a)	81501	20722	1 ea
10.0	1010LT	(not included)	(n/a)	81601	20723	1 ea

1000 Series, TLL (PTFE Luer Lock)



TLL (PTFE Luer Lock) - 25mL to 100mL



TLL (PTFE Luer Lock), 1mL to 10mL

Volume (mL)	Description	Needle	Needle L	Hamilton No.	Cat. No.	Qty
1.0	1001TLL	(not included)	(n/a)	81320	20997	1 ea
2.5	1002TLL	(not included)	(n/a)	81420	20998	1 ea
5.0	1005TLL	(not included)	(n/a)	81520	20999	1 ea
10.0	1010TLL	(not included)	(n/a)	81620	21000-U	1 ea
25.0	1025TLL	(not included)	(n/a)	82520	20683	1 ea
50.0	1050TLL	(not included)	(n/a)	85020	20707	1 ea
100.0	1100TLL	(not included)	(n/a)	86020	21967	1 ea

1000 Series, TLL (PTFE Luer Lock) with slots

Volume (mL)	Description	Needle	Needle L	Hamilton No.	Cat. No.	Qty
1.0	1001TLL	(not included)	(n/a)	81327	26208	1 ea
2.5	1002TLL	(not included)	(n/a)	81427	26209	1 ea
5.0	1005TLL	(not included)	(n/a)	81527	26210-U	1 ea
10.0	1010TLL	(not included)	(n/a)	81627	26211-U	1 ea
25.0	1025TLL	(not included)	(n/a)	82527	26212	1 ea
50.0	1050TLL	(not included)	(n/a)	85027	26213	1 ea

Syringes

SGE Gas Tight Syringes, 1 mL to 100 mL

SGE Gas Tight Syringes, 1 mL to 100 mL



From left to right; 21965-U, 21533

Gas Tight syringes are constructed of borosilicate glass, PTFE plunger tips, and KEL-F Luer cones where applicable. An interference fit between the plunger tip and the barrel enhances the gas sealing properties of the syringe. Plungers are interchangeable. Syringes can be autoclaved, but the plunger should be removed.

- Maximum inertness for liquid or gas samples
- Suitable for manual dispenser/diluter applications
- High accuracy of dispensed volume
- Wide variety of terminations

SGE Gas Tight Syringe, Fixed Needle

Volume (mL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
1	1MDF-GT-1ML	22 ga	50 × 0.72	008102	29638-U	1 ea

SGE Gas Tight Syringes, Removable Needle

Volume (mL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
1	1MR-GT	23 ga (bevel tip)	50 × 0.63	008100	509388	1 ea
2.5	2.5MDR-GT	23 ga (bevel tip)	50 × 0.63	008500	509396	1 ea
5	5MDR-GT	23 ga (bevel tip)	50 × 0.63	008700	509418	1 ea
10	10MDR-GT	23 ga (bevel tip)	50 × 0.63	008900	509426	1 ea

SGE Gas Tight Syringes, Luer Lock

These syringes are supplied without a needle.

Volume (mL)	Description	Needle	Needle L	SGE No.	Cat. No.	Qty
1	1MDF-LL-GT	(not included)	(n/a)	008025	21964	1 ea
2.5	2.5MDF-LL-GT	(not included)	(n/a)	008425	509493	1 ea
5	5MDR-LL-GT	(not included)	(n/a)	008760	21965-U	1 ea
10	10MDR-LL-GT	(not included)	(n/a)	008960	509507	1 ea
25	25MDR-LL-GT	(not included)	(n/a)	009462	509515	1 ea
50	50MR-LL-GT	(not included)	(n/a)	009660	21532	1 ea
100	100MR-LL-GT	(not included)	(n/a)	009760	21533	1 ea

SGE Syringes Fitted with Luer Lock Valve

Volume (mL)	Description	Needle	Needle L	SGE No.	Cat. No.	Qty
1	1MDR-VLL-GT	(not included)	(n/a)	008160	509590	1 ea
5	5MDR-VLLMA-GT	(not included)	(n/a)	008770	509612	1 ea
10	10MDR-VLLMA-GT	(not included)	(n/a)	008970	509620	1 ea
25	25MDR-VLLMA-GT	(not included)	(n/a)	009472	509639	1 ea
100	100MR-VLLMA-GT	(not included)	(n/a)	009770	509655	1 ea

Syringes

Hamilton GASTIGHT® Syringes, 1700 Series

Hamilton GASTIGHT® Syringes, 1700 Series

Hamilton® SampleLock syringe

- Twist valve locks the sample in the syringe
- Positive rear plunger stop eliminates sample loss and plunger blowout at high pressures (not applicable to 1705 and 1710 models)
- Connects to either male or female Luer fittings by using an adapter. Male and female luer and male luer lock adapters thread onto the SampleLock valve making the syringe compatible with many connectors and fittings. All adapters have a Kel-F™ (CTFE) fluid path, with a port diameter of 0.039 in.
- Internal standards can be added through the valve port into the sample contained in the syringe

stainless steel needle bevel tip (point style 2)

We recommend Replacement Needle Cat. No. 19136-U (22s ga needle) for the 1705SL, 1710SL, & 1725SL syringes; Cat. No. 19137-U (22 ga needle) is recommended for the larger syringes. Both replacement needles will fit 250 µL to 10 mL syringes and will fit any SampleLock syringe.

Plunger Assemblies are available for the 1705SL (Cat. No. 26152-U) & 1710SL (Cat. No. 26154) syringes.



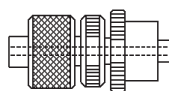
Volume	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
50 µL	1705SL	22s ga (bevel tip)	51 (2 in.)	80956	26280-U	1 ea
100 µL	1710SL	22s ga (bevel tip)	51 (2 in.)	81056	26281	1 ea
250 µL	1725SL	22s ga (bevel tip)	51 (2 in.)	81156	26282	1 ea
500 µL	1750SL	22 ga (bevel tip)	51 (2 in.)	81256	26283	1 ea
1.0 mL	1001SL	22 ga (bevel tip)	51 (2 in.)	81356	26284	1 ea
2.5 mL	1002SL	22 ga (bevel tip)	51 (2 in.)	81456	26285	1 ea
5.0 mL	1005SL	22 ga (bevel tip)	51 (2 in.)	81556	26286	1 ea
10.0 mL	1010SL	22 ga (bevel tip)	51 (2 in.)	81656	26287	1 ea
25.0 mL	1025SL	22 ga (bevel tip)	51 (2 in.)	86326	26288	1 ea
50.0 mL	1050SL	22 ga (bevel tip)	51 (2 in.)	86336	26289	1 ea
100.0 mL	1100SL	22 ga (bevel tip)	51 (2 in.)	86346	26290-U	1 ea

Plunger Assemblies for Sample Lock syringes

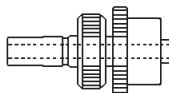
Syringe Volume (µL)	Description	Hamilton No.	Cat. No.	Qty
50	1705 LT, RN, or TLL	1162-01	26152-U	1 ea
100	1710 C, LT, N, RN, or TLL	1162-02	26154	1 ea

