Food and Beverage Standards
Vitamins

Vitamins

For use in HPLC, GC, and other traditional wet chemistry analyses.
All compounds have been thoroughly evaluated to ensure the utmost quality.

Vitamins – neat, unless otherwise noted.

DESCRIPTION	CAS NO.	QTY.	CAT. NO.	PRICE
WATER SOLUBLE VITAMINS				
Thiamine hydrochloride (B1)	67-03-8	1g	47858	
Riboflavin (B2)	83-88-5	1g	47861	
Pyridoxine hydrochloride (B6)	58-56-0	1g	47862	
L-Ascorbic acid	50-81-7	1g	47863	
Nicotinic acid	59-67-6	1g	47864	
Nicotinamide	98-92-0	1g	47865-U	
Folic acid	75708-92-8	500mg	47866	
Pantothenic acid (hemicalcium salt)	137-08-6	1g	47867	
D-Biotin	58-85-5	100mg	47868	
Cyanocobalamin (B12)	68-19-9	100mg	47869	
FAT SOLUBLE VITAMINS				
Retinol acetate	127-47-9	100mg	46958	
Retinol palmitate	79-81-2	100mg	46959-U	
D-α-Tocopherol succinate	4345-03-3	100mg	47782	
DL-α-Tocopherol	10191-41-0	100mg	47783	
rac-β-Tocopherol (50mg/mL in hexane)	148-03-8	1mL	46401-U	
δ-Tocopherol	119-13-1	100mg	47784	
γ-Tocopherol	54-28-4	10mg	47785	
DL-α-Tocopherol acetate	7695-91-2	100mg	47786	
Cholecalciferol (D3)	67-97-0	100mg	47763	
Ergocalciferol (D2)	50-14-6	100mg	47768	
Phylloquinone (K1)	84-80-0	100mg	47773	
Menaquinone (K2)	110232-49-8	100mg	47774	
Menadione (K3)	58-27-5	1000mg	47775	

Mycotoxins

Our mycotoxin standards are specifically designed for use according to the Official Methods of the Association of Official Analytical Chemists (AOAC). We test all products by spectroscopy and/or HPLC against known standards and previous lots to ensure precision and uniformity, assuring that you are obtaining the finest mycotoxin standards available.

Ordering Note: Due to recent changes in U.S. and international laws, you could need a license to order aflatoxin standards. A company representative will notify you if a license is necessary.

Caution: Mycotoxins may be carcinogenic and, therefore, should be handled only by qualified personnel.

DESCRIPTION	CONCENTRATION/SOLVENT	QTY.	CAT. NO.	PRICE
AFLATOXIN STANDARDS – QUANTITATIVE STANDARDS DESIGNED FOR USE IN ACCORDANCE WITH AOAC METHOD 970.44.				
Aflatoxin B and Aflatoxin G Mixes				
Each ampul contains 1µg B_1, 1µg G_1, 0.3µg B_2, and 0.3µg G_2.	Benzene:acetonitrile (98:2)	5 x 1mL	46300-U■	
	Methanol	5 x 1mL	46304-U	
	Methanol	5mL	46303	
Single Component Aflatoxin Standards				
Aflatoxin B_1 [1162-65-8]	3µg/mL in benzene:acetonitrile (98:2)	1mL	46323-U	
Aflatoxin B_2 [7220-81-7]	3µg/mL in benzene:acetonitrile (98:2)	1mL	46324-U	
Aflatoxin G_1 [1165-39-5]	3µg/mL in benzene:acetonitrile (98:2)	1mL	46325-U	
Aflatoxin G_2 [7241-98-7]	3µg/mL in benzene:acetonitrile (98:2)	1mL	46326-U	
Aflatoxin M_1 [6795-23-9]	10µg/mL in acetonitrile	1mL	46319-U	
Aflatoxin M_2 [6885-57-0]	1µg/mL in acetonitrile	1mL	46910-U	
OTHER MYCOTOXINS				
Deoxynivalenol (DON) [51481-10-8]	200µg/mL in ethyl acetate:methanol (95:5) For use in AOAC Methods 986.17 and 986.16	1mL	46911	
Ochratoxin A [303-47-9]	50µg/mL in benzene:acetic acid (99:1)	1mL	46912	
Ochratoxin B [4825-86-9]	50µg/mL in benzene:acetic acid (99:1) Ochratoxin A and B solutions have been produced according to the guidelines in AOAC Method 973.37	1mL	46913-U	
Patulin [149-29-1]	100µg/mL in chloroform Prepared for use with AOAC Method 974.18	1mL	46914-U	
Zearalenone [17924-92-4]	50µg/mL in acetonitrile AOAC Method 976.22 contains methodology for detecting zearalenone in corn. Method 985.18 lists a method for detecting and quantifying zearalenone and α-zearalenol in corn.	1mL	46916-U	

■ Intended for use in accordance with AOAC Method 971.22.

Food and Beverage Standards
Carbohydrates/Organic Acids/Sugar Alcohols

Carbohydrates/Organic Acids/Sugar Alcohols

Prepared, tested, and packaged using rigorous manufacturing procedures.

NAME OF KIT	DESCRIPTION			CAT. NO.	PRICE
Monosaccharides Kit				47267	
	Analyte	CAS No.	Quantity		
	D-(-)Arabinose	28697-53-2	500mg		
	D-(+)Galactose	59-23-4	500mg		
	D-(+)Glucose (mixed anomers)	50-99-7	500mg		
	D-(+)Mannose (mixed anomers)	3458-28-4	500mg		
	D-Psicose (mixed anomers)	551-68-8	100mg		
	D-(-)Ribose	50-69-1	500mg		
	D-(+)Xylose	58-86-6	500mg		
Disaccharides Kit				47268-U	
	Analyte	CAS No.	Quantity		
	Isomaltose (mixed anomers)	499-40-1	100mg		
	α-Lactose	5989-81-1	500mg		
	Maltose	6363-53-7	500mg		
	Sucrose	57-50-1	500mg		
Oligosaccharides Kit				47265	
	Analyte	CAS No.	Quantity		
	Maltoheptaose (Dp7)	34620-78-5	100mg		
	Maltohexaose (Dp6)	34620-77-4	100mg		
	Maltopentaose (Dp5)	34620-76-3	100mg		
	Maltotetraose (Dp4)	34612-38-9	100mg		
	Stachyose (Dp4)	10094-58-3	100mg		
	Maltotriose (Dp3)	1109-28-0	100mg		
	D-(+)Melezitose (Dp3)	10030-67-8	100mg		
	D-(+)Raffinose (Dp3)	17629-30-0	100mg		
	Isomaltotriose (Dp3)	3371-50-4	100mg		
Organic Acids Kit				47264	
	Analyte	CAS No.	Quantity		
	Acetic acid	64-19-7	500mg		
	Adipic acid	124-04-9	500mg		
	L-Ascorbic acid	50-81-7	500mg		
	Benzoic acid	65-85-0	500mg		
	Butyric acid	107-92-6	500mg		
	Citric acid	77-92-9	500mg		
	Formic acid	64-18-6	500mg		
	Fumaric acid	110-17-8	500mg		
	Isobutyric acid	79-31-2	500mg		
	DL-Isocitric acid	1637-73-6	100mg		
	L-(+)Lactic acid	79-33-4	100mg		
	Maleic acid	110-16-7	500mg		
	D-Malic acid	636-61-3	100mg		
	Malonic acid	141-82-2	500mg		
	Oxalic acid	144-62-7	500mg		
	Phytic acid	123408-98-0	500mg		
	Propionic acid	79-09-4	500mg		
	(-)Quinic acid	77-95-2	500mg		
	Shikimic acid	138-59-0	100mg		
	Succinic acid	110-15-6	500mg		
	D-Tartaric acid	147-71-7	500mg		
Sugar Alcohols Kit				47266	
	Analyte	CAS No.	Quantity		
	D-(+)Arabitol	488-82-4	500mg		
	Dulcitol (Galactitol)	608-66-2	500mg		
	iso-Erythritol	149-32-6	500mg		
	Glycerol	56-81-5	500mg		
	Maltitol	585-88-6	500mg		
	D-Mannitol	69-65-8	500mg		
	Ribitol (Adonitol)	488-81-3	500mg		
	D-Sorbitol	50-70-4	500mg		

Food and Beverage Standards
Alditol Acetates, Sweeteners, Antimicrobials

Alditol Acetates

These are quantitative standards. Concentrations of each component are selected to give a relatively uniform chromatogram for suit TLC, GC, or HPLC analysis.

MIX	COMPONENTS	QTY.	CAT. NO.	PRICE
Alditol Acetate Mix 1		1mL	47880-U	
	4 components, 50mg/mL total in chloroform			
	Rhamnitol acetate (25%) Ribitol acetate (25%)			
	Fucitol acetate (25%) Arabinitol acetate (25%)			
Alditol Acetate Mix 2		1mL	47881	
	4 components, 50mg/mL total in chloroform			
	Mannitol acetate (25%) Glucitol acetate (25%)			
	Galactitol acetate (25%) Inositol acetate (25%)			

Sweeteners

Sweeteners are classified into two main groups — caloric (nutritive) and non-caloric (non-nutritive). Nutritive sweeteners are metabolized by the body to provide energy. Non-nutritive sweetners are not metabolized by the body and are unchanged before excretion. The nutritive sweeteners are carbohydrates, or derivatives of carbohydrates, such as sugar alcohols.

The study of sweeteners is increasing, due to the dietary requirements of diabetics and concerns about obesity. We offer a variety of sweeteners that the food industry either is using or is evaluating for potential use. We have evaluated these standards to provide the highest quality for your analytical needs.

COMPOUND	CAS NO.	QTY.	CAT. NO.	PRICE
Acesulfame K	55589-62-3	1g	47134	
Aspartame	22839-47-0	500mg	47135	
Sodium cyclamate	139-05-9	1g	47827	
D-(+)Glucose	50-99-7	1g	47829	
Sodium saccharin	82385-42-0	1g	47839	
Saccharin (hemicalcium)	6381-91-5	1g	47840	
D-Sorbitol	50-70-4	1g	47841	
Xylitol	87-99-0	1g	47844	

Antimicrobials/Preservatives

These neat preservative standards have been evaluated to ensure that they are of the highest quality. We offer these standards in small quantities; there is no need to purchase a large quantity of chemicals, only to pay expensive disposal charges later.

Neat, each 1g.

COMPOUND	CAS NO.	QTY.	CAT. NO.	PRICE
Benzoic acid	65-85-0	1g	47849	
Sodium benzoate	532-32-1	1g	47850	
Methyl paraben	99-76-3	1g	47889	
Sorbic acid	110-44-1	1g	47845	
Potassium sorbate	590-00-1	1g	47848	

Food and Beverage Standards
Lipids

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 acids 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 acids are also listed.

Unsaturated fatty acids are named by replacing the "e" of the corresponding unsaturated hydrocarbon with the suffix "enoic" (e.g. 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:

$$CH_3(CH_2)_7CH = \overset{9}{C}H(CH_2)_7\overset{1}{C}OOH,$$

and linoleic acid is cis,cis-9,12-octadecadienoic acid:

$$CH_3(CH_2)_4CH = \overset{12}{C}HCH_2CH = \overset{9}{C}H(CH_2)_7\overset{1}{C}OOH.$$

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 Mix

MIX	COMPONENTS	WT. %	QTY.	CAT. NO.	PRICE
Linoleic Acid Methyl Ester cis/trans Isomer Mix	4 components, 10mg/mL in methylene chloride		1mL	47791	
	trans-9,trans-12-Octadecadienoic acid methyl ester	50			
	cis-9,trans-12-Octadecadienoic acid methyl ester	20			
	trans-9,cis-12-Octadecadienoic acid methyl ester	20			
	cis-9,cis-12-Octadecadienoic acid methyl ester	10			

C18 cis/trans Fatty Acids/FAMEs

10mg/mL in heptane.

DESCRIPTION	CAS NO.	QTY.	CAT. NO.	PRICE
cis-6-Octadecenoic methyl ester (Petroselinic)	2777-58-4	1mL	47198	
trans-6-Octadecenoic methyl ester (Petroselaidic)	–	1mL	47199	
cis-7-Octadecenoic methyl ester	2278-59-3	1mL	46900-U	
cis-9-Octadecenoic methyl ester (Oleic)	112-62-9	1mL	46902-U	
trans-9-Octadecenoic methyl ester (Elaidic)	2462-84-2	1mL	46903	
cis-11-Octadecenoic methyl ester (cis-Vaccenic)	1937-63-9	1mL	46904	
trans-11-Octadecenoic methyl ester (trans-Vaccenic)	6198-58-9	1mL	46905-U	
cis-12-Octadecenoic methyl ester	2733-86-0	1mL	46906	
trans-12-Octadecenoic methyl ester	20221-23-2	1mL	46907-U	
trans-13-Octadecenoic methyl ester	42199-38-2	1mL	46909	
cis-15-Octadecenoic methyl ester	10411-39-9	1mL	46953	
cis-9,12-Octadecedienoic methyl ester	112-63-0	1mL	46950-U	
trans-9,12-Octadecedienoic methyl ester	2566-97-4	1mL	46951-U	
cis-5,8,11,14,17-Eicosapentaenoic methyl ester	2734-47-6	1mL	47571-U	
cis-4,7,10,13,16,19-Docosahexaenoic methyl ester	301-01-9	1mL	47570-U	
cis-7,10,13,16,19-Docosapentaenoic methyl ester	108698-02-8	1mL	47563-U	

Highly Characterized Reference Oils

We offer highly characterized common 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 Analysis is provided with each oil sample.

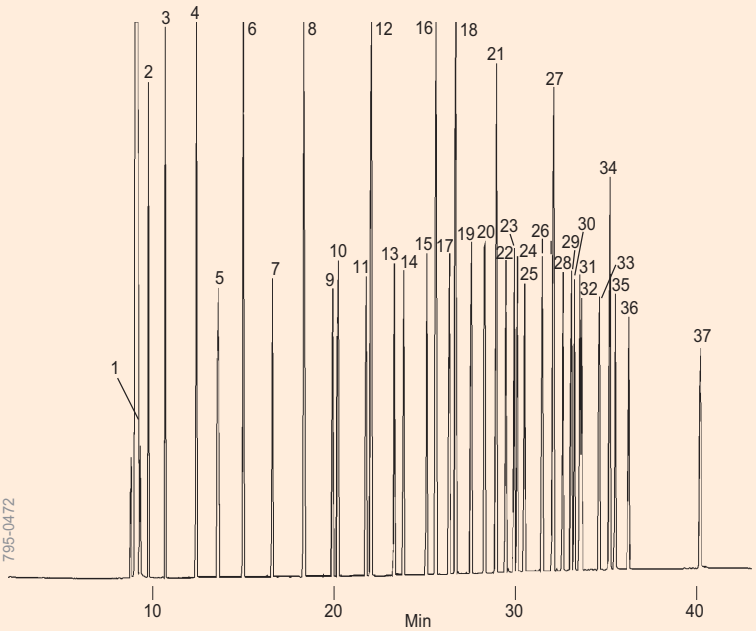
1g, packed in amber ampul under nitrogen.

DESCRIPTION	CAS NO.	WT.	CAT. NO.	PRICE
Canola oil	120962-03-0	1g	46961	
Coconut oil	8001-31-8	1g	46949	
Corn oil	8001-30-7	1g	47112-U	
Cottonseed oil	8001-29-4	1g	47113	
Flaxseed oil	8001-26-1	1g	47559-U	
Lard oil	8016-28-2	1g	47115-U	
Menhaden fish oil	8002-50-4	1g	47116	
Menhaden fish oil, partially hydrogenated (PHMO)	—	1g	47117	
Olive oil – refined	8001-25-0	1g	47118	
Palm oil	8002-75-3	1g	46962	
Peanut oil	8002-03-7	1g	47119	
Safflower oil	8001-23-8	1g	47120-U	
Soybean oil	8001-22-7	1g	47122	
Sunflower seed oil	8001-21-6	1g	47123	

Supelco 37 Component FAME Mix

This fatty acid methyl ester (FAME) reference standard is carefully prepared by weight. The weight percentage of each component is indicated. Each ampul contains 10mg/mL of the FAME reference standard mix in methylene chloride.

DESCRIPTION	QTY.	CAT. NO.	PRICE
Supelco 37 Component FAME Mix	1mL	47885-U	



Component FAME	Wt. %
1. Butyric (C4:0)	4
2. Caproic (C6:0)	4
3. Caprylic (C8:0)	4
4. Capric (C10:0)	4
5. Undecanoic (C11:0)	2
6. Lauric (C12:0)	4
7. Tridecanoic (C13:0)	2
8. Myristic (C14:0)	4
9. Myristoleic (C14:1)	2
10. Pentadecanoic (C15:0)	2
11. cis-10-Pentadecenoic (C15:1)	2
12. Palmitic (C16:0)	6
13. Palmitoleic (C16:1)	2
14. Heptadecanoic (C17:0)	2
15. cis-10-Heptadecenoic (C17:1)	2
16. Stearic (C18:0)	4
17. Elaidic (C18:1n9t)	2
18. Oleic (C18:1n9c)	4
19. Linolelaidic (C18:2n6t)	2
20. Linoleic (C18:2n6c)	2
21. Arachidic (C20:0)	4
22. γ-Linolenic (C18:3n6)	2
23. cis-11-Eicosenoic (C20:1)	2
24. Linolenic (C18:3n3)	2
25. Heneicosanoic (C21:0)	2
26. cis-11,14-Eicosadienoic (C20:2)	2
27. Behenic (C22:0)	4
28. cis-8,11,14-Eicosatrienoic (C20:3n6)	2
29. Erucic (C22:1n9)	2
30. cis-11,14,17-Eicosatrienoic (C20:3n3)	2
31. Arachidonic (C20:4n6)	2
32. Tricosanoic (C23:0)	2
33. cis-13,16-Docosadienoic (C22:2)	2
34. Lignoceric (C24:0)	4
35. cis-5,8,11,14,17-Eicosapentaenoic (C20:5n3)	2
36. Nervonic (C24:1)	2
37. cis-4,7,10,13,16,19-Docosahexaenoic (C22:6n3)	2

Column: SP-2560, 100m x 0.25mm ID, 0.20µm film
Cat. No.: 24056
Oven: 140°C (5 min) to 240°C at 4°C/min
Carrier: helium, 20cm/sec
Det.: FID, 260°C
Inj.: 1µL Cat. No. 47885-U, split 100:1, 260°C

Food and Beverage Standards
Lipids

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 Table 1).

RM-1 – Corn, cottonseed, kapok, poppyseed, rice, safflower, sesame, soybean, sunflower, and walnut oils

RM-2 – Hempseed, linseed, perilla, and rubberseed oils

RM-3 – Mustard seed, peanut, and rapeseed oils

Rapeseed Oil Reference Mix – Modern low erucic acid oils

RM-4 – Neatsfoot, olive, and teaseed oils

RM-5 – Babassu, coconut, ouri-curi, and palm kernel oils

RM-6 – Lard, beef tallow, mutton tallow, and palm oil

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 Table 1) 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.

Table 1. Specifications for Quantitative Products
Each mix is carefully prepared by weight percent.

MIX	CAT. NO.	METHYL ESTER (% COMPOSITION BY WEIGHT)																			
Qty.: 100mg each, neat Storage Temp.: -0 C		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)
PRICE																							
RM-1	O7006-1AMP									6.0			3.0	35.0	50.0	3.0		3.0					
RM-2	O7131-1AMP									7.0			5.0	18.0	36.0	34.0							
RM-3	O7256-1AMP							1.0		4.0			3.0	45.0	15.0	3.0		3.0			3.0	20.0	3.0
Rapeseed	O7756-1AMP							1.0		4.0			3.0	60.0	12.0	5.0		3.0	1.0		3.0	5.0	3.0
RM-4	O7381-1AMP									11.0			3.0	80.0	6.0								
RM-5	O7506-1AMP	7.0		5.0		48.0		15.0		7.0			3.0	12.0	3.0								
RM-6	O7631-1AMP							2.0		30.0	3.0		14.0	41.0	7.0	3.0							
PRICE																							
NHI-C	O8256-1AMP	1.5		3.0		6.0		12.0		19.4			24.9					33.2					
NHI-D	O8381-1AMP							11.8		23.6	6.9		13.1	44.6									
NHI-F	O8631-1AMP							2.5		4.2			7.3					13.6			25.4		47.0
NHI-A	O7881-1AMP							25.0		10.0			65.0										
NHI-B	O8131-1AMP							4.0		40.0			56.0										
NHI-E	O8506-1AMP	6.3		9.1		12.1		23.3		49.2													
PRICE																							
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		

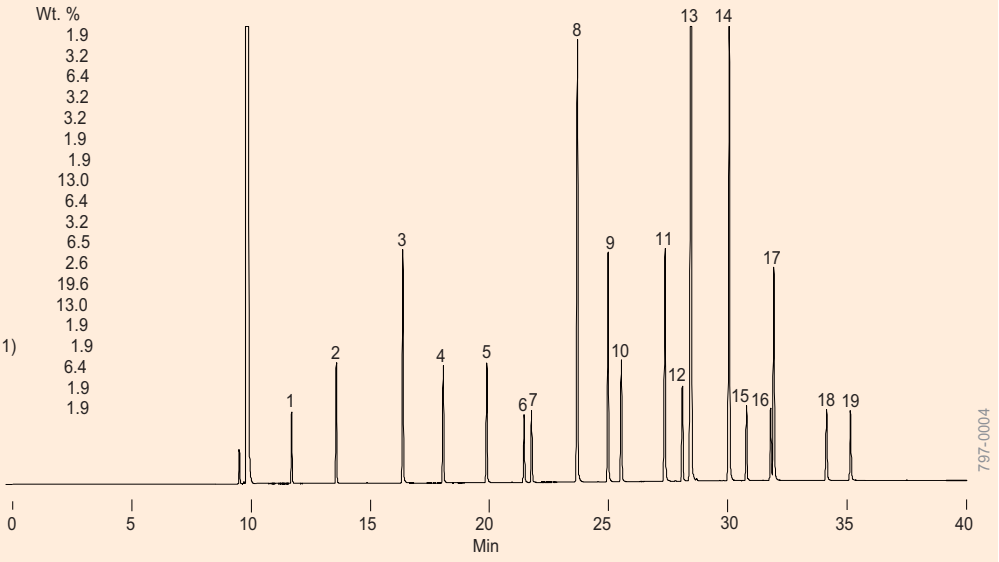
**Stability problems arise with international shipment of mixtures containing linolenate. When ordering such mixtures from outs ide the continental US or central Europe, please check with your local dealer regarding ordering practices.

Grain Fatty Acid Methyl Ester Mix

This fatty acid methyl ester (FAME) mixture is carefully prepared by weight. The weight percentage of each component is indicat
Each ampul contains 10mg/mL of the FAME reference standard mix in methylene chloride.

DESCRIPTION	QTY.	CAT. NO.	PRICE
Grain Fatty Acid Methyl Ester Mix	1mL	47801	

	Component FAME	Wt. %
1.	Caprylic (C8:0)	1.9
2.	Capric (C10:0)	3.2
3.	Lauric (C12:0)	6.4
4.	Tridecanoic (C13:0)	3.2
5.	Myristic (C14:0)	3.2
6.	Myristoleic (C14:1n9c)	1.9
7.	Pentadecanoic (C15:0)	1.9
8.	Palmitic (C16:0)	13.0
9.	Palmitoleic (C16:1n9c)	6.4
10.	Heptadecanoic (C17:0)	3.2
11.	Stearic (C18:0)	6.5
12.	Elaidic (C18:1n9t)	2.6
13.	Oleic (C18:1n9c)	19.6
14.	Linoleic (C18:2n6c)	13.0
15.	Arachidic (C20:0)	1.9
16.	cis-11-Eicosenoic (C20:1)	1.9
17.	Linolenic (C18:3n3)	6.4
18.	Behenic (C22:0)	1.9
19.	Erucic (C22:1n9)	1.9



Column: SP-2560, 100m x 0.25mm ID, 0.20µm film
Cat. No.: 24056
Oven: 140°C (5 min) to 240°C at 4°C/min
Carrier: helium, 20cm/sec
Det.: FID, 260°C
Inj.: 1µL, 260°C, split 100:1

Polyunsaturated Fatty Acid (PUFA) Methyl Esters

These are complex qualitative standard mixtures. Because they are extracted from natural materials, relative peak sizes and com
may vary from lot to lot.

DESCRIPTION	QTY.	CAT. NO.	PRICE
PUFA NO. 1			
Marine Source	100mg	47033	
Typically contains each FAME listed			
C14:0, C16:0, C16:1 ω7, C18:1 ω9, C18:1 ω7, C18:2 ω6, C18:4 ω3, C20:1 ω9, C20:5 ω3, C22:1 ω11, C22:1 ω9, C22:5 ω3, C22:6 ω3			
PUFA NO. 2			
Animal Source	100mg	47015-U	
Typically contains each FAME listed			
C14:0, C16:0, C16:1 ω7, C18:0, C18:1 ω9, C18:1 ω7, C18:2 ω6, C18:3 ω6, C18:3 ω3, C20:3 ω6, C20:4 ω6, C20:5 ω3, C22:4 ω6, C22:5 ω3, C22:6 ω3			
PUFA NO. 3			
From Menhaden Oil	100mg	47085-U	
Typically contains each FAME listed			
C14:0, C16:0, C16:1 ω7, C16:2 ω4, C16:4 ω1, C18:0, C18:1 ω9, C18:1 ω7, C18:2 ω6, C18:2 ω4, C18:3 ω4, C18:3 ω3, C18:4 ω3, C20:1 ω9, C20:4 ω6, C20:4 ω3, C20:5 ω3, C22:5 ω3, C22:6 ω3			

Note: In the ω-x classification, carbon atoms are numbered from the terminal methyl group to the first carbon of the ethylenic bond.
X denotes the position at the double bond closest to the terminal methyl group.

Food and Beverage Standards
Lipids

Qualitative Methyl Ester Mixes

These 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.

MIXES AND SOLUTIONS	COMPONENTS	QTY.	CAT. NO.	PRICE
SATURATED FAMES				
Fatty Acid Methyl Esters, Saturated Straight Chains Kit	10 individually packaged FAMEs, each 1g Caproic (6:0) Caprylic (8:0) Capric (10:0) Lauric (12:0) Myristic (14:0) Palmitic (16:0) Stearic (18:0) Arachidic (20:0) Behenic (22:0) Lignoceric (24:0)		ME10-1KT	
Fatty Acid Methyl Esters, Saturated Straight Chains Kit	19 individually packaged FAMEs, each 1g Caproic (6:0) Heptanoic (7:0) Caprylic (8:0) Nonanoic (9:0) Capric (10:0) Undecanoic (11:0) Lauric (12:0) Tridecanoic (13:0) Myristic (14:0) Pentadecanoic (15:0) Palmitic (16:0) Heptadecanoic (17:0) Stearic (18:0) Nonadecanoic (19:0) Arachidic (20:0) Heneicosanoic (21:0) Behenic (22:0) Tricosanoic (23:0) Lignoceric (24:0)		ME19-1KT	
Fatty Acid Methyl Esters, Saturated Straight Chains Kit	7 individually packaged FAMEs, each 100mg Pentacosanoic (25:0) Hexacosanoic (26:0) Heptacosanoic (27:0) Octacosanoic (28:0) Nonacosanoic (29:0) Triacontanoic (30:0) Hentriacontanoic (31:0), approx. 98% pure		ME7-1KT	
UNSATURATED FAMES				
Fatty Acid Methyl Esters, Unsaturated Kit	14 individually packaged FAMEs in the amounts indicated Myristoleic (14:1), 100mg Palmitoleic (16:1), 100mg Petroselinic (18:1), 100mg Oleic (18:1), 1g Elaidic (18:1), 500mg cis-Vaccenic (18:1, cis), 100mg Linoleic (18:2), 1g Linolelaidic (18:2), 100mg Linolenic (18:3, trans), 100mg cis-11-Eicosenoic (20:1), 100mg Arachidonic (20:4), 100mg Erucic (22.1), 100mg cis-4,7,10,13,16,19-Docosahexaenoic (22:6), 100mg Nervonic (24:1), 100mg		ME14-1KT	
Fatty Acid Methyl Ester Mix	4 components, approx. 10mg each 11-Eicosenoic (20:1) 11,14-Eicosadienoic (20:2) (98% pure) Arachidonic (20:4) 5,8,11,14,17-Eicosapentaenoic (20:5)	40mg	18912-1AMP	
Fatty Acid Methyl Ester Mix	5 components, approx. 10mg each 11-Eicosenoic (20:1) 11,14-Eicosadienoic (20:2) (98% pure) 11,14,17-Eicosatriaenoic (20:3) (97-99% pure) Arachidonic (20:4) 5,8,11,14,17-Eicosapentaenoic (20:5)	50mg	18913-1AMP	

MIXES AND SOLUTIONS	COMPONENTS	QTY.	CAT. NO.	PRICE
UNSATURATED FAMES (CONTD.)				
Fatty Acid Methyl Ester Mix	6 components, total of 100mg neat mixture weight percentages indicated Stearic acid m.e. (C18:0), 10% Oleic acid m.e. (C18:1, cis-9), 20% Elaidic acid m.e. (C18:1, trans-9), 20% Linoleic acid m.e. (C18:2 cis-9,12), 20% Linolelaidic acid m.e. (C18:2, trans-9,12), 20% Arachidic acid m.e. (C20:0), 10%	100mg	18916-1AMP	
Fatty Acid Methyl Ester Mix	10 components, total of 100mg neat mixture weight percentages indicated Myristic acid m.e. (C14:0), 4% Palmitic acid m.e. (C16:0), 10% Stearic acid m.e. (C18:0), 6% Oleic acid m.e. (C18:1, cis-9), 25% Elaidic acid m.e. (C18:1, trans-9), 10% Linoleic acid m.e. (C18:2 cis-9,12), 34% Linolelaidic acid m.e. (C18:2, trans-9,12), 2% Linolenic acid m.e. (C18:3, cis-9,12,15), 5% Arachidic acid m.e. (C20:0), 2% Behenic acid m.e. (C22:0), 2%	100mg	18917-1AMP	
Fatty Acid Methyl Ester Mix R: 36/37/38 S: 26-36	14 components, total of 100mg neat mixture weight percentages indicated Caprylic acid m.e. (C8:0), 8% Capric acid m.e. (C10:0), 8% Lauric acid m.e. (C12:0), 8% Myristic acid m.e. (C14:0), 8% Palmitic acid m.e. (C16:0), 11% Palmitoleic acid m.e. (C16:1, cis-9), 5% Stearic acid m.e. (C18:0), 8% Oleic acid m.e. (C18:1, cis-9), 5% Linoleic acid m.e. (C18:2 cis-9,12), 5% Linolenic acid m.e. (C18:3, cis-9,12,15), 5% Arachidic acid m.e. (C20:0), 8% Behenic acid m.e. (C22:0), 8% Erucic acid m.e. (C22:1, cis-13), 5% Lignoceric acid m.e. (C24:0), 8%	100mg	18918-1AMP	
Fatty Acid Methyl Ester Mix R: 36/37/038 S: 26-36	37 components, total of 100mg neat mixture weight percentages indicated Butyric acid m.e. (C4:0), 4% Caproic acid m.e. (C6:0), 4% Caprylic acid m.e. (C8:0), 4% Capric acid m.e. (C10:0), 4% Undecanoic acid m.e. (C11:0), 2% Lauric acid m.e. (C12:0), 4% Tridecanoic acid m.e. (C13:0), 2% Myristic acid m.e. (C14:0), 4% Myristoleic acid m.e. (C14:0, cis-9), 2% Pentadecanoic acid m.e. (C15:0), 2% cis-10 Pentadecenoic acid m.e. (C15:1) (approx. 98%), 2% Palmitic acid m.e. (C16:0), 6% Palmitoleic acid m.e. (C16:1, cis-9), 2% Heptadecanoic acid m.e. (C17:0), 2% cis-10 Heptadecenoic acid m.e. (C17:1), 2% Stearic acid m.e. (C18:0), 4% Oleic acid m.e. (C18:1, cis-9), 4% Elaidic acid m.e. (C18:1, trans-9), 2% Linoleic acid m.e. (C18:2 cis-9,12), 2% Linolelaidic acid m.e. (C18:2, trans-9,12), 2% Linolenic acid m.e. (C18:3, cis-9,12,15), 2% g-Linolenic acid m.e. (C18:3, cis-6,9,12), 2% Arachidic acid m.e. (C20:0), 4% cis-11-Eicosenoic acid m.e. (C20:1), 2% cis-11,14-Eicosadienoic acid m.e. (C20:2), (98%), 2% cis-11,14,17-Eicosatrienoic acid m.e. (C20:3) (97-99%), 2% cis-8,11,14-Eicosatrienoic acid m.e. (C20:3), 2% Arachidonic acid m.e. (C20:4, cis-5,8,11,14), 2% cis-5,8,11,14,17-Eicosapentaenoic acid m.e. (C20:5), 2% Heneicosanoic acid m.e. (C21:0), 2% Behenic acid m.e. (C22:0), 4% Erucic acid m.e. (C22:1, cis-13), 2% cis-13,16-Docosadienoic acid m.e. (C22:2), 2% cis-4,7,10,13,16,19-Docosahexaenoic acid m.e. (C22:6), 2% Tricosanoic acid m.e. (C23:0), 2% Lignoceric acid m.e. (C24:0), 4% Nervonic acid m.e. (C24:1, cis-15), 2%	100mg	18919-1AMP	
Fatty Acid Methyl Ester Mix	19 components, total of 100mg neat mixture weight percentages indicated Caprylic acid m.e. (C8:0), 1.9% Capric acid m.e. (C10:0), 3.2% Lauric acid m.e. (C12:0), 6.4% Tridecanoic acid m.e. (C13:0), 3.2% Myristic acid m.e. (C14:0), 3.2% Myristoleic acid m.e. (C14:0, cis-9), 1.9% Pentadecanoic acid m.e. (C15:0), 1.9% Palmitic acid m.e. (C16:0), 13.0% Palmitoleic acid m.e. (C16:1, cis-9), 6.4% Heptadecanoic acid m.e. (C17:0), 3.2% Stearic acid m.e. (C18:0), 6.5% Oleic acid m.e. (C18:1, cis-9), 19.6% Elaidic acid m.e. (C18:1, trans-9), 2.6% Linoleic acid m.e. (C18:2 cis-9,12), 13.0% Linolenic acid m.e. (C18:3, cis-9,12,15), 6.4% Arachidic acid m.e. (C20:0), 1.9% cis-11-Eicosenoic acid m.e. (C20:1), 1.9% Behenic acid m.e. (C22:0), 1.9% Erucic acid m.e. (C22:1, cis-13), 1.9%	100mg	18920-1AMP	

Food and Beverage Standards
Lipids

Qualitative Fatty Acid Mixes

These 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.

MIXES AND SOLUTIONS	COMPONENTS	QTY.	CAT. NO.	PRICE
SATURATED FATTY ACIDS				
Fatty Acids, Even Carbon Straight Chains Kit	10 individually packaged fatty acids in the amounts indicated Caproic acid (C6:0), 10mL; Caprylic acid (C8:0), 10mL; Capric acid (C10:0), 10g; Lauric acid (C12:0), 10g; Myristic acid (C14:0), 10g; Palmitic acid (C16:0), 10g; Stearic acid (C18:0), 10g; Arachidic acid (C20:0), 10g; Behenic acid (C22:0), 10g; Lignoceric acid (C24:0), 10g		EC10-1KT	
Fatty Acids, Even Carbon Straight Chains Kit	10 individually packaged fatty acids in the amounts indicated Caproic acid (C6:0), 10mL; Caprylic acid (C8:0), 10mL; Capric acid (C10:0), 10g; Lauric acid (C12:0), 10g; Myristic acid (C14:0), 10g; Palmitic acid (C16:0), 10g; Stearic acid (C18:0), 5g; Arachidic acid (C20:0), 5g; Behenic acid (C22:0), 5g; Lignoceric acid (C24:0), 1g		EC10A-1KT	
Fatty Acids, Odd Carbon Straight Chains Kit	9 individually packaged fatty acids, 1g each Heptanoic acid (C7:0) (approx. 98% pure); Nonanoic acid (C9:0) (97-99% pure); Undecanoic acid (C11:0); Tridecanoic acid (C13:0); Pentadecanoic acid (C15:0); Heptadecanoic acid (C17:0); Nonadecanoic acid (C19:0); Heneicosanoic acid (C21:0); Tricosanoic acid (C23:0)		OC9-1KT	
Volatile Acid Standard Mix	10 components, 10mM each in 100mL deionized water Formic acid; Acetic acid; Propionic acid; Isobutyric acid; Butyric acid; Isovaleric acid; n-Valeric acid; Isocaproic acid (4-Methyl-n-valeric acid); Hexanoic acid (n-Caproic acid); Heptanoic acid	100mL	46975-U	
UNSATURATED FATTY ACIDS				
Fatty Acid Mix	4 fatty acids, approx. 10mg each 6,9,12,15-Octadecatetraenoic acid (18:4) (90% pure) Arachidonic acid (20:4) 5,8,11,14,17-Eicosapentaenoic acid (20:5) 4,7,10,13,16,19-Docosahexaenoic acid (22:6)	40mg	17824-1AMP	
Fatty Acids, Unsaturated Kit	10 individually packaged fatty acids, 100mg each Palmitoleic acid (16:1); Elaidic acid (18:1, trans); Oleic acid (18:1); Petroselinic acid (18:1); Linoleic acid (18:2); Linolenic acid, ~98% (18:3); Arachidonic acid (20:4); Erucic acid (22:1); Docosahexaenoic acid (22:6); Nervonic acid (24:1)		UN10-1KT	

Mono-, Di-, and Triglycerides

These standards are approximately equal weight mixtures. They are qualitative standards, useful in determining relative retention times and establishing approximate response factors.

Each mix is prepared by weight, and the composition verified by gas and/or thin layer liquid chromatography. The weight percent of each component is indicated. Each product contains 100mg total weight of lipid unless otherwise indicated.

MIXES AND SOLUTIONS	COMPONENTS	QTY.	CAT. NO.	PRICE
QUALITATIVE MIXES				
Triglyceride Mix	5 components, approx. 20mg each Tricaprylin (8:0); Tricaprin (10:0); Trilaurin (12:0); Trimyristin (14:0); Tripalmitin (16:0)	100mg	17811-1AMP	
Triglyceride Mix	3 components, approx. 33 1/3 mg each Triolein (18:1, cis-9); Trielaidin (18:1, trans-9); Tripetroselinin (18:1, cis-6)	100mg	17818-1AMP	
Olive Oil Standard Mix▲	5 components at the concentrations indicated Trilinolein (18:2), 2% 1,2-Dilinoleoyl-3-oleoyl-rac-glycerol (18:2, 18:2, 18:1), 4% Triolein (18:1), 60% 1,2-Dioleoyl-3-palmitoyl-rac-glycerol (18:1, 18:1, 16:0), 30% 1,2-Dioleoyl-3-stearoyl-rac-glycerol (18:1, 18:1, 18:0), 4%	50mg	TRI5-1AMP	
Mono-, Di-, and Triglyceride Mix	4 components, approx. 10mg each Monoolein (18:1); 1,2-Diolein (18:1); 1,3-Diolein (18:1); Triolein (18:1)	40mg	1787-1AMP	

▲ Component percentages are target values. Actual composition may vary from lot to lot. Lot specific analysis is available upon request from our Technical Service department.

MIXES AND SOLUTIONS	COMPONENTS	CAT. NO.	PRICE
QUALITATIVE MIXES (CONTD.)			
Triglycerides Kit	10 individually packaged triglycerides, 50mg each Trilaurin (C12:0) 1,2-Dilauroyl-3-myristoyl-rac-glycerol (C12:0/C12:0/C14:0) 1,2-Dimyristoyl-3-lauroyl-rac-glycerol (C14:0/C14:0/C12:0) Trimyristin (C14:0) 1,2-Dimyristoyl-3-palm itoyl-rac-glycerol (C14:0/C14:0/C16:0) 1,2-Dipalmitoyl-3-myristoyl-rac-glycerol (C16:0/C16:0/C14:0) Tri palmitin (C16:0) 1,2-Distearoyl-3-myristoyl-rac-glycerol (C18:0/C18:0/C14:0) 1,2-Distearoyl-3-palmitoyl-rac-glycerol (C18:0/C18:0/C16:0) T ristearin (C18:0)	TRI10-1KT	
Triglycerides Kit	19 individually packaged triglycerides in quantities indicated Shipped in dry ice. Triacetin (C2:0), 100mg Tributyrin (C4:0), 100mg Tricaproin (C6:0), 1mL Tricaprylin (C8:0), 0.5mL Tricaprin (C10:0), 100mg Trilaurin (C12:0), 100mg Trimyristin (C14:0), 1g Tripalmitin (C16:0), 100mg Tripalmitolein (C16:1, cis-9), approx. 98%, 100mg Tripetroselinin (C18:1, cis-6), 100mg Tristearin (C18:0), 100mg Triolein (C18:1, cis-9), 100mg Trielaidin (C18:1, trans-9), 100mg Trilinolein (C18:2, cis-9,12), 100mg Trilinolenin (C18:3, cis-9,12,15), approx. 98%, 100mg Triarachidin (C20:0), 100mg Tri-cis-11-eicosenoin (C20:1), 100mg Tribehenin (C22:0), 100mg Trierucin (C22:1, cis-13), 100mg	TRI19-1KT	
Triglycerides, Saturated, Even Carbon Chains Kit	11 individually packaged triglycerides in quantities indicated Triacetin (2:0), 100mg Tributyrin (4:0), 100mg Tricaproin (6:0), 1mL Tricaprylin (8:0), 1mL Tricaprin (10:0), 100mg Trilaurin (12:0), 100mg Trimyristin (14:0), 100mg Tripalmitin (16:0), 100mg Tristearin (18:0), 100mg Triarachidin (20:0), 100mg Tribehenin (22:0), 100mg	TRI11-1KT	
Mono-, Di-, and Triglycerides Kit	12 individually packaged glycerides, 100mg each 1-Monolauroyl-rac-glycerol (12:0) Dilaurin (12:0) Trilaurin (12:0) 1-Monomyristoyl-rac-glycerol (14:0) Dimyristin (14:0) Trimyristin (14:0) 1-Monopalmitoyl-rac-glycerol (16:0) Dipalmitin (16:0) Tripalmitin (16:0) 1-Monostearoyl-rac-glycerol (18:0) Distearin (18:0) Tristearin (18:0)	MDT12-1KT	
Phospholipid Mixture for HPLC R: 45-46-23/24/25-36/37/38 S: 45-26-36/37/39-23	4 components in 2.0mL of a chloroform solution L- α-Phosphatidylcholine, 1.5mg/mL L- α-Phosphatidylethanolamine, 1.2mg/mL L- α-Phosphatidylinositol, ammonium salt, 0.9mg/mL L- α-Lysophosphatidylcholine, 0.3mg/mL	P3817-1VL	

Sterols

Sterols make up the majority of the unsaponifiable matter in vegetable and animal fats. Animal fats contain mostly cholesterol; 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 ampul under nitrogen.

DESCRIPTION	CAS NO.	CONCENTRATION	QTY.	CAT. NO.	PRICE
5-α-Cholestane	481-21-0	10mg/mL in chloroform	1mL	47124	
Campesterol	474-62-4	100µg/mL in chloroform	1mL	47126	
Cholesterol	57-88-5	10mg/mL in chloroform	1mL	47127-U	
Dihydrocholesterol	80-97-7	10mg/mL in chloroform	1mL	47129	
Ergosterol	57-87-4	10mg/mL in chloroform	1mL	47130-U	
Stigmasterol	83-48-7	10mg/mL in chloroform	1mL	47132	
β-Sitosterol	83-46-5	100µg/mL in chloroform	1mL	47133	

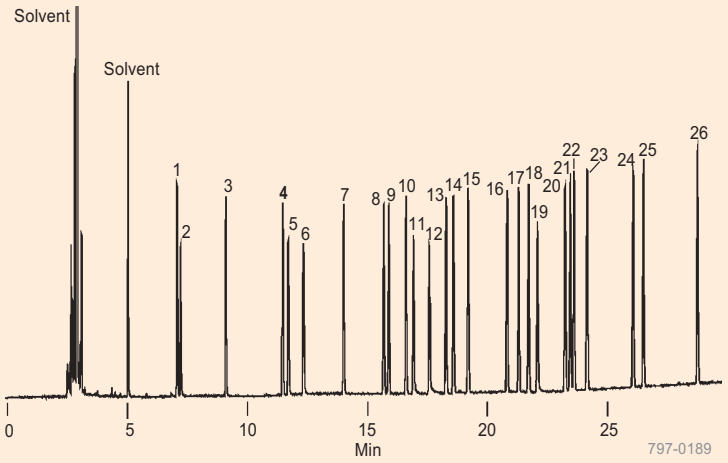
*Purity approx. 60%.

Bacterial Identification Standards
Lipids

Standard for Bacteria Identification

This is a qualitative standard of bacterial acid methyl esters in methyl caproate (10mg/mL total concentration).

DESCRIPTION	QTY.	CAT. NO.	PRICE
Bacterial Acid Methyl Ester (BAME)	1mL	47080-U	



1. 11:0 Me. undecanoate
2. 2-OH 10:0 Me. 2-hydroxydecanoate
3. 12:0 Me. dodecanoate
4. 13:0 Me. tridecanoate
5. 2-OH 12:0 Me. 2-hydroxydodecanoate
6. 3-OH 12:0 Me. 3-hydroxydodecanoate
7. 14:0 Me. tetradecanoate
8. i-15:0 Me. 13-methyltetradecanoate
9. a-15:0 Me. 12-methyltetradecanoate
10. 15:0 Me. pentadecanoate
11. 2-OH 14:0 Me. 2-hydroxytetradecanoate
12. 3-OH 14:0 Me. 3-hydroxytetradecanoate
13. i-16:0 Me. 14-methylpentadecanoate
14. $16:1^{9}$ Me. cis-9-hexadecenoate
15. 16:0 Me. hexadecanoate
16. i-17:0 Me. 15-methylhexadecanoate
17. $17:0^{\Delta}$ Me. cis-9,10- methylenehexadecanoate
18. 17:0 Me. heptadecanoate
19. 2-OH 16:0 Me. 2-hydroxyhexadecanoate
20. $18:2^{9,12}$ Me. cis-9,12-octadecadienoate
21. $18:1^{9}$ Me. cis-9-octadecenoate
22. $18:1^{9}$ Me. trans-9-octadecenoate
23. 18:0 Me. o ctadecanoate
24. $19:0^{\Delta}$ Me. cis-9,10- methyleneoctadecanoate
25. 19:0 Me. nonadecanoate
26. 20:0 Me. eicosanoate

Column: SPB-1, 30m x 0.25mm ID, 0.25µm film
Cat. No.: 24028
Oven: 150°C (4 min) to 250°C (5 min) at 4°C/min
Carrier: helium, 20cm/sec (150°C)
Det.: FID
Inj.: 1µL

Water Soluble Fatty Acid (WSFA) Mixes

MIXES AND SOLUTIONS	COMPONENTS	QTY.	CAT. NO.	PRICE
WSFA-2	0.1% of each fatty acid in water (weight percent) Acetic acid (C2), Butyric acid (C4), Valeric acid (C5) Propionic acid (C3), Isobutyric acid (iC4), Isovaleric acid (iC5)	5mL	47056	
WSFA-4	0.1% of each fatty acid in water (weight percent) Acetic acid (C2), Isobutyric acid (iC4), 2-Methylbutyric acid (2-methyl C4) Propionic acid (C3), Valeric acid (C5), Isovaleric acid (iC5) Butyric acid (C4)	5mL	47058	

Other Qualitative Standards

MIXES AND SOLUTIONS	COMPONENTS	QTY.	CAT. NO.	PRICE
Volatile Acid Standard Mix	10 components, 10mM each in deionized water Formic acid, n-Valeric acid Acetic acid, Isocaproic acid (4-Methyl-n-valeric acid) Propionic acid, Hexanoic acid (n-Caproic acid) Isobutyric acid, Isovaleric acid Butyric acid, Heptanoic acid	100mL	46975-U	
Nonvolatile Acid Standard Mix	8 components, 1 meq of each in deionized water Pyruvic acid, Methyl malonic acid Lactic acid, Malonic acid Oxalacetic acid, Fumaric acid Oxalic acid, Succinic acid	100mL	46985-U	

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Tables

All chemicals listed in this catalog are for investigational use only. They are not intended for human consumption or to be used in food or food additives. None are for general drug or medicinal use on humans. We believe the information in this catalog, offered in good faith, is accurate.

Limited Warranty: All Matreya Products, except those specifically exempted, are warranted (for 90 days) to be free of defects in materials and workmanship, if properly stored. Any replacements required as a result of such defects will be made without charge provided that such defective products are returned with a written explanation. Please request a Returned Goods Authorization before returning products under this warranty.

Technical Service

Our technical service department may be contacted by telephone at 800.342.3595, or by e-mail to techservice@matreya.com.

Note that there are excellent resources for general information on lipid nomenclature, distribution and biochemistry available on the internet. One such source is www.lipidlibrary.co.uk maintained by W.W. Christie and colleagues. Another source for detailed discussion on isolation and purification protocols is www.cyberlipid.org. This site also maintains discussion groups for lipid researchers.

Natural Products

Some of our glycolipids are extracted from natural sources. These products have a normal heterogeneity in their lipid components, particularly in the fatty acids. Variations include carbon chain length as well as the presence or absence of 2-hydroxy fatty acids. Products based on sphingosine may contain longer chain sphingoid bases as well as chains with multiple double bonds. This heterogeneity may result in additional spots showing on TLC plates or multiple peaks in LC analyses. We have listed the typical fatty acid compositions of our natural products in the appendix.

Storage

Catalog items in unopened containers are stable for at least one year when stored under the conditions indicated in the catalog listing. Items containing unsaturated fatty acids are subject to oxidation and should be stored in solution in organic solvents or under argon. Glycolipids and phospholipids should not be stored in aqueous solutions due to potential hydrolysis.

Sphingolipid Structures and Pathways

In a clear and straightforward manner, this wall chart indicates the structures and relationships between most commonly discussed sphingolipids. A one-page thumbnail version of the chart is shown on page 95. Full size copies (approximately 35 x 26 inches) are available on request to customer service.

Package Weight

Unless otherwise specified, the package will contain at least the indicated amount and usually slightly more. The user is cautioned to always measure the required amount from the container.

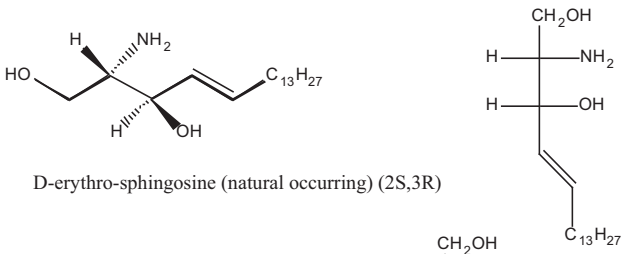
Sphingoid bases, sphingolipids and glycosphingolipids.

Sphingoid bases such as sphingosine are the characteristic structural unit of the sphingolipids . The bases are long chain aliphatic amines, containing two or three hydroxyl groups, and typically a *trans*-double bond at C4. In animal tissues most abundant base is sphingosine with a C18 aliphatic chain containing a double bond in position 4 . The saturated analogue is dihydrosphingosine or sphinganine. In plants the common long chain base is the 4 hydroxy saturated base phytosphingosine.

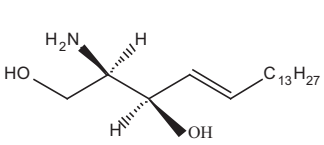
Sphingolipids are widely distributed in animal tissues, particularly cell membranes. Sphingoid bases linked to fatty acids via an amide bond at C2 are ceramides and are present in trace amounts in most tissues. Glycosphingolipids (ceramides having various mono- and oligosaccharides on the OH group at C1) are neutral glycosphingolipids (i.e., cerebrosides and globosides). Those with sialic acid derivatized sugars are acidic glycolipids (i.e., gangliosides). They are amphiphilic and can be solubilized in buffers via sonication and micelle formation.

Gangliosides are present in substantial amounts in nerve cell membranes, and together with globosides are found in the membranes of white and red blood cells. These plus the glycosphingolipids of the lacto- and neolacto-series are involved in cell recognition (e.g. blood group determinants). Glycolipid expression on the surface of cells determines their antigenicity as well as their status, i.e. differentiated vs. undifferentiated (embryonic), normal vs. malignant, etc. (1). The ganglioside GM1 stimulates nerve growth (2,3) and has been reported to have a curative effect on experimental Parkinsonism (4). For an overview see (5). Gangliosides are also being investigated as potential anti-tumor vaccines (57). Glycosphingolipids are also essential for the correct functioning of cell surface receptors (6). Matreya is your best source for many sphingolipids. Most of Matreya's sphingosines and ceramides are fully synthetic and as such 98%+ pure. Others, particularly the glycosphingolipids are highly purified natural products (98%+), and can be used either as standards or biochemical reagents without further purification.

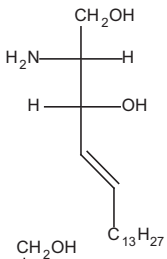
Through total synthesis, all four isomers of sphingosine are available as well as a number of sphingosines with other than 18 carbons and a number of ceramides (for details in using ceramides in cell culture see Hauser et al. [9]). Fluorescent labeled ceramides, glycosphingolipids and sphingomyelins are also available for study. D. N. Brindley and his group have been exploring the interaction of ceramides,sphingosine and sphingosine 1-phosphate in regulating DNA synthesis and phospholipase D activity (10). **See Literature References on page 96.**

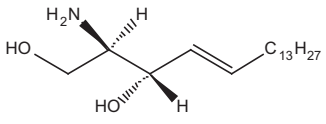


D-erythro-sphingosine (natural occurring) (2S,3R)

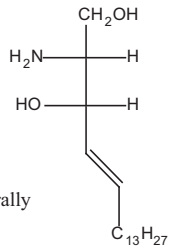


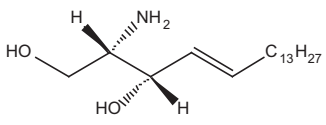
D-threo-sphingosine (2R,3R)



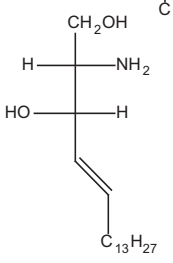


L-erythro-sphingosine (enantiomer of naturally occurring sphingosine) (2R,3S)



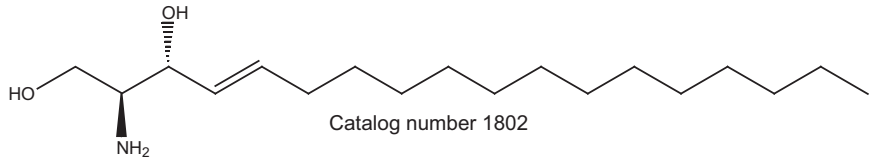


L-threo-sphingosine (2S,3S)



Sphingosines

Synthetic sphingosines with C18 sphingoid base



Catalog number 1802

1802 **D-erythro-Sphingosine** **25 mg**
Sphingosine, C18 chain $C_{18}H_{37}NO_2$ **CAS#:** 123-78-4

Source: synthetic **Mol. Wt.:** 299 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** alcohols, chloroform, DMSO **Storage:** –20°C

Selective inhibitor of phosphokinase C

References:
Y. Hannun et al., Science, **235**, 670, *1987*
S. Spiegel et al., *Proc. Intern. Conf. Biol. Function Glycosphingolipids*, Santa Barbara, CA *1990*

1806 **L-threo-Sphingosine** **10 mg**
L-threo-Sphingosine, C18 chain $C_{18}H_{37}NO_2$

Source: synthetic **Mol. Wt.:** 299 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO **Storage:** –20°C

1826 **L-erythro-Sphingosine** **5 mg**
L-erythro-Sphingosine, C18 chain $C_{18}H_{37}NO_2$ **CAS#:** 6036-75-5

Source: synthetic **Mol. Wt.:** 299 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO **Storage:** –20°C

1827 **D-threo-Sphingosine** **5 mg**
D-threo-Sphingosine, C18 chain $C_{18}H_{37}NO_2$ **CAS#:** 6036-85-7

Source: synthetic **Mol. Wt.:** 299 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO **Storage:** –20°C

1304 **Sphingosine** **10 mg**
D-erythro-Sphingosine $C_{18}H_{37}NO_2$ **CAS#:** 123-78-4

Source: semi-synthetic, bovine **Mol. Wt.:** 299 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** alcohol, chloroform **Storage:** –20°C

Synthetic sphingosines with sphingoid bases other than C18

Varying chain lengths allow the study of translocation effects of sphingosines and ceramides into cells.

1833 **D-erythro-C14-Sphingosine** **5 mg**
Sphingosine with C14 chain $C_{14}H_{29}NO_2$

Source: synthetic **Mol. Wt.:** 243 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO **Storage:** –20°C

1835 **D-erythro-C16-Sphingosine** **5 mg**
Sphingosine with C16 chain $C_{16}H_{33}NO_2$

Source: synthetic **Mol. Wt.:** 271 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1837 **D-erythro-C10-Sphingosine** **5 mg/ml, 1 ml**
Sphingosine with C10 chain $C_{10}H_{21}NO_2$

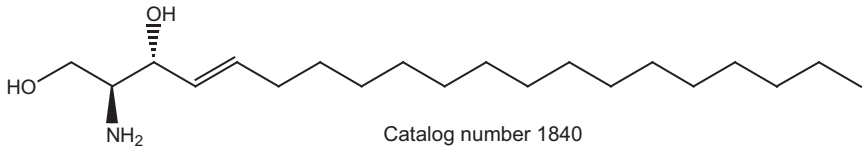
Source: synthetic **Mol. Wt.:** 187 **Purity:** 98+% by TLC, GC **Appearance:** liquid **Solvent:** ethanol **Solubility:** ethanol **Storage:** –20°C

1838 **D-erythro-C12-Sphingosine** **5 mg**
Sphingosine with C12 chain $C_{12}H_{25}NO_2$ CAS#: 6918-49-6

Source: synthetic **Mol. Wt.:** 215 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1840 **D-erythro-C20-Sphingosine** **5 mg**
Sphingosine with C20 chain $C_{20}H_{41}NO_2$

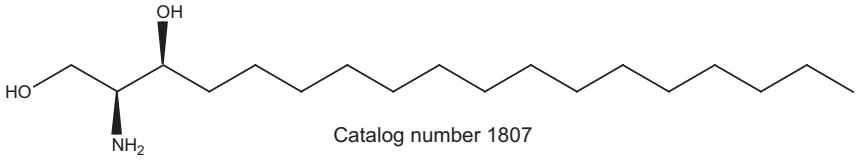
Source: synthetic **Mol. Wt.:** 328 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO **Storage:** –20°C



Catalog number 1840

Synthetic dihydrosphingosines

D,L-*threo*- Dihydrosphingosine has also been found to be a significant inhibitor of sphingosine kinase (11). The D,L-*erythro*-isomer has been used as an inactive control. We now offer all four isomers in pure form making detailed studies possible. Safingol, the L-*threo*-isomer is a potent inhibitor of PKC and as such is capable of reversing multi-drug resistance in cancer cells (12). **See Literature References on page 96.**



Catalog number 1807

1807 **L-threo-Dihydrosphingosine (Safingol)** **5 mg**
1807-025 L-threo-Sphinganine, C18 chain $C_{18}H_{39}NO_2$ **CAS#:** 15639-50-6 **25 mg**

Source: synthetic **Mol. Wt.:** 301 **Melting Point (°C):** 103-114 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol
Storage: –20°C
References:
C.W. Sachs et al., ibid., **270**, 26639, *1995*
G.K. Schwartz et al., J. Natl. Cancer Inst., **87**, 1394, *1995*

1831 **D-erythro-Dihydrosphingosine** **25 mg**
1831-1 D-erythro-Sphinganine, C18 chain $C_{18}H_{39}NO_2$ **CAS#:** 764-22-7 **1 g**

Source: synthetic **Mol. Wt.:** 301 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO **Storage:** –20°C
Inhibitor of PLA_2 and PLD

References:
D.I. Yule et al., ibid, **268**, 12353, *1993*
B. M. Buehrer, R.M. Bell, Adv. in Lipid Res., **26**, 59, *1993*
C. W. Sachs et al., J. Biol. Chem., **270**, 26639, *1995*

1846 **L-erythro-Dihydrosphingosine** **1 mg**
L-erythro-Sphinganine, C18 chain $C_{18}H_{39}NO_2$

Source: synthetic **Mol. Wt.:** 301 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO **Storage:** –20°C

References:
D.I. Yule et al., ibid, **268**, 12353, *1993*
B. M. Buehrer, R.M. Bell, Adv. in Lipid Res., **26**, 59, *1993*
C. W. Sachs et al., J. Biol. Chem., **270**, 26639, *1995*

1851 **D-threo-Dihydrosphingosine** **1 mg**
D-threo-Sphinganine, C18 chain $C_{18}H_{39}NO_2$ **CAS#:** 6036-86-8

Source: synthetic **Mol. Wt.:** 301 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO **Storage:** –20°C

References:
D.I. Yule et al., ibid, **268**, 12353, *1993*
B. M. Buehrer, R.M. Bell, Adv. in Lipid Res., **26**, 59, *1993*
C. W. Sachs et al., J. Biol. Chem., **270**, 26639, *1995*

1324 **D,L-erythro-Dihydrosphingosine** **25 mg**
D,L-erythro-Sphinganine, C18 chain $C_{18}H_{39}NO_2$ **CAS#:** 3102-56-5

Source: synthetic **Mol. Wt.:** 301 **Purity:** erythro 77%; threo 23% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO **Storage:** –20°C
Inhibitor of sphingosine kinase

References:
D.I. Yule et al., ibid, **268**, 12353, *1993*
B. M. Buehrer, R.M. Bell, Adv. in Lipid Res., **26**, 59, *1993*
C. W. Sachs et al., J. Biol. Chem., **270**, 26639, *1995*

1326 **D,L-C16-Dihydrosphingosine (mixed isomers)** **10 mg**
D,L-Sphinganine with C16 chain $C_{16}H_{35}NO_2$

Source: synthetic **Mol. Wt.:** 273 **Purity:** erythro 90%, threo 10% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO **Storage:** –20°C

References:
D.I. Yule et al., ibid, **268**, 12353, *1993*
B. M. Buehrer, R.M. Bell, Adv. in Lipid Res., **26**, 59, *1993*
C. W. Sachs et al., J. Biol. Chem., **270**, 26639, *1995*

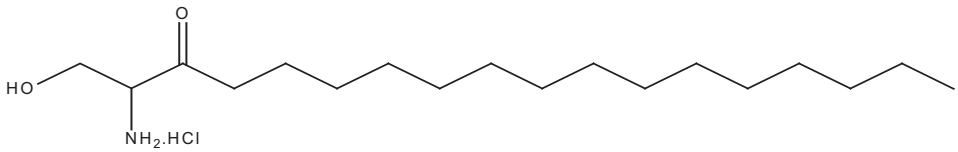
1845 **D-erythro-C20-Dihydrosphingosine** **5 mg**
D-erythro-Sphinganine, C20 chain $C_{20}H_{43}NO_2$ **CAS#:** 24006-62-0

Source: synthetic **Mol. Wt.:** 330 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol 5:1, warm ethanol **Storage:** –20°C

1839 **D,L-erythro-C20-Dihydrosphingosine** **10 mg**
D,L-erythro-Sphinganine, C20 chain $C_{20}H_{43}NO_2$

Source: synthetic **Mol. Wt.:** 330 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol 5:1, warm ethanol **Storage:** –20°C

3-keto-Dihydrosphingosines



Catalog number 1876

1876 **3-keto-Dihydrosphingosine•HCl** **10 mg**
3-keto-Sphinganine hydrochloride $C_{18}H_{37}NO_2$•HCl **CAS#:** 18944-28-0

Source: synthetic **Mol. Wt.:** 336 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1891 **3-keto-C6-Dihydrosphingosine•HCl** **10 mg**
1-Hydroxy-2-amino-3-keto-hexane • HCl $C_6H_{13}NO_2 \cdot HCl$

Source: synthetic **Mol. Wt.:** 168 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** ethanol, methanol, DI water **Storage:** –20°C

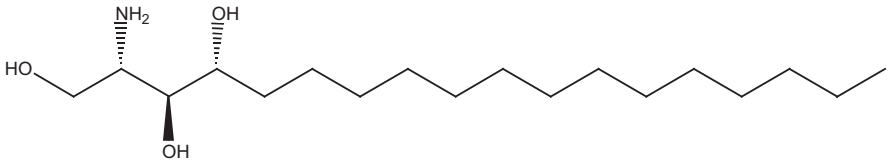
1892 **3-keto-C8-Dihydrosphingosine•HCl** **10 mg**
1-Hydroxy-2-amino-3-keto-octane • HCl $C_8H_{17}NO_2 \cdot HCl$

Source: synthetic **Mol. Wt.:** 196 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DI water **Storage:** –20°C

1893 **3-keto-C12-Dihydrosphingosine•HCl** **10 mg**
1-Hydroxy-2-amino-3-keto-dodecane • HCl $C_{12}H_{25}NO_2 \cdot HCl$

Source: synthetic **Mol. Wt.:** 252 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Phytosphingosines



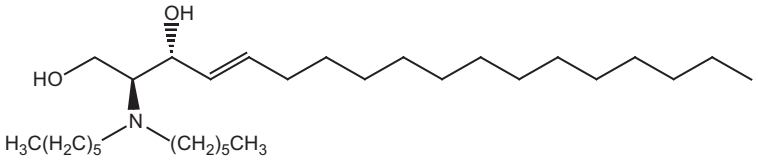
Catalog number 1330

1330 **Phytosphingosine** **50 mg**
1330-1 4-Hydroxysphinganine $C_{18}H_{39}NO_3$ **CAS#** 554-62-1 **1 g**

Source: natural, yeast (Pichia ciferri) **Mol. Wt.:** 318 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol, chloroform/methanol 2:1 (warm) **Storage:** –20°C

Reference:
Keliu, Xiping Zhang, Robert L. Lester, and Robert C. Dickson. J. Biol. Chem., **280**, Issue 24, 22679-22687, *June 17, 2005*

Other sphingosine derivatives and precursors



Catalog number 1896

1320 **N,N-Dimethyl-D-erythro-sphingosine** **5 mg/ml, 1 ml**
$C_{20}H_{41}NO_2$ **CAS#:** 119567-63-4

Source: synthetic **Mol. Wt.:** 328 **Purity:** 98+% by TLC **Appearance:** liquid
Solvent: isopropanol **Solubility:** chloroform, ethanol, isopropanol, methanol
Storage: –20°C

Inhibitor of phosphokinase C

Reference:
B. Felding-Habermann et al., Biochemistry, **29**, 6314, *1990*

1896 **N,N-Dihexyl-D-erythro-sphingosine** **5 mg/ml, 1 ml**
Sphingosine with tertiary amine group $C_{30}H_{61}NO_2$

Source: synthetic **Mol. Wt.:** 468 **Purity:** 95% by TLC **Appearance:** liquid
Solvent: ethanol **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1805 **N-Palmitoyl serinol** **10 mg**
$C_{19}H_{39}NO_3$ **CAS#:** 126127-31-9

Source: synthetic **Mol. Wt.:** 329 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, methanol, ethanol **Storage:** –20°C

Sphingosine precursor

Ceramides

Ceramide is a fatty acid amide of sphingosine. It may be formed by dehydrogenation of dihydroceramide; by hydrolysis of sphingomyelin or glycosphingolipids; or by acylation of free sphingosine. Ceramide functions as a precursor in the synthesis of sphingomyelin (by an exchange reaction with phosphatidylcholine and phosphatidylethanolamine); of glycosphingolipids (by glycosylation with UDP-hexose); and of free sphingosine and fatty acid by hydrolysis. The sphingosine can be phosphorylated by a kinase to form sphingosine-1-phosphate, which may undergo further hydrolysis or cleavage.

Control of sphingolipid metabolism maintains vital balance points in cell physiology. Two of ceramide's metabolites, sphingosine-1-phosphate and glucosylceramide, produce cell proliferation. Sphingosine-1-phosphate is also a highly active regulator of angiogenesis, vascular maturation, cardiac development, immunity, and directed cell movement. Sphingosine, the free base, is a potent inhibitor of protein kinase C and is involved in intracellaular calcium regulation.

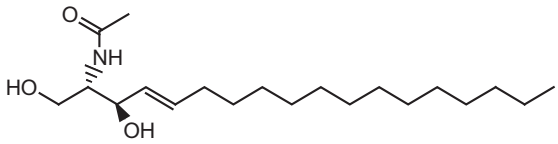
Sphingolipid enzymes seem to be particularly active in cancers, so modifying their activities by exogenous action may provide alternatives to chemical therapies. These enzymes are controlled by many known agents, such as 1,25-dihdroxy-vitamin D_3, tumor necrosis factor-α, nerve growth factor, interleukin 1, endothelial growth factor, glutathione, arachidonic acid, dexamethasone, many anticancer drugs, therapeutic radiation, and activators of the FAS receptor.

Ceramide exerts numerous biological effects, including induction of cell maturation, cell cycle arrest, terminal cell differentiation, cell senescence, and cell death. Other effects include producing reactive oxygen in mitochondria (followed by apoptosis) and stimulating phosphorylation of certain proteins (especially mitogen activated protein). It also stimulates some protein phosphatases (especially protein phosphatase 2A). Thus ceramide is an important controller of protein activity

It is apparent from these relationships that ceramide exists at the crux of several enzyme reaction cycles and that experiments involving sphingolipid function call for control of all of the cycles and their branch-off points. Matreya is the major supplier of these lipids, which can be used as standards for analysis of tissues (a much needed part of modern research) and identification of major sphingolipids.

Ceramides with short side chains have been shown to enter easily into cells where they are biologically active. Ceramides with longer side chains, however, also enter cells if dissolved in dodecane-isopropanol first. Fluorescent labeled ceramides and sphingomyelin made from fluorescent labeled acids instead of plain fatty acids are also available for the study of the localization and metabolism of sphingolipids in the cell. Matreya now offers all four isomers of C2, C4, C6 and C18 ceramides. The corresponding dihydroceramides are being used as inactive controls

In three major reviews, Radin (54-56) has discussed the biochemistry and chemistry of ceramide and outlined many potential approaches to cancer therapy using ceramides and related compounds as generators of apoptosis.
See Literature References on page 96.



Catalog number 1901

Synthetic ceramides derived from C18-sphingosine

1901 **N-Acetyl-D-erythro-sphingosine** **10 mg**
N-C2:0-D-erythro-Ceramide $C_{20}H_{39}NO_3$ **CAS#:** 3102-57-6

Source: synthetic **Mol. Wt.:** 342 **Purity:** 98+ by TLC, GC **Appearance:** white solid
Solubility: chloroform, ethanol, methanol, DMSO, (up to 5 mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1829 **N-Acetyl-L-threo-sphingosine** **1 mg**
N-C2:0-L-threo-Ceramide $C_{20}H_{39}NO_3$

Source: synthetic **Mol. Wt.:** 342 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO, DMF (up to 5 mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1847 **N-Acetyl-L-erythro-sphingosine** **1 mg**
N-C2:0-L-erythro-Ceramide $C_{20}H_{39}NO_3$

Source: synthetic **Mol. Wt.:** 342 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO, DMF (up to 5 mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1900 **N-Hexanoyl-D-erythro-sphingosine** **10 mg**
N-C6:0-D-erythro-Ceramide $C_{24}H_{47}NO_3$ **CAS#:** 124753-97-5

Source: synthetic **Mol. Wt.:** 398 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol. DMSO (up to 5 mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1828 **N-Hexanoyl-L-threo-sphingosine** **1 mg**
N-C6:0-L-threo-Ceramide $C_{24}H_{47}NO_3$

Source: synthetic **Mol. Wt.:** 398 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, DMSO, DMF (up to 5mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1848 **N-Hexanoyl-L-erythro-sphingosine** **1 mg**
N-C6:0-L-erythro-Ceramide $C_{24}H_{47}NO_3$

Source: synthetic **Mol. Wt.:** 398 **Purity:** 98+% by TLC; GC **Appearance:** white solid **Solubility:** chloroform, ethanol, DMSO, DMF (up to 5mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1809 **N-Hexanoyl-D-threo-sphingosine** **1 mg**
N-C6:0-D-threo-Ceramide $C_{24}H_{47}NO_3$

Source: synthetic **Mol. Wt.:** 398 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, methanol, DMSO (up to 5 mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1903 **N-Octanoyl-D-erythro-sphingosine** **10 mg**
N-C8:0-D-erythro-Ceramide $C_{26}H_{51}NO_3$ **CAS#:** 74713-59-0

Source: synthetic **Mol. Wt.:** 426 **Purity:** 98+ by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO (up to 5 mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1830 **N-Octanoyl-L-threo-sphingosine** **1 mg**
N-C8:0-L-threo-Ceramide $C_{26}H_{51}NO_3$

Source: synthetic **Mol. Wt.:** 426 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, DMSO, DMF (up to 5 mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1810 **N-Octanoyl-D-threo-sphingosine** **1 mg**
N-C8:0-D-threo-Ceramide $C_{26}H_{51}NO_3$

Source: synthetic **Mol. Wt.:** 426 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, DMSO, DMF (up to 5mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1333 **N-Decanoyl-D-erythro-sphingosine** **10 mg**
N-C10:0-D-erythro-Ceramide $C_{28}H_{55}NO_3$

Source: synthetic **Mol. Wt.:** 454 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO, (up to 5mg/ml)
Storage: –20°C

2037 **N-Pentadecanoyl-D-erythro-sphingosine** **10 mg**
N-C15:0-D-erythro-Ceramide $C_{33}H_{65}NO_3$

Source: synthetic **Mol. Wt.:** 524 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol, warm methanol **Storage:** –20°C

1915 **N-Hexadecanoyl-D-erythro-sphingosine** **10 mg**

N-C16:0-D-erythro-Ceramide $C_{34}H_{67}NO_3$ **CAS#:** 24696-26-2

Source: synthetic **Mol. Wt.:** 538 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol, warm methanol **Storage:** –20°C

Reference:
Yosuke Osawa, Hiroshi Uchinami, Jacek Bielawski, Robert F. Schwabe, Yusuf A. Hannun, and David A. Brenner. J. Biol. Chem., **280**, Issue 30, 27879-27887, *July 29, 2005*

2038 **N-Heptadecanoyl-D-erythro-sphingosine** **10 mg**
N-C17:0-D-erythro-Ceramide $C_{35}H_{69}NO_3$ **CAS#:** 24696-26-2

Source: synthetic **Mol. Wt.:** 552 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol, warm methanol **Storage:** –20°C

1832 **N-Octadecanoyl-D-erythro-sphingosine** **10 mg**
N-C18:0-D-erythro-Ceramide $C_{36}H_{71}NO_3$ **CAS#:** 2304-81-6

Source: synthetic **Mol. Wt.:** 566 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, hot ethanol, chloroform/methanol 2:1 (up to 5mg/ml)
Storage: –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

2039 **N-Nonadecanoyl-D-erythro-sphingosine** **10 mg**
N-C19:0-D-erythro-Ceramide $C_{37}H_{73}NO_3$

Source: synthetic **Mol. Wt.:** 580 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol, warm methanol **Storage:** –20°C

1843 **N-Octadecanoyl-L-threo-sphingosine** **1 mg**
N-C18:0-L-threo-Ceramide $C_{36}H_{71}NO_3$

Source: synthetic **Mol. Wt.:** 566 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, DMSO, DMF (up to 5mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1850 **N-Octadecanoyl-L-erythro-sphingosine** **1 mg**
N-C18:0-L-erythro-Ceramide $C_{36}H_{71}NO_3$

Source: synthetic **Mol. Wt.:** 566 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, DMSO, DMF (up tp 5mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1855 **N-Octadecanoyl-D-threo-sphingosine** **1 mg**
N-C18:0-D-threo-Ceramide $C_{36}H_{71}NO_3$

Source: synthetic **Mol. Wt.:** 566 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, DMSO, DMF (up to 5mg/ml) **Storage:** –20°C

1916 **N-Tetracosanoyl-D-erythro-sphingosine** **5 mg**
N-C24:0-D-erythro-Ceramide $C_{42}H_{83}NO_3$ **CAS#:** 34435-05-7

Source: synthetic **Mol. Wt.:** 650 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform **Storage:** –20°C

2-Hydroxy ceramides

2042 **N-(R,S)-alpha-Hydroxydodecanoyl-D-erythro-sphingosine** **5 mg**
N-(R,S)-alpha-Hydroxy-C12:0-D-erythro-ceramide $C_{30}H_{59}NO_4$

Source: synthetic **Mol. Wt.:** 498 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, methanol, ethanol, DMSO **Storage:** –20°C

2044 **N-(R,S)-alpha-Hydroxyoctadecanoyl-D-erythro-sphingosine** **5 mg**
N-(R,S)-alpha-Hydroxy-C18:0-D-erythro-ceramide $C_{36}H_{71}NO_4$

Source: synthetic **Mol. Wt.:** 582 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol/water, 2:1:0.5 **Storage:** –20°C

Ceramide made from sphingosines with sphingoid bases other than C18

1842 **N-Acetyl-D-erythro-sphingosine (C14 sphingoid base)** **5 mg**
N-C2:0 Ceramide of D-erythro-C14-sphingosine $C_{16}H_{31}NO_2$

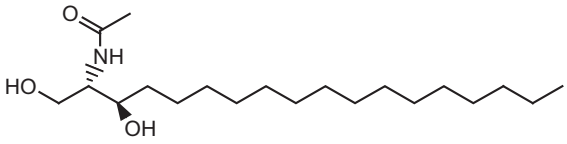
Source: synthetic **Mol. Wt.:** 285 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, DMSO, DMF (up to 5 mg/ml) **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1856 **N-Hexanoyl-D-erythro-sphingosine (C8 sphingoid base)** **1 mg**
N-C6:0 Ceramide of D-erythro-C8-sphingosine $C_{14}H_{27}NO_2$

Source: synthetic **Mol. Wt.:** 257 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Dihydroceramides



Catalog number 1834

1834 **N-Acetyl-D-erythro-dihydrosphingosine** **1 mg**
N-C2:0-D-erythro-Dihydroceramide; N-Acetyl-D-erythro-sphinganine
$C_{20}H_{41}NO_3$

Source: synthetic **Mol. Wt.:** 344 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1910 **N-Hexanoyl-D-erythro-dihydrosphingosine** **1 mg**
N-C6:0-D-erythro-Dihydroceramide; N-Hexanoyl-D-erythro-sphinganine
$C_{24}H_{49}NO_3$

Source: synthetic **Mol. Wt.:** 400 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DMSO **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1854 **N-Octanoyl-D-erythro-dihydrosphingosine** **1 mg**
N-C8:0-D-erythro-Dihydroceramide; N-Octanoyl-D-erythro-sphinganine
$C_{26}H_{53}NO_3$

Source: synthetic **Mol. Wt.:** 428 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, DMSO **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

2041 **N-Octadecanoyl-D-erythro-dihydrospingosine** **10 mg**
N-C18:0-D-erythro-Dihydroceramide; N-Octadecanoyl-D-erythro-sphinganine
$C_{36}H_{73}NO_3$

Source: synthetic **Mol. Wt.:** 568 **Purity:** 98% by TLC **Appearance:** white solid **Solubility:** warm chloroform/methanol, 5:1; hot ethanol, DMSO **Storage:** –20°C

2-Hydroxy dihydroceramides

2043 **N-(R,S)-alpha-Hydroxydodecanoyl-D-erythro-dihydrosphingosine** **5 mg**
N-(R,S)-alpha-Hydroxy-C12:0-D-erythro-dihydroceramide $C_{30}H_{61}NO_4$

Source: synthetic **Mol. Wt.:** 500 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol/water, 2:1:0.5 **Storage:** –20°C

2045 **N-(R,S)-alpha-Hydroxyoctadecanoyl-D-erythro-dihydrosphingosine** **5 mg**
N-(R,S)-alpha-Hydroxy-C18:0-D-erythro-dihydroceramide $C_{36}H_{73}NO_4$

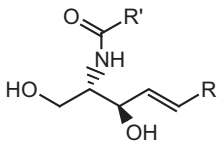
Source: synthetic **Mol. Wt.:** 584 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol/water, 2:1:0.5 **Storage:** –20°C

2047 **N-(R,S)-alpha-Hydroxyhexadecanoyl-D-erythro-dihydrosphingosine** **5 mg**

N-(R,S)-alpha-Hydroxy-C16:0-D-erythro-dihydroceramide $C_{34}H_{69}NO_4$

Source: synthetic **Mol. Wt.:** 556 **Purity:** 98+% by TLC **Appearance:** solid
Solubility: chloroform/methanol/water, 2:1:0.5 **Storage:** –20°C

Ceramides from natural sources



General ceramide structure

1056 **Ceramides** **25 mg**

Ceramides with hydroxy and non-hydroxy acyl groups
$C_{42}H_{83}NO_4$ **CAS#:** 104404-17-13

Source: natural, bovine **Mol. Wt.:** 666(2-hydroxy-lignoceroyl) **Purity:** 98+% by TLC **Appearance:** off-white solid **Solubility:** chloroform/methanol 2:1
Storage: –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1322 **Ceramides** **10 mg**
1322-05 Ceramides with mostly non-hydroxy acyl groups $C_{36}H_{71}NO_3$ **50 mg**

Source: natural, bovine **Mol. Wt.:** 566 (stearoyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol 2:1, ethanol
Storage: –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

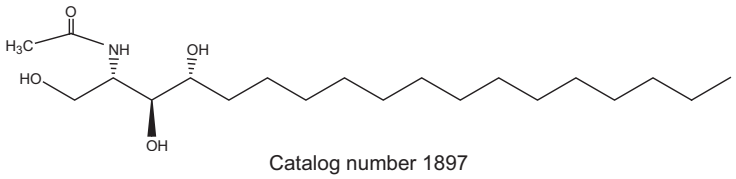
1323 **Ceramides** **10 mg**
1323-05 Ceramides with mostly hydroxy acyl groups $C_{36}H_{71}NO_4$ **50 mg**

Source: natural, bovine **Mol. Wt.:** 582 (2-hydroxy-stearoyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol 2:1, methanol
Storage: –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

See Table III in Appendix for typical fatty acid content of products prepared from natural sources.