Hamilton® Hub Adapter

for use with Hamilton Sample Lock Syringes



26293 - Accepts female luer or female luer lock



26292 - Accepts female luer

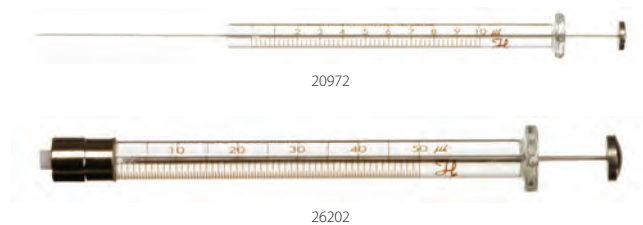
Volume (µL)	Description	Hamilton No.	Cat. No.	Qty
250	Male Luer/Removable needle hub converts large hub RN termination (250 µL or larger) to a Male luer connection.	35080	26292	1 ea
250	Male Luer Lock/Removable needle hub converts large hub (250 µL or larger) to a Male Luer Lock connection	35083	26293	1 ea

Syringes

Hamilton GASTIGHT® Syringes, 1700 Series: 1700 Series GASTIGHT Syringes

1700 Series GASTIGHT Syringes

LTN style syringes supplied with a cemented needle. Luer tip and PTFE Luer Lock syringes are not supplied with a needle.



1700 Series, N (Cemented Needle)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	1701N	26s ga (bevel tip)	51 (2 in.)	80000	20972	1 ea
25	1702N	22s ga (bevel tip)	51 (2 in.)	80200	20973	1 ea
50	1705N	22s ga (bevel tip)	51 (2 in.)	80900	20687	1 ea
100	1710N	22s ga (bevel tip)	51 (2 in.)	81000	20688	1 ea
250	1725N	22s ga (bevel tip)	51 (2 in.)	81100	20689	1 ea

1700 Series, LTN (Luer Tip Cemented Needle)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
500	1750LTN	22 ga (bevel tip)	51 (2 in.)	81217	20690-U	1 ea

1700 Series, N (Cemented Needle) Cone Tip, Side-Port

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	1701N	26s ga (side-port)	51 (2 in.)	80039	24585	1 ea
25	1702N	22s ga (side-port)	51 (2 in.)	80239	24586	1 ea
250	1725	22s ga (side-port)	51 (2 in.)	81139	20705	1 ea
500	1750	22 ga (side-port)	51 (2 in.)	81243	20708	1 ea

1700 Series, NCH (Cemented Needle with Chaney Adapter)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	1701NCH	26s ga (bevel tip)	51 (2 in.)	80004	20974	1 ea

1700 Series, RN (Removable Needle)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	1701RN	26s ga (bevel tip)	51 (2 in.)	80030	20780-U	1 ea
25	1702RN	22s ga (bevel tip)	51 (2 in.)	80230	20781	1 ea
50	1705RN	22s ga (bevel tip)	51 (2 in.)	80930	20782	1 ea
100	1710RN	22s ga (bevel tip)	51 (2 in.)	81030	20783	1 ea
250	1725RN	22s ga (bevel tip)	51 (2 in.)	81130	20784	1 ea
500	1750RN	22 ga (bevel tip)	51 (2 in.)	81230	20785-U	1 ea

1700 Series, LT (Luer Tip, no needle)



Volume (µL)	Description	Needle	Needle L	Hamilton No.	Cat. No.	Qty
10	1701LT	(not included)	(n/a)	80001	20976	1 ea
25	1702LT	(not included)	(n/a)	80201	20977	1 ea
50	1705LT	(not included)	(n/a)	80901	20715	1 ea
100	1710LT	(not included)	(n/a)	81001	20716	1 ea

Syringes

Hamilton GASTIGHT® Syringes, 1700 Series: 1700 Series GASTIGHT Syringes

1700 Series, LT (Luer Tip, no needle) (continued)

Volume (µL)	Description	Needle	Needle L	Hamilton No.	Cat. No.	Qty
250	1725LT	(not included)	(n/a)	81101	20717	1 ea
500	1750LT	(not included)	(n/a)	81201	20714	1 ea

1700 Series, TLL (PTFE Luer Lock, no needle)

Volume (µL)	Description	Needle	Needle L	Hamilton No.	Cat. No.	Qty
50	1705TLL	(not included)	(n/a)	80920	26202	1 ea
100	1710TLL	(not included)	(n/a)	81020	26203	1 ea
250	1725TLL	(not included)	(n/a)	81120	20915	1 ea
500	1750TLL	(not included)	(n/a)	81220	20916	1 ea

1700 Series, TLL (PTFE Luer Lock, no needle) with slots

needle size (not included)



26204

Volume (µL)	Description	Needle	Needle L	Hamilton No.	Cat. No.	Qty
50	1705TLL	(not included)	(n/a)	80927	26204	1 ea
100	1710TLL	(not included)	(n/a)	81027	26205	1 ea
250	1725TLL	(not included)	(n/a)	81127	26206	1 ea
500	1750TLL	(not included)	(n/a)	81227	26207	1 ea

SGE Gas Tight Syringes, 10 µL to 10 mL



SGE Gas Tight syringe

Gas Tight syringes are constructed of borosilicate glass, PTFE plunger tips, and KEL-F Luer cones where applicable. An interference fit between the plunger tip and the barrel enhances the gas sealing properties of the syringe. Plungers are interchangeable. Syringes can be autoclaved, but the plunger should be removed.

- Maximum inertness for liquid or gas samples
- Suitable for manual dispenser/diluter applications
- High accuracy of dispensed volume
- Wide variety of terminations

SGE Gas Tight Syringes, Fixed Needle

Volume (µL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
10	10F-GT	26 ga (bevel tip)	50 × 0.47	002200	26256	1 ea
25	25F-GT	25 ga (bevel tip)	50 × 0.50	003200	26257	1 ea
50	50F-GT	25 ga (bevel tip)	50 × 0.50	004200	26258-U	1 ea
100	100F-GT	25 ga (bevel tip)	50 × 0.50	005200	26259	1 ea
250	250F-GT	25 ga (bevel tip)	50 × 0.50	006200	26260-U	1 ea
500	500F-GT	25 ga (bevel tip)	50 × 0.50	007200	26261	1 ea

SGE Gas Tight Syringes, Removable Needle

Volume	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
10 µL	10R-GT	26 ga (bevel tip)	50 × 0.47	002250	26237	1 ea
25 µL	25R-GT	25 ga (bevel tip)	50 × 0.50	003250	26262	1 ea
50 µL	50R-GT	25 ga (bevel tip)	50 × 0.50	004250	26263	1 ea
100 µL	100R-GT	25 ga (bevel tip)	50 × 0.50	005250	26264	1 ea
250 µL	250R-GT	25 ga (bevel tip)	50 × 0.50	006250	26265	1 ea

Syringes

SGE Gas Tight Syringes, 10 µL to 10 mL

Volume	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
500 µL	500R-GT	25 ga (bevel tip)	50 × 0.50	007250	26266	1 ea
1 mL	1MR-GT	23 ga (bevel tip)	50 × 0.63	008100	509388	1 ea
2.5 mL	2.5MDR-GT	23 ga (bevel tip)	50 × 0.63	008500	509396	1 ea
5 mL	5MDR-GT	23 ga (bevel tip)	50 × 0.63	008700	509418	1 ea
10 mL	10MDR-GT	23 ga (bevel tip)	50 × 0.63	008900	509426	1 ea

SGE Gas Tight Syringes, Luer Lock

These syringes are supplied without a needle.

Volume	Description	Needle	Needle L	SGE No.	Cat. No.	Qty
50 µL	50F-LL-GT	(not included)	(n/a)	004230	509450	1 ea
100 µL	100F-LL-GT	(not included)	(n/a)	005230	509469	1 ea
250 µL	250F-LL-GT	(not included)	(n/a)	006230	509477	1 ea
500 µL	500F-LL-GT	(not included)	(n/a)	007230	509485	1 ea
1 mL	1MDF-LL-GT	(not included)	(n/a)	008025	21964	1 ea
2.5 mL	2.5MDF-LL-GT	(not included)	(n/a)	008425	509493	1 ea
5 mL	5MDR-LL-GT	(not included)	(n/a)	008760	21965-U	1 ea
10 mL	10MDR-LL-GT	(not included)	(n/a)	008960	509507	1 ea
25 mL	25MDR-LL-GT	(not included)	(n/a)	009462	509515	1 ea
50 mL	50MR-LL-GT	(not included)	(n/a)	009660	21532	1 ea
100 mL	100MR-LL-GT	(not included)	(n/a)	009760	21533	1 ea

SGE Syringes with Removable Needle Valve

Volume (µL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
100	100R-V-GT	23 ga	50 × 0.63	005279	509531	1 ea
250	250R-V-GT	23 ga	50 × 0.63	006279	509558	1 ea

Hamilton GASTIGHT® Syringes, 1800 Series

- Ideal for corrosive, radioactive, or sterile materials
- Removable handle minimizes heat transfer from hand to sample, making the syringe easy to hold
- Accurate and reproducible to ±1%
- Field repairable

1800 series, N (cemented needle)



Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	1801N	26s ga (bevel tip)	51 (2 in.)	84875	21390	1 ea
25	1802N	22s ga (bevel tip)	51 (2 in.)	84878	21391	1 ea
50	1805N	22s ga (bevel tip)	51 (2 in.)	84881	21392	1 ea
100	1810N	22s ga (bevel tip)	51 (2 in.)	84884	21393	1 ea
250	1825N	22s ga (bevel tip)	51 (2 in.)	84887	21394	1 ea

Syringes

Hamilton GASTIGHT® Syringes, 1800 Series

1800 series, RN (removable needle)



Volume (μL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
10	1801RN	26s ga (bevel tip)	51 (2 in.)	84877	21395	1 ea
25	1802RN	22s ga (bevel tip)	51 (2 in.)	84880	21396	1 ea
50	1805RN	22s ga (bevel tip)	51 (2 in.)	84883	21397	1 ea
100	1810RN	22s ga (bevel tip)	51 (2 in.)	84886	21398	1 ea
250	1825RN	22s ga (bevel tip)	51 (2 in.)	84889	21399	1 ea

Hamilton On-Column Syringes

Use the 701RNFS syringes with liquid samples. A PTFE plunger tip makes the 1701RNFS syringes gas tight. Syringes come with a replaceable fused silica needle. Capacity 10 μL, 0.17 mm OD, 10 cm length, point style #3. Use with 0.20 mm I.D. or larger columns.

On-Column Injection, Fixed Needle Microliter™ Syringes

Volume (μL)	Description	Size	Needle L (cm)	Hamilton No.	Cat. No.	Qty
10	701SN	32 ga (blunt tip)	7.5	80351	21351	1 ea
10	701SN	32 ga (blunt tip)	12.5	80308	21352	1 ea

On-column Injection, Removable Needle, Fused Silica

Volume (μL)	Description	Needle	Needle L × O.D.	Hamilton No.	Cat. No.	Qty
10	701RNFS	(blunt tip)	10 cm × 0.17 mm	87402	21359	1 ea
10	701RN	(bevel tip)	12.5 cm × 0.23 mm	80386	26724	1 ea

Fused Silica Needles for RNFS Syringes (PTFE Syringe Tubing may be found with Syringe Accessories)

Volume (μL)	Description	Size	Needle L	Hamilton No.	Cat. No.	Qty
10	RNFS	(blunt tip)	11.5 ×	17076	26725	1 ea

Precision Sampling Syringes

Valco® Precision Sampling Syringe, Series A

Series A - Removable Needle: This Pressure-Lok syringe allows storage of sample within the syringe. Rotary valve in the needle hub allows for sample pre-pressurization prior to injection.

- Integral sample storage valve - actuated by turning the nose piece
- Positive rear flange plunger stop - prevents plunger from blowing out of barrel at elevated pressure
- Modular construction - all components may be quickly disassembled for easy cleaning or replacement
- Leak-tight to 250 psi - liquids and gases



Volume (mL)	Description	Needle	Needle L × O.D. × I.D. (in.)	VICI No.	Cat. No.	Qty
0.10	Series A	(bevel tip)	2.25 × 0.029 × 0.012	010025	22261	1 ea
0.25	Series A	(bevel tip)	2.25 × 0.029 × 0.012	010031	22262	1 ea
0.50	Series A	(bevel tip)	2.25 × 0.029 × 0.012	010032	22263	1 ea
1	Series A	(bevel tip)	2.25 × 0.029 × 0.012	010033	22264	1 ea
2	Series A	(bevel tip)	2.25 × 0.029 × 0.012	010034	22265	1 ea
5	Series A	(bevel tip)	2.25 × 0.029 × 0.012	010035	22266	1 ea
10	Series A	(bevel tip)	2.25 × 0.029 × 0.012	010036	22267	1 ea

Syringes

Precision Sampling Syringes

Valco® Precision Sampling Syringe, Series A-2

Series A-2 - Removable Needle: An economically priced general purpose syringe, it is leak-tight to 250 psi for both gas and liquids.

- Push-button valve - allows instantaneous injection
- Smaller volumes - great for small volatile samples



Volume	Description	Needle	Needle L × O.D. × I.D. (in.)	VICI No.	Cat. No.	Qty
25 µL	Series A-2	(bevel tip)	2 × 0.028 × 0.005	050023	22268	1 ea
50 µL	Series A-2	(bevel tip)	2 × 0.028 × 0.005	050024	22269-U	1 ea
0.10 mL	Series A-2	(bevel tip)	2 × 0.028 × 0.005	050025	22270-U	1 ea
0.25 mL	Series A-2	(bevel tip)	2 × 0.029 × 0.012	050031	22271	1 ea
0.50 mL	Series A-2	(bevel tip)	2 × 0.029 × 0.012	050032	22272	1 ea
1 mL	Series A-2	(bevel tip)	2 × 0.029 × 0.012	050033	22273	1 ea
2 mL	Series A-2	(bevel tip)	2 × 0.029 × 0.012	050034	22274	1 ea
5 mL	Series A-2	(bevel tip)	2 × 0.029 × 0.012	050035	22275	1 ea
10 mL	Series A-2	(bevel tip)	2 × 0.029 × 0.012	050036	22276	1 ea

Valco® Precision Sampling Syringe, Series C

Series C - Removable Needle: A heavy duty gas syringe, it features a positive rear plunger stop and a special low-dead volume, removable needle. No sample storage capacity.