Phytoceramides



Catalog number 1897

1897 **N-Acetyl-phytosphingosine** **5 mg**
N-C2:0-Phytoceramide $C_{20}H_{41}NO_4$

Source: semi-synthetic, yeast (Pichia ciferri) **Mol. Wt.:** 360 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol, chloroform/methanol 1:1 (warm), warm DMSO **Storage:** –20°C

1895 **N-Hexanoyl-phytosphingosine** **5 mg**
N-C6:0-Phytoceramide $C_{24}H_{49}NO_4$

Source: semi-synthetic, yeast (Pichia ciferri) **Mol. Wt.:** 416 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol, chloroform/methanol 1:1 (warm) **Storage:** –20°C

1894 **N-Octanoyl-phytosphingosine** **5 mg**
N-C8:0-Phytoceramide $C_{26}H_{53}NO_4$

Source: semi-synthetic, yeast (Pichia ciferri) **Mol. Wt.:** 444 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol, chloroform/methanol 1:1 (warm) **Storage:** –20°C

2035 **N-Hexadecanoyl-phytosphingosine** **5 mg**
N-C16:0-Phytoceramide $C_{34}H_{69}NO_4$

Source: semi-synthetic, yeast (Pichia ciferri) **Mol. Wt.:** 556 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol 5:1 **Storage:** –20°C

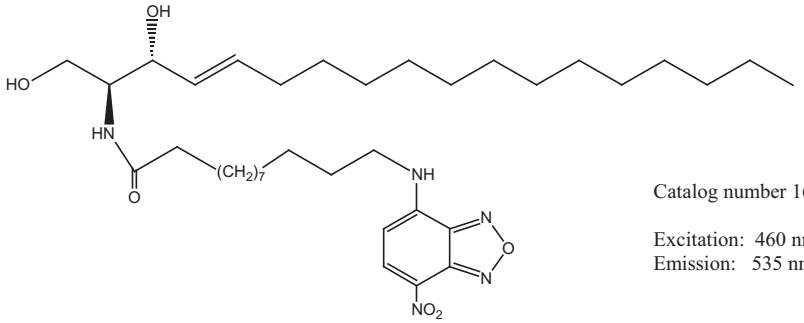
2034 **N-Stearoyl-phytosphingosine** **5 mg**
N-C18:0-Phytoceramide $C_{36}H_{73}NO_4$

Source: semi-synthetic, yeast (Pichia ciferri) **Mol. Wt.:** 584 **Purity:** 98+% by TLC-MS **Appearance:** white solid **Solubility:** chloroform/methanol 1:1 (warm) **Storage:** –20°C

2036 **N-Tetracosanoyl-phytosphingosine** **5 mg**
N-C24:0-Phytoceramide $C_{42}H_{85}NO_4$

Source: semi-synthetic, yeast (Pichia ciferri) **Mol. Wt.:** 668 **Purity:** 98+% by TLC-MS **Appearance:** white solid **Solubility:** chloroform/methanol 5:1 **Storage:** –20°C

Fluorescent ceramides



Catalog number 1618

Excitation: 460 nm
Emission: 535 nm

1841 **N-Hexanoyl-NBD-D-erythro-sphingosine** **100 µg**
1841-001 N-C6:0-NBD-ceramide; N-C6:0-NBD-D-erythro-sphingosine, fluorescent; N-(NBD-aminocaproyl)-D-erythro-sphingosine $C_{30}H_{49}N_5O_6$ **CAS#:** 86701-10-2 **1 mg**

Source: synthetic **Mol. Wt.:** 575 **Melting Point (°C):** 85.7-87.9 **Purity:** 98+% by TLC **Appearance:** orange film, vacuum dried **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1618 **N-Dodecanoyl-NBD-D-erythro-sphingosine** **100 ug**
1618-001 N-C12:0-NBD ceramide; N-C12:0-NBD-D-erythro-sphingosine, fluorescent; N-(NBD-aminolauroyl)-D-erythro-sphingosine $C_{36}H_{61}N_5O_6$ **1 mg**

Source: synthetic **Mol. Wt.:** 660 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/methanol 2:1, methanol **Storage:** –20°C

1857 **N-Hexanoyl-NBD-L-threo-sphingosine** **100 µg**
1857-001 N-C6:0-NBD-ceramide; N-C6:0-NBD-L-threo-sphingosine, fluorescent; N-(NBD-aminocaproyl)-L-threo-sphingosine $C_{30}H_{49}N_5O_6$ **1 mg**

Source: synthetic **Mol. Wt.:** 575 **Purity:** 98+% by TLC **Appearance:** red-orange solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1620 **N-Dodecanoyl-NBD-L-threo-sphingosine** **100 µg**
1620-001 N-C12:0-NBD-ceramide; N-C12:0-NBD-L-threo-sphingosine, fluorescent; N-(NBD-aminolauroyl)-L-threo-sphingosine $C_{36}H_{61}N_5O_6$ **1 mg**

Source: synthetic **Mol. Wt.:** 660 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/methanol 2:1, methanol **Storage:** –20°C

1624 **N-Hexanoyl-NBD-L-threo-dihydrosphingosine** **100 µg**
1624-001 N-C6:0-NBD-dihydroceramide; N-C6:0-NBD-L-threo-dihydrosphingosine, fluorescent; N-(NBD-aminocaproyl)-L-threo-dihydrosphingosine $C_{30}H_{51}N_5O_6$ **1 mg**

Source: synthetic **Mol. Wt.:** 578 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/methanol 2:1, methanol **Storage:** –20°C

1623 **N-Dodecanoyl-NBD-L-threo-dihydrosphingosine** **100 µg**
1623-001 N-C12:0-NBD-dihydroceramide; N-C12:0-NBD-L-threo-dihydrosphingosine, fluorescent; N-(NBD-aminolauroyl)-L-threo-dihydrosphingosine $C_{36}H_{63}N_5O_6$ **1 mg**

Source: synthetic **Mol. Wt.:** 662 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/methanol 2:1, methanol **Storage:** –20°C

1626 **N-Hexanoyl-NBD-D-erythro-dihydrosphingosine** **100 µg**
1626-001 N-C6:0-NBD-dihydroceramide; N-C6:0-NBD-D-erythro-dihydrosphingosine, fluorescent; N-(NBD-aminocaproyl)-D-erythro-dihydrosphingosine **1 mg**
$C_{30}H_{51}N_5O_6$

Source: synthetic **Mol. Wt.:** 578 **Purity:** 98+% by TLC **Appearance:** orange solid
Solubility: chloroform/methanol 2:1, methanol **Storage:** –20°C

1625 **N-Dodecanoyl-NBD-D-erythro-dihydrosphingosine** **100 µg**
1625-001 N-C12:0-NBD-dihydroceramide; N-C12:0-NBD-D-erythro-dihydrosphingosine, fluorescent; N-(NBD-aminolauroyl)-D-erythro-dihydrosphingosine $C_{36}H_{63}N_5O_6$ **1 mg**

Source: synthetic **Mol. Wt.:** 662 **Purity:** 98+% by TLC **Appearance:** orange solid
Solubility: chloroform/methanol 2:1, methanol **Storage:** –20°C

1628 **N-Hexanoyl-NBD-phytosphingosine** **100 µg**
1628-001 N-C6:0-NBD-phytoceramide; N-C6:0-NBD-phytosphingosine, fluorescent; N-(NBD-aminocaproyl)-phytosphingosine $C_{30}H_{51}N_5O_7$ **1 mg**

Source: semi-synthetic, bacteria **Mol. Wt.:** 594 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/methanol 2:1, methanol **Storage:** –20°C

1627 **N-Dodecanoyl-NBD-phytosphingosine** **100 µg**
1627-001 N-C12:0-NBD-phytoceramide; N-C12:0-NBD-phytosphingosine, fluorescent; N-(NBD-aminolauroyl)-phytosphingosine $C_{36}H_{63}N_5O_7$ **1 mg**

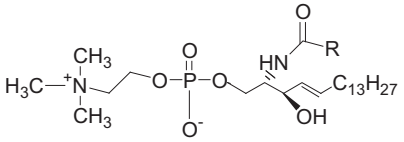
Source: semi-synthetic, bacteria **Mol. Wt.:** 678 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/methanol 2:1, methanol **Storage:** –20°C

See Biochemicals and Reagents section (page 85) for additional fluorescent labeled products.

Compounds with fluorescent labels other than NBD are available on custom basis. Contact Technical Service for more information.

Phosphosphingolipids

Sphingomyelins



Catalog number 1051

1051 **Sphingomyelin** **25 mg**
1051-1 SPM; ceramide-1-phosphorylcholine $C_{41}H_{83}N_2O_6P$ **CAS#:** 85187-10-6 **1 g**

Source: natural, bovine **Mol. Wt.:** 731 (stearoyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Predominately C18:0 and C24:1 fatty acids

1328 **Sphingomyelin** **25 mg**
SPM; ceramide-1-phosphorylcholine $C_{47}H_{95}N_2O_6P$ **CAS#:** 85187-10-6

Source: natural, porcine **Mol. Wt.:** 815 (lignoceroyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform, ethanol **Storage:** –20°C

Predominately C16:0 and C24:0 fatty acids

1329 **Sphingomyelin** **25 mg**
SPM; ceramide-1-phosphorylcholine $C_{46}H_{93}N_2O_6P$ **CAS#:** 85187-10-6

Source: natural, bovine buttermilk **Mol. Wt.:** 801 (tricosanoyl) **Purity:** 98+% by TLC **Appearance:** off white solid **Solubility:** chloroform, ethanol **Storage:** –20°C

Approximately equal amounts of C16:0, C22:0, C23:0, and C24:0 fatty acids

1332 **Sphingomyelin** **25 mg**
1332-1 Ceramide-1-phosphorylcholine $C_{39}H_{79}N_2O_6P$ **1 gram**

Source: natural, egg yolk, chicken **Mol. Wt.:** 703 (palmitate) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform, methanol, warm ethanol
Storage: –20°C

1907 **N-Acetyl-sphingosylphosphorylcholine** **5 mg**
Sphingomyelin with C2:0 fatty acid $C_{25}H_{51}N_2O_6P$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 506 **Purity:** 98+% by TLC
Appearance: vacuum dried **Solubility:** ethanol, chloroform/methanol 2:1
Storage: –20°C

Mixture of D-erythro and L-threo isomers

1909 **N-Hexanoyl-sphingosylphosphorylcholine** **5 mg**
Sphingomyelin with C6:0 fatty acid $C_{29}H_{59}N_2O_6P$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 563 **Purity:** 98+% by TLC
Appearance: solid, vacuum dried **Solubility:** ethanol, chloroform/methanol 2:1
Storage: –20°C

Mixture of D-erythro and L-threo isomers

1911 **N-Octadecanoyl-sphingosylphosphorylcholine** **5 mg**
Sphingomyelin with C18:0 fatty acid $C_{41}H_{83}N_2O_6P$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 731 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Mixture of D-erythro and L-threo isomers

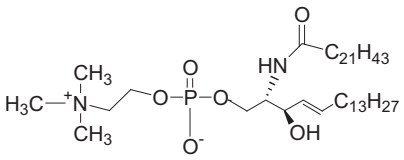
1890 **N-Heptadecanoyl-sphingosylphosphorylcholine** **5 mg**
Sphingomyelin with C17:0 fatty acid $C_{40}H_{81}N_2O_6P$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 717 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Mixture of D-erythro and L-threo isomers

1917 **N-Eicosanoyl-D-erythro-sphingosylphosphorylcholine** **0.5 mg**
Sphingomyelin with C20:0 fatty acid $C_{43}H_{87}N_2O_6P$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 759 **Purity:** 98+% by TLC
Appearance: solid, vacuum dried **Solubility:** chloroform/methanol 14:1, ethanol, methanol **Storage:** –20°C



Catalog number 1918

1918 **N-Docosanoyl-D-erythro-sphingosylphosphorylcholine** **0.5 mg**
Sphingomyelin with C22:0 fatty acid $C_{45}H_{91}N_2O_6P$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 787 **Purity:** 98+% by TLC **Appearance:** solid, vacuum dried **Solubility:** chloroform/methanol 14:1, ethanol, methanol **Storage:** –20°C

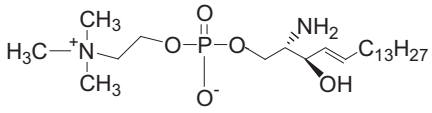
2200 **N-1-^{13}C-Palmitoyl-sphingosylphosphorylcholine** **1mg**
D-erythro-Sphingomyelin with 1-^{13}C-palmitic acid; SPM with ^{13}C labeled fatty acid $^{12}C_{38}{}^{13}CH_{79}N_2O_6P$

Source: semi-synthetic, bovine **Mol. Wt.:** 703 **Purity:** 98+% by TLC **Appearance:** waxy solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1327 **N-Acetyl-sphingosylphosphorylethanolamine** **5 mg**
Sphingosylphosphorylethanolamine with C2:0 fatty acid side chain (D-erythro) $C_{38}H_{77}N_2O_6P$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 689 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

Sphingosylphosphorylcholines (SPC)



Catalog number 1318

1318 **D-erythro-Sphingosylphosphorylcholine** **5 mg**
D-erythro-SPC $C_{23}H_{49}N_2O_5P$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 464 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1319 **L-threo-Sphingosylphosphorylcholine** **5 mg**
L-threo-SPC $C_{23}H_{49}N_2O_5P$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 464 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1321 **Sphingosylphosphorylcholine** **10 mg**
1321-05 lyso-Sphingomyelin; SPC (mixture of D-erythro and L-threo isomers) **50 mg**
$C_{23}H_{49}N_2O_5P$ **CAS#:** 82970-80-7

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 466 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1913 **lyso-Dihydrosphingomyelin** **1 mg**
Dihydrosphingosylphosphorylcholine (mixture of D-erythro and L-threo isomers) $C_{23}H_{52}N_2O_5P$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 485 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

Sphingosine phosphates

1803 **D-erythro-Sphingosine-1-phosphate** **5 mg**
S-1-P, S-P-A $C_{18}H_{38}NO_5P$ **CAS#:** 26993-30-6

Source: synthetic **Mol. Wt.:** 380 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: warm acetic acid **Storage:** –20°C

References:
T.K. Ghosh et al., J. Biol. Chem., **269**, 22628, *1994*
L.Kindman et al., ibid, **269**, 13088, *1994*
A. Olivera et al., ibid, **269**, 17924, *1994*
M. Mattie, et. al., J. Biol. Chem. **269**:3181, *1994*
Yosuke Osawa, Hiroshi Uchinami, Jacek Bielawski, Robert F. Schwabe, Yusuf A. Hannun, and David A. Brenner. J. Biol. Chem., **280**, Issue 30, 27879-27887, *July 29, 2005*

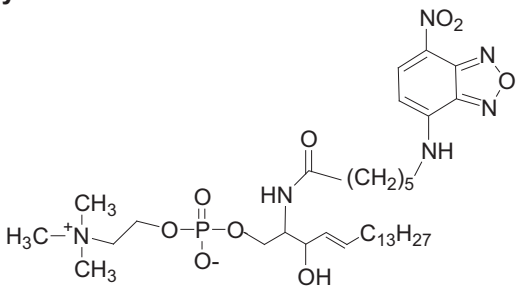
1852 **D-erythro-Dihydrosphingosine-1-phosphate** **5 mg**
$C_{18}H_{40}NO_5P$ **CAS#:** 19794-97-9

Source: synthetic **Mol. Wt.:** 382 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: warm acetic acid **Storage:** –20°C

2046 **N-Hexadecanoyl-D-erythro-sphingosine-1-phosphate, NH_4^+salt** **5 mg**
N-C16:0-Ceramide-1-phosphate $C_{34}H_{68}NO_6P$

Source: synthetic **Mol. Wt.:** 618 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: chloroform/methanol/acetic acid, 60:15:25 **Storage:** –20°C

Fluorescent sphingomyelins



Catalog number 1912

Excitation: 460 nm
Emission: 535 nm

1912 **N-Hexanoyl-NBD-sphingosylphosphorylcholine** **100 µg**
1912-001 N-C6:0-NBD-sphingomyelin, fluorescent; N-C6:0-NBD-sphingosylphosphorylcholine; fluorescent sphingomyelin; N-(NBD-aminocaproyl)-sphingomyelin **1 mg**
$C_{35}H_{61}N_6O_9P$ **CAS#:** 94885-04-8

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 740 **Purity:** 98+% by TLC
Appearance: red-brown solid **Solubility:** chloroform, ethanol, methanol
Storage: –20°C

Mixture of D-erythro and L-threo isomers

1619	**N-Dodecanoyl-NBD-sphingosylphosphorylcholine**	**100 µg**
1619-001	N-C12:0-NBD-sphingomyelin, fluorescent; N-C12:0-NBD-sphingosylphosphorylcholine; fluorescent sphingomyelin; N-(NBD-aminolauroyl)-sphingomyelin $C_{41}H_{73}N_6O_4P$	**1 mg**

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 825 **Purity:** 98+% by TLC
Appearance: orange solid **Solubility:** chloroform/methanol 2:1, methanol
Storage: –20°C

Mixture of D-erythro and L-threo isomers

See Biochemicals and Reagents section (page 85) for additional fluorescent labeled products.

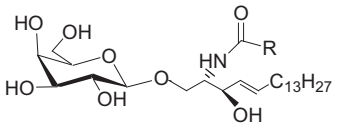
Compounds with fluorescent labels other than NBD are available on custom basis. Contact Technical Service for more information.

Glycosphingolipids

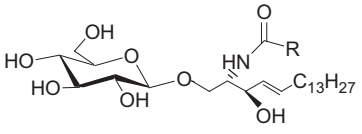
Glycosphingolipids are widely distributed in animal and plant tissues. They consist of a ceramide (Cer) bound in glycosidic linkage through the primary hydroxyl to a mono- or oligosaccharide which may contain substituents such as a sulfate, acetate, or phosphate group. They are amphiphilic and the less glycosylated compounds can be dispersed in buffers by dissolving them in a detergent or organic solvent (EtOH, DMSO, isoPrOH) and mixing by sonication.

Galactosphingolipids, mainly GalCer (cerebrosides) and its sulfate ester, occur in large amounts in the nervous system. Glucosphingolipids, the simplest of which is GlcCer (glucocerebrosides), are very widely distributed, particularly in nerve cell membranes. GlcCer is isolated from a variety of natural sources including human, bovine, and plant. Each of these sources has a heterogeneity in the fatty acid content of the ceramide as well as an occasional variation in the sphingoid chain. Globosides (containing both glucose and galactose) are a prominent group of glycosphingolipids, they contain an α-linked galactose moiety and are typically located in blood cell membranes. Gangliosides are another prominent group of glycosphingolipids; they are acidic because of substitution with sialic (neuraminic) acid. The glycosphingolipids function in a wide range of enzyme and structural interactions, such as immunological or membrane recognition phenomena, binding of microbial pathogens, hormone and growth factor actions, cancer cell growth and malignancy, atheroscerosis, genetic disease errors, blood group determinants, etc. Tissues change in glycosphingolipid composition during embryogenesis, maturation, aging, and other vital physiological processes. Some glycosphingolipids stimulate cell proliferation, others induce apoptosis, effects of great significance to cancer therapy and maturational development. Marked differences in glycosphingolipid composition are seen in normal and cancerous cells. See references 41-53.
See Literature References on page 96.

Galactosylceramides and glucosylceramides



Galactosylceramide



Glucosylceramide

1050 **Cerebrosides** **50 mg**
Galactosylceramide, ceramide beta-D-galactoside
$C_{48}H_{93}NO_8$ **CAS#:** 85305-88-0

Source: natural, bovine **Mol. Wt.:** 812 (lignoceryl form) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

Contains both hydroxy and non-hydroxy fatty acid side chains

1066 **Cerebroside, Kerasin (top spot)** **10 mg**
Galactosylceramide with mostly non-hydroxy fatty acid side chain
$C_{42}H_{81}NO_8$ **CAS#:** 536-13-0

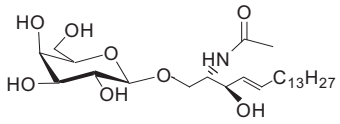
Source: natural, bovine **Mol. Wt.:** 728 (stearoyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol/water 2:1:0.5
Storage: –20°C

1138 **Cerebroside, Phrenosin (bottom spot)** **10 mg**
Galactosylceramide with mostly 2-hydroxy fatty acid side chains
$C_{42}H_{81}NO_9$ **CAS#:** 37211-11-3

Source: natural, bovine **Mol. Wt.:** 743 (2-hydroxystearoyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol/water 2:1:0.5
Storage: –20°C

1305 **Psychosine, (in free amine form)** **10 mg**
lyso-Cerebroside; 1-beta-D-galactosylsphingosine
$C_{24}H_{47}NO_7$ **CAS#:** 2238-90-6

Source: semi-synthetic, bovine **Mol. Wt.:** 461 **Purity:** 98+% by TLC **Appearance:** off-white solid **Solubility:** ethanol, chloroform/methanol 5:1 **Storage:** –20°C



Catalog number 1325

1325 **N-Acetyl-psychosine** **10 mg**
N-C2:0-Cerebroside; cerebroside with C2:0 fatty acid $C_{26}H_{49}NO_8$

Source: semi-synthetic, bovine **Mol. Wt.:** 503 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1335 **N-Pentadecanoyl-psychosine** **5 mg**
N-C15:0-Cerebroside $C_{39}H_{75}NO_8$

Source: semi-synthetic, bovine **Mol. Wt.:** 685 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/ methanol, 2:1 **Storage:** –20°C

1334 **N-Octanoyl-β-D-galactosylceramide** **10 mg**
1334-50 N-C8:0-Galactosylceramide $C_{32}H_{61}NO_8$ **50 mg**

Source: semi-synthetic, bovine **Mol. Wt.:** 588 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/ methanol, 9:1, ethanol, methanol **Storage:** –20°C

1621 **N-Hexanoyl-NBD-galactosylceramide** **100 µg**
1621-001 N-C6:0-NBD-beta-D-galactosylsphingosine; N-C6:0-NBD-cerebroside; N-C6:0-NBD-galactosylceramide, fluorescent; N-(NBD-aminocaproyl)-galactosylsphingosine $C_{36}H_{59}N_5O_{11}$ **1 mg**

Source: semi-synthetic, bovine **Mol. Wt.:** 738 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/ methanol, 5:1, methanol **Storage:** –20°C

1057 **Glucocerebrosides** **5 mg**
Glucosylceramide; ceramide beta-D-glucoside
$C_{46}H_{93}NO_8$ **CAS#:** 85305-87-9

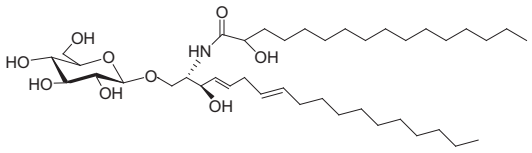
Source: natural, human **Mol. Wt.:** 812 (lignoceroyl) **Purity:** 98+% by TLC **Appearance:** white to an off white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

Contains 24:1 fatty acid side chain. See Table III (p 90-94) for other fatty acid content

1521 **Glucocerebrosides** **5 mg**
1521-50 Glucosylceramide; ceramide beta-D-glucoside $C_{46}H_{89}NO_8$ **50 mg**

Source: natural, bovine buttermilk **Mol. Wt.:** 784 (docosanoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

See Table III (p 90-94) for side chain variants



Catalog number 1522

1522 **Glucocerebrosides, plant** **5 mg**
1522-100 Glucosylceramide; ceramide beta-D-glucoside $C_{40}H_{75}NO_9$ **100 mg**

Source: natural, plant **Mol. Wt.:** 714 (2-hydroxyhexadecanoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

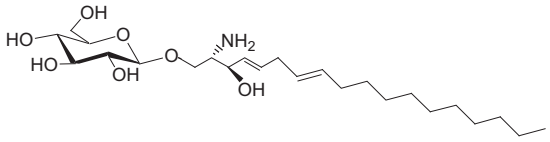
Sphingoid backbone is >95% 4,8-sphingadiene (C18:2 t,t-4,8) and most of the fatty acids are of the 2-hydroxy type. See Table III page 90-94.

1622 **N-Hexanoyl-NBD-glucosylceramide** **100 µg**
1622-001 N-C6:0-NBD-beta-D-glucosylsphingosine; N-C6:0-NBD-glucosylceramide, fluorescent $C_{36}H_{59}N_5O_{11}$ **1 mg**

Source: semi-synthetic, bovine **Mol. Wt.:** 738 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/methanol 5:1, methanol **Storage:** –20°C

1306 **Glucopsychosine** **5 mg**
Glucosylsphingosine; lyso-glucocerebroside; 1-beta-D-glucosylsphingosine
$C_{24}H_{47}NO_7$ **CAS#:** 52050-17-6

Source: semi-synthetic, bovine **Mol. Wt.:** 461 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** ethanol, methanol, chloroform/methanol 2:1 **Storage:** –20°C



Catalog number 1310

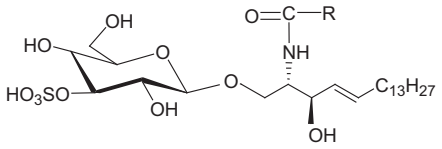
1310 **Glucopsychosine** **5 mg**
Glucosylsphingosine; lyso-glucocerebroside; 1-beta-D-glucosylsphingosine
$C_{24}H_{45}NO_7$ **CAS#:** 52050-17-6

Source: natural, plant **Mol. Wt.:** 459 **Purity:** 98+% by TLC
Appearance: off white solid **Solubility:** chloroform/methanol 4:1 **Storage:** –20°C

Sphingoid backbone is >95% 4,8-sphingadiene (C18:2 t,t-4, 8)

1531 **N-Docosanoyl-glucopsychosine** **1 mg**
Glucocerebroside with C22:0 fatty acid side chain; N-Docosanoyl-β-glucosylsphingosine $C_{46}H_{89}NO_8$

Source: semi-synthetic, bovine **Mol. Wt.:** 784 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform **Storage:** –20°C



Catalog number 1049

1049 **Sulfatides** **50 mg**
Ceramide-galactoside-3-sulfate; cerebroside sulfate $C_{42}H_{81}NO_{11}S$
CAS#: 85496-63-5

Source: natural, bovine **Mol. Wt.:** 830 (stearoyl) Na Salt **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol/water 2:1:0.1 (if needed, a few drops of acetic acid) **Storage:** –20°C

1904 **lyso-Sulfatide (NH_4^+ salt)** **1 mg**
Sphingosine-1-galactoside-3-sulfate $C_{24}H_{47}NO_{10}S$ **CAS#:** 38621-58-8

Source: semi-synthetic, bovine **Mol. Wt.:** 542 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

2076 **N-Acetyl-sulfatide** **1 mg**
N-C2:0-sulfatide; N-acetyl-sphingosyl-beta-D-galactoside-3-sulfatide
$C_{26}H_{49}NO_{11}S$

Source: semi-synthetic, bovine **Mol. Wt.:** 584 **Purity:** 98+% by TLC **Appearance:** solid **Solubility:** chloroform/methanol 1:1, ethanol, methanol **Storage:** –20°C

1875 **N-Palmitoyl-sulfatide** **1 mg**
Sulfatide with C16:0 fatty acid side chain; N-palmitoyl-sphingosyl-beta-D-galactoside-3-sulfate $C_{40}H_{76}NO_{11}S$

Source: semi-synthetic, bovine **Mol. Wt.:** 780 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1888 **N-Tetracosanoyl-sulfatide** **1 mg**
N-C24:0-Sulfatide; N-tetracosanoyl-sphingosyl-beta-D-galactoside-3-sulfate
$C_{48}H_{93}NO_{11}S$

Source: semi-synthetic, bovine **Mol. Wt.:** 892 **Purity:** 98+% by TLC
Appearance: solid **Solubility:** chloroform/methanol 5:1 **Storage:** –20°C

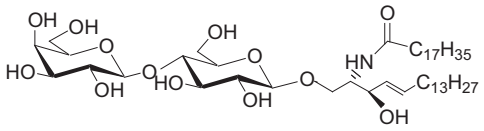
1536 **N-Octadecanoyl-D_3-sulfatide** **1 mg**
N-C18:0-D_3-Sulfatide $C_{42}H_{78}D_3NO_{11}S$

Source: semi-synthetic, bovine **Mol. Wt.:** 833 **Purity:** 98+% by TLC
Appearance: off-white solid **Solubility:** chloroform/methanol/DI water 2:1:0.1
Storage: –20°C

1632 **N-Dodecanoyl-NBD-sulfatide** **100 µg**
1632-001 N-C12:0-NBD-sulfatide; N-Dodecanoyl-NBD-lyso-sulfatide; N-Dodecanoyl-NBD-sphingosyl-beta-D-galactoside-3-sulfate $C_{42}H_{71}N_5O_{14}S$ **1 mg**

Source: semi-synthetic, bovine **Mol. Wt.:** 901 **Purity:** 98+% by TLC
Appearance: red-orange solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

Lactosylceramides



Catalog number 1500

1500 **Lactosylceramide** **1 mg**
LC, lactocerebrosides; CDH, ceramide beta-lactoside
$C_{48}H_{91}NO_{13}$ **CAS#:** 4682-48-8

Source: natural, porcine **Mol. Wt.:** 890 (stearoyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol/water 5:1:0.1, DMSO
Storage: –20°C

Contains 2-hydroxy fatty acids (See Table I)

1507 **Lactosylceramide** **5 mg**
1507-50 LC; lactocerebrosides; CDH, ceramide beta-lactoside $C_{53}H_{101}NO_{13}$ **50 mg**
CAS#: 4682-48-8

Source: natural, bovine buttermilk **Mol. Wt.:** 960 (tricosanoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol/water 5:1:0.1
Storage: –20°C

1517 **lyso-Lactosylceramide** **1 mg**
Lactosylsphingosine; lyso-LC $C_{30}H_{57}NO_{12}$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 623 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol/water 2:1:0.1
Storage: –20°C

1532 **N-Palmitoyl-lactosylceramide** **1 mg**
Lactosylceramide with C16:0 fatty acid side chain $C_{46}H_{87}NO_{13}$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 862 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol/water 2:1:0.1
Storage: –20°C

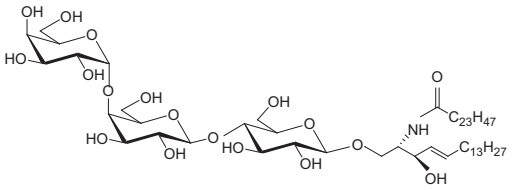
1629 **N-Hexanoyl-NBD-lactosylceramide** **50 ug**
1629-001 N-Hexanoyl-NBD-beta-D-lactosylsphingosine; N-C6:0-NBD-beta-D-lactosylsphingosine; N-C6:0-NBD-lactosylceramide, fluorescent; fluorescent LC; N-(NBD-aminocaproyl)-lactosylsphingosine $C_{42}H_{69}N_5O_{16}$ **1 mg**

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 900 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1630 **N-Dodecanoyl-NBD-lactosylceramide** **50 µg**
1630-001 N-Dodecanoyl-NBD-beta-D-lactosylsphingosine; N-C12:0-NBD-beta-D-lactosylsphingosine; N-C12:0-NBD-lactosylceramide, fluorescent; fluorescent LC; N-(NBD-aminolauroyl)-lactosylsphingosine $C_{48}H_{81}N_5O_{16}$ **1 mg**

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 984 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

Ceramide trihexosides



Catalog number 1067

1067 **Ceramide trihexosides** **1 mg**
1067-10 CTH; Gb3; globotriaosylceramide $C_{60}H_{103}NO_{18}$ **CAS#:** 71965-57-6 **10 mg**

Source: natural, porcine **Mol. Wt.:** 1126 (tetracosanoyl) **Purity:** 98+% by TLC **Appearance:** off white solid **Solubility:** chloroform/methanol 2:1, DMSO, hot methanol **Storage:** –20°C

Contains hydroxy and non-hydroxy fatty acid side chains

1513 **Ceramide trihexosides (top spot)** **0.5 mg**
CTH with non-hydroxy fatty acid side chain $C_{54}H_{101}NO_{18}$

Source: natural, porcine **Mol. Wt.:** 1052 (stearoyl) **Purity:** 98+% by TLC **Appearance:** off white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1514 **Ceramide trihexosides (bottom spot)** **0.5 mg**
CTH with hydroxy fatty acid side chain $C_{54}H_{101}NO_{19}$

Source: natural, porcine **Mol. Wt.:** 1068 (hydroxystearoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 1:1, DMSO, hot methanol **Storage:** –20°C

References:
S. Ashkenazi, T. C. Cleary, J. Clin. Microbiol., **27**, 1145, *1989*
J. Ghislain et al., J. of Immunol., **153**, 3655, *1995*

1520 **lyso-Ceramide trihexoside** **1 mg**
lyso-CTH; lyso-globotriosylsphingosine $C_{36}H_{67}NO_{17}$ **CAS#** 126550-86-5

Source: semi-synthetic, porcine **Mol. Wt.:** 786 **Purity:** 98+% by TLC **Appearance:** film, vacuum dried **Solubility:** chloroform/methanol/water 2:1:0.1 **Storage:** –20°C

1523 **N-Heptadecanoyl ceramide trihexoside** **0.5 mg**
N-C17:0-Ceramide trihexoside; N-heptadecanoyl globotriaosylceramide $C_{53}H_{99}NO_{18}$

Source: semi-synthetic, porcine **Mol. Wt.:** 1038 **Purity:** 98+% by TLC **Appearance:** solid **Solubility:** chloroform/methanol 2:1:, DMSO, hot methanol **Storage:** –20°C

1524 **N-Tricosanoyl ceramide trihexoside** **0.5 mg**
N-C23:0-Ceramide trihexoside; N-tricosanoyl globotriaosylceramide
$C_{59}H_{111}NO_{18}$

Source: semi-synthetic, porcine **Mol. Wt.:** 1122 **Purity:** 98+% by TLC
Appearance: solid **Solubility:** chloroform/methanol 2:1:, DMSO, hot methanol
Storage: –20°C

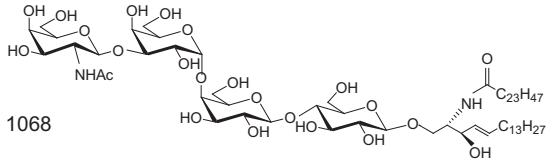
1631 **N-Dodecanoyl-NBD-ceramide trihexoside** **100 µg**
1631-001 N-C12:0-NBD-CTH; N-C12:0-NBD-globotriaosylceramide; N-(NBD-aminolauroyl) ceramide trihexoside $C_{54}H_{91}N_5O_{21}$ **1 mg**

Source: semi-synthetic, porcine **Mol. Wt.:** 1145 **Purity:** 98+% by TLC
Appearance: red-orange solid **Solubility:** chloroform/methanol 2:1: DMSO; hot methanol **Storage:** –20°C

1537 **N-Octadecanoyl-D_3-ceramide trihexoside** **0.5 mg**
C18:0-D_3-CTH; C18:0-D_3-Gb3; N-Octadecanoyl-D_3-globotriaosylceramide
$C_{54}H_{98}D_3NO_{18}$

Source: semi-synthetic, porcine **Mol. Wt.:** 1059 **Purity:** 98+% by TLC
Appearance: off-white solid **Solubility:** chloroform/methanol 2:1:, DMSO
Storage: –20°C

Globosides



Catalog number 1068

1068 **Globosides** **5 mg**
Gb4; globotetrahexosylceramide $C_{62}H_{114}N_2O_{23}$ **CAS#:** 11034-93-8

Source: natural, porcine **Mol. Wt.:** 1254 (tetracosanoyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol 2:1, DMSO, hot methanol
Storage: –20°C

Labeled glycolipids

Stable isotopes

1914 **N-Stearoyl-D_{35}-psychosine, perdeuterated** **5 mg**
Cerebrosides with N-C18:0-D_{35} fatty acid side chain $C_{42}H_{46}D_{35}NO_8$

Source: semi-synthetic, bovine **Mol. Wt.:** 762 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, hot ethanol, chloroform/methanol 2:1
Storage: –20°C

Deuterium labeled stearoyl-sidechain

1533 **N-Palmitoyl-D_3-glucopsychosine, deuterated** **1 mg**
N-C16:0-D_3-Glucopsychosine; glucocerebroside with C16:0-D_3 fatty acid side chain $C_{40}H_{74}D_3NO_8$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 703 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1534 **N-Palmitoyl-D_3-lactosylceramide, deuterated** **1 mg**
N-C16:0-D_3-Lactosylceramide; lactosylceramide with C16:0-D_3 fatty acid side chain $C_{46}H_{84}D_3NO_{13}$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 864 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol/water 5:1:0.1
Storage: –20°C

1536 **N-Octadecanoyl-D_3-sulfatide** **1 mg**
N-C18:0-D_3-Sulfatide $C_{42}H_{78}D_3NO_{11}S$

Source: semi-synthetic, bovine **Mol. Wt.:** 833 **Purity:** 98+% by TLC
Appearance: off-white solid **Solubility:** chloroform/methanol/DI water 2:1:0.1
Storage: –20°C

1537 **N-Octadecanoyl-D_3-ceramide trihexoside** **0.5 mg**
C18:0-D_3-CTH; C18:0-D_3-Gb3; N-Octadecanoyl-D_3-globotriaosylceramide
$C_{54}H_{98}D_3NO_{18}$

Source: semi-synthetic, porcine **Mol. Wt.:** 1059 **Purity:** 98+% by TLC
Appearance: off-white solid **Solubility:** chloroform/methanol 2:1:, DMSO
Storage: –20°C

Fluorescent compounds

1621 **N-Hexanoyl-NBD-galactosylceramide** **100 µg**
1621-001 **1 mg**
N-C6:0-NBD-beta-D-galactosylsphingosine; N-C6:0-NBD-cerebroside; N-C6:0-NBD-galactosylceramide, fluorescent; N-(NBD-aminocaproyl)-beta-D-galactosylsphingosine $C_{36}H_{59}N_5O_{11}$

Source: semi-synthetic, bovine **Mol. Wt.:** 738 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/methanol 5:1, methanol
Storage: –20°C

1622 **N-Hexanoyl-NBD-glucosylceramide** **100 µg**
1622-001 **1 mg**
N-C6:0-NBD-beta-D-glucosylsphingosine; N-C6:0-NBD-glucosylceramide, fluorescent; N-(NBD-aminocaproyl)-beta-D-glucosylsphingosine
$C_{36}H_{59}N_5O_{11}$

Source: semi-synthetic, bovine **Mol. Wt.:** 738 **Purity:** 98+% by TLC **Appearance:** orange solid **Solubility:** chloroform/methanol 5:1, methanol
Storage: –20°C

1629 **N-Hexanoyl-NBD-lactosylceramide** **50 ug**
1629-001 **1 mg**
N-Hexanoyl-NBD-beta-D-lactosylsphingosine; N-C6:0-NBD-beta-D-lactosylsphingosine; N-C6:0-NBD-lactosylceramide, fluorescent: fluorescent LC; N-(NBD-aminocaproyl)-beta-D-lactosylsphingosine $C_{42}H_{69}N_5O_{16}$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 900 **Purity:** 98+% by TLC
Appearance: orange solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1630 **N-Dodecanoyl-NBD-lactosylceramide** **50 µg**
1630-001 **1 mg**
N-Dodecanoyl-NBD-beta-D-lactosylsphingosine; N-C12:0-NBD-beta-D-lactosylsphingosine; N-C12:0-NBD-lactosylceramide, fluorescent; fluorescent LC; N-(NBD-aminolauroyl)-beta-D-lactosylsphingosine $C_{48}H_{81}N_5O_{16}$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 984 **Purity:** 98+% by TLC
Appearance: orange solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1631	**N-Dodecanoyl-NBD-ceramide trihexoside**	**100 µg**
1631-001	N-C12:0-NBD-CTH; N-C12:0-NBD-globotriaosylceramide; N-(NBD-aminolauroyl) ceramide trihexoside $C_{54}H_{91}N_5O_{21}$	**1 mg**

Source: semi-synthetic, porcine **Mol. Wt.:** 1145 **Purity:** 98+% by TLC
Appearance: red-orange solid **Solubility:** chloroform/methanol 2:1: DMSO; hot methanol **Storage:** –20°C

1632	**N-Dodecanoyl-NBD-sulfatide**	**100 µg**
1632-001	N-C12:0-NBD-sulfatide; N-Dodecanoyl-NBD-lyso-sulfatide; N-Dodecanoyl-NBD-sphingosyl-beta-D-galactoside-3-sulfate; N-(NBD-amniolauroyl) sulfatide $C_{42}H_{71}N_5O_{14}S$	**1 mg**

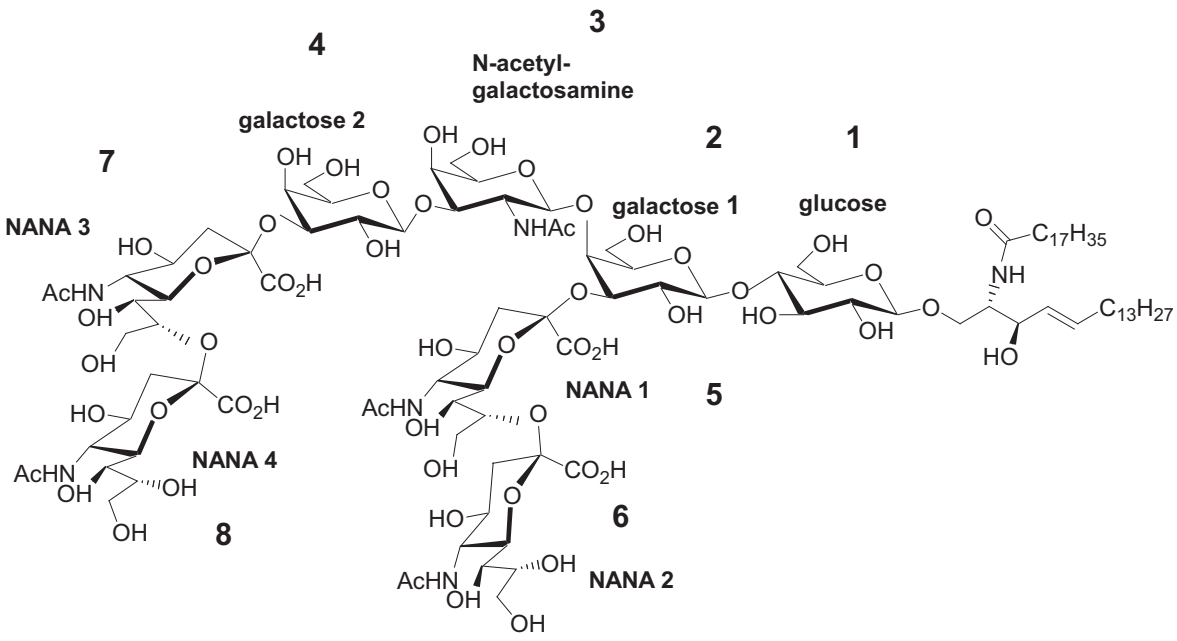
Source: semi-synthetic, bovine **Mol. Wt.:** 901 **Purity:** 98+% by TLC
Appearance: red-orange solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

See Biochemicals and Reagents section (page 85) for additional fluorescent labeled products.

Compounds with fluorescent labels other than NBD are available on custom basis. Contact Technical service for more information.

Gangliosides

The diagram below can be used with the general formulas given in the ganglioside descriptions to construct the individual structures.