Volume (mL)	Description	Needle	Needle L × O.D. × I.D. (in.)	VICI No.	Cat. No.	Qty
0.10	Series C	(bevel tip)	2 × 0.029 × 0.012	030025	22277	1 ea
1	Series C	(bevel tip)	2 × 0.029 × 0.012	030033	22280	1 ea
2	Series C	(bevel tip)	2 × 0.029 × 0.012	030034	22281	1 ea
5	Series C	(bevel tip)	2 × 0.029 × 0.012	030035	22282	1 ea

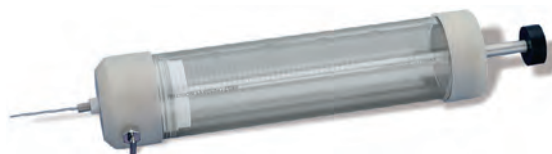
Valco® Precision Sampling syringe, Magnum series

Magnum Series - Removable Needle: This Pressure-Lok series syringe allows sampling and storage of samples up to 500 mL. A low-dead volume, removable needle is used, and a rotary valve allows on-site sampling for later analysis. It is ideal for collection, trace analysis and sample concentration of environmental contaminants.

Magnum Series

needle size (bevel tip)

needle L × O.D. × I.D. 2 in. × 0.035 in. × 0.023 in.



Volume (mL)	Description	Needle	Needle L × O.D. × I.D. (in.)	VICI No.	Cat. No.	Qty
100	Magnum Series	(bevel tip)	2 × 0.035 × 0.023	060040	21736	1 ea
500	Magnum Series	(bevel tip)	2 × 0.035 × 0.023	060042	21738	1 ea

Syringes

Precision Sampling Syringes

Valco® Precision Sampling syringe, series C-120

C-120 – Fixed Needle: A general purpose chromatography syringe with a PTFE-tipped plunger. Leak-tight to 250 psi.



Volume (μL)	Description	Needle	Needle L (in.)	VICI No.	Cat. No.	Qty
10	C-120	(bevel tip)	2	120022	20961	1 ea
25	C-120	(bevel tip)	2	120023	20962	1 ea
100	C-120	(bevel tip)	2	120025	20964	1 ea

Valco® Precision Sampling syringe, series C-160

C-160 – Fixed Needle: An economically priced general purpose syringe, it is leak-tight to 250 psi for both gas and liquids.



Volume (μL)	Description	Needle	Needle L (in.)	VICI No.	Cat. No.	Qty
100	C-160	(bevel tip)	2	160025	20953	1 ea

Valco® Precision Sampling syringe, series D

Series D - Removable Needle: This standard gas sampling syringe is well-suited for routine laboratory applications. It is leak tight to 250 psi and comes with a special low-dead volume needle connector for gas samples.



Volume (mL)	Description	Needle	Needle L × O.D. × I.D. (in.)	VICI No.	Cat. No.	Qty
2	Series D	(bevel tip)	2 × 0.029 × 0.012	040034	22295	1 ea

Valco® Precision Sampling syringe, series CG-130

CG-130: This model has a reinforced plunger syringe with an internal guide and special plunger that eliminates bending problems.

CG-130



Volume (μL)	Description	Needle	Needle L (in.)	VICI No.	Cat. No.	Qty
5	CG-130	(bevel point)	2	130021	20954	1 ea
10	CG-130	(bevel point)	2	130022	20955-U	1 ea

Valco® Precision Sampling syringe, series D-140

D-140 – Removable Needle: A plunger-in-needle design is featured in this GC sample injection syringe. A positive rear stop prevents plunger bending. It fills by retracting the plunger, and features easy maintenance and replaceable parts.



Volume (μL)	Description	Size	Needle L × O.D. × I.D. (in.)	VICI No.	Cat. No.	Qty
2	D-140	-	2½ × 0.019 × 0.008	140012	20985	1 ea

Syringes

Precision Sampling Syringes: Replacement Needles for VICI Precision Sampling Syringes

Replacement Needles for VICI Precision Sampling Syringes

Precision Sampling syringe needles



Volume (μL)	Description	Size	Needle L × O.D. × I. D. (in.)	VICI No.	Cat. No.	Qty
5-10	CG-130	-	2.25 × 0.019 × 0.005	123050	20949	3 ea
25-10000	A-2, C, D	-	2.0 × 0.028 × 0.005	943050	22298-U	3 ea
25-10000	A-2, C, D	-	2.0 × 0.029 × 0.012	943052	22289	3 ea
100-10000	Series A	-	2.25 × 0.029 × 0.012	913050	20996	3 ea
100-10000	Series A	-	2.25 × 0.029 × 0.012	913052	22288	3 ea
100-10000	A-2, C, D	-	2.0 × 0.029 × 0.012	943051	22299	3 ea
50000-500000	Magnum Series	-	2.0 × 0.035 × 0.023	953050	21740-U	3 ea

Valco® Precision Sampling plunger tips

For series A, A-2, C, and D Pressure-Lok Gas syringes. For 25 μL to 250 μL syringes, factory repair only.

for use with Series A, A-2, C, & D Precision Sampling Syringe

PTFE

Size	Description	VICI No.	Cat. No.	Qty
500 μL	plunger tip for 500μL syringe	013932	21950	2 ea
1 mL	plunger tip for 1mL syringe	013933	21951	2 ea
2 mL	plunger tip for 2mL syringe	013934	21952-U	2 ea
5 mL	plunger tip for 5mL syringe	013935	21953-U	2 ea

Syringes

Hamilton Syringe Replacement Parts

Hamilton Syringe Replacement Parts



Standard RN Needles

**Point Style #1: Cone Tip**

Recommended for use with pre-drilled septa. The shape of this needle has been developed for multi-injections on the Agilent/HP 7673A autosampler.

**Point Style #2: Bevel Tip**

The bevel tip (22° on Hamilton syringes, 20° on SGE syringes) is designed for optimum septum penetration and to prevent septum coring.

**Point Style #3: Blunt Tip**

The 90° blunt tip has chamfered and polished edges that eliminate damage to the valve's rotor seal and stator face. This style also can be used for pipetting of liquids.

**Point Style #5: Cone Tip, Side-port hole**

Liquid samples can be filled and dispensed through the side hole, and septum damage is minimized by the solid domed tip.

Needles for Hamilton® RN Syringes, Point Style #1 (Cone Tip)

Volume (µL)	Description	Needle	Needle L × O.D. (mm)	Hamilton No.	Cat. No.	Qty
5-10	ASRN	23s ga (cone tip)	43 × 0.64	7786-01	21327-U	6 ea
5-10	ASRN	26s ga (cone tip)	43 × 0.47	7786-02	21326	6 ea
5-10	ASRN	23s-26s ga (cone tip)	43 × 0.47-0.63	7785-01	24582	6 ea

Needles for Hamilton® RN Syringes, Point Style #2 (Bevel Tip)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
2.5-100	bevel tip (stainless steel)	22 ga	51 (2 in.)	7758-01	Z288993-1PAK	3 ea
2.5-100	bevel tip (stainless steel)	22 ga	76 (3 in.)	7804-01	Z118117-6EA	6 ea
2.5-100	bevel tip (stainless steel)	22 ga	101.5 (4 in.)	7804-01	Z118125-3EA Z118125-6EA	3 ea 6 ea
2.5-100	bevel tip (stainless steel)	22s ga	51 (2 in.)	7758-03	19133-U	6 ea
2.5-100	bevel tip (stainless steel)	26s ga	51 (2 in.)	7758-02	19131-U	6 ea
2.5-100	bevel tip (stainless steel)	26s ga	101.5 (4 in.)	7804-04	Z121401-6EA	6 ea
2.5-100	bevel tip (stainless steel)	26 ga	51 (2 in.)	7758-04	19132-U	6 ea
250-10000	bevel tip (stainless steel)	22 ga	51 (2 in.)	7779-01	19137-U	6 ea
250-10000	bevel tip (stainless steel)	22 ga	101.5 (4 in.)	7806-01	Z118109-6EA	6 ea
250-10000	bevel tip (stainless steel)	22s ga	51 (2 in.)	7779-03	19136-U	6 ea
250-10000	bevel tip (stainless steel)	26 ga	51 (2 in.)	7779-04	19135-U	6 ea
250-10000	bevel tip (stainless steel)	26s ga	51 (2 in.)	7779-02	19134-U	6 ea

Syringes

Hamilton Syringe Replacement Parts

Needles for Hamilton® RN Syringes, Point Style #3 (Blunt Tip)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
2.5-100	blunt tip (stainless steel)	22s ga	51 (2 in.)	7770-01	19139-U	6 ea
2.5-100	blunt tip (stainless steel)	25s ga (Waters)	50 (1.97 in.)	8647-01	58398	6 ea
2.5-100	blunt tip (stainless steel)	26s ga	51 (2 in.)	7768-01	19138-U	6 ea
250-10000	blunt tip (PEEK)	16 ga	51 (2 in.)	8650-01	26710-U	6 ea
250-10000	blunt tip (stainless steel)	22s ga	51 (2 in.)	7780-03	19142-U	6 ea
250-10000	blunt tip (stainless steel)	25s ga (Waters)	50 (1.97 in.)	8648-01	58399	6 ea
250-10000	blunt tip (stainless steel)	22 ga	51 (2 in.)	7780-04	19143-U	6 ea
250-10000	blunt tip (stainless steel)	26s ga	51 (2 in.)	7780-01	19140-U	6 ea
250-10000	blunt tip (stainless steel)	26 ga	51 (2 in.)	7780-02	19141-U	6 ea

Needles for Hamilton® HPLC Syringes for Waters

for use with Waters U6K Loop Injector

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
2.5-100	blunt tip (stainless steel)	25s ga (Waters)	50 (1.97 in.)	8647-01	58398	6 ea
250-10000	blunt tip (stainless steel)	25s ga (Waters)	50 (1.97 in.)	8648-01	58399	6 ea

Needles for Hamilton® RN Syringes, Point Style #5 (Cone Tip, Side port Hole)

Volume (µL)	Description	Needle	Needle L (mm)	Hamilton No.	Cat. No.	Qty
2.5-100	cone tip, side port	26s ga	51 (2 in.)	7784-07	19144-U	6 ea
2.5-100	cone tip, side port	22s ga	51 (2 in.)	7784-05	19146-U	6 ea
250-10000	cone tip, side port	26s ga	51 (2 in.)	7784-03	19147-U	6 ea
250-10000	cone tip, side port	22s ga	51 (2 in.)	7784-01	19151-U	6 ea
250-10000	cone tip, side port	26 ga	51 (2 in.)	7784-04	19148-U	6 ea
250-10000	cone tip, side port	22 ga	51 (2 in.)	7784-02	19154-U	6 ea

Needles for LT and TLL syringes

Hamilton® Needles for LT and TLL Syringes

needle L 51 mm (2 in.)



Metal Hub Needles



Kel-F Hub Needles

Volume	Description	Size	Needle L (mm)	Hamilton No.	Cat. No.	Qty
(n/a)	Metal hub	28 ga (bevel tip)	51 (2 in.)	90028	20757	6 ea
(n/a)	Metal hub	22 ga (bevel tip)	51 (2 in.)	90022	21746	6 ea
(n/a)	Metal hub	22s ga (bevel tip)	51 (2 in.)	90038	21748-U	6 ea
(n/a)	Metal hub	22 ga (blunt tip)	51 (2 in.)	91022	21741	6 ea
(n/a)	Metal hub	22 ga (cone tip, side-port)	51 (2 in.)	90222	20803	6 ea
(n/a)	KEL-F hub	28 ga (bevel tip)	51 (2 in.)	90128	20756	6 ea
(n/a)	KEL-F hub	22s ga (bevel tip)	51 (2 in.)	90138	21749	6 ea
(n/a)	KEL-F hub	22 ga (bevel tip)	51 (2 in.)	90122	21747	6 ea

Syringes

Hamilton Syringe Replacement Parts: *Needles for LT and TLL syringes*

Hamilton® Needles for LT and TLL Syringes (continued)

Volume	Description	Size	Needle L (mm)	Hamilton No.	Cat. No.	Qty
(n/a)	KEL-F hub	22 ga (blunt tip)	51 (2 in.)	90134	21744	6 ea
(n/a)	KEL-F hub	22s ga (blunt tip)	51 (2 in.)	90534	Z288977-1PAK	6 ea
(n/a)	KEL-F hub	22s ga (cone tip, side-port)	51 (2 in.)	90438	21743	6 ea
(n/a)	KEL-F hub	22 ga (cone tip, side-port)	51 (2 in.)	90422	21742-U	6 ea

Syringe barrels, plunger assemblies, and repair kits

Hamilton® syringe barrel



Replacement Barrel Assemblies for 800 Series Syringes

Volume (mL)	Description	Hamilton No.	Cat. No.	Qty
5.0	1005	10123	Z267368-1EA	1 ea
10	1010	10124	Z267376-1EA	1 ea

Hamilton® Plunger Assemblies with tips for series 1000, 1700, and 1800

For field repair of Hamilton Series 1000, 1700, and 1800 syringes.