1064 **Gangliotetraosylceramide** **1 mg**
Asialo GM_1; Gg4 $C_{62}H_{116}N_2O_{23}$ **CAS#:** 71012-19-6

Source: semi-synthetic, bovine **Mol. Wt.:** 1240 (stearoyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol/water 2:1:0.1, forms micellar solution in water **Storage:** –20°C

General formula: 1,2,3,4

1512 **Gangliotriosylceramide** **100 µg**
Asialo-GM_2; Gg3 $C_{56}H_{104}N_2O_{18}$

Source: semi-synthetic, human **Mol. Wt.:** 1078 (stearoyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol/water 2:1:0.1, forms micellar solution in water **Storage:** –20°C

General formula: 1,2,3

1061 **Monosialoganglioside GM_1 (NH_4^+ salt)** **5 mg**
1061-50 GM_1 $C_{73}H_{131}N_3O_{31}$ **CAS#:** 37758-47-7 **50 mg**

Source: natural, bovine **Mol. Wt.:** 1545 (stearoyl) **Purity:** 98+% by TLC
Appearance: white solid, **Solubility:** chloroform/methanol/water 2:1:0.1, forms micellar solution in water **Storage:** –20°C

General formula: 1,2,3,4,5

References:
Qing Zhang, Keiko Furukawa, Ho-Hsiang Chen, Takumi Sakakibara, Takeshi, and Koichi Furukawa. J. Biol. Chem., **281**, Issue 26, 18145-18155, *June 30, 2006*
Birkles. Zeng G, Gaol, Yu R.K., Aubry J. Biochimie, **85**:455-63, *2003*
Inokuchi J, Momosaki K., Shimeno H., Nagamatsu A., Radin NS. J. Cell Physiol, **141**: 573-83, *1989*

2050 **N-Octadecanoyl-D_3-monosialoganglioside GM_1** **0.5 mg**
N-D3-Stearoyl-GM_1 $C_{73}H_{128}N_3O_{31}D_3$

Source: semi-synthetic, bovine **Mol. Wt.:** 1548 **Purity:** 98+% by TLC
Appearance: solid **Solubility:** chloroform/methanol/water 2:1:0.1, forms micellar solution in water **Storage:** –20°C

Reference:
Qing Zhang, Keiko Furukawa, Ho-Hsiang Chen, Takumi Sakakibara, Takeshi, and Koichi Furukawa. J. Biol. Chem., **281**, Issue 26, 18145-18155, *June 30, 2006*

1502 **Monosialoganglioside GM_2 (NH_4^+ salt)** **500 µg**
GM_2 $C_{67}H_{121}N_3O_{26}$ **CAS#:** 19600-01-02

Source: natural, human **Mol. Wt.:** 1383 (stearoyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol/water 2:1:0.1, forms micellar solution in water **Storage:** –20°C

General formula: 1,2,3,5

1503 **Monosialoganglioside GM_3 (NH_4^+ salt)** **500 µg**
GM_3 $C_{64}H_{118}N_2O_{21}$ **CAS#:** 54827-14-4

Source: natural, bovine buttermilk **Mol. Wt.:** 1250 (tricosanoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1, forms micellar solution in water **Storage:** –20°C

General formula: 1,2,5

References:
Inokuchi J, Momosaki K., Shimeno H., Nagamatsu A., Radin NS. J. Cell Physiol, **141**: 573-83, *1989*
Lovat P.E., Corazzari M., Disano F., Piacentini M., Redfern C.P. Cancer Lett., **228**: 105-110, *2005*
Malisan R., Testi R., IUBMB Life, **57**:477-482, *2005*

1535 **Monosialoganglioside GM4, egg (NH_4^+ salt)** **0.5 mg**
GM_4 $C_{53}H_{88}N_2O_{16}$

Source: natural, egg, chicken **Mol. Wt.:** 1008 (oleoyl) **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol 2:1, forms micellar solution in water **Storage:** –20°C

General formula: 1,5

References:
Ledeen, R.W., R.K. Yu, and L.F. Eng. J. Neurochem, **21**:829-839, *1978*
Li Y., E. Sugiyama, T. Ariga, J. Nakayama, M. Hayama, Y. Hama, H. Nakagawa, T. Tai, S. Li, and T. Ksama. J. Lipid Res., **43**:1019-1025, *2002*

1062 **Disialoganglioside GD_{1a} (NH_4^+ salt)** **5 mg**
GD_{1a} $C_{84}H_{148}N_4O_{40}$ **CAS#:** 12707-58-3

Source: natural, bovine **Mol. Wt.:** 1852 (stearoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol/water 2:1:0.1, forms micellar solution in water **Storage:** –20°C

General formula: 1,2,3,4,5,7

1501 **Disialoganglioside GD_{1b} (NH_4^+salt)** **1 mg**
GD_{1b} $C_{84}H_{148}N_4O_{40}$ **CAS#:** 19553-76-5

Source: natural, bovine **Mol. Wt.:** 1852 (stearoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol/water 2:1:0.1 **Storage:** –20°C

General formula: 1,2,3,4,5,6

1504 **Disialoganglioside GD_3 (NH_4^+ salt)** **1 mg**
GD_3 $C_{75}H_{125}N_3O_{29}$ **CAS#:** 62010-37-1

Source: natural, bovine buttermilk **Mol. Wt.:** 1541 (tricosanoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1, forms micellar solution in water **Storage:** –20°C

General formula: 1,2,5,6

References:
Lovat P.E., Corazzari M., Disano F., Piacentini M., Redfern C.P. Cancer Lett., **228**: 105-110, *2005*
Malisan R., Testi R., IUBMB Life, **57**:477-482, *2005*
Reimer A.B., Forster-Waldl E., Bramswig K.H., Pollak A., Zielinski C.C., Pehamberger H., Lode H.N., Scheiner O., Jensen-Jarolim E., Eur. J. Immunol., **36**:1267-1270, *2006*

1063 **Trisialoganglioside GT_{1b} (NH_4^+ salt)** **5 mg**
GT_{1b} $C_{95}H_{165}N_5O_{48}$ **CAS#:** 59247-13-1

Source: natural, bovine **Mol. Wt.:** 2144 (stearoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol/water 2:1:0.1, forms micellar solution in water **Storage:** –20°C

General Formula: 1,2,3,4,5,6,7

1516 **Tetrasialoganglioside GQ_{1b} (NH_4^+ salt)** **100 µg**
GQ_{1b} $C_{106}H_{182}N_6O_{56}$ **CAS#:** 68652-37-9

Source: natural, bovine **Mol. Wt.:** 2435 (stearoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol/water 2:1:0.1, forms micellar solution in water **Storage:** –20°C

General formula: 1,2,3,4,5,6,7,8

References:
Birkles. Zeng G, Gaol, Yu R.K., Aubry J. Biochimie, **85**:455-63, *2003*
Overell J.R., Willison H.J., Curr. Opin. Neurol., **18**:562-566, *2005*

1526 **Fucosylated monosialoganglioside GM_1 (NH_4^+ salt)** **500 µg**
Fucosyl-GM_1 $C_{79}H_{141}N_3O_{35}$

Source: natural, porcine **Mol. Wt.:** 1691 (stearoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol/water 2:1:0.1, forms micellar solution in water **Storage:** –20°C

1518 **lyso-Monosialoganglioside GM_1 (NH_4^+ salt)** **500 µg**
lyso-GM_1 $C_{55}H_{97}N_3O_{30}$ **CAS#:** 171483-40-2

Source: semi-synthetic, bovine **Mol. Wt.:** 1279 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** chloroform/methanol/water 2:1:0.2
Storage: –20°C

1065 **Purified mixed gangliosides, bovine (NH_4^+ salt)** **25 mg**
Mixed gangliosides

Source: natural, bovine **Purity:** 98+% by TLC **Appearance:** off white solid
Solubility: chloroform/methanol/water 2:1:0.1, forms micellar solution in water
Storage: –20°C

Approximately 98% GM_1, GD_{1a}, GD_{1b} and GT_{1b}, remaining 2% other gangliosides

1525 **Purified mixed gangliosides, porcine, (NH_4^+ salt)** **25 mg**

Source: natural, porcine **Purity:** 98+% by TLC **Appearance:** off-white solid
Solubility: chloroform/methanol/water 2:1:0.1, forms micellar solution in water
Storage: –20°C

Approximately 98% GM_1, GD_{1a}, GD_{1b} and GT_{1b}, remaining 2% other gangliosides

Glycosphingolipid reference mixes for TLC

These mixtures are qualitative standards prepared from our purified glycosphingolipids.

1505 **Neutral glycosphingolipid qualmix** **1 mg/ml, 1 ml**
Glycosylceramides, qualitative mix

Source: natural, bovine and porcine **Appearance:** liquid **Solvent:**
chloroform/methanol 2:1 **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

Contains: cerebrosides, lactosylceramide, ceramide trihexoside, globoside

1508 **Monosialoganglioside mix** **0.5 mg/ml, 1 ml**
GM_3, GM_2, GM_1 qualitative mix

Source: natural, bovine **Appearance:** liquid **Solvent:** chloroform/methanol/water
2:1:0.1 **Solubility:** chloroform/methanol/water 2:1:0.1 **Storage:** –20°C

Contains: GM_3, GM_2, GM_1

1509 **Disialoganglioside mix** **0.5 mg/ml, 1 ml**
GD_3, GD_{1a}, GD_{1b}, qualitative mix

Source: natural, bovine **Appearance:** liquid **Solvent:** chloroform/methanol/water
2:1:0.1 **Solubility:** chloroform/methanol/water 2:1:0.1 **Storage:** –20°C

Contains: GD_3, GD_{1a}, GD_{1b}

1510 **Lactosylceramide and sialosyl derivatives mix** **0.5 mg/ml, 1 ml**
LC, GM_3, GD_3 qualitative mix

Source: natural, bovine **Appearance:** liquid **Solvent:** chloroform/methanol/water
2:1:0.1 **Solubility:** chloroform/methanol/water 2:1:0.1 **Storage:** –20°C

Contains: LC, GM_3, GD_3

1511 **Gangliotetraosylceramide and sialosyl derivatives mix** **0.5 mg/ml, 1 ml**
asialo-GM_1, GM_1, GD_{1a}, GD_{1b}, GT_{1b} qualitative mix

Source: natural, bovine **Appearance:** liquid **Solvent:** chloroform/methanol/water 2:1:0.1 **Solubility:** chloroform/methanol/water 2:1:0.1 **Storage:** –20°C

Contains: asialo-GM_1, GM_1, GD_{1a}, GD_{1b}, GT_{1b}

Antibodies directed against glycolipids

These monoclonal and polyclonal antibodies are directed against the carbohydrate chains of Matreya's glycolipids. The same carbohydrate moieties are found on many glycoproteins. The antibodies are for use in ELISA or TLC immunoblotting applications (12). All antibodies are quality tested by actual performance in ELISA and TLC immunoblotting. The antibodies contain no preservatives and are shipped on dry ice.
See Literature References on page 96.

1977 **Anti-ganglioside GD_3** **50 µl**
Monoclonal antibody to GD_3, isotype IgG

Source: natural, mouse hybridoma R-24 cell line **Appearance:** liquid **Solubility:** water **Storage:** –20°C **Dry Ice Charge Applies**

Suitable for TLC immunoblotting, ELISA

References:
Kusunoki, A. et al., Neurology, **37**;1795 *1987*
Pukel, C. S. et al., J. Exptl. Med., **155**:1137, *1982*
Ren, S. et al., Cancer Res., **49**:7051, *1989*

1950 **Anti-ganglioside asialo GM_1** **100 µl**
Polyclonal antibody to asialo-GM_1, isotype IgG

Source: natural, rabbit **Appearance:** liquid **Solubility:** water **Storage:** –20°C **Dry Ice Charge Applies**

Suitable for ELISA, TLC-immunoblotting. Slight cross reaction to GM_1

References:
Kusunoki, A. et al., Neurology, **37**;1795 *1987*
Yoship, H. et al., J. Neurochemistry, **61**:658, *1993*

1951 **Anti-ganglioside asialo-GM_2** **50 µl**
Polyclonal antibody to asialo-GM_2, isotype IgG, IgM

Source: natural, rabbit **Appearance:** liquid **Solubility:** water **Storage:** –20°C **Dry Ice Charge Applies**

Suitable for ELISA, TLC-immunoblotting

References:
Kusunoki, A. et al., Neurology, **37**;1795 *1987*
Yoship, H. et al., J. Neurochemistry, **61**:658, *1993*

1954 **Anti-ganglioside GM_1** **100 µl**
Polyclonal antibody to GM_1, isotype IgG

Source: natural, rabbit **Appearance:** liquid **Solubility:** water **Storage:** –20°C **Dry Ice Charge Applies**

Suitable for ELISA, TLC-immunoblotting. Slight cross reaction to asialo-GM_1

References:
Kusunoki, A. et al., Neurology, **37**;1795 *1987*
Yoship, H. et al., J. Neurochemistry, **61**:658, *1993*

1961 **Anti-ganglioside GM_2 (NANA)** **50 µl**

Polyclonal antibody to GM_2 (NANA), isotype IgG, IgM

Source: natural, rabbit **Appearance:** liquid **Solubility:** water **Storage:** –20°C
Dry Ice Charge Applies

Suitable for ELISA, TLC-immunoblotting

References:
Kusunoki, A. et al., Neurology, **37**;1795 *1987*
Kusunoki, A. et al. Arch. Biochem. Biophys., 255-226, *1987*
Saito, M. et al. Biochem. Biophys. Res. Comm., **127**:1, *1985*
Pukel, C. S. et al., J. Exptl. Med., **155**:1137, *1982*
Ren, S. et al., Cancer Res., **49**:7051, *1989*
Yu, R. K. et al., Ann. Neurol., **27**:530, *1990*
Yoship, H. et al., J. Neurochemistry, **61**:658, *1993*

1962 **Anti-ganglioside GM_2 (NGNA)** **50 µl**

Polyclonal antibody to GM_2 (NGNA), isotype IgG, IgM

Source: natural, rabbit **Appearance:** liquid **Solubility:** water **Storage:** –20°C
Dry Ice Charge Applies

Suitable for TLC immunoblotting, ELISA

References:
Kusunoki, A. et al., Neurology, **37**;1795 *1987*
Kusunoki, A. et al. Arch. Biochem. Biophys., 255-226, *1987*
Saito, M. et al. Biochem. Biophys. Res. Comm., **127**:1, *1985*
Pukel, C. S. et al., J. Exptl. Med., **155**:1137, *1982*
Ren, S. et al., Cancer Res., **49**:7051, *1989*
Yu, R. K. et al., Ann. Neurol., **27**:530, *1990*

1957 **Anti-ganglioside GM_4** **50 µl**

Polyclonal antibody to GM_4, isotype IgG

Source: natural, rabbit **Appearance:** liquid **Solubility:** water **Storage:** –20°C
Dry Ice Charge Applies

Suitable for ELISA, TLC-immunoblotting

References:
Kusunoki, A. et al., Neurology, **37**;1795 *1987*
Yoship, H. et al., J. Neurochemistry, **61**:658, *1993*

1960 **Anti-globoside GL-4** **50 µl**

Polyclonal antibody to GL-4, isotype IgG, IgM

Source: natural, rabbit **Appearance:** liquid **Solubility:** water **Storage:** –20°C
Dry Ice Charge Applies

Suitable for ELISA, TLC-immunoblotting

References:
Kusunoki, A. et al., Neurology, **37**;1795 *1987*
Kusunoki, A. et al. Arch. Biochem. Biophys., 255-226, *1987*
Saito, M. et al. Biochem. Biophys. Res. Comm., **127**:1, *1985*
Pukel, C. S. et al., J. Exptl. Med., **155**:1137, *1982*
Ren, S. et al., Cancer Res., **49**:7051, *1989*
Yu, R. K. et al., Ann. Neurol., **27**:530, *1990*
Yoship, H. et al., J. Neurochemistry, **61**:658, *1993*

Enzyme Inhibitors

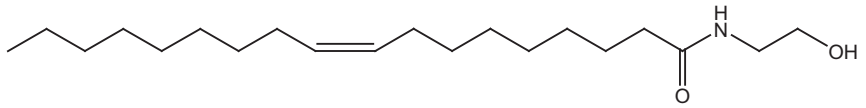
Ceramide: UDPglucose Transferase. PDMP (D,L-threo-1-phenyl-2-decanoylamino-3-morpholino-1-propanol-HCl) closely resembles the natural sphingolipid substrate of brain glucosyl transferase and is a very potent and competitive inhibitor of the enzyme (13). It has been shown to block outgrowth of neurites in cultured retina and to block glucolipid synthesis in cultured 3T3 cells (14). N.S. Radin and co-workers have shown (15) that PPMP has activity equivalent to that of PDMP when cell homogenates and brain and liver microsomes are used, but it is about 20 times more potent when used with intact cells. In another paper (16), Radin's group has shown that PDMP has substantial activity against Ehrlich ascites tumors in mice. Recent publications from the laboratory of Myles Cabot (17, 18) show that PPMP can reverse multi-drug resistance in cancer cells by causing a build-up of ceramide and preventing the synthesis of glycosylated ceramides. **See Literature References on page 96.**

Matreya also offers the resolved D- and L-threo-isomers of PDMP and PPMP.

Protein Kinase C Inhibitor. Sphingosine is a potent and reversible inhibitor of protein kinase C (19); it also has been shown at low concentrations to stimulate DNA synthesis and act synergistically with known growth factors (20). Note that Safingol (our L-threo-dihydrosphingosine) has also been shown to partially reverse multi-drug resistance in cancer cells (18) *via* inhibition of protein kinase C.

Dihydroceramide desaturase Inhibitor. Cyclopropenylceramide is the first known inhibitor of this enzyme and may allow significant studies on the role of ceramide in apoptosis. Matreya is the only source for this inhibitor. (58)

Ceramidase Inhibitors. N-Oleoylethanolamine has been shown to be an efficacious inhibitor of the ceramidase found in human kidney and cerebellum (21). It is specifically an inhibitor of acid ceramidase (22) with an IC_{50} of ca. 500 µM. N-Hexadecanoylethanolamine can be used as an inactive control. D-MAPP is a potent (IC_{50} approximately 5 µM) inhibitor of alkaline ceramidase. Its enantiomer L-MAPP is inactive as an inhibitor and acts as a substrate for this enzyme (22,23). **See Literature References on page 96.**



Catalog number 1751

1751 **N-Oleoylethanolamine** **100 mg**
NOE $C_{20}H_{39}NO_2$ **CAS#:** 111-58-0

Source: synthetic **Mol. Wt.:** 326 **Melting Point (°C):** 63-66 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, ethyl ether, DMSO **Storage:** –20°C

Activity: acid ceramidase inhibitor

References:
C. J. Hillard and W.B. Campbell. J. Lipid. Res., **38**: 2383-2398, *1997*
Wasilewski M., Wieckowski M.R., Dymmowska D, Wojtczak L. BBA **1657**: 151-163, *2004*
Spinedi A., DiBartolomeo S., and Piacentini M. BBRC, **255**: 456-459, *1999*

1786 **N-Hexadecanoylethanolamine** **100 mg**
$C_{18}H_{37}NO_2$ **CAS#** 544-31-0

Source: synthetic **Mol. Wt.:** 299 **Melting Point (°C):** 99-102 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Activity: inactive as acid ceramidase inhibitor

References:
C. J. Hillard and W.B. Campbell. J. Lipid. Res., **38**: 2383-2398, *1997*
Wasilewski M., Wieckowski M.R., Dymmowska D, Wojtczak L. BBA **1657**: 151-163, *2004*
Spinedi A., DiBartolomeo S., and Piacentini M. BBRC, **255**: 456-459, *1999*

1757 **Anandamide** **10 mg/ml, 1 ml**

Arachidonylethanolamide; 5,8,11,14(Z,Z,Z,Z)-Eicosatetraenoyl 2'-hydroxy-ethyl-amide $C_{22}H_{37}NO_2$ **CAS#:** 94421-68-8

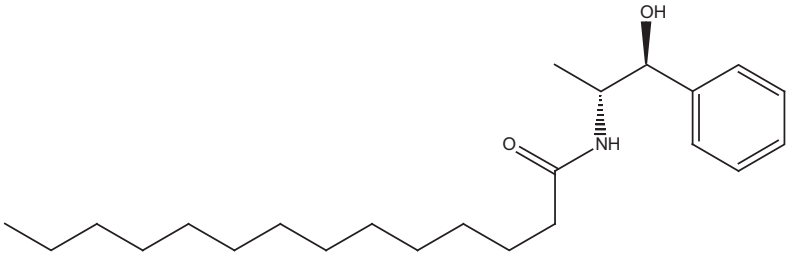
Source: synthetic **Mol. Wt.:** 347 **Purity:** 98+% by TLC **Appearance:** liquid
Solvent: chloroform **Solubility:** chloroform, ethanol **Storage:** –20°C

Induces apoptosis, endocannabinoid

References:
M. van der Stelt and V. DiMarzo; Prostaglandins Other Lipid Mediat. **77**, 111, *2005*
Wasilewski M., Wieckowski M.R., Dymmowska D, Wojtczak L. BBA **1657**: 151-163, *2004*
C. Grimaldi, et al.; Exp. Cell Res. **312**, 363, *2006*

1807 **L-threo-Dihydrosphingosine (Safingol)** **5 mg**
1807-025 L-threo-Sphinganine, C18 chain $C_{18}H_{39}NO_2$ **CAS#:** 15639-50-6 **25 mg**

Source: synthetic **Mol. Wt.:** 301 **Melting Point (°C):** 103-114 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol
Storage: –20°C
References:
C.W. Sachs et al., ibid., **270**, 26639, *1995*
G.K. Schwartz et al., J. Natl. Cancer Inst., **87**, 1394, *1995*



Catalog number 1859

1859 **D-MAPP** **100 mg**

D-erythro-2-Tetradecanoylamino-1-phenyl-1-propanol $C_{23}H_{39}NO_2$
CAS#: 143492-39-1

Source: synthetic **Mol. Wt.:** 361 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: ethanol **Storage:** –20°C

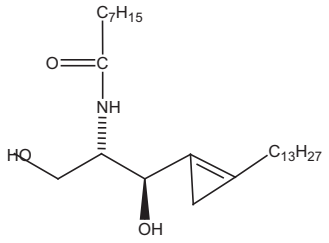
Activity: alkaline ceramidase inhibitor

1860 **L-MAPP** **100 mg**

L-erythro-2-Tetradecanoylamino-1-phenyl-1-propanol $C_{23}H_{39}NO_2$
CAS#: 143492-38-0

Source: synthetic **Mol. Wt.:** 361 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: ethanol **Storage:** –20°C

Activity: inactive as alkaline ceramidase inhibitor



Catalog number: 1886

1886 **N-C8:0-Cyclopropenylceramide** **1 mg**
1886-005 N-C8:0-CPPC; N-[(1R, 2S)-2-hydroxy-1-hydroxymethyl-2-(2-tridecyl-1-cyclopropenyl) ethyl] octanamide; GT_{11} $C_{27}H_{51}NO_3$ **5 mg**

Source: synthetic **Mol. Wt.:** 437 **Melting Point (°C):** 69-70 **Purity:** 98+% by ^{1}H NMR; HPLC **Appearance:** off white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Activity: Dihydroceramide desaturase inhibitor

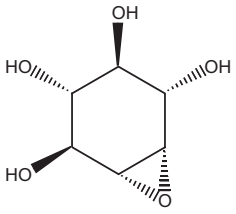
References:
Jacqueline M. Kraveka, Li Li, Zdzislaw M. Szulc, Jacek Bielawski, Besium Ogretmen, Yusuf A. Hannun, Lina M. Obeid, and Alicja Bielawska. J. Biol. Chem., **10**, 1074/jbc. M700647200, *February 5, 2007*
G. Triola, G. Fabrias, and A. Liebaria. Agnew. Chem. Int. Ed., 40, No. 10, 1960-1962, *2001*
Triola G., Fabrias G., Casas J., and Liebaria A. J. Org. Chem. 68 (26), 9924-9932, *2003*
Bedia C., Triola G., Casas J., Liebaria A., Fabrias G. Or. Biomol. Chem. 3 (20), 3707-3712, *2005*

1887 **N-C16:0-Cyclopropenylceramide** **1 mg**
1887-005 N-C16:0-CPPC; N-[(1R, 2S)-2-hydroxy-1-hydroxymethyl-2-(2-tridecyl-1-cyclopropenyl) ethyl] hexadecamide $C_{35}H_{67}NO_3$ **5 mg**

Source: synthetic **Mol. Wt.:** 550 **Melting Point (°C):** 156-157 **Purity:** 98+% by ^{1}H NMR; HPLC **Appearance:** off white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Activity: Dihydroceramide desaturase inhibitor

References:
G. Triola, G. Fabrias, and A. Liebaria. Agnew. Chem. Int. Ed., 40, No. 10, 1960-1962, *2001*
Triola G., Fabrias G., Casas J., and Liebaria A. J. Org. Chem. 68 (26), 9924-9932, *2003*
Bedia C., Triola G., Casas J., Liebaria A., Fabrias G. Or. Biomol. Chem. 3 (20), 3707-3712, *2005*



Catalog number 1889

1889 **Conduritol B epoxide** **25 mg**
$C_6H_{10}O_5$ **CAS#:** 6090-95-5

Source: synthetic **Mol. Wt.:** 162 **Melting Point (°C):** 164-166 **Purity:** 98+% by TLC, NMR **Appearance:** solid **Solubility:** water, DMSO, methanol (slightly) **Storage:** –20°C

Inhibits α-glucosidase activity; specific inhibitor of glucocerebrosidase in cultured cells.

1719 **D,L-threo-PDMP** **100 mg**

D,L-threo-1-Phenyl-2-decanoylamino-3-morpholino-1-propanol•HCl
$C_{23}H_{38}N_2O_3$•HCl **CAS#:** 80938-69-8

Source: synthetic **Mol. Wt.:** 427 **Melting Point (°C):** 158-161 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** ethanol, methanol, chloroform, DMSO **Storage:** –20°C

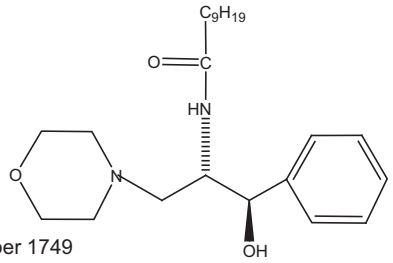
Activity: glucosyl ceramide synthase inhibitor

1720 **D,L-threo-PPMP** **100 mg**

D,L-threo-l-Phenyl-2-hexadecanoylamino-3-morpholino-1-propanol•HCl
$C_{29}H_{50}N_2O_3$•HCI **CAS#:** 149022-18-4

Source: synthetic **Mol. Wt.:** 511 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** alcohols, chloroform **Storage:** –20°C

Activity: glucosyl ceramide synthase inhibitor



Catalog number 1749

1749 **L-threo-PDMP** **10 mg**

L-threo-1-Phenyl-2-decanoylamino-3-morpholino-1-propanol•HCl
$C_{23}H_{38}N_2O_3$•HCl **CAS#:** 109836-81-9

Source: synthetic **Mol. Wt.:** 427 **Melting Point (°C):** 89-92 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** ethanol, methanol **Storage:** –20°C

1753 **D,L-erythro-PPMP** **100 mg**

D,L-erythro-1-Phenyl-2-hexadecanoylamino-3-morpholino-1-propanol•HCl
$C_{29}H_{50}N_2O_3$•HCl

Source: synthetic **Mol. Wt.:** 511 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DSMO **Storage:** –20°C

1755 **D,L-erythro-PDMP** **100 mg**

D,L-erythro-1-Phenyl-2-decanoylamino-3-morpholino-1-propanol•HCl
$C_{23}H_{38}N_2O_3$•HCl **CAS#:** 109760-77-2

Source: synthetic **Mol. Wt.:** 427 **Melting Point (°C):** 112-115 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, DSMO **Storage:** –20°C

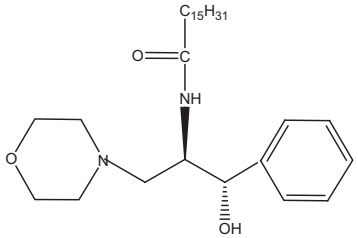
1756 **D-threo-PDMP** **10 mg**

D-threo-1-Phenyl-2-decanoylamino-3-morpholino-1-propanol•HCl
$C_{23}H_{38}N_2O_3$•HCl **CAS#:** 109836-82-0

Source: synthetic **Mol. Wt.:** 427 **Melting Point (°C):** 94-97 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** ethanol, methanol **Storage:** –20°C

Activity: glucosyl ceramide synthase inhibitor

References:
Nicholson K.M., Quinn D.M., Kellett G. L., Warr J.R. Br. J. Cancer **81**: 423-430, *1999*
Sietsma H., Veldman R.J., Vander Kolk D., Ausema B., Nijhof W., Kamps W., Vellenga E., Kok J.W. Clin. Cancer Res. **6**:942-948, *2000*
Basu S., Ma R., Mikulla B., Bradley M., Moulton C., Basu M., Banerjee S., Inokuchi J. J. Glycoconj. **20**:157-168, *2003*
Radin N.S. Biochem Pharmacol **57**:589-595, *1999*



Catalog number 1865

1865 **D-threo-PPMP** **10 mg**

D-threo-1-Phenyl-2-hexadecanoylamino-3-morpholino-1-propanol•HCl
$C_{29}H_{50}N_2O_2$•HCl

Source: synthetic **Mol. Wt.:** 511 **Melting Point (°C):** 94-98 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** ethanol, methanol **Storage:** –20°C

Activity: glucosyl ceramide synthase inhibitor

References:
Abe A., Inokuchi J., Jimbo M., Shimeno H., Nagamatsu A., Shayman J.A., Shukla G.S., Radin N.S.J. Biochem (Tokyo) **111**:191-196, *1992*
Maurer B.J., Melton L., Billups C., Cabot M.C., Reynolds C.P. J. Natl. Cancer Inst. **92**:1897-1909, *2000*
Puri A., Hug P., Munoz-Barroso I., Blumenthal R. Biochem. Biophys. Res. Commun **242**:219-225, *1998*
Couto A.S., Caffaro C., Uhrig M.L., Kimura E., Peres V.J., Merino E.F., Katzin A.M., Nishioka M., Nonami H., Era-Balsells R. Eur. J. Biochem. **271**: 2204-2214, *2004*
Morjani H., Aouali N., Belhoussine R., Veldman R.J., Levade T., Manfait M. Int. J. Cancer **94**:157-165, *2001*

1868 **L-threo-PPMP** **10 mg**

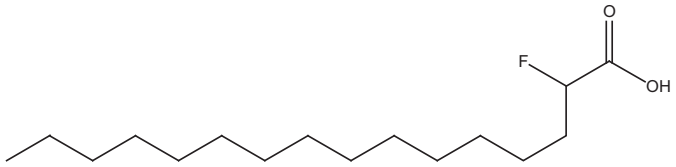
L-threo-1-Phenyl-2-hexadecanoylamino-3-morpholino-1-propanol•HCl
$C_{29}H_{50}N_2O_3$•HCl

Source: synthetic **Mol. Wt.:** 511 **Melting Point (°C):** 89-94 **Purity:** 98+% by TLC
Appearance: white solid **Solubility:** ethanol, methanol **Storage:** –20°C

1800 **Castanospermine** **25 mg**

1,6,7,8-tetrahydroxyoctahydroindolizine $C_8H_{15}NO_4$ **CAS#:** 79831-76-8

Source: natural, plant **Mol. Wt.:** 189 **Melting Point (°C):** 210-215 **Purity:** 98+% by TLC, NMR **Appearance:** solid **Solubility:** water, methanol/water, 90:10
Storage: –20°C



Catalog number 1717

1717 **2-Fluoropalmitic acid** **25 mg**
$C_{16}H_{31}FO_2$ **CAS#:** 89270-22-4

Source: synthetic **Mol. Wt.:** 274 **Melting Point (°C):** 83-85 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Activity: Acyl-CoA synthase inhibitor

1718 **Methyl 2-fluoropalmitate** **10 mg**
$C_{17}H_{33}FO_2$

Source: synthetic **Mol. Wt.:** 288 **Melting Point (°C):** 36-38 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Activity: inactive ester of 2-fluoropamitic acid

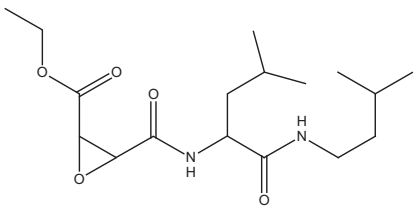
1750 **2,2-Difluoropalmitic acid** **25 mg**
$C_{16}H_{30}F_2O_2$

Source: synthetic **Mol. Wt.:** 292 **Melting Point (°C):** 50.8-53 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1858 **2-Acetyl-4-(1R, 2S, 3R, 4-tetrahydroxybutyl)-imidazole** **1 mg**
THI $C_9H_{14}N_2O_5$ **CAS#:** 94944-70-4

Source: synthetic **Mol. Wt.:** 230 **Melting Point (°C):** n/a **Purity:** 99% by HPLC, MS, NMR **Appearance:** white solid **Solubility:** water **Storage:** –20°C

Reference:
S.R. Schwab, J.P. Pereira, M. Matloubian, Y. Xu, Y. Huang, and J.G. Cyster. Science **309**: 1735, *2005*



Catalog number 1752

1752 **EST** **5 mg**
E-64-d; Loxastatin $C_{17}H_{30}N_2O_5$ **CAS#:** 88321-09-9

Source: synthetic **Mol. Wt.:** 342 **Melting Point (°C):** 125-127 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

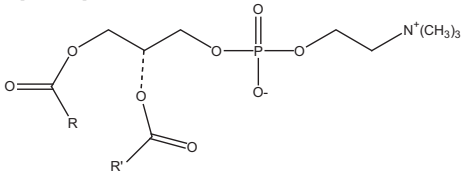
Activity: cystein protease inhibitor

Reference:
S. Mehdi, TIBS, **16**, *April 1991*

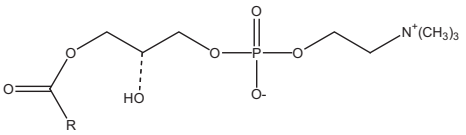
Glycerolipids

Glycerophospholipids

Natural phospholipids



Catalog number 1044



Catalog number 1046

1044 **Lecithin** **50 mg/ml, 1 ml**
Phosphatidylcholine; PC $C_{44}H_{84}NO_8P$ **CAS#:** 8002-43-5

Source: natural, egg **Mol. Wt.:** 787 (oleoyl) **Purity:** 98+% by TLC
Appearance: liquid **Solvent:** chloroform **Solubility:** chloroform, ethyl ether, ethanol
Storage: –20°C

See Table III page 90-94 for fatty acid content

1070 **Lecithin** **50 mg/ml, 1 ml**
Phosphatidylcholine; PC $C_{44}H_{84}NO_8P$ **CAS#:** 8002-43-5

Source: natural, bovine **Mol. Wt.:** 787 (oleoyl) **Purity:** 98+% by TLC **Appearance:** liquid **Solvent:** chloroform **Solubility:** chloroform, ethyl ether **Storage:** –20°C

See Table III page 90-94 for fatty acid content

1302 **Lecithin** **50 mg/ml, 1 ml**
Phosphatidylcholine; PC $C_{44}H_{80}NO_3P$ **CAS#:** 8002-43-5

Source: natural, plant **Mol. Wt.:** 783 (linoleoyl) **Purity:** 98+% by TLC
Appearance: liquid **Solvent:** chloroform **Solubility:** chloroform, ethyl ether
Storage: –20°C

See Table III page 90-94 for fatty acid content

1046 **lyso-Lecithin** **50 mg**
lyso-Phosphatidylcholine $C_{24}H_{52}NO_7P$ **CAS#:** 9008-30-4

Source: natural, egg **Mol. Wt.:** 496 (palmitoyl) **Purity:** 98+% by TLC **Appearance:** solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

See Table III page 90-94 for fatty acid content

1047 **Phosphatidylserine** **50 mg/ml, 1 ml**
PS $C_{42}H_{78}NO_{10}P$

Source: natural, bovine **Mol. Wt.:** 788 (oleoyl) **Purity:** 98+% by TLC **Appearance:** liquid **Solvent:** chloroform **Solubility:** chloroform, toluene
Storage: –20°C

See Table III page 90-94 for fatty acid content

1048 **Phosphatidylinositol (Na^+ salt)** **10 mg/ml, 1 ml**
PI $C_{45}H_{78}O_{13}P$ Na **CAS#** 383907-36-6

Source: natural, plant **Mol. Wt.:** 880 (linoleoyl) **Purity:** 98+% by TLC **Appearance:** liquid **Solvent:** chloroform **Solubility:** chloroform, ethyl ether **Storage:** –20°C

See Table III page 90-94 for fatty acid content

1336 **Phosphatidylinositol, plant, soy, (K+ salt)** **50 mg/ml, 1ml**
$C_{43}H_{78}O_{13}P$ K **CAS#** 383907-36-6

Source: natural, plant, soy **Mol. Wt.:** 873 (linoleoyl and pamitoyl) **Purity:** 98+% by TLC **Appearance:** tinted liquid **Solvent:** chloroform **Solubility:** chloroform, ethyl ether **Storage:** –20°C

1053 **Phosphatidic acid (NH_4^+ salt)** **50 mg**
PA $C_{39}H_{72}O_8P$ NH_4

Source: semi-synthetic, egg **Mol. Wt.:** 744 (oleoyl) **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** –20°C

See Table III page 90-94 for fatty acid content

1045 **Phosphatidylethanolamine** **50 mg/ml, 1 ml**
PE $C_{41}H_{78}NO_8P$ **CAS#:** 39382-08-6

Source: natural, egg **Mol. Wt.:** 744 (oleoyl) **Purity:** 98+% by TLC **Appearance:** liquid **Solvent:** chloroform **Solubility:** chloroform **Storage:** –20°C

See Table III page 90-94 for fatty acid content

1069 **Phosphatidylethanolamine** **50 mg/ml, 1 ml**
PE $C_{41}H_{78}NO_8P$ **CAS#:** 90989-93-8

Source: natural, bovine **Mol. Wt.:** 744 (oleoyl) **Purity:** 98+% by TLC **Appearance:** liquid **Solvent:** chloroform **Solubility:** chloroform **Storage:** –20°C

1301 **Phosphatidylethanolamine** **50 mg/ml, 1 ml**
PE $C_{41}H_{74}NO_3P$ **CAS#:** 90989-93-8

Source: natural, plant **Mol. Wt.:** 740 (linoleoyl) **Purity:** 98+% by TLC **Appearance:** liquid **Solvent:** chloroform **Solubility:** chloroform **Storage:** –20°C

See Table III page 90-94 for fatty acid content

1052 **Phosphoglycerides kit** **1 each**

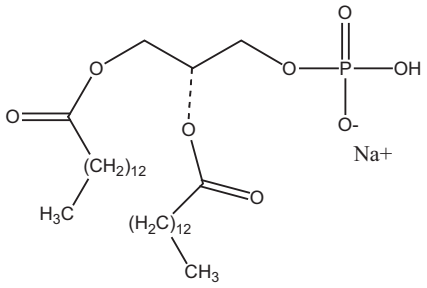
Source: natural, egg, bovine, plant **Purity:** 98+% by TLC **Appearance:** liquid/solid **Solvent:** various **Storage:** –20°C

Individually packed in ampules and vials (Purity 98+%): Phosphatidic acid NH_4^+ salt 10mg; Phosphatidylethanolamine, egg (in 1 ml $CHCl_3$) 10mg; Sphingomyelin, bovine 10mg; Phosphatidylserine, bovine (in 1 ml $CHCl_3$) 10 mg; Lecithin, egg (in 1 ml $CHCl_3$) 10 mg; lyso-Lecithin, egg 10 mg; Cerebrosides, bovine 10mg; Sulfatides, bovine 10mg; Phosphatidylinositol, Na^+salt, plant (in 1 ml $CHCl_3$) 3mg

Synthetic phospholipids

These phospholipids have 98+% chemical purity except where stated and 99% fatty acid chain purity. Store at -20° C. Solubility: see individual entries

Phosphatidic acid derivatives



Catalog number 1428

1428 **1,2-Dimyristoyl-sn-glycero-3-phosphatidic acid** **100 mg**
DMPA $C_{31}H_{60}O_8P•Na$ **CAS#:** 80724-31-8

Source: synthetic **Mol. Wt.:** 615 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: chloroform/methanol/acetic acid, 4:1:0.1 **Storage:** –20°C

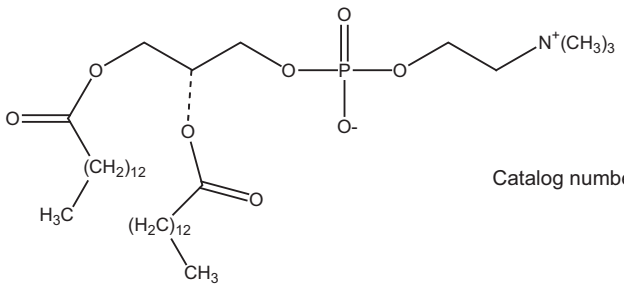
1429 **1,2-Dipalmitoyl-sn-glycero-3-phosphatidic acid** **100 mg**
DPPA $C_{35}H_{68}O_8P•Na$ **CAS#:** 70240-64-1

Source: synthetic **Mol. Wt.:** 671 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: chloroform/methanol/acetic acid, 4:1:0.1 **Storage:** –20°C

1430 **1,2-Distearoyl-sn-glycero-3-phosphatidic acid** **100 mg**
DSPA $C_{39}H_{76}O_8P•Na$ **CAS#:** 108321-18-2

Source: synthetic **Mol. Wt.:** 727 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: chloroform/methanol/acetic acid, 4:1:0.1 **Storage:** –20°C

Phosphatidylcholines



Catalog number 1425

1442 **1,2-Dilauroyl-sn-glycero-3-phosphorylcholine** **100 mg**
DLPC $C_{32}H_{64}NO_8P$ **CAS#:** 18194-25-7

Source: synthetic **Mol. Wt.:** 622 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: methylene chloride, methanol **Storage:** –20°C

1425 **1,2-Dimyristoyl-sn-glycero-3-phosphorylcholine** **100 mg**
DMPC $C_{36}H_{72}NO_8P$ **CAS#:** 18194-24-6

Source: synthetic **Mol. Wt.:** 678 **Purity:** 98+% by TLC **Appearance:** white solid
Melting Point: 130-139°C **Solubility:** methylene chloride, methanol **Storage:** –20°C

1426 **1,2-Dipalmitoyl-sn-glycero-3-phosphorylcholine** **100 mg**
DPPC $C_{40}H_{80}NO_8P$ **CAS#:** 63-89-8

Source: synthetic **Mol. Wt.:** 734 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: methylene chloride, methanol **Storage:** –20°C

1400 **1,2-Diheptadecanoyl-sn-glycero-3-phosphorylcholine** **50 mg**
DHDPC $C_{42}H_{84}NO_8P$ **CAS#:** 70897-27-7

Source: synthetic **Mol. Wt.:** 762 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: methylene chloride, methanol **Storage:** –20°C

1427 **1,2-Distearoyl-sn-glycero-3-phosphorylcholine** **100 mg**
DSPC $C_{44}H_{88}NO_8P$ **CAS#:** 816-94-4

Source: synthetic **Mol. Wt.:** 790 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: methylene chloride, methanol **Storage:** –20°C

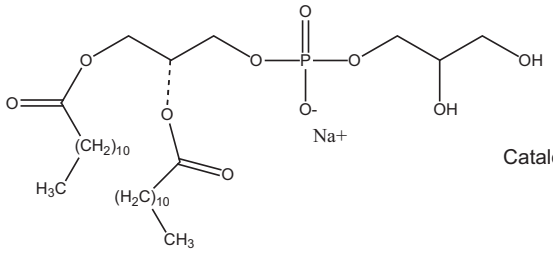
1437 **1-Palmitoyl-2-oleoyl-sn-glycero-3-phosphorylcholine** **100 mg**
POPC $C_{42}H_{84}NO_8P$ **CAS#:** 26853-31-6

Source: synthetic **Mol. Wt.:** 760 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: methylene chloride, methanol **Storage:** –20°C

1445 **1-Palmitoyl-sn-glycero-3-phosphorylcholine** **100 mg**
lyso-PPC $C_{24}H_{50}NO_7P$ **CAS#:** 17364-16-8

Source: synthetic **Mol. Wt.:** 496 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: methylene chloride, methanol **Storage:** –20°C

Phosphatidylglycerols



Catalog number 1443

1443 **1,2-Dilauroyl-sn-glycero-3-phosphorylglycerol** **100 mg**
DLPG $C_{30}H_{58}O_{10}P•Na$ **CAS#:** 73548-69-3

Source: synthetic **Mol. Wt.:** 632 **Purity:** 98+% by TLC **Appearance:** white solid
Solubility: chloroform/methanol, 5:1 **Storage:** –20°C

1431 **1,2-Dimyristoyl-sn-glycero-3-phosphorylglycerol** **100 mg**
DMPG $C_{34}H_{66}O_{10}P•Na$ **CAS#:** 67232-80-8

Source: synthetic **Mol. Wt.:** 689 **Purity:** 98+% by TLC **Appearance:** white solid
Melting Point: 120-129°C **Solubility:** chloroform/methanol, 5:1 **Storage:** –20°C

1432 **1,2-Dipalmitoyl-sn-glycero-3-phosphorylglycerol** **100 mg**
DPPG $C_{38}H_{74}O_{10}P•Na$ **CAS#:** 67232-81-9

Source: synthetic **Mol. Wt.:** 745 **Purity:** 98+% by TLC **Appearance:** white solid
Melting Point: 122-127°C **Solubility:** chloroform/methanol, 5:1 **Storage:** –20°C

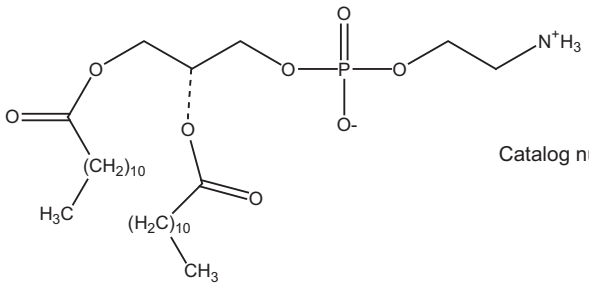
1433 **1,2-Distearoyl-sn-glycero-3-phosphorylglycerol** **100 mg**
DSPG $C_{42}H_{82}O_{10}P•Na$ **CAS#:** 4537-78-4

Source: synthetic **Mol. Wt.:** 801 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol, 5:1 **Storage:** –20°C

1438 **1-Palmitoyl-2-oleoyl-sn-glycero-3-phosphorylglycerol** **100 mg**
POPG $C_{40}H_{76}O_{10}P•Na$ **CAS#:** 81490-05-3

Source: synthetic **Mol. Wt.:** 771 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol, 5:1 **Storage:** –20°C

Phosphatidylethanolamines



Catalog number 1444

1444 **1,2-Dilauroyl-sn-glycero-3-phosphorylethanolamine** **100 mg**
DLPE $C_{29}H_{58}NO_8P$ **CAS#:** 59752-57-7

Source: synthetic **Mol. Wt.:** 579 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform + methanol mixture **Storage:** –20°C

1434 **1,2-Dimyristoyl-sn-glycero-3-phosphorylethanolamine** **100 mg**
DMPE $C_{33}H_{66}NO_8P$ **CAS#** 998-07-2

Source: synthetic **Mol. Wt.:** 636 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/facetic acid 95:5; chloroform/methanol/water/acetic acid 100:30:10:2.5 **Storage:** –20°C

1435 **1,2-Dipalmitoyl-sn-glycero-3-phosphorylethanolamine** **100 mg**
DPPE $C_{37}H_{74}NO_8P$ **CAS#:** 923-61-5

Source: synthetic **Mol. Wt.:** 692 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/acetic acid 95:5; chloroform/methanol/water/acetic acid 100:30:10:2.5 **Storage:** –20°C

1436 **1,2-Distearoyl-sn-glycero-3-phosphorylethanolamine** **100 mg**
DSPE $C_{41}H_{82}NO_8P$ **CAS#:** 1069-79-0

Source: synthetic **Mol. Wt.:** 748 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/acetic acid 95:5; chloroform/methanol/water/acetic acid 100:30:10:2.5 **Storage:** –20°C

1439 **1,2-Distearoyl-phosphatidylethanolamine-methyl-polyethyleneglycol conjugate-2000 (Na^+ salt)** **100 mg**
DSPE-MPEG-2000 **CAS#:** 147867-65-0

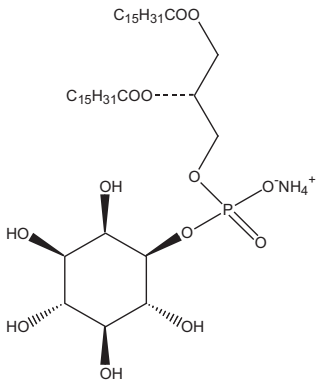
Source: synthetic **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform **Storage:** –20°C

Phosphatidylinositols

The metabolism of inositol lipids is involved in the signal transduction of many hormones, neurotransmitters and growth factors (1,2). In the classical pathway, phosphatidylinositol-specific phospholipase C (PI-PLC) hydrolyzes phosphatidyl 4,5-biphosphate (PIP_2) to yield 1,2-diacylglycerol (DAG) and inositol 1,4,5-triphosphate (IP_3). The role of IP_3 and DAG as second messengers is well recognized.