Plunger Assemblies

Syringe Volume	Description	Hamilton No.	Cat. No.	Qty
1 mL	1001 LT-N-LTN-RN	1359-01	26159	1 ea
2.5 mL	1002 LT-LTN-RN-TLL	1360-01	26161	1 ea
5 mL	1005, all	13230	26162	1 ea
10 mL	1010 LT-LTN-RN-TLL	13231	26163	1 ea
10 µL	1701, all	13205	21343	1 ea
25 µL	1702 C, LT, N, or RN	1122-01	26150	1 ea
50 µL	1705 LT, RN, or TLL	1162-01	26152-U	1 ea
100 µL	1710 C, LT, N, RN, or TLL	1162-02	26154	1 ea
250 µL	1725 LT, N, RN, or TLL	1162-03	26156	1 ea
500 µL	1750 LT, LTN, RN, or TLL	1169-01	26158-U	1 ea
10 µL	1801 N, RN	32193	27383	1 ea
25 µL	1802 N, RN	1160-01	26151	1 ea
50 µL	1805 N, RN	1161-01	26153	1 ea
100 µL	1810 N, RN	1161-02	26155-U	1 ea

Syringes

Hamilton Syringe Replacement Parts: *Syringe barrels, plunger assemblies, and repair kits***7000 series repair kits**

Kit includes needle, plunger wire, ferrule, and instructions.

Needle L (mm)	Description	Hamilton No.	Cat. No.	Qty
70 (2.75 in.)	7001KH	17888	26733	1 ea
70 (2.75 in.)	7101KH	17890	26736	1 ea
70 (2.75 in.)	7001KH	17188	26732-U	1 ea
70 (2.75 in.)	7101KH	17190	26735-U	1 ea
70 (2.75 in.)	7002KH	17891	26739	1 ea
70 (2.75 in.)	7105KH	17893	26745-U	1 ea
70 (2.75 in.)	7000.5KH	17187	26729	1 ea

SGE Replacement Needles**SGE Needles for RN syringes**

Volume (µL)	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
0.5	NP 0.5BN-5C	23 ga (cone tip)	50 × 0.63	033010	24424	1 ea
1	1B-5C	23 ga (cone tip)	50 × 0.63	034055	509248	1 ea
1	1B-7C	23 ga (cone tip)	70 × 0.63	034057	24432	1 ea
5	N5-5	26 ga (bevel tip)	50 × 0.47	036110	24436	5 ea
5	NP5B-7C	23 ga (cone tip)	70 × 0.63	035057	24435	1 ea
10	10R-S-0.63	23 ga (cone tip)	42 × 0.63	037747	24442	2 ea
10	N10-VA8X00H-II	25 ga (cone tip side-port)	53 × 0.50	037777	24445	1 ea
10	N10-5	26 ga (bevel tip)	50 × 0.47	037110	24437	5 ea
10	10R-HP-0.63	23 ga (cone tip)	42 × 0.63	037717	24439	2 ea
10	for 10R-VA8X, 8035	25 ga (bevel tip)	50 × 0.50	037776	24444	2 ea
25	25R-HP-0.63	23 ga (cone tip)	42 × 0.63	038717	509728	2 ea
25-500	N25/500-5	25 ga (bevel tip)	50 × 0.50	038110	24447	5 ea

SGE Needles for Luer Lock Syringes

26270-U

Volume	Description	Needle	Needle L × O.D. (mm)	SGE No.	Cat. No.	Qty
(n/a)	NLL-5/23	23 ga (bevel tip)	50 × 0.63	39802	26270-U	5 ea
(n/a)	NLL-5/23H	23 ga (side hole/dome)	50 × 0.63	39803	26271	2 ea
(n/a)	NLL-7/23	23 ga (bevel tip)	70 × 0.63	39807	26272	5 ea
(n/a)	NLL-11.5/23	23 ga (bevel tip)	115 × 0.63	39811	26273-U	5 ea
(n/a)	NLL-LC	22 ga (blunt tip)	51 × 0.71	39895	26274	2 ea

Syringes

Syringe Accessories

Syringe Accessories

Hamilton® Syringe Cleaner

▶ 14-824-50

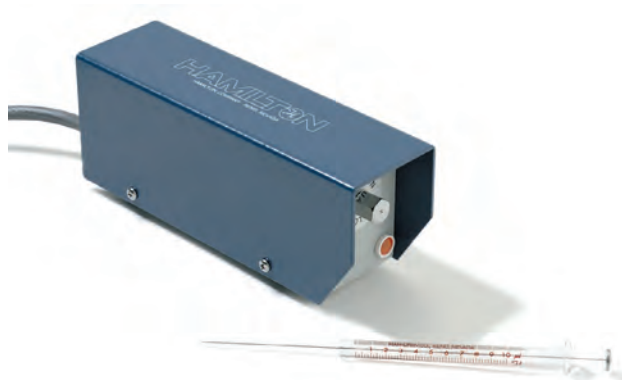
120 V, L 6.0 in. × W 1.8 in. × H 2.7 in.

Helps rid your chromatogram of ghosts.

Cleans Hamilton syringes and other syringes with needles up to 18 gauge (0.049 in. O.D.). Just connect the unit to your water aspirator or other vacuum source, insert the needle through the septum and, in 10-30 seconds, you're ready for a new sample. A combination of heat (250 °C) and vacuum vaporizes and removes contaminating volatiles in a single operation.

No liquids are required with Hamilton Series 7000 syringes. For Series 700 and other conventional syringes, use a rheostat to lower the temperature (to 50 °C or below) and maintain a flow of solvent through the barrel and needle.

Instructions are included.



20770-U

20770-U

1 ea

GR-2 Septa

These low cost gray silicone rubber septa are designed for routine, isothermal use. For use with 50 °C to 200 °C inlet temperature.



▶ diam. 5.0 mm ($\frac{3}{16}$ in.)

20712

100 ea

Needle Cleaning Kit

Formulated specifically for GC syringes.

Perfect for cleaning small orifices such as FID jets and syringe needles. This kit includes one 70 mL bottle (makes 700 mL of cleaning solution), ten wires in each of five sizes (0.076 to 0.306 mm O.D.), and instructions.

Packaged in a reusable box that prevents wires from being damaged during storage.

Cleaning wires (O.D.) Use to clean needle gauges

0.089 mm 26s, 31-33

0.126 mm 22s, 25s, 28-30

0.167 mm 27

0.207 mm 24-26 mm

0.306 mm 22, 23 and larger

product of Hamilton, 76620



Needle Cleaning Kit

21578

1 ea

Syringe Cleaning Solution

▶ 70 mL

product of Hamilton, 18310

20742

1 ea

Syringes

Syringe Accessories

Hamilton® GASTIGHT® digital syringe

This N.I.S.T. traceable, calibrated syringe device provides constant injection rate. The LCD display shows syringe volume within ± 0.5% of volume dispensed. A fine adjustment thumbwheel sets syringe volumes and the plunger stop can be set for repetitive injections. The 701N is cemented needle, RN syringes have removable, 2 in. (51 mm) bevel tip needle. stainless steel needle bevel tip (point style 2)

needle L 2 in.



Hamilton Digital Syringe

Needle L (in.)	Description	Needle	Hamilton No.	Cat. No.	Qty
2 10	701N	26s ga D-	S80300	24452	1 ea
2 10	1701RN	26s ga D-	S80030	Z261173-1EA	1 ea
2 25	1702RN	22s ga D-	S80230	Z261181-1EA	1 ea
2 500	1750RN	22 ga D-	S81230	Z261246-1EA	1 ea

Hamilton® 800 Series MULTI-PAK

▶ volume 10-250 µL

Designed for Waters® U6K Injection Valve. Includes one each of 10, 25, 50, 100, & 250µL volume syringes:

- Contains one handle and a selection of syringe plunger/barrel combinations
- Removable needles (RNW), includes nine needles
- Reinforced plunger - plunger bending is eliminated due to the reinforced plunger stem.

Items included in the 800 series Multi-Pak (Hamilton part number 84890) include:

Hamilton part number Description

- 32135 Handle for barrel/plunger
- 32129 801RN barrel/plunger, 10 µL
- 32117 802RN barrel/plunger, 25 µL
- 32120 805RN barrel/plunger, 50 µL
- 32123 810RN barrel/plunger, 100 µL
- 32126 825RN barrel/plunger, 250 µL
- 30902 RN nut
- 7758-02 Removable needles (26s/2"/2), 6/pk for 10-100 µL syringes
- 7758-03 Removable needles (22s/2"/2), 6/pk for 10-100 µL syringes
- 7779-03 Removable needles (22s/2"/2), 6/pk for 250 µL syringes

800RNW

needle size 25s ga (blunt tip)

product of Hamilton, 84891

needle L 51 mm (2 in.)

Z109681-1SET 5 ea

Hamilton® TLC syringes

PTFE coats the final 3/4 in. of this 2 in. (51 mm) long cemented needle. This allows for more reproducible sample spotting on TLC plates.

needle L 51 mm (2 in.)
coated tip



Description	Cat. No.	Qty
volume 10 µL, needle size 26s ga, needle type fixed	Z264385-1EA	1 ea
volume 25 µL, needle size 22s ga, needle type fixed	Z264393-1EA	1 ea
volume 50 µL, size, needle size 22 ga, needle type fixed	Z264407-1EA	1 ea
volume 100 µL, needle size 22 ga, needle type fixed	Z264415-1EA	1 ea

Purge and Trap Syringes

The Hamilton 1005SLPT is the purge and trap version of the SampleLock syringe is designed for analyzing drinking water samples according US EPA purge and trap concentration techniques (EPA methods 502.1, 502.2, 503.1, 524.1, and 524.2).

The Hamilton 1005TLL syringe does not have a valve attachment. Both syringes have a volume of 5.0 mL. Needles are not included.



From left to right; 20999, 26294

Description	Hamilton No.	Cat. No.	Qty
1005TLL	81520	20999	1 ea
1005SLPT	81570	26294	1 ea

Constant Rate Syringe, 2-50 µL

Features and Benefits

Eliminates injection variability. Spring-driven plunger delivers sample at the same injection rate, regardless of the operator. Micrometer dials the desired volume. Stainless steel plunger and PTFE sealing tip. Repeatable and resettable accuracy ±1%.

CR700-50

needle size 22 ga (blunt tip)

product of Hamilton, 84303



Constant Rate Syringe

20713 1 ea

Syringes

Syringe Accessories

Repeating Dispenser

► for use with Hamilton all 10 μL -2.5 mL Hamilton Syringes, for use with Hamilton PB600-1

Accurately divides samples. Discharges 1/50th of the syringe's capacity at each push of the button. Fits all 10 μL -2.5 mL Hamilton syringes. Order syringe separately. product of Hamilton, 83700



20943 - The syringe is not included

20943

1 ea

Headspace/Soil-Gas Syringe

- Fitted with valve and special Luer probe with side hole
 - Needle valve in hub allows gas sample to be stored in syringe during transfer to lab
 - Recommended for soil headspace extraction
 - Probe is removable and replaced with needle during injection in GC
- needle size 23 ga (bevel tip)

needle L x O.D. 50 mm x 0.63 mm



23986

Needle L x O.D. (mm)	Descripti- on	SGE No.	Cat. No.	Qty
50 x 0.63	5MDR-HS-V	008775	23984	1 ea
50 x 0.63	10MDR-HSV	008975	23986	1 ea
50 x 0.63	MAH-P, Luer Probe only	031571	23985	1 ea

Hamilton® Chaney Adapter

Recommended for sample reproducibility.



From left to right; 20765, 21350-U

Description	Cat. No.	Qty
for use with Hamilton 700, 1700, 1000 series (except 10 μL), for use with Hamilton 7000 series ((0.5 - 5 μL))	21350-U	1 ea
for use with Hamilton 700,1000 series, 1700 series ((5-10 μL))	26704	1 ea
for use with Hamilton 800/1800 series ((5-500 μL))	26705	1 ea

Hamilton® Plunger Guide

Plunger guides are recommended for consistent, reproducible injections.

- Prevents syringe plunger bending
- Adjustable stop prevents plunger damage
- Easily installed

Description	Cat. No.	Qty
for use with Hamilton 700, 1700 Series (25-500 μL), for use with Hamilton 7000 Series (0.5 to 5 μL)	26707	1 ea
for use with Hamilton 75, 701,1701 Series (5-10 μL only)	20765	1 ea

Hamilton® Valves

These valves include wetted paths constructed of chemically inert PTFE and KEL-F materials (1000 psig or less). The HV models are for stand-alone use: HVP valves can stand alone; or can be mounted into panels to allow custom installation into control panels or instruments.

Description	Cat. No.	Qty
Hamilton® Valves, Hamilton (HV) plug valve, flow path "T", ports: 3	24786	1 ea
Hamilton® Valves, HV, flow path 90 Degree, ports: 3	24787	1 ea
Hamilton® Valves, HVP plug valve (can be panel mounted), flow path Distribution, ports: 4	24794	1 ea
Hamilton® Valves, HV, flow path Loop, ports: 4	24788	1 ea
Hamilton® Valves, HVP (can be panel mounted), flow path Distribution, ports: 3	24793	1 ea

Syringes

Syringe Accessories

Miniature Two-Way Valve

Meets requirements for US EPA Method 602 for purgeable aromatic compounds

This miniature two-way valve is durable, dependable, and easy to use. The inert plastic components (CTFE body and female Luer connectors, PTFE core) will not interact with ultrapure or corrosive fluids. Its small size (2 in.³ / 33 cm³) and weight (1 oz. / 28 g) make it unobtrusive. A 0.059 in. internal passage minimizes sample hold-up.

When used with a Hamilton PTFE Luer Lock (TLL) syringe, the valve is particularly useful for transporting gaseous or liquid samples (e.g., environmental analyses of air or water). Use the valve with the Hamilton fittings included, or with any standard 1/4 × 28 threaded fittings (e.g. Cheminert® fittings) in flexible tubing systems.

Aluminum housing, stainless steel driver stem, operating range from 10 °C to 100 °C at pressures to 100 psi (7 kg/cm²).