In a second, more recently discovered pathway, the activation of phosphoinositide (PI) 3-kinase results in the formation of three novel phosphatidyl (PI) lipids phosphorylated at the D3 position of the inositol ring: PI-3-P, PI-3,4-P_2 and PI-3,4,5-P_3 (3). These D3 lipids are not known substrates for any of the phospholipase C enzymes and function as second messengers. PI 3-kinase activity is correlated with many cellular processes, including the regulation of cell growth, oncogenic transformation, chemotaxis and receptor down-regulation among others (4,5,6). The recent paper on the effect of PI3,4-P2 on the *Akt* proto-oncogene product (9) also contains protocols for applying PIP's to cell cultures. Matreya's synthetic phosphatidylinositols and inositol phosphates are excellent tools for investigating these second messengers, understanding the enzyme mechanisms involved in phosphoinositide metabolism (7,8) and for designing therapeutic pharmacological agents. The compounds are evaluated by ^{1}H and ^{31}P NMR to guarantee enantiomeric purity of >98%. **See Literature References on page 96.**

Phosphatidylinositols



Catalog number 1779

1779 **Phosphatidylinositol, dipalmitoyl, (NH_4^+ salt)** **0.5 mg**
1779-1 PI; DPPI (NH_4^+ salt) $C_{41}H_{78}O_{13}P•NH_4$ **1 mg**

Source: synthetic **Mol. Wt.:** 828 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** chlorofom/methanol/water 5:1:0.1
Storage: –20°C

1773 **Phosphatidylinositol 3-phosphate, dipalmitoyl, (NH_4^+ salt)** **100 µg**
1773-1 DPPI-3-P; PI-3-P dipalmitoyl (NH_4^+ salt) $C_{41}H_{77}O_{16}P_2$ •$3NH_4$ **1 mg**
1773-5 **5 mg**

Source: synthetic **Mol. Wt.:** 942 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR,
Appearance: white solid **Solubility:** chloroform/methanol/water 1:1:0.3
Storage: –20°C

References:
B.A. Fenderson, E.M. Eddy, S.Hakomori, BioEssays **12**, 173, *1990*
R. T. Dobrowsky et al., ibid, **268**, 15523, *1993*
Berridge, M. J., Nature **361**:315, *1993*
Bhamare, N. et al., 1996 *Phosphorus, Sulfur and Silicon* XXX, Overseas Publishers Association, Amsterdam B.V. 109-110:317

1780 **Phosphatidylinositol 3-phosphate, dipalmitoyl, (Na^+ salt)** **100 µg**
1780-1 DPPI-3-P; PI-3-P dipalmitoyl (Na^+ salt) $C_{41}H_{77}O_{16}P_2$•3Na **1 mg**
1780-5 **5 mg**

Source: synthetic **Mol. Wt.:** 957 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** water **Storage:** –20°C

1922 **Phosphatidylinositol 4-phosphate, dioctanoyl, (NH_4^+ salt)** **100 µg**
1922-1 DOPI-4-P; PI-4-P dioctanoyl (NH_4^+ salt) $C_{25}H_{45}O_{16}P_2 \bullet 3NH_4$ **1 mg**
1922-5 **5 mg**

Source: synthetic **Mol. Wt.:** 718 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** soluble in water; slightly soluble in methanol; slightly soluble in chloroform/methanol/DI water, 1:1:0.3 **Storage:** –20°C

1919 **Phosphatidylinositol 4-phosphate, dipalmitoyl, (NH_4^+ salt)** **100 µg**
1919-1 DPPI-4-P; PI-4-P dipalmitoyl (NH_4^+ salt) $C_{41}H_{77}O_{16}P_2 \bullet 3NH_4$ **1 mg**
1919-5 **5 mg**

Source: synthetic **Mol. Wt.:** 942 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** methanol, chloroform/methanol/water 1:1:0.3, slightly soluble in water **Storage:** –20°C

1923 **Phosphatidylinositol 5-phosphate, dioctanoyl, (NH_4^+ salt)** **100 µg** **0**
1923-1 DOPI-5-P; PI-5-P dioctanoyl (NH_4^+ salt) $C_{25}H_{45}O_{16}P_2 \bullet 3NH_4$ **1 mg**
1923-5 **5 mg**

Source: synthetic **Mol. Wt.:** 718 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** soluble in water; slightly soluble in methanol; slightly soluble in chloroform/methanol/DI water, 1:1:0.3 **Storage:** –20°C

1920 **Phosphatidylinositol 5-phosphate, dipalmitoyl, (NH_4^+ salt)** **100 µg**
1920-1 DPPI-5-P; PI-5-P dipalmitoyl (NH_4^+ salt) $C_{41}H_{77}O_{16}P_2 \bullet 3NH_4$ **1 mg**
1920-5 **5 mg**

Source: synthetic **Mol. Wt.:** 942 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** methanol, chloroform/methanol/water 1:1:0.3, slightly soluble in water **Storage:** –20°C

1781 **Phosphatidylinositol bis-3,4-phosphate, dipalmitoyl, (NH_4^+ salt)** **100 µg**
1781-1 DPPI-3,4-P2; PI-3,4-P2 dipalmitoyl (NH_4^+ salt) $C_{41}H_{76}O_{19}P_3 \bullet 5NH_4$ **1 mg**
1781-5 **Source:** synthetic **Mol. Wt.:** 1056 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR **5 mg**
Appearance: white solid **Solubility:** chloroform/methanol/water 1:1:0.3
Storage: –20°C

1774 **Phosphatidylinositol bis-3,4-phosphate, dipalmitoyl, (Na^+ salt)** **100 µg**
1774-1 DPPI-3,4-P2; PI-3,4-P2 dipalmitoyl (Na^+ salt) $C_{41}H_{76}O_{19}P_3 \bullet 5Na$ **1 mg**
1774-5 **5 mg**

Source: synthetic **Mol. Wt.:** 1081 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR,
Appearance: white solid **Solubility:** water **Storage:** –20°C

References:
Carpenter, C. L. and L.C. Cantley, Curr. Opin. Cell Biol. **8**:153, *1996*
Ireton, K. et al., Science **274**:80, 1996

1784 **Phosphatidylinositol bis-4,5-phosphate, dioctanoyl, (NH_4^+ salt)** **100 µg**
1784-1 DOPI-4,5-P2; PI-4,5-P2 dioctanoyl (NH_4^+ salt) $C_{25}H_{49}O_{19}P_3 \bullet 5NH_4$ **1 mg**
1784-5 **5 mg**

Source: synthetic **Mol. Wt.:** 831 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** chloroform/methanol/water 1:1:0.3
Storage: –20°C

1778 **Phosphatidylinositol bis-4,5-phosphate, dioctanoyl, (Na^+ salt)** **100 µg**
1778-1 DOPI-4,5-P2; PI-4,5-P2 dioctanoyl (Na^+ salt) $C_{25}H_{44}O_{19}P_3 \bullet 5Na$ **1 mg**
1778-5 **5 mg**

Source: synthetic **Mol. Wt.:** 856 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** water **Storage:** –20°C

1777 **Phosphatidylinositol bis-4,5-phosphate, dipalmitoyl, (NH_4^+ salt)** **100 µg**
1777-1 DPPI-4,5-P2; PI-4,5-P2 dipalmitoyl (NH_4^+ salt) $C_{41}H_{76}O_{19}P_3 \bullet 5NH_4$ **1 mg**
1777-5 **5 mg**

Source: synthetic **Mol. Wt.:** 1056 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** chloroform/methanol/water 1:1:0.3
Storage: –20°C

1782	**Phosphatidylinositol bis-4,5-phosphate, dipalmitoyl, (Na^+ salt)**	**100 µg**
1782-1	DPPI-4,5-P2; PI-4,5-P2 dipalmitoyl (Na^+ salt) $C_{41}H_{76}O_{19}P_3$•5Na	**1 mg**
1782-5		**5 mg**

Source: synthetic **Mol. Wt.:** 1081 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** water **Storage:** –20°C

1921	**Phosphatidylinositol tris-3,4,5-phosphate, dioctanoyl, (Na^+ salt)**	**100 µg**
1921-1	DOPI-3,4,5-P3; PI-3,4,5-P3 dioctanoyl (Na^+ salt) $C_{25}H_{43}O_{22}P_4$•7Na	**1 mg**
1921-5		**5 mg**

Source: synthetic **Mol. Wt.:** 980 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** water **Storage:** –20°C

1783	**Phosphatidylinositol tris-3,4,5-phosphate, dipalmitoyl, (NH_4^+ salt)**	**100 µg**
1783-1	DPPI-3,4,5-P3; PI-3,4,5-P3 dipalmitoyl (NH_4^+ salt) $C_{41}H_{75}O_{22}P_4$•7NH_4	**1 mg**
1783-5		**5 mg**

Source: synthetic **Mol. Wt.:** 1170 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** chloroform/methanol/water 1:1:0.3
Storage: –20°C

1775	**Phosphatidylinositol tris-3,4,5-phosphate, dipalmitoyl, (Na^+ salt)**	**100 µg**
1775-1	DPPI-3,4,5-P3; PI-3,4,5-P3, dipalmitoyl (Na^+ salt) $C_{41}H_{75}O_{22}P_4$•7Na	**1 mg**
1775-5		**5 mg**

Source: synthetic **Mol. Wt.:** 1205 **Purity:** 98+% by ^{1}H NMR, ^{31}P NMR
Appearance: white solid **Solubility:** water **Storage:** –20°C

References:
Carpenter, C. L. and L.C. Cantley, Curr. Opin. Cell Biol. **8**:153, *1996*
Ireton, K. et al., Science **274**:80, 1996

Bacterial tetraethers

1303	**Main phospholipid (MPL) of *Thermoplasma acidophilum*, (>95% pure)**	**5 mg**

Purified MPL of *Thermoplasma acidophilum* (>95% pure) $C_{95}H_{188}O_{16}P$

Source: natural, Archaebacteria **Mol. Wt.:** 1618 **Purity:** >95% by TLC, HPLC
Appearance: yellow solid **Solubility:** chloroform/methanol 2:1, hexane/2-propanol/DI water 30:40:5 **Storage:** 4-8°C

References:
H.-J. Freisleben et al., J. Liposome Res. **3**(3), 817, *1993*
H.-J. Freisleben et al., ibid., **5**(1), 215, *1995*
H.-J. Freisleben et al., Chem. Phys. Lipids **78**, 137, *1995*
H.-J. Freisleben et al., Archives Biochem. Biophys. **294**(2), 418, *1992*

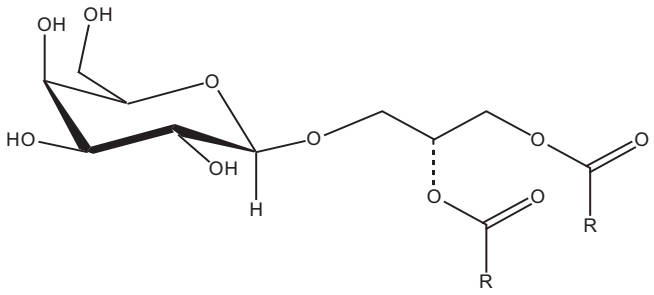
1303-2	**Main phospholipid (MPL) of *Thermoplasma acidophilum*, (>50% pure)**	**50 mg**

MPL of *Thermoplasma acidophilum* (>50% pure) $C_{95}H_{188}O_{16}P$

Source: natural, Archaebacteria **Mol. Wt.:** 1618 **Purity:** >50% by TLC
Appearance: brown viscous liquid **Solubility:** chloroform/methanol 2:1, hexane/2-propanol/DI water 30:40:5 **Storage:** 4–8°C highly hygroscopic

References:
H.-J. Freisleben et al., J. Liposome Res. **3**(3), 817, *1993*
H.-J. Freisleben et al., ibid., **5**(1), 215, *1995*
H.-J. Freisleben et al., Chem. Phys. Lipids **78**, 137, *1995*
H.-J. Freisleben et al., Archives Biochem. Biophys. **294**(2), 418, *1992*

Glycosyl glycerides



Catalog number 1058

1058 **Monogalactosyldiglyceride** **10 mg**
MGDG (hydrogenated) $C_{45}H_{86}O_{10}$ **CAS#:** 41670-62-6

Source: natural, plant **Mol. Wt.:** 787 (stearoyl) **Purity:** 98+% by TLC **Appearance:** off white solid **Solubility:** chloroform/methanol/water 4:1:0.1 **Storage:** –20°C

1059 **Digalactosyldiglyceride** **5 mg**
DGDG (hydrogenated) $C_{51}H_{96}O_{15}$ **CAS#:** 92457-02-8

Source: natural, plant **Mol. Wt.:** 949 (stearoyl) **Purity:** 98+% by TLC **Appearance:** off white solid **Solubility:** chloroform/methanol/water 4:1:0.1 **Storage:** –20°C

Fatty acids

Simple fatty acids

Saturated fatty acids and methyl esters

These products are 99% pure by GC. They are stable at room temperature and are supplied neat.

1200 **Methyl hexanoate** **1 g**
Methyl caproate; C6:0 methyl ester $C_7H_{14}O_2$ **CAS#:** 106-70-7

Source: natural, plant **Mol. Wt.:** 130 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1196 **Heptanoic acid** **1 g**
C7:0 fatty acid $C_7H_{14}O_2$ **CAS#:** 111-14-8

Source: natural, plant **Mol. Wt.:** 130 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1197 **Methyl heptanoate** **1 g**
C7:0 fatty acid methyl ester $C_8H_{16}O_2$ **CAS#:** 106-73-0

Source: natural, plant **Mol. Wt.:** 144 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1198 **Octanoic acid** **1 g**
Caprylic acid;C8:0 acid $C_8H_{16}O_2$ **CAS#:** 124-07-2

Source: natural, plant **Mol. Wt.:** 144 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1199 **Methyl octanoate** **1 g**
Methyl caprylate; C8:0 methyl ester $C_9H_{18}O_2$ **CAS#:** 111-11-5

Source: natural, plant **Mol. Wt.:** 158 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, ethyl ether **Storage:** room temperature

1163 **Nonanoic acid** **100 mg**
C9:0 fatty acid; pelargonic acid $C_9H_{18}O_2$ **CAS#:** 112-05-0

Source: synthetic **Mol. Wt.:** 158 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, ethyl ether **Storage:** room temperature

1164 **Methyl nonanoate** **100 mg**
C9:0 methyl ester $C_{10}H_{20}O_2$ **CAS#:** 1731-84-6

Source: synthetic **Mol. Wt.:** 172 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, ethyl ether **Storage:** room temperature

1261 **Methyl decanoate** **500 mg**
Methyl caprate; C10:0 methyl ester $C_{11}H_{22}O_2$ **CAS#:** 110-42-9

Source: natural, plant **Mol. Wt.:** 186 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane **Storage:** room temperature

1165 **Undecanoic acid** **100 mg**
C11:0 fatty acid $C_{11}H_{22}O_2$ **CAS#:** 112-37-8

Source: synthetic **Mol. Wt.:** 186 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1166 **Methyl undecanoate** **100 mg**
C11:0 methyl ester $C_{12}H_{24}O_2$ **CAS#:** 1731-86-8

Source: synthetic **Mol. Wt.:** 200 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, ethyl ether **Storage:** room temperature

1008 **Dodecanoic acid** **1 g**
Lauric acid; C12:0 acid $C_{12}H_{24}O_2$ **CAS#:** 143-07-7

Source: natural, plant **Mol. Wt.:** 200 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1009 **Methyl dodecanoate** **1 g**
Methyl laurate; C12:0 methyl ester $C_{13}H_{26}O_2$ **CAS#:** 111-82-0

Source: natural, plant **Mol. Wt.:** 214 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, ethyl ether **Storage:** room temperature

1161 **Tridecanoic acid** **100 mg**
C13:0 fatty acid $C_{13}H_{26}O_2$ **CAS#:** 638-53-9

Source: synthetic **Mol. Wt.:** 214 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1162 **Methyl tridecanoate** **100 mg**
C13:0 methyl ester $C_{14}H_{28}O_2$ **CAS#:** 1731-88-0

Source: synthetic **Mol. Wt.:** 228 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, ethyl ether **Storage:** room temperature

1010 **Tetradecanoic acid** **1 g**
Myristic acid; C14:0 acid $C_{14}H_{28}O_2$ **CAS#:** 544-63-8

Source: natural, plant **Mol. Wt.:** 228 **Purity:** 99% by TLC, GC
Appearance: white solid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1011 **Methyl tetradecanoate** **1 g**
Methyl myristate; C14:0 methyl ester $C_{15}H_{30}O_2$ **CAS#:** 124-10-7

Source: natural, plant **Mol. Wt.:** 242 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1012 **Pentadecanoic acid** **1 g**
C15:0 fatty acid $C_{15}H_{30}O_2$ **CAS#:** 1002-84-2

Source: synthetic **Mol. Wt.:** 242 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1013 **Methyl pentadecanoate** **1 g**
C15:0 methyl ester $C_{16}H_{32}O_2$ **CAS#:** 7132-64-1

Source: synthetic **Mol. Wt.:** 256 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1014 **Hexadecanoic acid** **1 g**
Palmitic acid; C16:0 fatty acid $C_{16}H_{32}O_2$ **CAS#:** 57-10-3

Source: natural, plant **Mol. Wt.:** 256 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1015 **Methyl hexadecanoate** **1 g**
Methyl palmitate; C16:0 methyl ester $C_{17}H_{34}O_2$ **CAS#:** 112-39-0

Source: natural, plant **Mol. Wt.:** 270 **Purity:** 99% by TLC, GC
Appearance: white solid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1018 **Heptadecanoic acid** **1 g**
Margaric acid; C17:0 fatty acid $C_{17}H_{34}O_2$ **CAS#:** 506-12-7

Source: synthetic **Mol. Wt.:** 270 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1019 **Methyl heptadecanoate** **1 g**
Methyl margarate; C17:0 methyl ester $C_{18}H_{36}O_2$ **CAS#:** 1731-92-6

Source: synthetic **Mol. Wt.:** 284 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1020 **Octadecanoic acid** **1 g**
Stearic acid; C18:0 fatty acid $C_{18}H_{36}O_2$ **CAS#:** 57-11-4

Source: natural, plant **Mol. Wt.:** 284 **Purity:** 99% by TLC, GC
Appearance: white solid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1021 **Methyl octadecanoate** **1 g**
Methyl stearate; C18:0 methyl ester $C_{19}H_{38}O_2$ **CAS#:** 112-61-8

Source: natural, plant **Mol. Wt.:** 298 **Purity:** 99% by TLC, GC
Appearance: white solid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** room temperature

1028 **Nonadecanoic acid** **100 mg**
C19:0 fatty acid $C_{19}H_{38}O_2$ **CAS#:** 646-30-0

Source: synthetic **Mol. Wt.:** 298 **Purity:** 99% by TLC, GC
Appearance: white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1029 **Methyl nonadecanoate** **100 mg**
C19:0 methyl ester $C_{20}H_{40}O_2$ **CAS#:** 1731-94-8

Source: synthetic **Mol. Wt.:** 312 **Purity:** 99% by TLC, GC
Appearance: white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1030 **Eicosanoic acid** **500 mg**
Arachidic acid; C20:0 fatty acid $C_{20}H_{40}O_2$ **CAS#:** 506-30-9

Source: natural, plant **Mol. Wt.:** 312 **Purity:** 99% by TLC, GC
Appearance: white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1031 **Methyl eicosanoate** **500 mg**
Methyl arachidate; C20:0 methyl ester $C_{21}H_{42}O_2$ **CAS#:** 1120-28-1

Source: natural, plant **Mol. Wt.:** 326 **Purity:** 99% by TLC, GC
Appearance: white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1241 **Heneicosanoic acid** **100 mg**
C21:0 fatty acid $C_{21}H_{42}O_2$ **CAS#:** 2363-71-5

Source: synthetic **Mol. Wt.:** 326 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1242 **Methyl heneicosanoate** **100 mg**
C21:0 methyl ester $C_{22}H_{44}O_2$ **CAS#:** 6064-90-0

Source: synthetic **Mol. Wt.:** 341 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1035 **Docosanoic acid** **500 mg**
Behenic acid; C22:0 fatty acid $C_{22}H_{44}O_2$ **CAS#:** 112-85-6

Source: natural, plant **Mol. Wt.:** 341 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1036 **Methyl docosanoate** **500 mg**
Methyl behenate; C22:0 methyl ester $C_{23}H_{46}O_2$ **CAS#:** 929-77-1

Source: natural, plant **Mol. Wt.:** 354 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1186 **Tricosanoic acid** **100 mg**
C23:0 fatty acid $C_{23}H_{46}O_2$ **CAS#:** 2433-96-7

Source: synthetic **Mol. Wt.:** 355 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1187 **Methyl tricosanoate** **100 mg**
C23:0 methyl ester $C_{24}H_{48}O_2$ **CAS#:** 2433-97-8

Source: synthetic **Mol. Wt.:** 368 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1037 **Tetracosanoic acid** **100 mg**
Lignoceric acid; C24:0 fatty acid $C_{24}H_{48}O_2$ **CAS#:** 557-59-5

Source: synthetic **Mol. Wt.:** 369 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1038 **Methyl tetracosanoate** **100 mg**
Methyl lignocerate; C24:0 methyl ester $C_{25}H_{50}O_2$ **CAS#:** 2442-49-1

Source: synthetic **Mol. Wt.:** 382 **Purity:** 99% by GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1251 **Hexacosanoic acid** **25 mg**
Cerotic acid; C26:0 acid $C_{26}H_{52}O_2$ **CAS#:** 506-46-7

Source: synthetic **Mol. Wt.:** 370 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

1252 **Methyl hexacosanoate** **25 mg**
Methyl cerotate; C26:0 methyl ester $C_{27}H_{54}O_2$ **CAS#:** 5802-85-4

Source: synthetic **Mol. Wt.:** 411 **Purity:** 99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** room temperature

Unsaturated fatty acids and methyl esters

Unsaturated fatty acids are easily oxidized. Flush open containers with argon or nitrogen and store at -20°C, in dark.

1157 **Myristoleic acid** **100 mg**
C14:1 (cis-9) fatty acid $C_{14}H_{26}O_2$ **CAS#:** 544-64-9

Source: natural, plant **Mol. Wt.:** 226 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1040 **Methyl myristoleate** **100 mg**
C14:1 (cis-9) methyl ester $C_{15}H_{28}O_2$ **CAS#:** 56219-06-8

Source: natural, plant **Mol. Wt.:** 240 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1243 **cis-6-Hexadecenoic acid** **25 mg**
Sapienic acid $C_{16}H_{30}O_2$

Source: synthetic **Mol. Wt.:** 254 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** ethanol, methanol, chloroform, ethyl ether
Storage: –20°C

1016 **Palmitoleic acid** **100 mg**
C16:1 (cis-9) fatty acid $C_{16}H_{30}O_2$ **CAS#:** 373-49-9

Source: natural, plant **Mol. Wt.:** 254 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1017 **Methyl palmitoleate** **100 mg**
C16:1 (cis-9) methyl ester $C_{17}H_{32}O_2$ **CAS#:** 1120-25-8

Source: natural, plant **Mol. Wt.:** 268 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1147 **Palmitelaidic acid** **100 mg**
C16:1 (trans-9) acid $C_{16}H_{30}O_2$ **CAS#:** 10030-73-6

Source: synthetic **Mol. Wt.:** 254 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1148 **Methyl palmitelaidate** **100 mg**
C16:1 (trans-9) methyl ester $C_{17}H_{32}O_2$ **CAS#:** 10030-74-7

Source: synthetic **Mol. Wt.:** 268 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1208 **11-Hexadecenoic acid, (92% cis, 8% trans)** **50 mg**
C16:1 (cis-11) acid $C_{16}H_{30}O_2$

Source: synthetic **Mol. Wt.:** 254 **Purity:** >98%, by TLC **Appearance:** liquid
Solubility: chloroform, ethanol, hexane, methanol **Storage:** –20°C

92% cis, 8% trans by GC

1204 **Heptadecenoic acid** **100 mg**
C17:1 (cis-10) acid $C_{17}H_{32}O_2$ **CAS#:** 29743-97-3

Source: synthetic **Mol. Wt.:** 268 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1203 **Methyl heptadecenoate** **100 mg**
C17:1 (cis-10) methyl ester $C_{18}H_{34}O_2$ **CAS#:** 75190-82-8

Source: synthetic **Mol. Wt.:** 282 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1022 **Oleic acid** **1 g**
C18:1 (cis-9) acid $C_{18}H_{34}O_2$ **CAS#:** 112-80-1

Source: natural, plant **Mol. Wt.:** 282 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1023 **Methyl oleate** **1 g**
C18:1 (cis-9) methyl ester $C_{19}H_{36}O_2$ **CAS#:** 112-62-9

Source: natural, plant **Mol. Wt.:** 296 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1149 **Elaidic acid** **1 g**
C18:1 (trans-9) acid $C_{18}H_{34}O_2$ **CAS#:** 112-79-8

Source: synthetic **Mol. Wt.:** 282 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1150 **Methyl elaidate** **1 g**
C18:1 (trans-9) methyl ester $C_{19}H_{36}O_2$ **CAS#:** 1937-62-8

Source: natural, plant **Mol. Wt.:** 296 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1262 **trans 11-Octadecenoic acid** **100 mg**
C18:1 (trans-11) acid, trans vaccenic acid $C_{18}H_{34}O_2$ **CAS#:** 693-72-1

Source: synthetic **Mol. Wt.:** 282 **Purity:** 99% by TLC, GC **Appearance:** solid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1263 **Methyl trans 11-octadecenoate** **100 mg**
Methyl trans vaccenate; C18:1 (trans-11) methyl ester $C_{19}H_{36}O_2$
CAS#: 6198-58-9

Source: synthetic **Mol. Wt.:** 296 **Purity:** 99% by TLC, GC **Appearance:** clear liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1024 **Linoleic acid** **1 g**
C18:2 (cis,cis-9,12) acid $C_{18}H_{32}O_2$ **CAS#:** 60-33-3

Source: natural, plant **Mol. Wt.:** 280 **Purity:** 99% by TLC, GC **Appearance:** clear liquid **Solubility:** ethyl ether, ethanol, hexane **Storage:** –20°C

1025 **Methyl linoleate** **1 g**
C18:2 (cis,cis-9,12) methyl ester $C_{19}H_{34}O_2$ **CAS#:** 112-63-0

Source: natural, plant **Mol. Wt.:** 294 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1151 **Linoelaidic acid** **100 mg**
C18:2 (trans, trans-9, 12) acid $C_{18}H_{32}O_2$ **CAS#:** 506-21-8

Source: natural, plant **Mol. Wt.:** 280 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1152 **Methyl linoelaidate** **100 mg**
C18:2 (trans, trans-9,12) methyl ester $C_{19}H_{34}O_2$ **CAS#:** 2566-97-4

Source: natural, plant **Mol. Wt.:** 294 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1266 **cis-11-Octadecenoic acid** **100 mg**
cis-vaccenic acid; C18:1(cis-11) acid $C_{18}H_{34}O_2$ **CAS#:** 506-17-2

Source: natural, plant **Mol. Wt.:** 282 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1267 **Methyl cis-11-octadecenoate** **100 mg**
Methyl cis-vaccenate; C18:1(cis-11) methyl ester $C_{19}H_{36}O_2$
CAS#: 1937-63-9

Source: semi-synthetic, plant **Mol. Wt.:** 296 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1026 **Linolenic acid** **500 mg**
C18:3 (all cis-9,12,15) acid $C_{18}H_{30}O_2$ **CAS#:** 463-40-1

Source: natural, plant **Mol. Wt.:** 278 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1027 **Methyl linolenate** **500 mg**
C18:3 (all cis-9,12,15) methyl ester $C_{19}H_{32}O_2$ **CAS#:** 301-00-8

Source: natural, plant **Mol. Wt.:** 292 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1153 **gamma-Linolenic acid** **100 mg**
C18:3 (all cis-6,9,12) acid $C_{18}H_{30}O_2$ **CAS#:** 506-26-3

Source: natural, plant **Mol. Wt.:** 278 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1154 **Methyl gamma-linolenate** **100 mg**
C18:3 (all cis-6,9,12) methyl ester $C_{19}H_{32}O_2$ **CAS#:** 16326-32-2

Source: natural, plant **Mol. Wt.:** 292 **Purity:** 99% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1205 **Nonadecenoic acid** **100 mg**
C19:1 (cis-10) acid $C_{19}H_{32}O_2$ **CAS#:** 73033-09-7

Source: synthetic **Mol. Wt.:** 296 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1206 **Methyl nonadecenoate** **100 mg**
C19:1 (cis-10) methyl ester $C_{20}H_{34}O_2$ **CAS#:** 19788-74-0

Source: synthetic **Mol. Wt.:** 310 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1032 **Eicosenoic acid** **100 mg**
C20:1 (cis-11) acid $C_{20}H_{38}O_2$ **CAS#:** 5561-99-9

Source: natural, plant **Mol. Wt.:** 310 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1033 **Methyl eicosenoate** **100 mg**
C20:1 (cis-11) methyl ester $C_{21}H_{40}O_2$ **CAS#:** 2390-09-2

Source: natural, plant **Mol. Wt.:** 324 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1192 **Eicosadienoic acid** **100 mg**
C20:2 (cis, cis-11, 14) acid $C_{20}H_{36}O_2$ **CAS#:** 2091-39-6

Source: synthetic **Mol. Wt.:** 322 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1193 **Methyl eicosadienoate** **100 mg**
C20:2 (cis, cis-11, 14) methyl ester $C_{21}H_{38}O_2$ **CAS#:** 2463-02-7

Source: synthetic **Mol. Wt.:** 322 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1179 **Methyl 5,8,11-eicosatrienoate** **1 mg/ml, 1 ml**
C20:3 (all cis-5,8,11) methyl ester, mead acid methyl ester $C_{21}H_{36}O_2$
CAS#: 14602-39-2

Source: natural, plant **Mol. Wt.:** 320 **Purity:** 90% by TLC, GC **Appearance:** liquid
Solvent: hexane **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1269 **Methyl homogamma linolenate, C20:3n6** **50 mg**
Methyl 8,11,14-eicosatrienoate $C_{21}H_{36}O_2$

Source: semi-synthetic, plant **Mol. Wt.:** 320 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** hexane, ethyl ether, chloroform **Storage:** –20°C

1042 **Arachidonic acid** **100 mg**
C20:4 (all cis-5,8,11,14) acid $C_{20}H_{32}O_2$ **CAS#:** 506-32-1

Source: natural, plant **Mol. Wt.:** 304 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: ethyl ether, hexane, methylene chloride **Storage:** –20°C
Dry Ice Charge Applies

1034 **Methyl arachidonate** **100 mg**
C20:4 (all cis-5,8,11,14) methyl ester $C_{21}H_{34}O_2$ **CAS#:** 2566-89-4

Source: natural, plant **Mol. Wt.:** 318 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C
Dry Ice Charge Applies

1167 **Eicosapentaenoic acid** **25 mg**
EPA ; omega-3 fatty acid; C20:5 (all cis-5,8,11,14,17) acid $C_{20}H_{30}O_2$
CAS#: 10417-94-4

Source: natural, fish oil **Mol. Wt.:** 302 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether, ethanol, DMSO, DMF
Storage: –20°C **Dry Ice Charge Applies**

Anti-hyperlipoproteinenic agent; 5-LOX inhibitor

1194 **Methyl eicosapentaenoate** **25 mg**
Methyl ester of omega-3 fatty acid; C20:5 (all cis-5,8,11,14,17) methyl ester
$C_{21}H_{32}O_2$ **CAS#:** 2734-47-6

Source: natural, fish oil **Mol. Wt.:** 316 **Purity:** 99% by TLC, GC **Appearance:** clear liquid **Solubility:** chloroform, ethyl ether, hexane **Storage:** –20°C
Dry Ice Charge Applies

1264 **Docosenoic acid** **100 mg**
C22:1 (cis-13), erucic acid $C_{22}H_{42}O_2$ **CAS#:** 112-86-7

Source: natural, plant **Mol. Wt.:** 339 **Purity:** >99% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether, hexane **Storage:** –20°C

1265 **Methyl docosenoate** **100 mg**
C22:1 (cis-13) methyl ester; methyl erucate $C_{23}H_{44}O_2$ **CAS#:** 1120-34-9

Source: plant **Mol. Wt.:** 352 **Purity:** >99% by TLC, GC **Appearance:** white solid
Solubility: chloroform, ethyl ether, hexane **Storage:** –20°C

1175 **Docosapentaenoic acid** **25 mg**
C22:5 (all cis-7,10,13,16,19) acid $C_{22}H_{34}O_2$ **CAS#:** 24880-45-3

Source: semi-synthetic **Mol. Wt.:** 330 **Purity:** 98+% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, ethyl ether, hexane **Storage:** –20°C
Dry Ice Charge Applies

1244 **Methyl docosapentaenoate** **25 mg**
C22:5 (all cis-7,10,13,16,19) methyl ester $C_{23}H_{36}O_2$ **CAS#:** 108698-02-8

Source: semi-synthetic **Mol. Wt.:** 344 **Purity:** 98+% by TLC, GC **Appearance:** liquid **Solubility:** ethyl ether, ethanol, hexane, **Storage:** –20°C
Dry Ice Charge Applies

1136 **Docosahexaenoic acid** **100 mg**
DHA; C22:6, (all cis-4,7,10,13,16,19) omega-3 fatty acid $C_{22}H_{32}O_2$ **CAS#:** 6217-54-5

Source: natural, plant **Mol. Wt.:** 328 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: ethyl ether, hexane, methylene chloride, ethanol, DMSO, DMF
Storage: –20°C **Dry Ice Charge Applies**

1041 **Methyl docosahexaenoate** **100 mg**
C22:6 (all cis-4,7,10,13,16,19) methyl ester; methyl ester of omega-3 fatty acid
$C_{23}H_{34}O_2$ **CAS#:** 2566-90-7

Source: natural, plant **Mol. Wt.:** 342 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C **Dry Ice Charge Applies**

1155 **Nervonic acid** **100 mg**
C24:1 (cis-15) acid $C_{24}H_{46}O_2$ **CAS#:** 506-37-6

Source: synthetic **Mol. Wt.:** 367 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1156 **Methyl nervonate** **100 mg**
C24:1 (cis-15) methyl ester $C_{25}H_{48}O_2$ **CAS#:** 2733-88-2

Source: synthetic **Mol. Wt.:** 381 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

Trans fatty acids and methyl esters

1147 **Palmitelaidic acid** **100 mg**
C16:1 (trans-9) acid $C_{16}H_{30}O_2$ **CAS#:** 10030-73-6

Source: synthetic **Mol. Wt.:** 254 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1148 **Methyl palmitelaidate** **100 mg**
C16:1 (trans-9) methyl ester $C_{17}H_{32}O_2$ **CAS#:** 10030-74-7

Source: synthetic **Mol. Wt.:** 268 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1149 **Elaidic acid** **1 g**
C18:1 (trans-9) acid $C_{18}H_{34}O_2$ **CAS#:** 112-79-8

Source: synthetic **Mol. Wt.:** 282 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1150 **Methyl elaidate** **1 g**
C18:1 (trans-9) methyl ester $C_{19}H_{36}O_2$ **CAS#:** 1937-62-8

Source: natural, plant **Mol. Wt.:** 296 **Purity:** 99% by TLC, GC **Appearance:** liquid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1262 **trans 11-Octadecenoic acid** **100 mg**
C18:1 (trans-11) acid; trans vaccenic acid $C_{18}H_{34}O_2$ **CAS#:** 693-72-1

Source: synthetic **Mol. Wt.:** 282 **Purity:** 99% by TLC, GC **Appearance:** solid
Solubility: chloroform, hexane, ethyl ether **Storage:** –20°C

1263 **Methyl trans 11-octadecenoate** **100 mg**
Methyl trans vaccenate; C18:1 (trans-11) methyl ester $C_{19}H_{36}O_2$
CAS#: 6198-58-9

Source: synthetic **Mol. Wt.:** 296 **Purity:** 99% by TLC, GC **Appearance:** clear liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1151 **Linoelaidic acid** **100 mg**
C18:2 (trans, trans-9, 12) acid $C_{18}H_{32}O_2$ **CAS#:** 506-21-8

Source: natural, plant **Mol. Wt.:** 280 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1152 **Methyl linoelaidate** **100 mg**
C18:2 (trans, trans-9,12) methyl ester $C_{19}H_{34}O_2$ **CAS#:** 2566-97-4

Source: natural, plant **Mol. Wt.:** 294 **Purity:** 99% by TLC, GC
Appearance: liquid **Solubility:** chloroform, hexane, ethyl ether **Storage:** –20°C

1131 **Cis-trans isomer standard** **5 mg/ml, 5 ml**
Qualitative mix

Source: margarine **Appearance:** liquid **Solvent:** 5ml methylene chloride
Solubility: methylene chloride **Storage:** –20°C

Analysis of positional cis-trans fatty acid isomers is ever more important in light of the new food industry rules. These isomers can be resolved on Supelco SP-2560 or an equivalent capillary GC column. Use this specially formulated mix to ensure proper operation of your column for this tricky separation. Mix consists of cis-trans fatty acid isomers as methyl esters in methylene chloride.

This is a qualitative standard containing in order of elution: C16:0, C18:0, C18:1 trans isomers (4 peaks), C18:1 cis & trans isomers (2 peaks), C18:1 cis isomers (4 peaks), C18:2, C20:0, C20:1 and C18:3 (same peak), C22:0

1181 **9(E),11(E)-Octadecadienoic acid** **25 mg**
9-trans, 11-trans CLA $C_{18}H_{32}O_2$ **CAS#:** 544-71-8

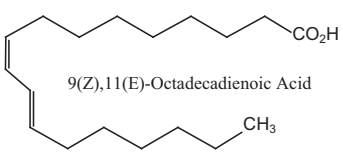
Source: synthetic **Mol. Wt.:** 280 **Melting Point (°C):** 55-57 **Purity:** 98+% by TLC, GC **Appearance:** off-white solid **Solubility:** chloroform, ethanol, hexane, methanol
Storage: –20°C

Conjugated linoleic acid isomers (CLA)

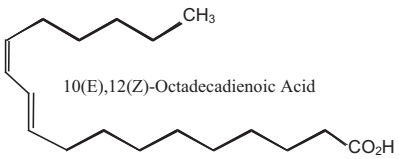
Linoleic acid is an essential fatty acid (18:2 ω6) of which several naturally occurring conjugated derivatives have been identified. These derivatives, called "conjugated linoleic acid" or CLA can have the two double bonds mainly in the 9 and 11 or in the 10 and 12 positions, resulting in eight possible geometric isomers. CLA occurs in meat (24) and dairy products (25,35). In both cases, the 9(Z),11(E)-isomer is predominant and is thought to be the biologically active form. CLA assimilated through the diet of animals is found in the intestinal musosa, liver and adipose tissue (26). See also review article by Parodi (35). CLA has several biological properties. It's anti-carcinogenic activity has been demonstrated by its ability to inhibit chemically induced tumor formation in animal models of carcinogenesis (24,27,28,29). The addition of CLA to culture medium suppresses the *in vitro* growth of human melanoma, colorectal and breast cancer cells (30). CLA also exhibits anti-atherogenic activity. Addition of CLA to a controlled atherogenic diet significantly reduced the development of atherosclerosis in hamsters and rabbits (31,32). Animals fed a diet containing CLA also had lower levels of low-density-lipoprotein (LDL) cholesterol. CLA may be involved in regulating fat and protein metabolism (33,34). Several species of animals fed CLA-supplemented diets showed improved feed efficiency. Lean body mass increased while body fat was reduced. This seems to be due, mainly or exclusively, to the 10(E),12(Z)-isomer (catalog # 1249, see below). CLA competes with linoleate for Δ6 desaturase (36). Dietary CLA normalizes impaired glucose tolerance in the Zucker diabetic fatty *fa/fa* rat (40) *via* activation of PPAR γ, a result which bears on the possible ameliorization or prevention of NIDDM. The 11(Z),13(E)-isomer (catalog # 1259) has been shown to be concentrated in the heart and in mitochondria. **See Literature References on page 96.**

CLA Research is Being Redone With Our Highly Pure Isomers

Most studies to date have utilized a mixture of CLA isomers containing less than 30% of the presumed active 9(Z),11(E)-isomer (37,38). In addition to the 9,11- and 10,12-isomers, 8,10- and 11,13-isomers have recently been identified in the widely used mixture (38,39). Matreya offers a highly pure CLA which is 98+% the active 9,11-"cis, trans" isomer. The corresponding "trans,trans" and "cis,cis" isomers are also available. In addition, we now offer the pure 10(E),12(Z)-isomer, which has been widely sought for comparison studies.
See Literature References on page 96.



9(Z),11(E)-Octadecadienoic Acid



10(E),12(Z)-Octadecadienoic Acid

1245 **9(Z),11(E)-Octadecadienoic acid** **25 mg**
1245-1 9-cis, 11-trans CLA $C_{18}H_{32}O_2$ **CAS#:** 2540-56-9 **1 g**
1245-10 **10 g**
Source: synthetic **Mol. Wt.:** 280 **Purity:** 98+% by TLC, GC **Appearance:** tinted oil
Solubility: chloroform, ethanol, hexane, methanol, DMSO **Storage:** –20°C

1255 **Methyl 9(Z), 11(E)-octadecadienoate** **25 mg**
Methyl ester of CLA (9-cis, 11-trans) $C_{19}H_{34}O_2$
Source: synthetic **Mol. Wt.:** 294 **Purity:** 98+% by TLC, GC **Appearance:** tinted oil
Solubility: chloroform, ethanol, hexane, methanol **Storage:** –20°C

1181 **9(E),11(E)-Octadecadienoic acid** **25 mg**
9-trans, 11-trans CLA $C_{18}H_{32}O_2$ **CAS#:** 544-71-8
Source: synthetic **Mol. Wt.:** 280 **Melting Point (°C):** 55-57 **Purity:** 98+% by TLC, GC **Appearance:** off-white solid **Solubility:** chloroform, ethanol, hexane, methanol **Storage:** –20°C

1257 **Methyl 9(E),11(E)-octadecadienoate** **25 mg**
Methyl ester of CLA (9-trans, 11-trans) $C_{19}H_{34}O_2$
Source: synthetic **Mol. Wt.:** 294 **Purity:** 98+% by TLC, GC **Appearance:** tinted oil
Solubility: chloroform, ethanol, hexane, methanol **Storage:** –20°C

1248	**9(Z),11(Z)-Octadecadienoic acid**	**25 mg**
1248-1	9-cis, 11-cis CLA $C_{18}H_{32}O_2$ **CAS#:** 544-40-7	**1 g**

Source: synthetic **Mol. Wt.:** 280 **Melting Point (°C):** 40-42 **Purity:** 96+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, ethyl ether **Storage:** –20°C

1256	**Methyl 9(Z), 11(Z)-octadecadienoate**	**25 mg**
	Methyl ester of CLA (9-cis, 11-cis) $C_{19}H_{34}O_2$	

Source: synthetic **Mol. Wt.:** 294 **Purity:** 96+% by TLC, GC **Appearance:** tinted oil **Solubility:** chloroform, ethanol, hexane, methanol **Storage:** –20°C

1249	**10(E),12(Z)-Octadecadienoic acid**	**25 mg**
1249-1	10-trans, 12-cis CLA $C_{18}H_{32}O_2$ **CAS#:** 2420-44-2	**1 g**
1249-10		**10 g**

Source: synthetic **Mol. Wt.:** 280 **Purity:** 98+% by TLC, GC **Appearance:** tinted oil **Solubility:** chloroform, ethanol, hexane, methanol **Storage:** –20°C

1254	**Methyl 10(E), 12(Z)-octadecadienoate**	**25 mg**
	Methyl ester of CLA (10-trans, 12-cis) $C_{19}H_{34}O_2$	

Source: synthetic **Mol. Wt.:** 294 **Purity:** 98+% by TLC, GC **Appearance:** tinted oil **Solubility:** chloroform, ethanol, hexane, methanol **Storage:** –20°C

1259	**11(Z), 13(E)-Octadecadienoic acid**	**25 mg**
	11-cis, 13-trans CLA $C_{18}H_{32}O_2$	

Source: synthetic **Mol. Wt.:** 280 **Purity:** 77% cis, trans; 2 % cis, cis; 6% trans, trans by TLC, GC **Appearance:** tinted oil **Solubility:** chloroform, ethanol, hexane, methanol **Storage:** –20°C

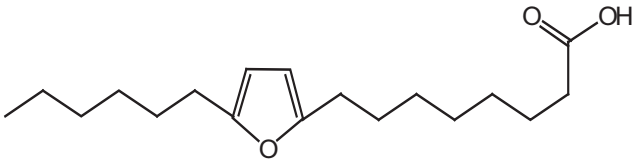
1247-1	**9(Z),11(E)-Octadecadienoic acid**	**1 g**
1247-10	9-cis, 11-trans CLA $C_{18}H_{32}O_2$ **CAS#:** 2540-56-9	**10 g**

Source: synthetic **Mol. Wt.:** 280 **Purity:** 74% 9(Z),11(E); 17%(Z),(Z); 1%(E),(E) by TLC, GC **Appearance:** tinted oil **Solubility:** ethanol, ethyl ether, hexane **Storage:** –20°C

1258	**Methyl 9(Z),11(E)-octadecadienoate**	**25 mg**
	Methyl ester of CLA (9-cis, 11-trans) $C_{19}H_{34}O_2$	

Source: synthetic **Mol. Wt.:** 294 **Purity:** 74% 9(Z),11(E); 17%(Z),(Z); 1% (E),(E) by TLC, GC **Appearance:** clear oil **Solubility:** chloroform, ethyl ether, hexane **Storage:** –20°C

Other CLA products and derivatives



Catalog number 1793

1793 **8-(5-Hexyl-2-furyl)-octanoic acid** **25 mg**
Furan fatty acid; 9,12-epoxy-9,11-octadecadienoic acid $C_{18}H_{30}O_3$
CAS#: 4179-44-6

Source: synthetic **Mol. Wt.:** 294 **Purity:** 98+% by TLC, GC **Appearance:** oil
Solubility: chloroform, ethanol, ethyl ether **Storage:** –20°C

1409 **1-Stearoyl-2-linoleoyl-sn-glycero-3-phosphorylcholine** **25 mg/ml, 1ml**
$C_{44}H_{84}NO_8P$

Source: synthetic **Mol. Wt.:** 786 **Purity:** 98+% by TLC **Appearance:** liquid
Solvent: chloroform **Solubility:** chloroform, ethanol **Storage:** –20°C

1410 **1-Stearoyl-2-[9(Z),11(E)-octadecadienoyl]-sn-glycero-3-phosphorylcholine** **25 mg/ml, 1ml**
$C_{44}H_{84}NO_8P$

Source: synthetic **Mol. Wt.:** 786 **Purity:** 98+% by TLC **Appearance:** liquid
Solvent: chloroform **Solubility:** chloroform, ethanol **Storage:** –20°C

1411 **1-Stearoyl-2-[10(E),12(Z)-octadecadienoyl]-sn-glycero-3-phosphorylcholine** **25 mg/ml, 1ml**
$C_{44}H_{84}NO_8P$

Source: synthetic **Mol. Wt.:** 786 **Purity:** 98+% by TLC **Appearance:** liquid
Solvent: chloroform **Solubility:** chloroform, ethanol **Storage:** –20°C

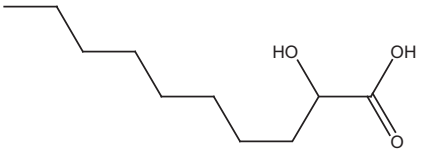
1794 **Methyl 8-(5-hexyl-2-furyl)-octanoate** **25 mg**
Methyl ester of furan fatty acid $C_{19}H_{32}O_3$ **CAS#:** 10038-16-1

Source: synthetic **Mol. Wt.:** 308 **Purity:** 98+% by TLC, GC **Appearance:** oil
Solubility: chloroform, ethanol, ethyl ether **Storage:** –20°C

Hydroxy fatty acids

2-Hydroxy fatty acids and methyl esters

These products are racemic and 98+% pure by GC and TLC. The 2-hydroxy fatty acids are components of glycosphingolipids and are involved in fatty acid degradation. They are stable and are supplied neat in vials.



Catalog number 1758

1758	**2-Hydroxydecanoic acid**	**50 mg**
1758-1	2-Hydroxy C10:0 acid $C_{10}H_{20}O_3$ **CAS#:** 5393-81-7	**1 g**

Source: synthetic **Mol. Wt.:** 188 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, methanol **Storage:** –20°C

1759	**Methyl 2-hydroxydecanoate**	**50 mg**
1759-1	2-Hydroxy C10:0 methyl ester $C_{11}H_{22}O_3$ **CAS#:** 71271-24-4	**1 g**

Source: synthetic **Mol. Wt.:** 202 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, methanol **Storage:** –20°C

1701	**2-Hydroxydodecanoic acid**	**50 mg**
1701-1	2-Hydroxy C12:0 acid $C_{12}H_{24}O_3$ **CAS#:** 2984-55-6	**1 g**

Source: synthetic **Mol. Wt.:** 216 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, methanol **Storage:** –20°C

1702	**Methyl 2-hydroxydodecanoate**	**50 mg**
1702-1	2-Hydroxy C12:0 methyl ester $C_{13}H_{26}O_3$ **CAS#:** 51067-85-7	**1 g**

Source: synthetic **Mol. Wt.:** 230 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether, methanol **Storage:** –20°C

1703	**2-Hydroxytetradecanoic acid**	**50 mg**
1703-1	2-Hydroxy C14:0 acid $C_{14}H_{28}O_3$ **CAS#:** 2507-55-3	**1 g**

Source: synthetic **Mol. Wt.:** 244 **Melting Point (°C):** 81-82 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, methanol **Storage:** –20°C

1704	**Methyl 2-hydroxytetradecanoate**	**50 mg**
1704-1	2-Hydroxy C14:0 methyl ester $C_{15}H_{30}O_3$ **CAS#:** 56009-40-6	**1 g**

Source: synthetic **Mol. Wt.:** 258 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether, methanol **Storage:** –20°C

1705	**2-Hydroxyhexadecanoic acid**	**50 mg**
1705-1	2-Hydroxy C16:0 acid $C_{16}H_{32}O_3$ **CAS#:** 764-67-0	**1 g**

Source: synthetic **Mol. Wt.:** 272 **Melting Point (°C):** 86-87 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1, methanol **Storage:** –20°C

1706	**Methyl 2-hydroxyhexadecanoate**	**50 mg**
1706-1	2-Hydroxy C16:0 methyl ester $C_{17}H_{34}O_3$ **CAS#:** 16742-51-1	**1 g**

Source: synthetic **Mol. Wt.:** 286 **Melting Point (°C):** 59-60 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether, methanol **Storage:** –20°C

1707	**2-Hydroxyoctadecanoic acid**	**50 mg**
1707-1	2-Hydroxy C18:0 acid $C_{18}H_{36}O_3$ **CAS#:** 629-22-1	**1 g**

Source: synthetic **Mol. Wt.:** 300 **Melting Point (°C):** 92-93 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol 5:1 **Storage:** –20°C

1708	**Methyl 2-hydroxyoctadecanoate**	**50 mg**
1708-1	2-Hydroxy C18:0 methyl ester $C_{19}H_{38}O_3$ **CAS#:** 2420-35-1	**1 g**

Source: synthetic **Mol. Wt.:** 315 **Melting Point (°C):** 64-66 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether, methanol **Storage:** –20°C

1709 **2-Hydroxyeicosanoic acid** **25 mg**
1709-0.5 2-Hydroxy C20:0 acid $C_{20}H_{40}O_3$ **CAS#:** 16742-48-6 **0.5 g**

Source: synthetic **Mol. Wt.:** 329 **Melting Point (°C):** 91-92 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol 5:1 **Storage:** –20°C

1710 **Methyl 2-hydroxyeicosanoate** **25 mg**
1710-0.5 2-Hydroxy C20:0 methyl ester $C_{21}H_{42}O_3$ **CAS#:** 16742-49-7 **0.5 g**

Source: synthetic **Mol. Wt.:** 343 **Melting Point (°C):** 62-64 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** –20°C

1711 **2-Hydroxydocosanoic acid** **25 mg**
1711-0.5 2-Hydroxy C22:0 acid $C_{22}H_{44}O_3$ **CAS#:** 13980-14-8 **0.5 g**

Source: synthetic **Mol. Wt.:** 366 **Melting Point (°C):** 96-97 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol 5:1 **Storage:** –20°C

1712 **Methyl 2-hydroxydocosanoate** **25 mg**
1712-0.5 2-Hydroxy C22:0 methyl ester $C_{23}H_{46}O_3$ **CAS#:** 13980-17-1 **0.5 g**

Source: synthetic **Mol. Wt.:** 371 **Melting Point (°C):** 72-73 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** –20°C

1713 **2-Hydroxytricosanoic acid** **10 mg**
2-Hydroxy C23:0 acid $C_{23}H_{46}O_3$ **CAS#:** 2718-37-8

Source: synthetic **Mol. Wt.:** 371 **Melting Point (°C):** 98-99 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol 5:1 **Storage:** –20°C

1714 **Methyl 2-hydroxytricosanoate** **10 mg**
2-Hydroxy C23:0 methyl ester $C_{24}H_{48}O_3$ **CAS#:** 118745-41-8

Source: synthetic **Mol. Wt.:** 385 **Melting Point (°C):** 68-70 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** –20°C

1715 **2-Hydroxytetracosanoic acid** **5 mg**
2-Hydroxy C24:0 acid; cerebronic acid $C_{24}H_{48}O_3$ **CAS#:** 544-57-0

Source: synthetic **Mol. Wt.:** 385 **Melting Point (°C):** 101-104 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform/methanol 5:1 **Storage:** –20°C

1716 **Methyl 2-hydroxytetracosanoate** **5 mg**
2-Hydroxy C24:0 methyl ester $C_{25}H_{50}O_3$ **CAS#:** 2433-95-6

Source: synthetic **Mol. Wt.:** 399 **Melting Point (°C):** 64-65 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether **Storage:** –20°C

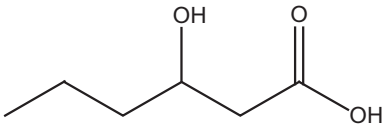
1722 **2-Hydroxy methyl ester mix** **10 mg/ml, 1 ml**
Quantitative mixture

Source: synthetic **Appearance:** liquid **Solvent:** methylene chloride **Solubility:** methylene chloride **Storage:** –20°C

Contains: 2-OH C14:0, 20%; 2-OH C16:0, 20%; 2-OH C18:0, 15%; 2-OH C20:0, 15.0%; 2-OH C22:0, 10%; 2-OH C23:0, 10%; 2-OH C24:0, 10%

3-Hydroxy fatty acids and methyl esters

These products are racemic and 98+% pure by GC and TLC. 3-Hydroxy fatty acids occur in the lipid fraction of many microorganisms and are useful in the typing of microbial isolates. They are stable and are supplied neat in vials.



Catalog number 1747

1747 **3-Hydroxyhexanoic acid** **25 mg**
1747-0.5 3-Hydroxy C6:0 acid $C_6H_{12}O_3$ **CAS#:** 10191-24-9 **0.5 g**

Source: synthetic **Mol. Wt.:** 132 **Purity:** 98+% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, methanol **Storage:** –20°C

1748 **Methyl 3-hydroxyhexanoate** **25 mg**
1748-0.5 3-Hydroxy C6:0 methyl ester $C_7H_{14}O_3$ **CAS#:** 21188-58-9 **0.5 g**

Source: synthetic **Mol. Wt.:** 146 **Purity:** 98+% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, methanol **Storage:** –20°C

1745 **3-Hydroxyoctanoic acid** **25 mg**
1745-0.5 3-Hydroxy C8:0 acid $C_8H_{16}O_3$ **CAS#:** 88930-08-9 **0.5 g**

Source: synthetic **Mol. Wt.:** 160 **Purity:** 98+% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, methanol **Storage:** –20°C

1746 **Methyl 3-hydroxyoctanoate** **25 mg**
1746-0.5 3-Hydroxy C8:0 methyl ester $C_9H_{18}O_3$ **CAS#:** 85549-54-8 **0.5 g**

Source: synthetic **Mol. Wt.:** 174 **Purity:** 98+% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, ethyl ether **Storage:** –20°C

1725 **3-Hydroxynonanoic acid** **25 mg**
1725-0.5 3-Hydroxy C9:0 acid $C_9H_{18}O_3$ **CAS#:** 88930-09-0 **0.5 g**

Source: synthetic **Mol. Wt.:** 174 **Melting Point (°C):** 60-62 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol
Storage: –20°C

1726 **Methyl 3-hydroxynonanoate** **25 mg**
1726-0.5 3-Hydroxy C9:0 methyl ester $C_{10}H_{20}O_3$ **CAS#:** 83968-06-3 **0.5 g**

Source: synthetic **Mol. Wt.:** 188 **Purity:** 98+% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, ethyl ether **Storage:** –20°C

1727 **3-Hydroxydecanoic acid** **25 mg**
1727-0.5 3-Hydroxy C10:0 acid $C_{10}H_{20}O_3$ **CAS#:** 5561-87-5 **0.5 g**

Source: synthetic **Mol. Wt.:** 188 **Melting Point (°C):** 57-60 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol
Storage: –20°C

1728 **Methyl 3-hydroxydecanoate** **25 mg**
1728-0.5 3-Hydroxy C10:0 methyl ester $C_{11}H_{22}O_3$ **CAS#:** 62675-82-5 **0.5 g**

Source: synthetic **Mol. Wt.:** 202 **Purity:** 98+% by TLC, GC **Appearance:** liquid
Solubility: chloroform, ethanol, methanol **Storage:** –20°C

1729 **3-Hydroxyundecanoic acid** **25 mg**
1729-0.5 3-Hydroxy C11:0 acid $C_{11}H_{22}O_3$ **CAS#:** 40165-88-6 **0.5 g**

Source: synthetic **Mol. Wt.:** 202 **Melting Point (°C):** 74-76 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1730 **Methyl 3-hydroxyundecanoate** **25 mg**
1730-0.5 3-Hydroxy C11:0 methyl ester $C_{12}H_{24}O_3$ **CAS#:** 127593-21-9 **0.5 g**

Source: synthetic **Mol. Wt.:** 216 **Purity:** 98+% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1731 **3-Hydroxydodecanoic acid** **25 mg**
1731-0.5 3-Hydroxy C12:0 acid $C_{12}H_{24}O_3$ **CAS#:** 8355-89-3 **0.5 g**

Source: synthetic **Mol. Wt.:** 216 **Melting Point (°C):** 71-72 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol **Storage:** –20°C

1732 **Methyl 3-hydroxydodecanoate** **25 mg**
1732-0.5 3-Hydroxy C12:0 methyl ester $C_{13}H_{26}O_3$ **CAS#:** 85464-97-7 **0.5 g**

Source: synthetic **Mol. Wt.:** 230 **Purity:** 98+% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, ethanol, ethyl ether **Storage:** –20°C

1733 **3-Hydroxytridecanoic acid** **25 mg**
1733-0.5 3-Hydroxy C13:0 acid $C_{13}H_{26}O_3$ **CAS#:** 32602-69-0 **0.5 g**

Source: synthetic **Mol. Wt.:** 230 **Melting Point (°C):** 80-83 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1734 **Methyl 3-hydroxytridecanoate** **25 mg**
1734-0.5 3-Hydroxy C13:0 methyl ester $C_{14}H_{28}O_3$ **0.5 g**

Source: synthetic **Mol. Wt.:** 244 **Purity:** 98+% by TLC, GC **Appearance:** liquid **Solubility:** chloroform, ethyl ether **Storage:** –20°C

1735 **3-Hydroxytetradecanoic acid** **25 mg**
1735-0.5 3-Hydroxy C14:0 acid $C_{14}H_{28}O_3$ **CAS#:** 3422-31-9 **0.5 g**

Source: synthetic **Mol. Wt.:** 244 **Melting Point (°C):** 80-81 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1736 **Methyl 3-hydroxytetradecanoate** **25 mg**
1736-0.5 3-Hydroxy C14:0 methyl ester $C_{15}H_{30}O_3$ **CAS#:** 55682-83-2 **0.5 g**

Source: synthetic **Mol. Wt.:** 258 **Melting Point (°C):** 36-37 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether, methanol **Storage:** –20°C

1739 **3-Hydroxyhexadecanoic acid** **25 mg**
1739-0.5 3-Hydroxy C16:0 acid $C_{16}H_{32}O_3$. **CAS#:** 928-17-6 **0.5 g**

Source: synthetic **Mol. Wt.:** 272 **Melting Point (°C):** 85-86 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

1740 **Methyl 3-hydroxyhexadecanoate** **25 mg**
1740-0.5 3-Hydroxy C16:0 methyl ester $C_{17}H_{34}O_3$ **CAS#:** 51883-36-4 **0.5 g**

Source: synthetic **Mol. Wt.:** 286 **Melting Point (°C):** 43-45 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol **Storage:** –20°C

1741 **3-Hydroxyheptadecanoic acid** **25 mg**
1741-0.5 3-Hydroxy C17:0 acid $C_{17}H_{34}O_3$ **0.5 g**

Source: synthetic **Mol. Wt.:** 286 **Melting Point (°C):** 93-95 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol **Storage:** –20°C

1742 **Methyl 3-hydroxyheptadecanoate** **25 mg**
1742-0.5 3-Hydroxy C17:0 methyl ester $C_{18}H_{36}O_3$ **0.5 g**

Source: synthetic **Mol. Wt.:** 300 **Melting Point (°C):** 53-55 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol **Storage:** –20°C

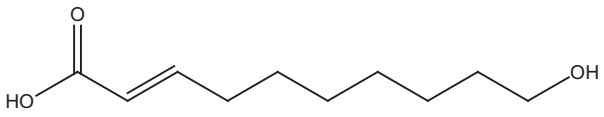
1743 **3-Hydroxyoctadecanoic acid** **25 mg**
1743-0.5 3-Hydroxy C18:0 acid $C_{18}H_{36}O_3$ **CAS#:** 45261-96-9 **0.5 g**

Source: synthetic **Mol. Wt.:** 300 **Melting Point (°C):** 52-54 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol **Storage:** –20°C

1744 **Methyl 3-hydroxyoctadecanoate** **25 mg**
1744-0.5 3-Hydroxy C18:0 methyl ester $C_{19}H_{38}O_3$ **CAS#:** 14531-40-9 **0.5 g**

Source: synthetic **Mol. Wt.:** 315 **Melting Point (°C):** 52-54 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol **Storage:** –20°C

Omega hydroxy fatty acids



Catalog number 1754

1754 **Royal Jelly acid** **50 mg**
1754-0.5 10-Hydroxy-2-(E)-decenoic acid; omega-hydroxy C10:1 (2-trans) $C_{10}H_{18}O_3$ **0.5 g**
CAS#: 14113-05-4

Source: synthetic **Mol. Wt.:** 186 **Melting Point (°C):** 63-65 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol
Storage: –20°C

1881 **15-Hydroxypentadecanoic acid** **25 mg**
omega-Hydroxy C15:0 $C_{15}H_{30}O_3$ **CAS#:** 4617-33-8

Source: synthetic **Mol. Wt.:** 258 **Melting Point (°C):** 84-86 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol
Storage: room temperature

1882 **Methyl 15-hydroxypentadecanoate** **25 mg**
omega-Hydroxy C15:0 fatty acid methyl ester $C_{16}H_{32}O_3$
CAS#: 76529-42-5

Source: synthetic **Mol. Wt.:** 272 **Melting Point (°C):** 50-52 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol, ethyl ether
Storage: room temperature

1760 **17-Hydroxyheptadecanoic acid** **25 mg**
omega-Hydroxy C17:0 fatty acid $C_{17}H_{34}O_3$ **CAS#:** 13099-34-8

Source: synthetic **Mol. Wt.:** 286 **Melting Point (°C):** 93-95 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol, ethyl ether
Storage: room temperature

1761 **Methyl 17-hydroxyheptadecanoate** **25 mg**
omega-Hydroxy C17:0 fatty acid methyl ester $C_{18}H_{36}O_3$
CAS#: 94036-00-7

Source: synthetic **Mol. Wt.:** 300 **Melting Point (°C):** 59-63 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol, ethyl ether **Storage:** room tempature

1877 **20-Hydroxyeicosanoic acid** **25 mg**
omega-Hydroxy C20:0 fatty acid $C_{20}H_{40}O_3$

Source: synthetic **Mol. Wt.:** 328 **Melting Point (°C):** 96-98 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol **Storage:** room temperature

1878 **Methyl 20-hydroxyeicosanoate** **25 mg**
omega-Hydroxy C20:0 fatty acid methyl ester $C_{21}H_{42}O_3$

Source: synthetic **Mol. Wt.:** 342 **Melting Point (°C):** 69-71 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol, ethyl ether **Storage:** room temperature

1879 **21-Hydroxyheneicosanoic acid** **25 mg**
omega-Hydroxy C21:0 fatty acid $C_{21}H_{42}O_3$

Source: synthetic **Mol. Wt.:** 342 **Melting Point (°C):** 72-75 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol **Storage:** room temperature

1880 **Methyl 21-hydroxyheneicosanoate** **25 mg**
omega-Hydroxy C21:0 fatty acid methyl ester $C_{22}H_{44}O_3$

Source: synthetic **Mol. Wt.:** 356 **Melting Point (°C):** 73-76 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol, ethyl ether **Storage:** room temperature

1818 **22-Hydroxydocosanoic acid** **25 mg**
Phellonic acid; omega-hydroxy C22:0 fatty acid $C_{22}H_{44}O_3$

Source: synthetic **Mol. Wt.:** 356 **Melting Point (°C):** 100-102 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol **Storage:** room temperature

1819 **Methyl 22-hydroxydocosanoate** **25 mg**
omega-Hydroxy C22:0 fatty acid methyl ester $C_{23}H_{46}O_3$

Source: synthetic **Mol. Wt.:** 370 **Melting Point (°C):** 73-75 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, warm ethanol, ethyl ether **Storage:** room temperature

1883 **Methyl 27-hydroxyheptacosanoate** **25 mg**
omega-Hydroxy C27:0 fatty acid methyl ester $C_{28}H_{56}O_3$

Source: synthetic **Mol. Wt.:** 440 **Melting Point (°C):** 85-89 **Purity:** 97+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform **Storage:** room temperature

1884 **Methyl 30-hydroxytriacontanoate** **25 mg**
omega-Hydroxy C30:0 fatty acid methyl ester $C_{31}H_{62}O_3$

Source: synthetic **Mol. Wt.:** 482 **Melting Point (°C):** 88-91 **Purity:** 97+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform **Storage:** room temperature

Other hydroxy fatty acids

1815 **Methyl threo-2,3-dihydroxypalmitate** **10 mg**
2,3-Dihydroxy C16:0 fatty acid methyl ester $C_{17}H_{34}O_4$

Source: synthetic **Mol. Wt.:** 302 **Melting Point (°C):** 77-79 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol **Storage:** room temperature

1182 **Ricinelaidic acid** **100 mg**
12-Hydroxy C18:1 (9-trans) fatty acid $C_{18}H_{34}O_3$ **CAS#:** 82188-83-8

Source: synthetic **Mol. Wt.:** 298 **Melting Point (°C):** 50-53 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol **Storage:** –20°C

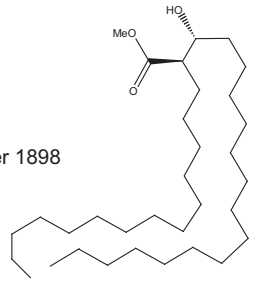
1183 **Methyl ricinelaidate** **100 mg**
12-Hydroxy C18:1 (9-trans) methyl ester $C_{19}H_{36}O_3$ **CAS#:** 7706-01-6

Source: synthetic **Mol. Wt.:** 312 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol **Storage:** –20°C

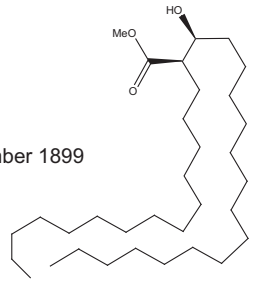
1766 **6-Hydroxyoctadecanoic acid** **10 mg**
6-Hydroxy C18:0 fatty acid $C_{18}H_{36}O_3$

Source: synthetic **Mol. Wt.:** 300 **Melting Point (°C):** 80-82 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** ethanol, methanol **Storage:** room temperature

Catalog number 1898



Catalog number 1899



1898 **Methyl D, L-threo-corynomycolate** **25 mg**
Hydroxy fatty acid with long branched chain $C_{33}H_{66}O_3$

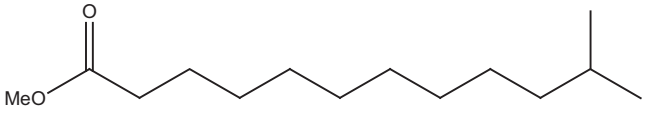
Source: synthetic **Mol. Wt.:** 511 **Melting Point (°C):** 70 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform **Storage:** room temperature

1899 **Methyl D,L-erythro-corynomycolate** **25 mg**
Hydroxy fatty acid with long branched chain $C_{33}H_{66}O_3$

Source: synthetic **Mol. Wt.:** 511 **Melting Point (°C):** 58 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform **Storage:** room temperature

Branched and cyclic fatty acids

iso-Fatty acids and esters



Catalog number 1656

1656 **Methyl 11-methyldodecanoate** **20 mg**
iso-Tridecanoic methyl ester; iso C13 methyl ester $C_{14}H_{28}O_2$
CAS#: 5129-57-7

Source: synthetic **Mol. Wt.:** 228 **Purity:** 98+% by GC **Appearance:** liquid
Solubility: hexane, ethyl ether, methylene chloride **Storage:** –20°C

1657 **Methyl 12-methyltridecanoate** **20 mg**
iso-Tetradecanoic methyl ester; iso C14 methyl ester $C_{15}H_{30}O_2$
CAS#: 5129-58-8

Source: synthetic **Mol. Wt.:** 242 **Purity:** 98+% by GC **Appearance:** liquid
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

1605 **13-Methyltetradecanoic acid** **20 mg**
iso-Pentadecanoic acid; iso C15 acid $C_{15}H_{30}O_2$

Source: synthetic **Mol. Wt.:** 242 **Purity:** 98+% by GC **Appearance:** white solid
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

1600 **Methyl 13-methyltetradecanoate** **20 mg**
iso-Pentadecanoic methyl ester; iso C15 methyl ester $C_{16}H_{32}O_2$
CAS#: 5129-59-9

Source: synthetic **Mol. Wt.:** 256 **Purity:** 98+% by GC **Appearance:** clear liquid
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

1601 **Methyl 14-methylpentadecanoate** **20 mg**
iso-Palmitic methyl ester; iso C16 methyl ester $C_{17}H_{34}O_2$ **CAS#:** 5129-60-2

Source: synthetic **Mol. Wt.:** 270 **Purity:** 98+% by GC **Appearance:** clear liqiud
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

1606 **15-Methylhexadecanoic acid** **20 mg**
iso-Heptadecanoic acid; iso C17 acid $C_{17}H_{34}O_2$

Source: synthetic **Mol. Wt.:** 270 **Purity:** 98+% by GC **Appearance:** white solid
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

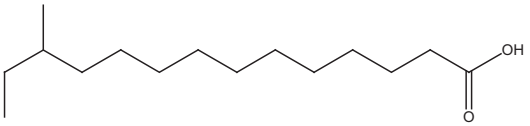
1602 **Methyl 15-methylhexadecanoate** **20 mg**
iso-Heptadecanoic methyl ester; iso C17 methyl ester $C_{18}H_{36}O_2$
CAS#: 6929-04-0

Source: synthetic **Mol. Wt.:** 284 **Purity:** 98+% by GC **Appearance:** clear liquid
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

1603 **Methyl 17-methyloctadecanoate** **20 mg**
iso-Nonadecanoic methyl ester; iso C19 methyl ester $C_{20}H_{40}O_2$

Source: synthetic **Mol. Wt.:** 312 **Purity:** 98+% by GC **Appearance:** clear liquid
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

anteiso-Fatty acids and esters



1615 **12-Methyltetradecanoic acid** **20 mg**
anteiso-Pentadecanoic acid; anteiso C15 acid $C_{15}H_{30}O_2$ **CAS#:** 5502-94-3

Source: synthetic **Mol. Wt.:** 242 **Purity:** 98+% by GC **Appearance:** white solid
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

1612 **Methyl 12-methyltetradecanoate** **20 mg**
anteiso-Pentadecanoic methyl ester; anteiso C15 methyl ester $C_{16}H_{32}O_2$
CAS#: 5129-66-8

Source: synthetic **Mol. Wt.:** 256 **Purity:** 98+% by GC **Appearance:** liquid
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

1613 **Methyl 13-methylpentadecanoate** **20 mg**
anteiso-Palmitic methyl ester; anteiso C16 methyl ester $C_{17}H_{34}O_2$
CAS#: 5487-50-3

Source: synthetic **Mol. Wt.:** 270 **Purity:** 98+% by GC **Appearance:** liquid
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

1616 **14-Methylhexadecanoic acid** **20 mg**
anteiso-Heptadecanoic acid; anteiso C17 acid $C_{17}H_{34}O_2$ **CAS#:** 5918-29-6

Source: synthetic **Mol. Wt.:** 270 **Purity:** 98+% by GC **Appearance:** white solid
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

1614 **Methyl 14-methylhexadecanoate** **20 mg**
anteiso-Heptadecanoic methyl ester; anteiso C17 methyl ester $C_{18}H_{36}O_2$
CAS#: 2490-49-5

Source: synthetic **Mol. Wt.:** 284 **Purity:** 98+% by GC **Appearance:** liquid
Solubility: chloroform, ethyl ether, ethanol **Storage:** –20°C

Methylated fatty acids

1207 **D,L-2,6-Dimethylheptanoic acid** **50 mg**
2,6-Dimethyl C7:0 fatty acid $C_9H_{18}O_2$

Source: synthetic **Mol. Wt.:** 158 **Purity:** 98+% by TLC, GC **Appearance:** clear oil
Solubility: chloroform **Storage:** room temperature

1791 **10-Methylhexadecanoic acid** **25 mg**
10-Methyl C16:0 fatty acid $C_{17}H_{34}O_2$

Source: synthetic **Mol. Wt.:** 270 **Purity:** 98+% by TLC, GC **Appearance:** clear oil
Solubility: chloroform **Storage:** room temperature

1792 **Methyl 10-methylhexadecanoate** **25 mg**
10-Methyl C16:0 fatty acid methyl ester $C_{18}H_{36}O_2$

Source: synthetic **Mol. Wt.:** 284 **Purity:** 98+% by TLC, GC **Appearance:** clear oil
Solubility: chloroform **Storage:** room temperature

1195 **Phytanic acid** **25 mg**
3,7,11,15-Tetramethylhexadecanoic acid $C_{20}H_{40}O_2$ **CAS#:** 14721-66-5

Source: semi-synthetic **Mol. Wt.:** 312 **Purity:** 97+% by GC **Appearance:** white solid **Solubility:** chloroform, methanol **Storage:** –20°C

Cyclopropyl fatty acids and esters

1822 **Dihydrosterculic acid** **25 mg**
cis-9,10-Methyleneoctadecanoic acid $C_{19}H_{36}O_2$ **CAS#:** 4675-61-0

Source: synthetic **Mol. Wt.:** 296 **Melting Point (°C):** 38-42 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, hexane **Storage:** –20°C

1823 **Methyl dihydrosterculate** **25 mg**
Methyl cis-9,10-methyleneoctadecanoate $C_{20}H_{38}O_2$ **CAS#:** 3971-54-8

Source: synthetic **Mol. Wt.:** 310 **Purity:** 98+% by TLC, GC **Appearance:** oil **Solubility:** chloroform, ethanol, methanol, hexane **Storage:** –20°C

Unusual fatty acids and derivatives

1751 **N-Oleoylethanolamine** **100 mg**
NOE $C_{20}H_{39}NO_2$ **CAS#:** 111-58-0

Source: synthetic **Mol. Wt.:** 326 **Melting Point (°C):** 63-66 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, ethyl ether, DMSO **Storage:** –20°C

Activity: acid ceramidase inhibitor

References:
C. J. Hillard and W.B. Campbell. J. Lipid. Res., **38**: 2383-2398, *1997*
Wasilewski M., Wieckowski M.R., Dymmowska D, Wojtczak L. BBA **1657**: 151-163, *2004*
Spinedi A., DiBartolomeo S., and Piacentini M. BBRC, **255**: 456-459, *1999*

1786 **N-Hexadecanoylethanolamine** **100 mg**
$C_{18}H_{37}NO_2$ **CAS#** 544-31-0

Source: synthetic **Mol. Wt.:** 299 **Melting Point (°C):** 99-102 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, ethanol, methanol, **Storage:** –20°C

Activity: inactive as acid ceramidase inhibitor

References:
C. J. Hillard and W.B. Campbell. J. Lipid. Res., **38**: 2383-2398, *1997*
Wasilewski M., Wieckowski M.R., Dymmowska D, Wojtczak L. BBA **1657**: 151-163, *2004*
Spinedi A., DiBartolomeo S., and Piacentini M. BBRC, **255**: 456-459, *1999*

1757 **Anandamide** **10 mg/ml, 1 ml**

Arachidonylethanolamide; 5,8,11,14(Z,Z,Z,Z)-eicosatetraenoyl 2-hydroxy-ethyl-amide $C_{22}H_{37}NO_2$ **CAS#:** 94421-68-8

Source: synthetic **Mol. Wt.:** 347 **Purity:** 98+% by TLC **Appearance:** liquid **Solvent:** chloroform **Solubility:** chloroform, ethanol **Storage:** –20°C

Induces apoptosis, endocannabinoid

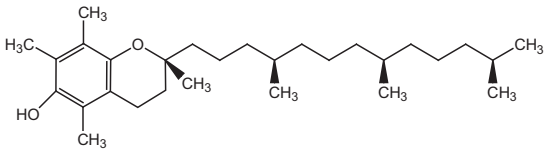
References:

Wasilewski M., Wieckowski M.R., Dymmowska D, Wojtczak L. BBA **1657**: 151-163, *2004*
M. van der Stelt and V. Di Marzo; Prostaglandins Other Lipid Mediat. **77**, *2005*
C. Grimaldi, et al.; Exp. Cell Res. **312**, 363, *2006*

Other lipids

Tocopherols

Catalog number 1072

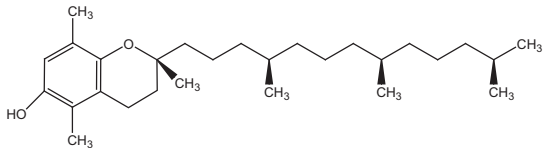


1072 **rac-alpha-Tocopherol** **50 mg/ml, 1 ml**

5,7,8-Trimethyltocol $C_{29}H_{50}O_2$ **CAS#:** 59-02-9

Source: synthetic **Mol. Wt.:** 431 **Purity:** 95% by TLC, 98% by GC **Appearance:** liquid **Solvent:** hexane **Solubility:** chloroform, ethanol, hexane, methanol **Storage:** –20°C

Catalog number 1071

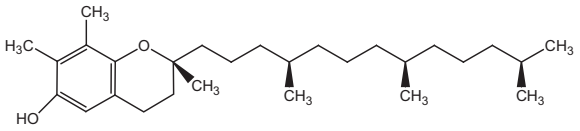


1071 **rac-beta-Tocopherol** **50 mg/ml, 1 ml**

5,8-Dimethyltocol $C_{28}H_{48}O_2$ **CAS#:** 148-03-8

Source: synthetic **Mol. Wt.:** 417 **Purity:** 95% by TLC, 98% by GC **Appearance:** liquid **Solvent:** hexane **Solubility:** chloroform, ethanol, hexane, methanol **Storage:** –20°C

Catalog number 1073

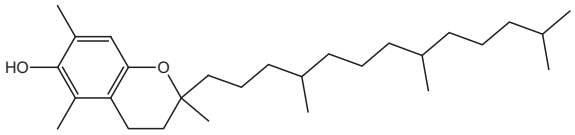


1073 **rac-gamma-Tocopherol** **50 mg/ml, 1 ml**

7,8-Dimethyltocol $C_{28}H_{48}O_2$ **CAS#:** 73980-80-0

Source: synthetic **Mol. Wt.:** 417 **Purity:** 95% by TLC, 97% by GC **Appearance:** liquid **Solvent:** hexane **Solubility:** chloroform, ethanol, hexane, methanol **Storage:** –20°C

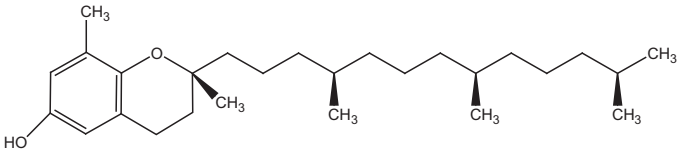
Catalog number 1074



1074 **rac-5,7-Dimethyltocol** **50 mg/ml, 1 ml**
$C_{28}H_{48}O_2$ **CAS#:** 493-35-6

Source: synthetic **Mol. Wt.:** 417 **Purity:** 95% by TLC, 98% by GC
Appearance: liquid **Solvent:** hexane **Solubility:** hexane, ethyl ether, chloroform, alcohols **Storage:** –20°C

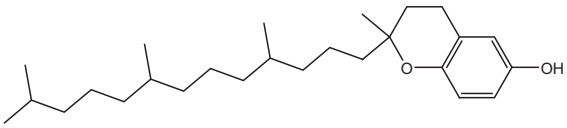
Catalog number 1790



1790 **(+)-delta-Tocopherol** **50 mg/ml, 1 ml**
8-Methyltocol $C_{27}H_{46}O_2$ **CAS#:** 119-13-1

Source: natural, plant **Mol. Wt.:** 403 **Purity:** 95% by TLC, 98% by GC
Appearance: liquid **Solvent:** hexane **Solubility:** chloroform, ethanol, hexane, methanol **Storage:** –20°C

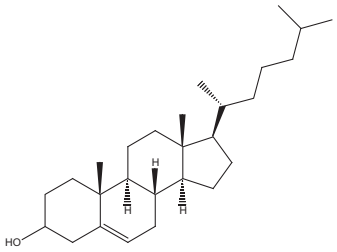
Catalog number 1797



1797 **Tocol** **50 mg/ml, 1 ml**
rac-Tocol $C_{26}H_{44}O_2$

Source: synthetic **Mol. Wt.:** 389 **Purity:** 95% by TLC, 98% by GC
Appearance: liquid **Solvent:** hexane **Solubility:** hexane, methanol, ethanol
Storage: –20°C

Cholestane derivatives



Catalog number 1006

1006 **Cholesterol** **500 mg**
$C_{27}H_{46}O$ **CAS#:** 57-88-5

Source: natural, ovine **Mol. Wt.:** 386 **Melting Point (°C):** 147-148 **Purity:** 98+% by GC **Appearance:** white solid **Solubility:** chloroform, ethanol **Storage:** –20°C

1115 **5-alpha-Cholestane** **100 mg**
$C_{27}H_{48}O$ **CAS#:** 481-21-0

Source: synthetic **Mol. Wt.:** 373 **Purity:** 98+% by GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether, hexane **Storage:** –20°C

1116 **Coprostanol** **25 mg**
5-beta-Cholestane-3-beta-ol $C_{27}H_{48}O$ **CAS#:** 360-68-9

Source: semi-synthetic **Mol. Wt.:** 390 **Melting Point (°C):** 101-103 **Purity:** 98+% by GC **Appearance:** white solid **Solubility:** chloroform, ethyl ether, warm methanol **Storage:** –20°C

Plant sterols and steryl glucosides

1119 **Plant sterol mix** **25 mg/ml, 1 ml**
Sterol mixture, qualitative

Source: natural, plant **Appearance:** liquid **Solvent:** chloroform **Solubility:** chloroform **Storage:** –20°C

Contains: Brassicasterol (13%), campesterol (26%), stigmasterol (7%), β-sitosterol (53%) in order of elution

1123 **Plant sterols kit** **1 kit**
Sterols kit

Source: synthetic or plant **Appearance:** liquid **Solvent:** chloroform **Solubility:** chloroform **Storage:** –20°C

Contains in individual packages: steryl glucoside 25 mg, esterified steryl glucoside 10 mg, plant sterol mixture 25 mg, β-sitosterol (55%) 100 mg, desmosterol (85%) 2 mg, lanosterol (55%) 100 mg, stigmasterol 25 mg, ergosterol 25 mg, coprostanol 5 mg, cholestanol 100 mg

1113 **β-Sitostanol** **50 mg**
Stigmastanol $C_{29}H_{52}O$ **CAS#:** 19466-47-8

Source: synthetic **Mol. Wt.:** 417 **Melting Point (°C):** 127-132 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** chloroform **Storage:** –20°C

1120 **Lanosterol** **500 mg**
$C_{30}H_{50}O$ **CAS#:** 79-63-0

Source: synthetic or plant **Mol. Wt.:** 427 **Purity:** 55% by TLC, GC **Appearance:** white solid **Solubility:** chloroform **Storage:** –20°C

1121 **Stigmasterol** **100 mg**
5,22-cholestadien-24-beta-ethyl-3-beta-ol $C_{29}H_{48}O$ **CAS#:** 83-48-7

Source: synthetic **Mol. Wt.:** 413 **Melting Point (°C):** 170 **Purity:** 95% by TLC, GC **Appearance:** white solid **Solubility:** chloroform **Storage:** –20°C

1122 **Ergosterol** **100 mg**
$C_{28}H_{44}O$ **CAS#:** 57-87-4

Source: synthetic or plant **Mol. Wt.:** 397 **Melting Point (°C):** 156 **Purity:** 95% by TLC, GC **Appearance:** white solid **Solubility:** chloroform **Storage:** –20°C

1117 **Steryl glucoside** **25 mg**
$C_{35}H_{60}O_6$

Source: natural, plant **Mol. Wt.:** 576 **Melting Point (°C):** 283-287 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1118 **Esterified steryl glucoside** **10 mg**
1:1:1, sterol:glucose:fatty acid $C_{51}H_{90}O_7$

Source: natural, plant **Mol. Wt.:** 814 **Purity:** 98+% by TLC **Appearance:** solid film **Solubility:** chloroform, ethyl ether, pyridine **Storage:** –20°C

Sterol, glucose and fatty acid in a molar ratio 1:1:1. Mol. Wt. based on ß-sitosterol glucoside palmitate.