20971, Sample Valve for Tekmar Concentrators



20940, Miniature Two-Way Inlet Valve

Description	Cat. No.	Qty
Hamilton Purge and Trap (HVP) plug valve, Distribution flow path, 2 ports, product of Tekmar, 14-0036-050	20971	1 ea
Female Luer connector, product of Hamilton Tekmar®, 14-0216-016, Kel-F™ (CTFE) fitting, thread, 1/4-28, port diam. 0.059 in.	20942-U	1 ea
Male Luer connector, product of Hamilton Tekmar®, 14-0122-016, Kel-F™ (CTFE) fitting, port diam. 0.059 in., thread, 1/4-28	20941	1 ea
Hamilton (HV) plug valve with male (2-0941) and female (20942-U) connectors included, number of positions: 2, 180° flow path	20940	1 ea

HV Valve Connector/Fitting

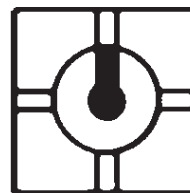
1/4-28 male thread.
CTFE

Description	Cat. No.	Qty
Male Luer lock, bore 0.060 in.	2124524-1EA	1 ea

Miniature Inert Valve

For building inert liquid or gas flow systems that will handle small volumes of ultrapure and corrosive fluids. Has universal housing with 1/4 × 28 in. female threaded ports that accept a wide variety of interchangeable fittings. Requires less than 2 in.³ of space.

temperature -10-100 °C (at 500 psi)



Description	Cat. No.	Qty
4 port, distribution plug, Hamilton (HV) plug valve	Z124486-1EA	1 ea

PTFE Body Two-Way Valve

This miniature, two-way valve from Hamilton provides flexibility, inertness, and small size for collecting gas samples and transporting or storing them in the original sampling syringe.

Fluid path is made entirely of PTFE to ensure inertness. Can be autoclaved for applications requiring sterility. 100 psig maximum pressure. Fits Hamilton PTFE Luer lock (TLL) and other Luer lock syringes.

- Lever-actuated on/off valve for storing and transporting samples.
- KEL-F hub needles attach to the valve
- Bore ID 0.39"

▶ for use with Hamilton PTFE Luer Lock (TLL) and other Luer lock syringes.



PTFE Body Two-Way Valve

20926	1 ea
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Push Button Valve

This Mininert valve will attach to your syringe and provide sample storing capability. It features push-button operation and an all-PTFE body with a stainless steel miniature valve stem.



Push Button Valve, Part number 22285 is designed for Luer-tip syringes.
Part number 22284 is available for syringes without a Luer-tip.

Description	Cat. No.	Qty
for use with Hamilton TLL syringes	22285	1 ea
for use with VICI Series C and D Pressure-Lok syringes	22284	1 ea

Syringes

Syringe Accessories

SGE Syringe Valves

Syringe valves are ideal for sample storage and transportation or to pressurize samples prior to injection. SGE offers several types of manually-operated syringe valves: push-pull for smaller volumes (2.5 µL-2.5 mL) and push-button valves (50 µL-2 L). SGE Luer Tip, Luer Lock and removable needle syringes can be fitted with valves. The valve allows fluid to be stored in the syringe without contamination.

Cat. No. 509337 is a push-pull valve with removable 0.63 mm O.D. × 5 cm cone tip needle. This valve will fit removable needle syringes, 25µL-2.5mL.

Cat. No. 509345 is a push-pull with Kel-F male Luer lock termination to fit removable needle syringes, 25µL-2.5mL.

Cat. No. 509353 is a push-button with Kel-F male Luer lock termination. This fits 5 mL to 2 liter syringes with removable Luer Lock or removable needle.

Cat. No. 509361 is a Luer Lock valve for any Luer Lock and Luer Tip syringe (50µl to 2 liter).



From top to bottom; 509337, 509345, 509353, 509361

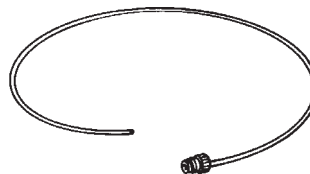
Description	Cat. No.	Qty
Push-pull with needle	509337	1 ea
Push-pull with Luer Lock	509345	1 ea
Push button with Luer Lock	509353	1 ea
Luer Lock with Luer Tip	509361	1 ea

PTFE Tubing Assemblies

- PTFE tubing with Kel-F hub on one end
- For use with LT or TLL Hamilton syringes or connectors

With Kel-F™ Luer hub.

A septum to be pierced with these PTFE needles must be punctured with a hollow SS needle. The PTFE needle is then threaded through. After threading, the SS needle is withdrawn, allowing the septum to seal around the PTFE needle. For 20ga PTFE use Z12,675-6 (14ga SS); 18ga PTFE use Z12,676-4 (13ga SS); 16ga PTFE use Z12,677-2 (12ga SS).



L (in.)	Size (gauge)	Cat. No.	Qty
12	20	Z117315-1EA	1 ea
12	18	Z117323-1EA	1 ea
12	16	Z117331-1EA	1 ea
12	14	Z117358-1EA	1 ea
12	12	Z117366-1EA	1 ea
24	20	Z117374-1EA	1 ea
24	18	Z117382-1EA	1 ea
24	16	Z117390-1EA	1 ea
24	14	Z117404-1EA	1 ea
24	12	Z117412-1EA	1 ea
36	20	Z203653-1EA	1 ea
36	18	Z203688-1EA	1 ea
36	16	Z203696-1EA	1 ea
36	14	Z203718-1EA	1 ea
36	12	Z203726-1EA	1 ea



TRADEMARKS

The following trademarks and registered trademarks are accurate to the best of our knowledge at the time of printing. Please consult individual manufacturers and other sources for specific information.

- 3D Biotek, LLC — 3D Insert™
3M Company — Empore™, Fluorinert®, Kel-F™
Ace Glass, Inc. — FETFE®
Advanced Materials Technology, Inc. — Fused-Core®
Agilent Technologies, Inc. — Agilent®, Zorbax®
Air Liquide — ACULIFE™, SCOTTY®
Almatis — alphaBond™
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Hamilton Co. — GASTIGHT®, Hamilton®, Microliter™
Hayes Separation Inc. — HayeSep®
Hewlett-Packard Corp. — Hewlett-Packard™
Hichrom Limited — Partisil™
Hitachi Ltd. — Hitachi®
IDEX Health & Science, LLC — Bottom-of-the-Bottle™, Jun-Air™, LiteTouch®, Microtight®, RheBuild®, RheFlex®, Rheodyne®, Sealtight™
Imerys Minerals California, Inc. — Celite®, Chromosorb®
Integrated Liner Technologies, Inc. — Inter-Seal™
J.G. Finneran Associates, Inc. — Interlocked™, R.A.M.™, Snap Seal™, Versa Vial™
Johnson Matthey Finland Oy — QuadraSil®
KNF Neuberger GmbH — Laboport®
Labclear — Oxiclear™
Lanxess Deutschland GmbH — Lewatit®
LGC Group — CERTAN®
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Makhteshim Chemical Works Ltd. — Guthion®
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