Propyleneglycol Monoesters

1862 **2-Hydroxypropyl hexadecanoate** **100 mg**
Propyleneglycol monopalmitate $C_{19}H_{38}O_3$

Source: synthetic **Mol. Wt.:** 314 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** hexane, ethyl ether, alcohol, chloroform, **Storage:** –20°C

1863 **2-Hydroxypropyl octadecanoate** **100 mg**
Propyleneglycol monostearate $C_{21}H_{42}O_3$

Source: synthetic **Mol. Wt.:** 342 **Purity:** 98+% by TLC, GC **Appearance:** white solid **Solubility:** hexane, ethyl ether, alcohol, chloroform, **Storage:** –20°C

Standards and reference compounds

Food industry mixes

Each methyl ester mix is carefully prepared by weight.

4210 **KEL-FIM-FAME-5 mix** **15.5 mg/ml 1 ml**
Methyl ester mix

Source: synthetic or plant **Appearance:** liquid **Solvent:** heptane **Solubility:** heptane **Storage:** –20°C

Contains the methyl esters of the following fatty acids (mg/ml in brackets): C8:0 (0.3), C10:0 (0.5), C12:0 (1.0), C13:0 (0.5), C14:0 (0.5), C14:1 (0.3), C15:0 (0.3), C16:0 (2.0), C16:1 (1.0), C17:0 (0.5), C18:0 (1.0), C18:1tr (0.4), C18:1c (3.0), C18:2 (2.0), C20:0 (0.3), C18:3 (1.0), C20:1 (0.3), C22:0 (0.3), C22:1 (0.3), listed in order of their elution.

2009 **FIM-FAME-6 mix** **33 mg/ml, 1 ml**
Methyl ester mix

Source: synthetic or plant **Appearance:** liquid **Solvent:** heptane **Solubility:** **Storage:** –20°C

Contains the methyl esters of these fatty acids. Each methyl ester is 3.03% of the mixture except C16:0 which is 6.06%. C4:0 , C6:0 , C8:0, C10:0 , C11:0, C12:0, C13:0 , C14:0, C14:1(cis-9), C15:0, C15:1(cis-10), C16:0, C16:1(cis-9), C17:0, C17:1(cis-10), C18:0, C18:1(trans-9), C18:1(cis-9), C18:2(all-cis-9,12), C20:0, C18:3(all-cis 6,9,12), C20:1(cis-11), C18:3(all-cis 9,12,15), C20:2(all-cis 11,14), C22:0, C20:3(all-cis 8,11,14), C22:1(cis 13), C20:3(all-cis 11,14,17), C20:4(all-cis 5,8,11,14), C22:2(all-cis 13,16), C24:1(cis-15), C22:6(all-cis 4,7,10,13,16,19), listed in order of their elution.

2010 **FIM-FAME-7 mix** **30 mg/ml, 1 ml**
Methyl ester mix

Source: synthetic or plant **Appearance:** liquid **Solvent:** methylene chloride **Solubility:** methylene chloride **Storage:** –20°C

Contains the methyl esters of these fatty acids (weight percent in [brackets]): C4:0 [4.0], C6:0 [4.0], C8:0 [4.0], C10:0 [4.0], C11:0 [2.0], C12:0 [4.0], C13:0 [2.0], C14:0 [4.0], C14:1(cis-9) [2.0], C15:0 [2.0], C15:1(cis-10) [2.0], C16:0 [6.0], C16:1(cis-9) [2.0], C17:0 [2.0], C17:1(cis-10) [2.0], C18:0 [4.0], C18:1(trans-9) [2.0], C18:1(cis-9) [4.0], C18:2(all-trans-9,12) [2.0], C18:2(all-cis-9,12) [2.0], C18:3(all-cis 6,9,12) [2.0], C20:0 [4.0], C20:1(cis-11) [2.0], C18:3(all-cis 9,12,15) [2.0], C21:0 [2.0], C20:2(all-cis 11,14) [2.0], C20:3 (all-cis 8,11,14) [2.0], C22:0 [4.0], C22:1(cis 13) [2.0], C20:3(all-cis 11,14,17) [2.0], C20:4(all-cis 5,8,11,14) [2.0], C23:0 [2.0], C22:2(all-cis 13,16) [2.0], C20:5(all-cis 5,8,11,14,17) [2.0], C24:0 [4.0], C24:1(cis-15) [2.0], 22:6(all-cis 4,7,10,13,16,19) [2.0}, listed in order of their elution.

Polyunsaturated fatty acid methyl esters mixes

These are complex qualitative standard mixtures of polyunsaturated fatty acid methyl esters. Because they are extracted from natural materials, relative peak sizes may vary from lot to lot.

1093 **PUFA-1** **100 mg**
Qualitative mix

Source: natural, fish oil **Appearance:** yellow oil **Solubility:** chloroform, ethanol, hexane, methanol **Storage:** –20°C

Contains: C14:0, C16:0, C16:1ω7, C18:1ω9, C18:1ω7, C18:2ω6, C18:4ω3, C20:1ω9, C20:2ω6, C20:5ω3, C22:1ω11, C22:1ω9, C22:5ω3, C22:6ω3

1081 **PUFA-2** **100 mg**
Qualitative mix

Source: natural, porcine **Appearance:** yellow oil **Solubility:** alcohols, hexane, chloroform **Storage:** –20°C

Contains: C14:0, C16:0, C16:1ω7, C18:0, C18:1ω9, C18:1ω7, C18:2ω6, C18:3ω6, C18:3ω3, C20:1ω9, C20:2ω6, C20:3ω6, C20:4ω6, C20:5ω3, C22:4ω6, C22:5ω3, C22:6ω3

1177 **PUFA-3** **100 mg**
Qualitative mix

Source: natural, menhaden oil **Appearance:** yellow oil **Solubility:** alcohols, hexane, chloroform **Storage:** –20°C

Contains: C14:0, C16:0, C16:1ω7, C16:2ω4, C16:3ω4, C16:4ω1, C18:0, C18:1ω9, C18:1ω7, C18:2ω6, C18:2ω4, C18:3ω4, C18:3ω3, C18:4ω3, C20:1ω9, C20:4ω6, C20:4ω3, C20:5ω3, C21:5ω3, C22:5ω3, C22:6ω3

Carbohydrate mixes

1124 **Alditol acetate mix-1** **50 mg/ml, 1 ml**
Quantitative carbohydrate mix

Source: synthetic **Appearance:** liquid **Solvent:** chloroform **Solubility:** chloroform **Storage:** –20°C

Contains: rhamnitol, fucitol, ribitol and arabinitol pentaacetates, 12.5 mg/ml each

1125 **Alditol acetate mix-2** **50 mg/ml, 1 ml**
Quantitative carbohydrate mix

Source: synthetic **Appearance:** liquid **Solvent:** chloroform **Solubility:** chloroform **Storage:** –20°C

Contains: mannitol, galactitol, glucitol and inositol hexaacetates, 12.5 mg/ml each

Other fatty acid methyl ester mixes

1722 **2-Hydroxy methyl ester mix** **10 mg/ml, 1 ml**
Source: synthetic **Appearance:** liquid **Solvent:** methylene chloride **Solubility:** methylene chloride **Storage:** –20°C

Quantitative mix contains: C14:0, 20%; C16:0, 20%; C18:0, 15%; C20:0, 15%; C22:0, 10%; C23:0, 10%; C24:0, 10%

1131 **Cis-trans isomer standard** **5 mg/ml, 5 ml**

Source: margarine **Appearance:** liquid **Solvent:** 5ml methylene chloride **Solubility:** methylene chloride **Storage:** –20°C

Analysis of positional cis-trans fatty acid isomers is ever more important in light of the new food industry rules. These isomers can be resolved on Supelco SP-2560 or an equivalent capillary GC column. Use this specially formulated mix to ensure proper operation of your column for this tricky separation. Mix consists of cis-trans fatty acid isomers as methyl esters in methylene chloride.

This is a qualitative standard containing in order of elution: C16:0, C18:0, C18:1 trans isomers (4 peaks), C18:1 cis & trans isomers (2 peaks), C18:1 cis isomers (4 peaks), C18:2, C20:0, C20:1 and C18:3 (same peak), C22:0

AOCS animal and vegetable oil reference mixes (RM mixes)

By studying problems with the quantitative analysis of animal and vegetable oils and fats, the American Oil Chemists' Society has found certain mixtures to be useful as reference standards. The composition of each mixture (see Table I below) is similar to the fatty acid distribution of certain oils. All mixtures are in methyl ester form and ready for GC analysis

Table I. AOCS Oil Reference Mixes

Each methyl ester mixture is carefully prepared by weight and the composition verified by gas chromatography. The weight percentage of each component is indicated in the Table.

Mix No. **Catalog No.**	RM-1 1084	RM-2 1085	RM-3 1086	Rapeseed 1083	RM-4 1087	RM-5 1088	RM-6 1089
C8:0 Caprylate						7.0	
C10:0 Caprate						5.0	
C12:0 Laurate						48.0	
C14:0 Myristate			1.0	1.0		15.0	2.0
C16:0 Palmitate	6.0	7.0	4.0	4.0	11.0	7.0	30.0
C16:1 Palmitoleate							3.0
C18:0 Stearate	3.0	5.0	3.0	3.0	3.0	3.0	14.0
C18:1 Oleate	35.0	18.0	45.0	60.0	80.0	12.0	41.0
C18:2 Linoleate	50.0	36.0	15.0	12.0	6.0	3.0	7.0
C18:3 Linolenate	3.0	34.0	3.0	5.0			3.0
C20:0 Arachidate	3.0		3.0	3.0			
C20:1 Eicosenoate				1.0			
C22:0 Behenate			3.0	3.0			
C22:1 Erucate			20.0	5.0			
C24:0 Lignocerate			3.0	3.0			

1083 **Rapeseed oil reference mixture** **25 mg/ml, 1 ml**

AOCS rapeseed oil reference mix

Source: synthetic or plant **Appearance:** liquid **Solvent:** methylene chloride
Solubility: ethyl ether, methylene chloride **Storage:** –20°C

Suitable standard for low erucic acid oil

1084 **RM-1 mix** **50 mg**
AOCS reference mix RM-1

Source: synthetic or plant **Appearance:** clear oil **Solubility:** chloroform, ethyl ether
Storage: –20°C

Suitable standard for corn, cottonseed, soybean, safflower, sesame, poppy seed, walnut kapok, and rice oils

1085 **RM-2 mix** **50 mg**
AOCS reference mix RM-2

Source: synthetic or plant **Appearance:** clear oil **Solubility:** chloroform, ethanol, ethyl ether **Storage:** –20°C

Suitable standard for linseed, perilla, hempseed, and rubberseed oils

1086 **RM-3 mix** **50 mg/ml, 1 ml**
AOCS reference mix RM-3

Source: synthetic or plant **Appearance:** liquid **Solvent:** methylene chloride **Solubility:** ethyl ether, methylene chloride **Storage:** –20°C

Suitable standards for peanut, rapeseed, and mustard seed oils

1087 **RM-4 mix** **50 mg**
AOCS reference mix RM-4

Source: synthetic or plant **Appearance:** clear oil **Solubility:** chloroform, ethyl ether **Storage:** –20°C

Suitable standard for olive, teaseed, and neatsfoot oils

1088 **RM-5 mix** **50 mg**
AOCS reference mix RM-5

Source: synthetic or plant **Appearance:** clear oil **Solubility:** chloroform **Storage:** –20°C

Suitable standard for coconut, palm kernel, babassu and ouri-ouri oils

1089 **RM-6 mix** **50 mg**
AOCS reference mix RM-6

Source: synthetic or plant **Appearance:** clear oil **Solubility:** ethyl ether, methylene chloride **Storage:** –20°C

Suitable standard for lard, beef tallow, mutton tallow, and palm oil

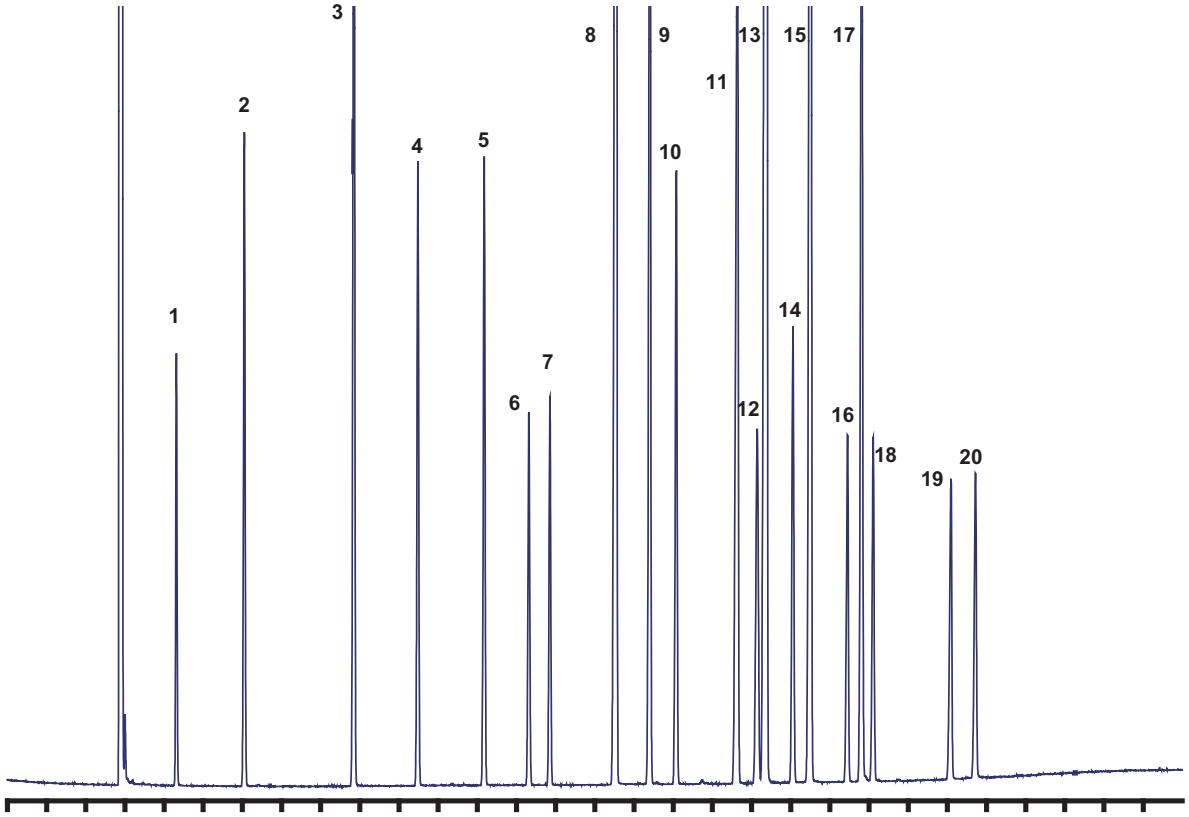
1082 **RM-7 kit** **50 mg ampules**
AOCS reference mix RM-7 kit

Source: synthetic or plant **Appearance:** liquid **Solvent:** methylene chloride **Solubility:** methylene chloride **Storage:** –20°C

50 mg ampules of RM-1, RM-2, RM-3, RM-4, RM-5, RM-6, and 25 mg of Rapeseed oil reference mixture

Custom mixes

Custom fatty acid methyl ester mixes can be prepared to your specification. Minimum quantity requirements apply to these orders.



Cat# 4210 spiked with 0.4 mg/ml C18:2t ester (methyl linoelaidate) and chromatographed on a Supelco SP 2330 fused silica column.

Peak number	FAME
1	C8:0
2	C10:0
3	C12:0
4	C13:0
5	C14:0
6	C14:1
7	C15:0
8	C16:0
9	C16:1
10	C17:0
11	C18:0
12	C18:1t-9
13	C18:1c-9
14	C18:2t,t-9,12
15	C18:2c,c-9,12
16	C20:0
17	C18:3
18	C20:1
19	C22:0
20	C22:1

Table II. Standards for GC analysis

GLC Standard mixes

GLC-10 through GLC-100 standards are **equal weight measures** of fatty acid methyl esters. They are quantitative standards, useful for determining relative **retention times and response factors.**

Each methyl ester mixture is carefully prepared by weight and the composition verified by gas chromatography. The weight percentage of each component is indicated below. All double bonds are cis.

Mixture Number Catalog Number	GLC-10 1095	GLC-30 1097	GLC-40 1098	GLC-50 1099	GLC-60 1100	GLC-70 1101	GLC-80 1102	GLC-90 1103	GLC-100 1104
C8:0 Caprylate		20.0				20.0			
C9:0 Nonanoate						20.0			
C10:0 Caprate		20.0				20.0			
C11:0 Undecanoate						20.0			
C12:0 Laurate		20.0				20.0			
C13:0 Tridecanoate							20.0	20.0	
C14:0 Myristate		20.0					20.0		
C15:0 Pentadecanoate							20.0	20.0	
C16:0 Palmitate	20.0	20.0	25.0				20.0		
C16:1 Palmitoleate-9 cis				20.0					
C17:0 Heptadecanoate							20.0	20.0	
C18:0 Stearate	20.0		25.0						20.0
C18:1 Oleate-9 cis	20.0			20.0					
C18:2 Linoleate-9,12 all cis	20.0								
C18:3 Linolenate-9,12,15 all cis	20.0								
C19:0 Nonadecanoate								20.0	20.0
C20:0 Arachidate			25.0		25.0				20.0
C20:1 Eicosenoate-11 cis				20.0	25.0				
C20:2 Eicosadienoate-11,14 all cis					25.0				
C20:3 Eicosatrienoate-11,14,17 all cis					25.0				
C21:0 Heneicosanoate								20.0	20.0
C22:0 Behenate			25.0						20.0
C22:1 Erucate-13				20.0					
C24:1 Nervonate				20.0					

1095 **GLC-10 mix** **50 mg**
Quantitative GC mix

Source: synthetic or plant **Appearance:** clear oil **Solubility:** methylene chloride
Storage: –20°C

1097 **GLC-30 mix** **50 mg**
Quantitative GC mix

Source: synthetic or plant **Appearance:** clear oil **Solubility:** methylene chloride
Storage: –20°C

1098 **GLC-40 mix** **50 mg/ml, 1 ml**
Quantitative GC mix

Source: synthetic or plant **Appearance:** liquid **Solvent:** methylene chloride
Solubility: methylene chloride **Storage:** –20°C

1099 **GLC-50 mix** **50 mg/ml, 1 ml**
Quantitative GC mix

Source: synthetic or plant **Appearance:** liquid **Solvent:** methylene chloride
Solubility: methylene chloride **Storage:** –20°C

1100 **GLC-60 mix** **50 mg/ml, 1 ml**
Quantitative GC mix

Source: synthetic or plant **Appearance:** liquid **Solvent:** methylene chloride
Solubility: methylene chloride **Storage:** –20°C

1101 **GLC-70 mix** **50 mg**
Quantitative GC mix

Source: synthetic or plant **Appearance:** clear oil **Solubility:** methylene chloride
Storage: –20°C

1102 **GLC-80 mix** **50 mg/ml, 1 ml**
Quantitative GC mix

Source: synthetic or plant **Appearance:** liquid **Solvent:** methylene chloride
Solubility: methylene chloride **Storage:** –20°C

1103 **GLC-90 mix** **50 mg/ml, 1 ml**
Quantitative GC mix

Source: synthetic or plant **Appearance:** liquid **Solvent:** methylene chloride
Solubility: methylene chloride **Storage:** –20°C

1104 **GLC-100 mix** **50 mg/ml, 1 ml**
Quantitative GC mix

Source: synthetic or plant **Appearance:** liquid **Solvent:** methylene chloride
Solubility: methylene chloride **Storage:** –20°C

Water soluble fatty acid mixes

1106 **WSFA-2 mix** **5 ml**
Water soluble fatty acid qualitative mix

Appearance: liquid **Solvent:** water **Solubility:** water **Storage:** Room Temp

Contains: acetic, propionic, isobutyric, n-butyric, isovaleric and n-valeric acids

1108 **WSFA-4 mix** **5 ml**
Water soluble fatty acid qualitative mix

Appearance: liquid **Solvent:** water **Solubility:** water **Storage:** Room Temp

Contains: acetic, propionic, isobutyric, n-butyric, 2-methyl butyric, isovaleric and n-valeric acids

Microbiology standard mixes

1105 **GLC-110 mix** **10 mg/ml, 1 ml**
Bacterial lipid standard, qualitative mix

Source: various **Appearance:** liquid **Solvent:** chloroform **Solubility:** methylene chloride, choroform **Storage:** –20°C

Contains:

methyl 12-methyltridecanoate	(iso-C14:0)	methyl 14-methylpentadecanoate	(iso-C16:0)
methyl myristate	(C14:0)	methyl palmitate	(C16:0)
methyl 12-methyltetradecanoate	(anteiso-C15:0)	methyl 14-methylhexadecanoate	(anteiso-C17:0)
methyl pentadecanoate	(C15:0)		

1114 **Bacterial acid methyl esters CP mix** **10 mg/ml, 1 ml**
Qualitative mix

Source: various **Appearance:** liquid **Solvent:** methyl caproate **Solubility:** hexane, ethanol, methanol **Storage:** –20°C

A qualitative standard. Mixture consists of equal amounts of the compounds listed.

methyl undecanoate	C11:0	methyl cis-9-hexadecenoate	C16:1^{9}
methyl 2-hydroxydecanoate	2-OH C10:0	methyl hexadecanoate	C16:0
methyl dodecanoate	C12:0	methyl 15-methylhexadecanoate	iso-C17:0
methyl tridecanoate	C13:0	methyl cis-9,10-methylenehexadecanoate	C17:0$\Delta^{9,10}$
methyl 2-hydroxydodecanoate	2-OH C12:0	methyl heptadecanoate	C17:0
methyl 3-hydroxydodecanoate	3-OH C12:0	methyl 2-hydroxyhexadecanoate	2-OH C16:0
methyl tetradecanoate	C14:0	methyl cis, cis-9,12-octadecadienoate	C18:2 ^{9,12}
methyl 13-methyltetradecanoate	iso-C15:0	methyl cis-9-octadecenoate	C18:1^{9}
methyl 12-methyltetradecanoate	anteiso-C15:0	methyl trans-9-octadecenoate	C18:1^{9}
methyl pentadecanoate	C15:0	methyl octadecanoate	C18:0
methyl 2-hydroxytetradecanoate	2-OH C14:0	methyl cis-9,10-methyleneoctadecanoate	C19:0$\Delta^{9,10}$
methyl 3-hydroxytetradecanoate	3-OH C14:0	methyl nonadecanoate	C19:0
methyl 14-methylpentadecanoate	iso-C16:0	methyl eicosanoate	C20:0

1075 **Volatile acid mix** **100 ml**
Qualitative mix

Appearance: liquid **Solvent:** water **Solubility:** water
Storage: 4-8°C

Contains: formic, acetic, propionic, isobutyric, n-butyric, isovaleric, n-valeric, isocaproic, n-caproic, and heptanoic acids

1077 **Non-volatile acid mix** **100 ml**
Qualitative mix

Appearance: liquid **Solvent:** water **Solubility:** water
Storage: 4-8°C

Contains: pyruvic, lactic, oxalacetic, oxalic, methyl malonic, malonic, fumaric and succinic acids.

Biochemical research standard mixes

These mixtures are prepared by precise gravimetric technique. All mixes contain equal amounts of listed components. A data sheet is supplied with each mixture.

1127 **Polar lipid mix** **25 mg/ml, 1 ml**
TLC standards mix

Source: natural, egg, ovine **Appearance:** liquid **Solvent:** chloroform/methanol 2:1
Solubility: chloroform/methanol 2:1 **Storage:** –20°C

Contains: cholesterol, phosphatidylethanolamine, lecithin, and lyso-lecithin

1128 **Sphingolipid mix** **25 mg/ml, 1 ml**
TLC standards mix

Source: natural, bovine **Appearance:** liquid **Solvent:** chlorofom/methanol 2:1
Solubility: chloroform/methanol 2:1 **Storage:** –20°C

Contains: cerebrosides, sulfatides, and sphingomyelin

1129 **Non-polar lipid mix A** **25 mg/ml, 1 ml**
TLC standards mix

Source: natural, plant, ovine **Appearance:** liquid **Solvent:** chloroform
Solubility: chloroform **Storage:** –20°C

Contains: cholesteryl palmitate, tripalmitin, palmitic acid, and cholesterol

1130 **Non-polar lipid mix B** **25 mg/ml, 1 ml**
TLC standards mix

Source: natural, plant, ovine **Appearance:** liquid **Solvent:** chloroform
Solubility: chloroform **Storage:** –20°C

Contains: cholesteryl oleate, methyl oleate, triolein, oleic acid, and cholesterol

Glycosphingolipid mixtures for TLC

These mixtures are qualitative standards prepared from our purified glycosphingolipids.

1505 **Neutral glycosphingolipid qualmix,** **1 mg/ml, 1 ml**
Glycosylceramides, qualitative mix

Source: natural, bovine and porcine **Appearance:** liquid **Solvent:**
chloroform/methanol 2:1 **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

Contains: cerebrosides, lactosylceramide, ceramide trihexoside, globoside

1508 **Monosialoganglioside mix** **0.5 mg/ml, 1 ml**
GM_3, GM_2, GM_1 qualitative mix

Source: natural, bovine **Appearance:** liquid **Solvent:** chloroform/methanol/water
2:1:0.1 **Solubility:** chloroform/methanol/water 2:1:0.1 **Storage:** –20°C

Contains: GM_3, GM_2, GM_1

1509 **Disialoganglioside mix** **0.5 mg/ml, 1 ml**
GD_3, GD_{1a}, GD_{1b}, qualitative mix

Source: natural, bovine **Appearance:** liquid **Solvent:** chloroform/methanol/water
2:1:0.1 **Solubility:** chloroform/methanol/water 2:1:0.1 **Storage:** –20°C

Contains: GD_3, GD_{1a}, GD_{1b}

1510 **Lactosylceramide and sialosyl derivatives mix** **0.5 mg/ml, 1 ml**
LC, GM_3, GD_3 qualitative mix

Source: natural, bovine **Appearance:** liquid **Solvent:** chloroform/methanol/water
2:1:0.1 **Solubility:** chloroform/methanol/water 2:1:0.1 **Storage:** –20°C

Contains: LC, GM_3, GD_3

1511 **Gangliotetraosylceramide and sialosyl derivatives mix** **0.5 mg/ml, 1 ml**
asialo-GM_1, GM_1, GD_{1a}, GD_{1b}, GT_{1b} qualitative mix

Source: natural, bovine **Appearance:** liquid **Solvent:** chloroform/methanol/water 2:1:0.1 **Solubility:** chloroform/methanol/water 2:1:0.1 **Storage:** –20°C

Contains: asialo-GM_1, GM_1, GD_{1a}, GD_{1b}, GT_{1b}

Biochemicals and reagents

Stable isotope labeled compounds

1914 **N-Stearoyl-D_{35}-psychosine, perdeuterated** **5 mg**
Cerebrosides with N-C18:0-D_{35} fatty acid side chain $C_{42}H_{46}D_{35}NO_8$

Source: semi-synthetic, bovine **Mol. Wt.:** 762 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform, hot ethanol, chloroform/methanol 2:1 **Storage:** –20°C

1533 **N-Palmitoyl-D_3-glucopsychosine, deuterated** **1 mg**
N-C16:0-D_3-Glucopsychosine; glucocerebroside with C16:0-D_3 fatty acid side chain $C_{40}H_{74}D_3NO_8$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 703 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1534 **N-Palmitoyl-D_3-lactosylceramide, deuterated** **1 mg**
N-C16:0-D_3-Lactosylceramide; lactosylceramide with C16:0-D_3 fatty acid side chain $C_{46}H_{84}D_3NO_{13}$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 864 **Purity:** 98+% by TLC **Appearance:** white solid **Solubility:** chloroform/methanol/water 5:1:0.1 **Storage:** –20°C

2200 **N-1-^{13}C-Palmitoyl-sphingosylphosphorylcholine** **1 mg**
D-erythro-Sphingomyelin with 1-^{13}C-palmitic acid; SPM with ^{13}C labeled fatty acid $^{12}C_{38}{}^{13}CH_{79}N_2O_6P$

Source: semi-synthetic, bovine **Mol. Wt.:** 703 **Purity:** 98+% by TLC **Appearance:** waxy solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

2050 **N-Octadecanoyl-D_3-monosialoganglioside GM_1** **0.5 mg**
N-D_3-Stearoyl-GM_1 $C_{73}H_{128}N_3O_{31}D_3$

Source: semi-synthetic, bovine brain **Mol. Wt.:** 1548 **Purity:** 98+% by TLC **Appearance:** solid, **Solubility:** chloroform/methanol/water 2:1:0.1, forms micellar solution in water **Storage:** –20°C

1536 **N-Octadecanoyl-D_3-sulfatide** **1 mg**
N-C18:0-D_3-Sulfatide $C_{42}H_{78}D_3NO_{11}S$

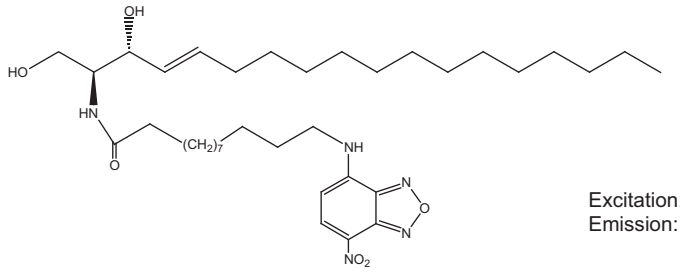
Source: semi-synthetic, bovine **Mol. Wt.:** 833 **Purity:** 98+% by TLC **Appearance:** off-white solid **Solubility:** chloroform/methanol/DI water 2:1:0.1 **Storage:** –20°C

1537 **N-Octadecanoyl-D_3-ceramide trihexoside** **0.5 mg**

C18:0-D_3-CTH; C18:0-D_3-Gb3; N-Octadecanoyl-D_3-globotriaosylceramide
$C_{54}H_{98}D_3NO_{18}$

Source: semi-synthetic, porcine **Mol. Wt.:** 1055 **Purity:** 98+% by TLC
Appearance: off-white solid **Solubility:** chloroform/methanol 2:1:, DMSO
Storage: –20°C

Fluorescent compounds



Catalog number 1618

Excitation: 460 nm
Emission: 535 nm

1841 **N-Hexanoyl-NBD-D-erythro-sphingosine** **100 µg**
1841-001 N-C6:0-NBD-ceramide; N-C6:0-NBD-D-erythro-sphingosine, fluorescent; N-(NBD-aminocaproyl)-D-erythro-sphingosine $C_{30}H_{49}N_5O_6$ **CAS#:** 86701-10-2 **1 mg**

Source: synthetic **Mol. Wt.:** 575 **Melting Point (°C):** 85-88 **Purity:** 98+% by TLC
Appearance: orange film, vacuum dried **Solubility:** chloroform, ethanol, methanol
Storage: –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1618 **N-Dodecanoyl-NBD-D-erythro-sphingosine** **100 µg**
1618-001 N-C12:0-NBD-ceramide; N-C12:0-NBD-D-erythro-sphingosine, fluorescent; N-(NBD-aminolauroyl)-D-erythro-sphingosine $C_{36}H_{61}N_5O_6$ **1 mg**

Source: synthetic **Mol. Wt.:** 660 **Purity:** 98+% by TLC **Appearance:** orange solid
Solubility: chloroform/methanol 2:1, methanol **Storage:** –20°C

1857 **N-Hexanoyl-NBD-L-threo-sphingosine** **100 µg**
1857-001 N-C6:0-NBD-ceramide; N-C6:0-NBD-L-threo-sphingosine, fluorescent; N-(NBD-aminocaproyl)-L-threo-sphingosine $C_{30}H_{49}N_5O_6$ **1 mg**

Source: synthetic **Mol. Wt.:** 575 **Purity:** 98+% by TLC **Appearance:** red-orange solid **Solubility:** chloroform, ethanol, methanol **Storage:** –20°C

Reference:
J. M. L. Hauser et al., J. Biol. Chem. **269**, 6803, *1994*

1620 **N-Dodecanoyl-NBD-L-threo-sphingosine** **100 µg**
1620-001 N-C12:0-NBD-ceramide; N-C12:0-NBD-L-threo-sphingosine, fluorescent; N-(NBD-aminolauroyl)-L-threo-sphingosine $C_{36}H_{61}N_5O_6$ **1 mg**

Source: synthetic **Mol. Wt.:** 660 **Purity:** 98+% by TLC **Appearance:** orange solid
Solubility: chloroform/methanol 2:1, methanol **Storage:** –20°C

1624 **N-Hexanoyl-NBD-L-threo-dihydrosphingosine** **100 µg**
1624-001 N-C6:0-NBD-dihydroceramide; N-C6:0-NBD-L-threo-dihydrosphingosine, fluorescent; N-(NBD-aminocaproyl)-L-threo-dihydrosphingosine $C_{30}H_{51}N_5O_6$ **1 mg**

Source: synthetic **Mol. Wt.:** 578 **Purity:** 98+% by TLC **Appearance:** orange solid
Solubility: chloroform/methanol 2:1, methanol **Storage:** –20°C

1623 **N-Dodecanoyl-NBD-L-threo-dihydrosphingosine** **100 µg**
1623-001 N-C12:0-NBD-dihydroceramide; N-C12:0-NBD-L-threo-dihydrosphingosine, fluorescent; N-(NBD-aminolauroyl)-L-threo-dihydrosphingosine **1 mg**
$C_{36}H_{63}N_5O_6$

Source: synthetic **Mol. Wt.:** 662 **Purity:** 98+% by TLC **Appearance:** orange solid
Solubility: chloroform/methanol 2:1, methanol **Storage:** –20°C

1626 **N-Hexanoyl-NBD-D-erythro-dihydrosphingosine** **100 µg**
1626-001 N-C6:0-NBD-dihydroceramide; N-C6:0-NBD-D-erythro-dihydrosphingosine, fluorescent; N-(NBD-aminocaproyl)-D-erythro-dihydrosphingosine **1 mg**
$C_{30}H_{51}N_5O_6$

Source: synthetic **Mol. Wt.:** 578 **Purity:** 98+% by TLC **Appearance:** orange solid
Solubility: chloroform/methanol 2:1, methanol **Storage:** –20°C

1625 **N-Dodecanoyl-NBD-D-erythro-dihydrosphingosine** **100 µg**
1625-001 N-C12:0-NBD-dihydroceramide; N-C12:0-NBD-D-erythro-dihydrosphingosine, fluorescent; N-(NBD-aminolauroyl)-D-erythro-dihydrosphingosine **1 mg**
$C_{36}H_{63}N_5O_6$

Source: synthetic **Mol. Wt.:** 662 **Purity:** 98+% by TLC **Appearance:** orange solid
Solubility: chloroform/methanol 2:1, methanol **Storage:** –20°C

1628 **N-Hexanoyl-NBD-phytosphingosine** **100 µg**
1628-001 N-C6:0-NBD-phytoceramide; N-C6:0-NBD-phytosphingosine, fluorescent; N-(NBD-aminocaproyl)-phytosphingosine **1 mg**
$C_{30}H_{51}N_5O_7$

Source: semi-synthetic, bacteria **Mol. Wt.:** 594 **Purity:** 98+% by TLC
Appearance: orange solid **Solubility:** chloroform/methanol 2:1, methanol
Storage: –20°C

1627 **N-Dodecanoyl-NBD-phytosphingosine** **100 µg**
1627-001 N-C12:0-NBD-phytoceramide; N-C12:0-NBD-phytosphingosine, fluorescent; N-(NBD-aminolauroyl)-phytosphingosine **1 mg**
$C_{36}H_{63}N_5O_7$

Source: semi-synthetic, bacteria **Mol. Wt.:** 678 **Purity:** 98+% by TLC
Appearance: orange solid **Solubility:** chloroform/methanol 2:1, methanol
Storage: –20°C

1912 **N-Hexanoyl-NBD-sphingosylphosphorylcholine** **100 µg**
1912-001 N-C6:0-NBD-sphingomyelin, fluorescent; N-C6:0-NBD-sphingosylphosphorylcholine; fluorescent sphingomyelin; N-(NBD-aminocaproyl)-sphingomyelin **1 mg**
$C_{35}H_{61}N_6O_9P$ **CAS#:** 94885-04-8

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 740 **Purity:** 98+% by TLC
Appearance: red-brown solid **Solubility:** chloroform, ethanol, methanol
Storage: –20°C

Mixture of D-erythro and L-threo isomers

1619 **N-Dodecanoyl-NBD-sphingosylphosphorylcholine** **100 ug**
1619-001 N-C12:0-NBD-sphingomyelin, fluorescent; N-C12:0-NBD-sphingosylphosphorylcholine; fluorescent sphingomyelin; N-(NBD-aminolauroyl)-sphingomyelin **1 mg**
$C_{41}H_{73}N_6O_4P$

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 825 **Purity:** 98+% by TLC
Appearance: orange solid **Solubility:** chloroform/methanol 2:1, methanol
Storage: –20°C

Mixture of D-erythro and L-threo isomers

1621 **N-Hexanoyl-NBD-galactosylceramide** **100 µg**
1621-001 N-C6:0-NBD-beta-D-galactosylsphingosine; N-C6:0-NBD-cerebrosides; N-C6:0-NBD-galactosylceramide, fluorescent; N-(NBD-aminocaproyl)-beta-D-galactosylsphingosine $C_{36}H_{59}N_5O_{11}$ **1 mg**

Source: semi-synthetic, bovine **Mol. Wt.:** 738 **Purity:** 98+% by TLC
Appearance: orange solid **Solubility:** chloroform/methanol 5:1, methanol
Storage: –20°C

1622 **N-Hexanoyl-NBD-glucosylceramide** **100 µg**
1622-001 N-C6:0-NBD-beta-D-glucosylsphingosine; N-C6:0-NBD-glucosylceramide, fluorescent; N-(NBD-aminocaproyl)-beta-D-glucosylsphingosine $C_{36}H_{59}N_5O_{11}$ **1 mg**

Source: semi-synthetic, bovine **Mol. Wt.:** 738 **Purity:** 98+% by TLC
Appearance: orange solid **Solubility:** chloroform/methanol 5:1, methanol
Storage: –20°C

1629 **N-Hexanoyl-NBD-lactosylceramide** **50 ug**
1629-001 N-Hexanoyl-NBD-beta-D-lactosylsphingosine; N-C6:0-NBD-beta-D-lactosylsphingosine; N-C6:0-NBD-lactosylceramide, fluorescent; fluorescent LC; N-(NBD-aminocaproyl)-beta-D-lactosylsphingosine $C_{42}H_{69}N_5O_{16}$ **1 mg**

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 900 **Purity:** 98+% by TLC
Appearance: orange solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1630 **N-Dodecanoyl-NBD-lactosylceramide** **50 µg**
1630-001 N-Dodecanoyl-NBD-beta-D-lactosylsphingosine; N-C12:0-NBD-beta-D-lactosylsphingosine; N-C12:0-NBD-lactosylceramide, fluorescent; fluorescent LC; N-(NBD-aminolauroyl)-beta-D-lactosylsphingosine $C_{48}H_{81}N_5O_{16}$ **1 mg**

Source: semi-synthetic, bovine buttermilk **Mol. Wt.:** 984 **Purity:** 98+% by TLC
Appearance: orange solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

1631 **N-Dodecanoyl-NBD-ceramide trihexoside** **100 µg**
1631-001 N-C12:0-NBD-CTH; N-C12:0-NBD-globotriaosylceramide; N-(NBD-aminolauroyl)-ceramide trihexoside $C_{54}H_{91}N_5O_{21}$ **1 mg**

Source: semi-synthetic, porcine **Mol. Wt.:** 1145 **Purity:** 98+% by TLC
Appearance: red-orange solid **Solubility:** chloroform/methanol 2:1: DMSO; hot methanol **Storage:** –20°C

1632 **N-Dodecanoyl-NBD-sulfatide** **100 µg**
1632-001 N-C12:0-NBD-sulfatide; N-Dodecanoyl-NBD-lyso-sulfatide; N-Dodecanoyl-NBD-sphingosyl-beta-D-galactoside-3-sulfate; N-(NBD-aminolauroyl)-sulfatide $C_{42}H_{71}N_5O_{14}S$ **1 mg**

Source: semi-synthetic, bovine **Mol. Wt.:** 901 **Purity:** 98+% by TLC
Appearance: red-orange solid **Solubility:** chloroform/methanol 2:1 **Storage:** –20°C

Appendix

Table III. Typical Fatty Acid Composition of Natural Lipids Made by Matreya LLC.
(actual composition may vary according to dietary history and growth condition of the source)

	Cat. # 1044 Lecithin (egg)	Cat: # 1070 Lecithin (bovine)	Cat: # 1302 Lecithin (plant)	Cat. # 1045 Phosphatidyl-ethanolamine (egg)	Cat: # 1301 Phosphatidyl-ethanolamine (plant)	Cat. # 1046 lyso-Lecithin (egg)	Cat. # 1047 Phosphatidylserine (bovine)	Cat. # 1048 Phosphatidylinositol (plant)
Fatty Acids								
C14:0		trace						
C16:0	31	35	14	19	22	72	1	36
C16:1		1		1				
C18:0	16	14	4	26	3	24	42	
C18:1	31	33	11	23	7	3	27	7
C18:2	16		66	14	60			50
C18:3			6		8			7
C20:0							1	
C20:1							4	
C20:4				10			4	
C21:0								
C22:0							1	
C22:1							1	
C22:6							7	
C23:0								
C24:0								
C24:1								
C25:0								
C25:1								
C26:0								
C26:1								
C27:0								
C27:1								
C14:0 2-OH								
C16:0 2-OH								
C18:0 2-OH								
C20:0 2-OH								
C22:0 2-OH								
C23:0 2-OH								
C24:0 2-OH								
C24:1 2-OH								
C25:0 2-OH								
C25:1 2-OH								
C26:0 2-OH								
C26:1 2-OH								
C16 cis 9,10 methylene								
C18 cis 9,10 methylene								
Others	6	17	0	7	0	1	12	0
Total	100	100	100	100	100	100	100	100

Typical Fatty Acid Composition of Natural Lipids Made by Matreya LLC (continued)
(actual composition may vary according to dietary history and growth condition of the source)

	Cat: # 1051 Sphingomyelin (bovine)	Cat: # 1328 Sphingomyelin (porcine RBC)	Cat: # 1053 Phosphatidic acid (semi-synthetic)	Cat: # 1057 Glucocerebrosides (human)	Cat: # 1058 Monogalactosyl-diglycerides (plant)	Cat: # 1059 Digalactosyldiglyceride (plant)	Cat: # 1061 Monosialoganglioside GM_1	Cat: # 1062 Disialoganglioside GD_{1a}
Fatty Acids								
C14:0							trace	trace
C16:0	3	30	39	14	23	9	1	1
C16:1								
C18:0	45	8	12	3	77	91	86	86
C18:1		2	34				3	3
C18:2			15					
C18:3								
C20:0	1	2		3			4	4
C20:1								
C20:4								
C21:0								
C22:0	4	10		24			2	2
C22:1								
C22:6								
C23:0		1		9			1	1
C24:0	8	30		33			1	1
C24:1	31	14		13			2	2
C25:0								
C25:1								
C26:0		2						
C26:1								
C27:0								
C27:1								
C14:0 2-OH								
C16:0 2-OH								
C18:0 2-OH								
C20:0 2-OH								
C22:0 2-OH								
C23:0 2-OH								
C24:0 2-OH								
C24:1 2-OH								
C25:0 2-OH								
C25:1 2-OH								
C26:0 2-OH								
C26:1 2-OH								
C16 cis 9,10 methylene								
C18 cis 9,10 methylene								
Others	8	1	0	1	0	0	0	0
Total	100	100	100	100	100	100	100	100

Typical Fatty Acid Composition of Natural Lipids Made by Matreya LLC (continued)
(actual composition may vary according to dietary history and growth condition of the source)

	Cat: # 1063 Trisialoganglioside GT_{1b}	Cat: # 1064 Gangliotetraosylceramide	Cat: # 1065 Purified mixed gangliosides	Cat: # 1501 Disialoganglioside GD_{1b}	Cat. # 1050 Cerebrosides (bovine)	Cat: # 1066 Cerebrosides Kerasin (bovine)	Cat: # 1138 Cerebrosides Phrenosin (bovine)	Cat. # 1049 Sulfatides (bovine)
Fatty Acids								
C14:0	trace	trace	trace	trace				
C16:0	1	1	1	1	trace	trace		trace
C16:1								
C18:0	86	86	86	86	4	5		5
C18:1	3	3	3	3				trace
C18:2								
C18:3								
C20:0	4	4	4	4	1	1		1
C20:1								
C20:4								
C21:0								
C22:0	2	2	2	2	4	9		7
C22:1						trace		trace
C22:6								
C23:0	1	1	1	1	2	5		
C24:0	1	1	1	1	10	25		18
C24:1	2	2	2	2	15	43		29
C25:0					3	3		2
C25:1					1	3		2
C26:0					2	2		1
C26:1					1	4		3
C27:0					2			1
C27:1					2			
C14:0 2-OH								
C16:0 2-OH								
C18:0 2-OH					15		36	5
C20:0 2-OH					1		1	trace
C22:0 2-OH					6		8	3
C23:0 2-OH					5		6	
C24:0 2-OH					17		25	10
C24:1 2-OH					6		9	6
C25:0 2-OH					3		4	2
C25:1 2-OH							2	
C26:0 2-OH							2	
C26:1 2-OH							2	
C16 cis 9,10 methylene								
C18 cis 9,10 methylene								
Others	0	0	0	0	0	0	5	5
Total	100	100	100	100	100	100	100	100

Typical Fatty Acid Composition of Natural Lipids Made by Matreya LLC (continued)

(actual composition may vary according to dietary history and growth condition of the source)

	Cat: # 1067 Ceramide trihexoside (porcine)	Cat: # 1068 Globosides (porcine)	Cat: # 1118 Esterified steryl glucoside	Cat: # 1056 Ceramides (bovine)	Cat: # 1322 Ceramides (non-hydroxy)	Cat: # 1323 Ceramides (hydroxy)	Cat: # 1535 Monosialoganglioside GM_4	Cat: # 1332 Sphingomyelin, (egg, chicken)	Cat: # 1516 Tetrasialoganglioside $GQ1_b$
Fatty Acids									
C14:0								trace	
C16:0	3	2	34	trace			4	72	5
C16:1									1
C18:0	2	1	8	4	11		2	8	80
C18:1	2		8					3	2
C18:2			36						3
C18:3			4						
C20:0	2	1	1	1	2		trace	2	4
C20:1							trace		
C20:4									
C21:0									
C22:0	17	15	4	4	10		3	5	2
C22:1							4		
C22:6									
C23:0	1	1	2	2	6		4	1	
C24:0	29	23	2	10	24		6	2	
C24:1	5	15		15	31		4	4	
C25:0				9	3				
C25:1				1	3				
C26:0		1		2	2				
C26:1		1		1	3				
C27:0				2					
C27:1				2					
C14:0 2-OH									
C16:0 2-OH									
C18:0 2-OH		trace		15		24	1		
C20:0 2-OH		trace		1		1	3		
C22:0 2-OH	3	3		6		8	25		
C23:0 2-OH	1			5		6	17		
C24:0 2-OH	19	11		17		35	18		
C24:1 2-OH	10	23				17	7		
C25:0 2-OH				3		4			
C25:1 2-OH									
C26:0 2-OH									
C26:1 2-OH						2			
C16 cis 9,10 methylene									
C18 cis 9,10 methylene									
Others	6	3	1	0	5	3	2	3	3
Total	100	100	100	100	100	100	100	100	100

Typical Fatty Acid Composition of Natural Lipids Made by Matreya LLC (continued)
(actual composition may vary according to dietary history and growth condition of the source)

	Cat: # 1329 Sphingomyelin (buttermilk)	Cat: # 1500 Lactosyl ceramide (porcine)	Cat: # 1507 Lactosyl ceramide (buttermilk)	Cat: # 1502 Monosialoganglioside GM2	Cat: # 1503 Monosialoganglioside GM3 (buttermilk)	Cat: # 1504 Disialoganglioside GD3 (buttermilk)	Cat: # 1521 Glucocerebrosides (buttermilk)	Cat: # 1522 Glucocerebrosides (plant)
Fatty Acids								
C14:0	1						trace	
C16:0	21	14	8	2	6	8	15	
C16:1								
C18:0	3	6	3	82	1	1	3	
C18:1		4	trace					
C18:2								
C18:3								
C20:0	1	1	2	7	1	1	2	
C20:1								
C20:4								
C21:0					1	2		
C22:0	23	9	28	4	23	24	31	
C22:1								
C22:6								
C23:0	29	1	33	trace	36	35	28	
C24:0	20	15	20	1	22	21	17	
C24:1	1	5	3	2	3	3		
C25:0								
C25:1								
C26:0								
C26:1								
C27:0								
C27:1								
C14:0 2-OH								trace
C16:0 2-OH								79
C18:0 2-OH		trace						trace
C20:0 2-OH								
C22:0 2-OH		8						8
C23:0 2-OH								1
C24:0 2-OH		24						9
C24:1 2-OH		13						
C25:0 2-OH								
C25:1 2-OH								
C26:0 2-OH								
C26:1 2-OH								
C16 cis 9,10 methylene								
C18 cis 9,10 methylene								
Others	1	0	3	2	7	5	4	3
Total	100	100	100	100	100	100	100	100

Fatty Acid/FAME Application Guide

Analysis of Foods for Nutritional Needs

SUPELCO® Analytical

Free Fatty Acid Analysis

FAME Preparation

FAME Analysis

Fatty Acid / FAME Application Guide

Analysis of Foods for Nutritional Needs

We are cognizant of the impact our products play in nearly every aspect of modern life, from protection of the environment to the safety of consumer products in all market categories. However, it is rewarding when our products can be directly applied to topics of great interest to the general population. One area currently of public interest is nutrition. Obesity, diabetes, and cardiovascular disease, along with their related costs, are increasing in America, Europe, and in other parts of the world. Although heredity contributes, a clear link between diet and these maladies has been firmly established. (1-4)

One measure of the nutritional and health value of a food is its fat content. It is not only total fat, but also the type of fat that must be considered. Some 'good fats' are required for biochemical processes or necessary for dissolving fat-soluble vitamins. Other 'bad fats' interfere with biochemical processes or accumulate in the cardiovascular system, potentially leading to health problems. Currently, there is an increase in research into the safety and health effects of fatty acids and toward understanding their fundamental biochemistry.

For the food chemist, determining the fatty acid composition of a product may be difficult because foods can contain a complex mixture of saturated, monounsaturated, and polyunsaturated fatty acids, each with a variety of carbon chain lengths.

This brochure was assembled to provide food chemists with a valuable resource to assist in identifying the proper products for the GC analysis of fatty acids, either as free fatty acids or as fatty acid methyl esters. Many of these specialized products, such as GC columns, SPE tubes, reagents, and chemical standards, were specifically developed for use in the qualitative and quantitative identification of fatty acids. Details of each of these products are included throughout this brochure, which is arranged by analytical application. The diverse analytical applications, chromatograms, and product listings that are attached within this brochure were selected with the chromatographer in mind, to help them ensure accurate and reproducible analyses.

Want additional information beyond what this brochure provides? Page 23 lists product literature and also recommended reading written by experts and researchers. Another resource is the Sigma-Aldrich/Supelco FAME web site: *sigma-aldrich.com/fame*, where product listings, technical literature detailing how to use these products, chromatograms with peak IDs and conditions, and peer-reviewed literature references can be easily found. Supelco Technical Service chemists are also invaluable sources for providing guidance with the selection and use of applicable products. Supelco Technical Service chemists can be reached at 800-359-3041 (US and Canada only), 814-359-3041, or at *techservice@sial.com*

Table of Contents

Free Fatty Acids

Short chain, volatile fatty acids are typically analyzed in the free form using specialized columns. This group of compounds may be referred to as free fatty acids (FFAs), volatile fatty acids (VFA), or carboxylic acids. The analysis of fatty acids in the free form instead of as fatty acid methyl esters results in easier and quicker sample preparation. Additionally, artifact formation that may result from a derivatization procedure, is eliminated.

This section (pages 3-4) focuses on the analysis of free fatty acids. Details on the preparation (pages 5-6) and analysis (pages 7-20) of fatty acid methyl esters can be found in other sections.

GC Column Choices

For the GC analysis of free fatty acids, a specialized column that will not allow the adsorption of active carboxyl groups is required. The Nukol, with its acidic characteristic, is well-suited for this application, allowing chromatography with excellent peak shapes. For application, USP code, polymer, and temperature limit information, as well as catalog numbers, please refer to page 21.

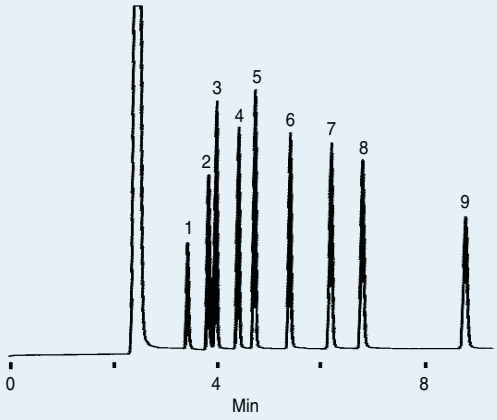
Chromatograms

The following selected chromatograms for this application are presented to assist the chromatographer in establishing analytical conditions. For assistance, contact Supelco Technical Service at 800-359-3041 (US and Canada only), 814-359-3041, or at *techservice@sial.com*

Figure 1. Short Chain Free Fatty Acids on the Nukol

column: Nukol, 30 m x 0.25 mm I.D., 0.25 µm (24107)
oven: 185 °C
det.: FID
carrier gas: helium, 20 cm/sec
injection: 1 µL, 100:1 split
sample: Volatile Free Acid Mix (46975-U), each analyte at 10 mM in deionized water

1. Acetic acid
2. Propionic acid
3. Isobutyric acid
4. Butyric acid
5. Isovaleric acid
6. Valeric acid
7. Isocaproic acid
8. Caproic acid
9. Heptanoic acid

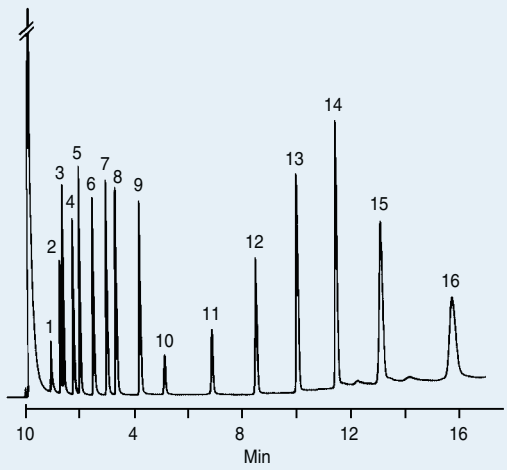


794-0479

Figure 2. Short and Long Chain Free Fatty Acids on the Nukol

column: Nukol, 15 m x 0.53 mm I.D., 0.50 µm (25326)
oven: 100 °C, 10 °C/min. to 220 °C
det.: FID
carrier gas: helium, 30 mL/min.
injection: 0.5 µL, direct injection
sample: 16 analytes, at various concentrations from 50 to 800 µg/mL

1. Acetic acid
2. Propionic acid
3. Isobutyric acid
4. Butyric acid
5. Isovaleric acid
6. Valeric acid
7. Isocaproic acid
8. Caproic acid
9. Heptanoic acid
10. Octanoic acid
11. Decanoic acid
12. Dodecanoic acid
13. Tetradecanoic acid
14. Hexadecanoic acid
15. Octadecanoic acid
16. Eicosanoic acid

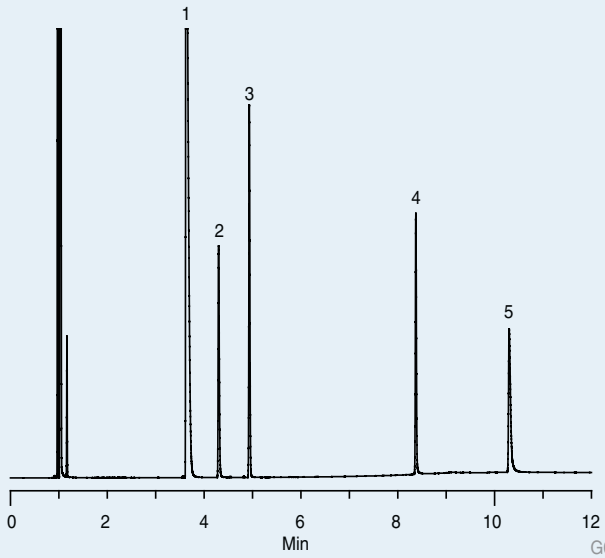


794-0480

Figure 3. Organic Acids on the Nukol

column: Nukol, 15 m x 0.32 mm I.D., 0.25 µm (24130)
oven: 80 °C (1 min.), 15 °C/min. to 200 °C (3 min.)
inj.: 250 °C
det.: FID, 250 °C
carrier gas: helium, 2 mL/min. constant
injection: 1 µL, 100:1 split
liner: 4 mm I.D., split, cup design
sample: 5 analytes, at concentrations indicated in 1 M H_3PO_4

1. Acetic acid, 8%
2. Propionic acid, 0.7%
3. Butyric acid, 0.7%
4. Sorbic acid, 0.7%
5. Benzoic acid, 0.7%



Chemical Standards

Standards for the determination of free fatty acids should be purchased from a chemical manufacturer with knowledge in the preparation, handling, storage, and shipment of volatile analytes. Sigma-Aldrich, with over 40 years in chemical standard manufacturing through the Supelco brand, offers the following standards.

Description			Cat. No.
Water Soluble Fatty Acid Mix 2 (WSFA-2)			47056
Each analyte at 0.1 wt. % in deionized water, 5 mL			
Acetic acid	*Isobutyric acid*	*Propionic acid*	
Butyric acid	*Isovaleric acid*	*Valeric acid*	
Water Soluble Fatty Acid Mix 4 (WSFA-4)			47058
Each analyte at 0.1 wt. % in deionized water, 5 mL			
Acetic acid	*Isovaleric acid*	*Propionic acid*	
Butyric acid	*2-Methylbutyric acid*	*Valeric acid*	
Isobutyric acid			
Volatile Free Acid Mix			46975-U
Each analyte at 10 mM in deionized water, 100 mL			
Acetic acid	*Hexanoic acid*	*4-Methylvaleric acid*	
Butyric acid	*Isobutyric acid*	*Propionic acid*	
Formic acid	*Isovaleric acid*	*Valeric acid*	
Heptanoic acid			
Non-Volatile Acid Standard Mix			46985-U
Each analyte at 0.01 meq/mL in deionized water, 100 mL			
Fumaric acid	*Methylmalonic acid*	*Pyruvic acid*	
Lactic acid	*Oxalacetic acid*	*Succinic acid*	
Malonic acid	*Oxalic acid*		

Solvents

All CHROMASOLV® solvents are prepared with unsurpassed attention to quality, and are designed for meeting stringent purity standards.

Description	Pkg. Size	Cat. No.
Chloroform, >=99.8%,amylene stabilized	100 mL 1 L	34854-100ML 34854-1L
Dichloromethane, >=99.8%, amylene stabilized	100 mL 1 L	34856-100ML 34856-1L
Hexane, >=95%	100 mL 1 L	270504-100ML 270504-1L
Heptane, >=99%	100 mL 1 L	34873-100ML 34873-1L
Toluene, 99.9%	100 mL 1 L	34866-100ML 34866-1L

Fatty Acid Methyl Ester (FAME) Preparation

GC can be used to analyze fatty acids either as free fatty acids or as fatty acid methyl esters. Details on the analysis of free fatty acids can be found on pages 3-4.

The primary reasons to analyze fatty acids as fatty acid methyl esters include:

- In their free, underivatized form, fatty acids may be difficult to analyze because these highly polar compounds tend to form hydrogen bonds, leading to adsorption issues. Reducing their polarity may make them more amenable for analysis.
- To distinguish between the very slight differences exhibited by unsaturated fatty acids, the polar carboxyl functional groups must first be neutralized. This then allows column chemistry to perform separations by boiling point elution (pages 7-9), and also by degree of unsaturation (pages 10-12), position of unsaturation (pages 13-15), and even the cis vs. trans configuration of unsaturation (pages 16-20).

The esterification of fatty acids to fatty acid methyl esters is performed using an alkylation derivatization reagent. Methyl esters offer excellent stability, and provide quick and quantitative samples for GC analysis. As shown in Figure 4, the esterification reaction involves the condensation of the carboxyl group of an acid and the hydroxyl group of an alcohol. Esterification is best done in the presence of a catalyst (such as boron trichloride). The catalyst protonates an oxygen atom of the carboxyl group, making the acid much more reactive. An alcohol then combines with the protonated acid to yield an ester with the loss of water. The catalyst is removed with the water. The alcohol that is used determines the alkyl chain length of the resulting esters (the use of methanol will result in the formation of methyl esters whereas the use of ethanol will result in ethyl esters).

Figure 4. Esterification Reaction

$$R\text{-}COOH + CH_3OH \xrightarrow{BCl_3} R\text{-}COO\text{-}CH_3 + H_2O$$

The following typical esterification procedure (using BCl_3-methanol) is intended as a guideline. It may need to be altered to meet the needs of a specific application.

1. Samples can be derivatized neat or after dissolving in solvent. If appropriate, dissolve sample in a non-polar solvent (such as hexane, heptane, or toluene). If the sample is in an aqueous solvent, first evaporate to dryness then use neat or dissolved in an organic, non-polar solvent.
2. Weigh 1-25 mg of sample into a 5-10 mL micro reaction vessel.
3. Add 2 mL BCl_3-methanol, 12% w/w. A water scavenger (such as 2,2-dimethoxypropane) can be added at this point.
4. Heat at 60 °C for 5-10 minutes. Derivatization times may vary, depending on the specific compound(s) being derivatized.
5. Cool, then add 1 mL water and 1 mL hexane.
6. Shake the reaction vessel (it is critical to get the esters into the non-polar solvent).
7. After allowing the layers to settle, carefully transfer the upper (organic) layer to a clean vial. Dry the organic layer by either:
   a. *Passing through a bed of anhydrous sodium sulfate during the transfer step to the clean vial.*
   b. *Adding anhydrous sodium sulfate to the clean vial then shaking.*
8. To determine the proper derivatization time, analyze aliquots of a representative sample using different derivatization times. Plot peak area (y-axis) vs derivatization time (x-axis). The minimum time to use is when no further increase in peak area is observed with increasing derivatization time (where the curve becomes flat).
9. If it is suspected that complete derivatization is never achieved, use additional reagent or re-evaluate temperature.
10. It is important to prepare a reagent blank, along with the samples, to identify any issues that may arise.

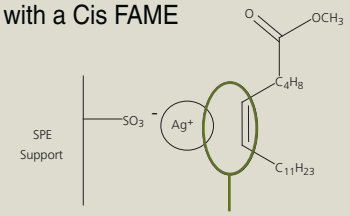
It is important to use only high quality derivatization reagents, to ensure that no artifacts are present during analysis. Additionally, only derivatization reagents with low moisture should be used, as the esterification reaction will be hindered by the presence of water. The storage conditions of derivatization reagents should be strictly adhered to, as some are susceptible to degradation during long-term storage. (5-6)

Description	Pkg. Size	Cat. No.
Derivatization Reagents		
BCl_3-Methanol, 12% w/w	20 x 1 mL	33353
BCl_3-Methanol, 12% w/w	20 x 2 mL	33089-U
BCl_3-Methanol, 12% w/w	400 mL	33033
BF_3-Methanol, 10% w/w	20 × 1 mL	33356
BF_3-Methanol, 10% w/w	19 × 2 mL	33020-U
BF_3-Methanol, 10% w/w	10 × 5 mL	33040-U
BF_3-Methanol, 10% w/w	400 mL	33021
BF_3-Butanol, 10% w/w	10 × 5 mL	33126-U
BF_3-Butanol, 10% w/w	100 mL	33125-U
Methanolic Base, 0.5 N	30 mL	33352
Methanolic Base, 0.5 N	100 mL	33080
Methanolic HCl, 0.5 N	20 × 1 mL	33354
Methanolic HCl, 0.5 N	10 × 5 mL	33095
Methanolic HCl, 3 N	20 × 1 mL	33355
Methanolic HCl, 3 N	10 × 3 mL	33051
Methanolic HCl, 3 N	400 mL	33050-U
Methanolic H_2SO_4, 10% v/v	6 × 5 mL	506516
Micro Reaction Vessels and Caps		
5 mL Clear, with Hole Caps	12 ea	33299
5 mL Clear, with Solid Caps	12 ea	27039
5 mL Amber, with Hole Caps	12 ea	27478-U
10 mL Clear, with Hole Caps	12 ea	27479
Water Scavenger		
2,2-Dimethoxypropane, 98%	25 mL	D136808-25ML
Sodium Sulfate, Anhydrous, >=99.0%		
Granular	500 g	239313-500G
Granular	1 Kg	239313-1KG
Granular	2.5 Kg	239313-2.5KG

FAME Fractionation Using Silver-Ion SPE Tubes

Discovery® Ag-Ion SPE tubes are based on silver-ion chromatography work first pioneered in 1966. As depicted in Figure 5, when silver ions are anchored onto SCX SPE functional group as counter-ions through electrostatic interaction, they have the ability to form polar complexes with the double bonds of unsaturated FAMEs under normal-phase conditions. More specifically, pi electrons of the FAME double bonds act as electron donors and silver-ions act as electron acceptors.

Figure 5. Schematic Representation of Ag-Ion SPE Interacting with a Cis FAME



Charge-transfer complex between Ag+ and unsaturated bond

G003513

The strength of the interactions between FAMEs and the silver counter-ions varies depending on the structure of the FAME:

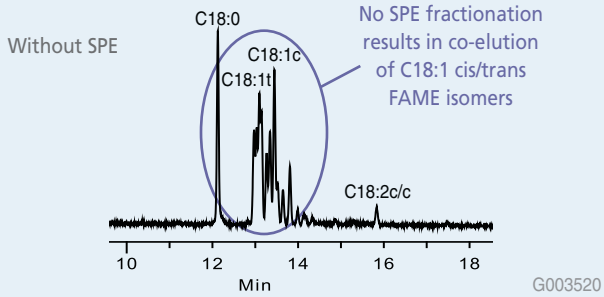
- Saturated FAMEs (no double bonds) have no interactions. Therefore, they are poorly retained.
- Cis double bonds offer more steric accessibility than their trans counter part, and therefore form stronger polar complexes. As a result, cis fatty acids are more strongly retained than trans fatty acids.
- FAMEs with a greater number of double bonds have stronger interactions than those with fewer double bonds. Trienes are retained stronger than dienes, which are retained stronger than monoenes.

The differences in the strengths of these polar complexes between classes of FAMEs and the silver counter-ions can be exploited, allowing for fractionation of cis and trans isomers by adjusting the elution solvent strength. Figure 6 shows GC analyses of microwave popcorn fatty acids as FAMEs, without SPE and also with SPE fractionation. As observed, changes in the strength of the elution solvent result in 'cleaner' chromatograms of FAME classes, useful for the detailed analysis of geometric isomers.

The recovery distribution of selected C18 FAMEs in each fraction, shown in Table 1, indicates the effectiveness of Discovery Ag-Ion SPE tubes for the fractionation of cis/trans FAMEs (strength of the interaction is greater for cis FAMEs than for trans FAMEs) and also for the fractionation of FAMEs by degree of unsaturation (strength of the interaction increases with increasing number of double bonds).

Figure 6. GC Analysis of Microwave Popcorn FAMEs

sample/matrix: 1.0 g of oil scraped from a popped bag of microwave popcorn was mixed with 8 mL DI water, liquid-liquid extracted with petroleum ether, methylated with BF_3-methanol, liquid-liquid extracted with hexane, concentrated to 5 mL, then dried with sodium sulfate (complete procedure can be found in T406062 IRV)
SPE tube: Discovery Ag-Ion, 750 mg/6 mL
conditioning: 4 mL acetone followed by 4 mL hexane
sample addition: 1 mL of extract in hexane
elution: (fraction 1): 6 mL hexane:acetone (96:4)
elution: (fraction 2): 4 mL hexane:acetone (90:10)
elution: (fraction 3): 4 mL acetone
column: SP-2560, 75 m x 0.18 mm I.D., 0.14 µm (23348-U)
oven: 180 °C
inj.: 220 °C
det.: FID, 220 °C
carrier gas: hydrogen, 40 cm/sec
injection: 0.5 µL, 100:1 split
liner: 4 mm I.D., split, cup design



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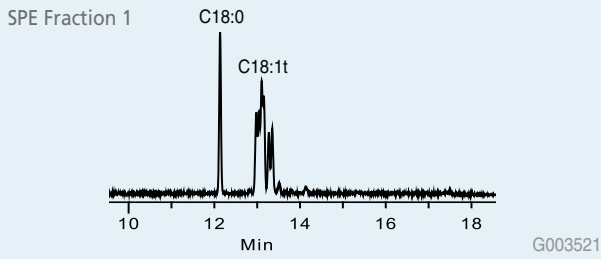

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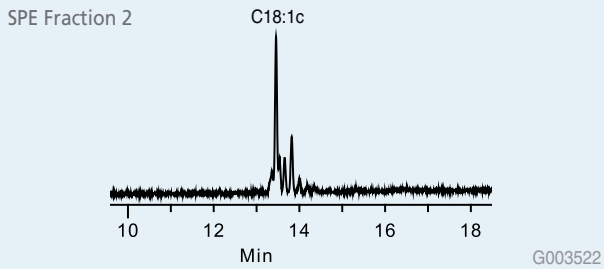

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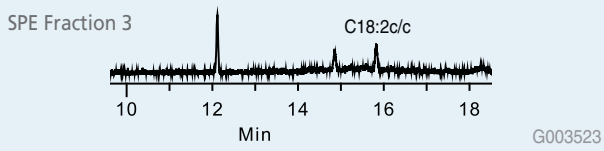


G003523

Table 1. Recovery Distribution of Selected C18 FAMEs by Fraction

Fraction	C18:0	C18:1 Trans	C18:1 Cis	C18:2 Cis/Cis
1	100%	100%	2%	----
2	----	----	98%	----
3	----	----	----	100%

Description	Pkg. Size	Cat. No.
750 mg/6mL SPE Tube	30	**54225-U**
750 mg/1mL Rezorian™ Cartridge	10	**54226-U**

FAMEs by Boiling Point Elution

The analysis of FAMEs by boiling point elution is used for pattern recognition. This technique is useful for:

- Determining the source of fatty acids when compared to patterns/profiles from known references, each with a unique fatty acid distribution. Qualitative and quantitative analysis is fundamental to food manufacturers for quality control, purity determination, and for the detection of adulterants.
- Observing subtle differences from sample to sample, which allows the effects on fatty acid metabolism, caused by either external or internal influences, to be detected. This growing area of research is commonly referred to as metabolomics, and extends to compound classes beyond fatty acids.

GC Column Choices

The separation of analytes in a boiling point elution requires the use of a non-polar GC column. The Equity-1, a rugged non-polar column, can be used for this application with great success. For application, USP code, polymer, and temperature limit information, as well as catalog numbers, please refer to page 21.

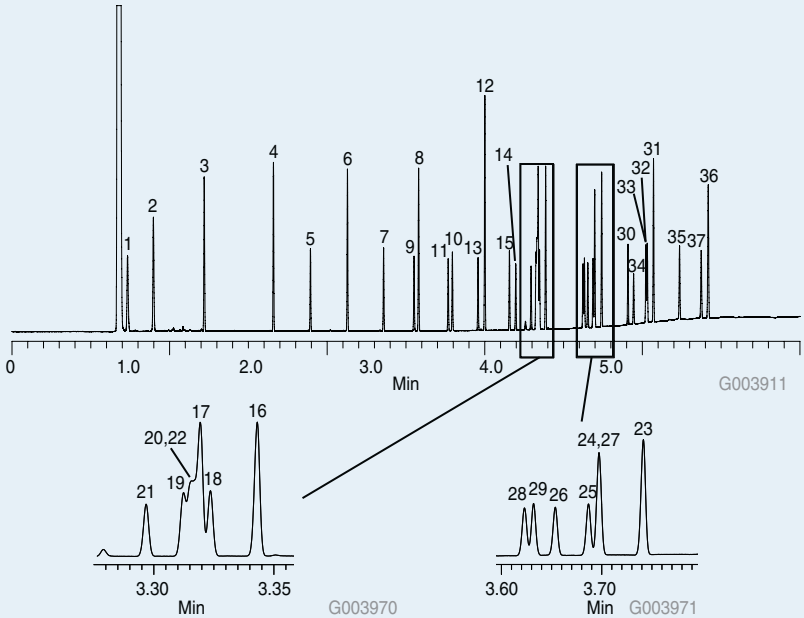
Chromatograms

The following selected chromatograms for this application are presented here to assist the chromatographer in establishing analytical conditions. For assistance, contact Supelco Technical Service at 800-359-3041 (US and Canada only), 814-359-3041, or at ***techservice@sial.com***

Figure 7. 37-Component FAME Mix on the Equity-1

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.: 250 °C
det.: 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

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 %

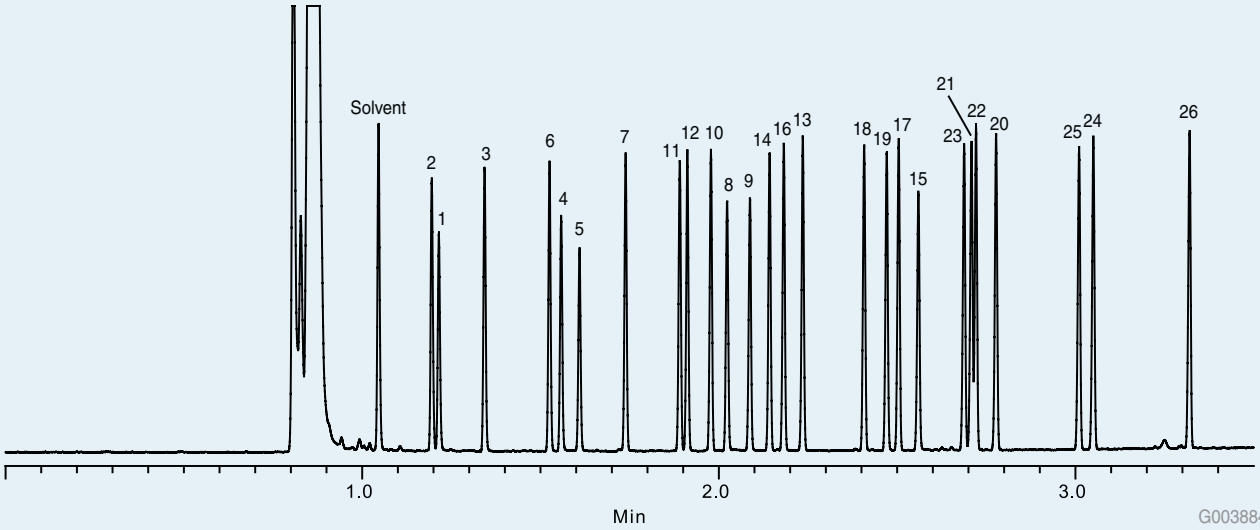


FAMEs by Boiling Point Elution

Figure 8. Bacterial Acid Methyl Esters (BAMEs) on the Equity-1

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.: 280 °C
det.: 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

1. Methyl 2-hydroxydecanoate (2-OH-C10:0)
2. Methyl undecanoate (C11:0)
3. Methyl dodecanoate (C12:0)
4. Methyl 2-hydroxydodecanoate (2-OH-C12:0)
5. Methyl 3-hydroxydodecanoate (3-OH-C12:0)
6. Methyl tridecanoate (C13:0)
7. Methyl tetradecanoate (C14:0)
8. Methyl 2-hydroxytetradecanoate (2-OH-C14:0)
9. Methyl 3-hydroxytetradecanoate (3-OH-C14:0)
10. Methyl pentadecanoate (C15:0)
11. Methyl 13-methyltetradecanoate (i-C15:0)
12. Methyl 12-methyltetradecanoate (α-C15:0)
13. Methyl hexadecanoate (C16:0)
14. Methyl 14-methylpentadecanoate (i-C16:0)
15. Methyl-2-hydroxyhexadeanoate (2-OH-C16:0)
16. Methyl cis-9-hexadecenoate ($C16:1^{9}$)
17. Methyl heptadecanoate (C17:0)
18. Methyl 15-methylhexadecanoate (i-C17:0)
19. Methyl cis-9,10-methylenehexadecanoate ($C17:0^{\Delta}$)
20. Methyl octadecanoate (C18:0)
21. Methyl cis-9-octadecenoate ($C18:1^{9}$)
22. Methyl trans-9-octadecenoate ($C18:1^{9}$) and Methyl cis-11-octadecanoate ($C18:1^{11}$)
23. Methyl cis-9,12-octadecadienoate ($C18:2^{9,12}$)
24. Methyl nonadecanoate (C19:0)
25. Methyl cis-9,10-methyleneoctadecanoate ($C19:0^{\Delta}$)
26. Methyl eicosanoate (C20:0)



Chemical Standards

To assign identification when performing the boiling point elution of fatty acid methyl esters for pattern recognition, standards of known reference must be used. To assist in confirming identification, Sigma-Aldrich offers the following chemical standards. One standard is the Supelco 37-Component FAME Mix (47885-U). This standard contains methyl esters of fatty acids ranging from C4 to C24, including key monounsaturated and polyunsaturated fatty acids, making this standard very useful to food analysts since it can be used to identify fatty acids in many different types of foods.

Characterized Reference Oils are offered that can be used as controls or check samples, providing an excellent means of standardizing applications and comparing results to others. AOCS Animal and Vegetable Reference Mixes are also available. Each quantitative mix is similar to the fatty acid distribution of certain oils, as specified in Table 2, and conforms to the requirements of AOCS Method Ce 1-62. (7)

Table 2. AOCS Animal and Vegetable Reference Mixes

Mix	Oils with Similar Fatty Acid Distribution
AOCS No. 1	Corn, cottonseed, kapok, poppyseed, rice, safflower, sesame, soybean, sunflower, and walnut
AOCS No. 2	Hempseed, linseed, perilla, and rubberseed
AOCS No. 3	Mustard seed, peanut, and rapeseed
AOCS No. 4	Neatsfoot, olive, and teaseed
AOCS No. 5	Babassu, coconut, ouri-curi, and palm kernel
AOCS No. 6	Lard, beef tallow, mutton tallow, and palm

Description	Cat. No.
Supelco 37-Component FAME Mix 10 mg/mL (total wt.) in methylene chloride, 1 mL See Figure 7 for list of analytes and concentrations	47885-U
Bacterial Acid Methyl Ester (BAME) Mix 10 mg/mL (total wt.) in methyl caproate, 1 mL qualitative standard (individual wt. % not available) See Figure 8 for a representative distribution	47080-U
Characterized Reference Oils	
Canola Oil, 1 g	46961
Coconut Oil, 1 g	46949
Corn Oil, 1 g	47112-U
Cottonseed Oil, 1 g	47113
Lard Oil, 1 g	47115-U
Linseed (Flaxseed) Oil, 1 g	47559-U
Menhaden Fish Oil, 1 g	47116
Olive Oil, 1 g	47118
Palm Oil, 1 g	46962
Peanut Oil, 1 g	47119
Safflower Oil, 1 g	47120-U
Soybean Oil, 1 g	47122
Sunflower Seed Oil, 1 g	47123
AOCS Animal and Vegetable Reference Mixes	
AOCS No.1, 100 mg	O7006-1AMP
AOCS No.2, 100 mg	O7131-1AMP
AOCS No.3, 100 mg	O7256-1AMP
Rapeseed Oil Reference Mix, 100 mg *Modern low erucic acid oil*	O7756-1AMP
AOCS No.4, 100 mg	O7381-1AMP
AOCS No.5, 100 mg	O7506-1AMP
AOCS No.6, 100 mg	O7631-1AMP

	Methyl Ester (% composition by weight)														
Description	C8:0 (caprylate)	C10:0 (caprate)	C12:0 (laurate)	C14:0 (myristate)	C16:0 (palmitate)	C16:1 (palmitoleate)	C18:0 (stearate)	C18:1 (oleate)	C18:2 (linoleate)	C18:3 (linolenate)	C20:0 (arachidate)	C20:1 (eicosenoate)	C22:0 (behenate)	C22:1 (erucate)	C24:0 (lignocerate)
AOCS No. 1					6.0		3.0	35.0	50.0	3.0	3.0				
AOCS No. 2					7.0		5.0	18.0	36.0	34.0					
AOCS No. 3				1.0	4.0		3.0	45.0	15.0	3.0	3.0		3.0	20.0	3.0
AOCS No. 4					11.0		3.0	80.0	6.0						
AOCS No. 5	7.0	5.0	48.0	15.0	7.0		3.0	12.0	3.0						
AOCS No. 6				2.0	30.0	3.0	14.0	41.0	7.0	3.0					
AOCS for Low Erucic Rapeseed Oil				1.0	4.0		3.0	60.0	12.0	5.0	3.0	1.0	3.0	5.0	3.0

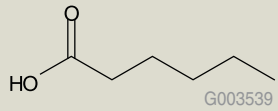
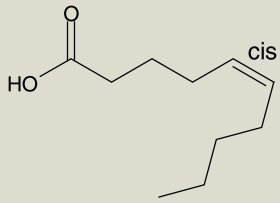
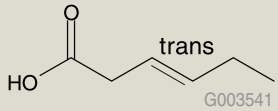
FAMEs by Degree of Unsaturation

Saturated, monounsaturated, polyunsaturated, and cis/trans configuration all refer to the structure of fatty acid moieties. Some of these structures are shown in Table 3, along with common sources and potential health effects. Because of this, it is important for food manufacturers to measure and report their levels so consumers have the chance to establish healthy dietary strategies.

Nutritionally, saturated fats are of particular concern, because an excess in the diet leads to their accumulation in the cardiovascular system, resulting in several health-related problems. Due to this, food manufacturers typically report the saturated fat vs. unsaturated fat content on the nutritional panel, allowing consumers wishing to have a healthier diet to make food choices with less saturated fat.

This section (pages 10-12) focuses on applications to determine the degree of unsaturation. Applications to determine the position of unsaturation are covered on pages 13-15. Applications to determine the cis/trans configuration of unsaturation are covered on pages 16-20.

Table 3. Types of Fatty Acids

Structure	Common Sources	Health Effects
Saturated Fatty Acids (no double bonds)  G003539	Palm kernel, Palm oil, Coconut (tropical oils), Butter, Hydrogenated Oils and Shortenings	Raise LDL cholesterol and increase risk of cardiovascular disease
Mono and Polyunsaturated Cis Fatty Acids (≥ 1 cis double bond)  G003540	Fluid/Liquid oils such as Soybean, Canola, Olive, Sunflower, and Corn	Lower LDL cholesterol, associated with reduced risk of cardiovascular disease
Mono and Polyunsaturated Trans Fatty Acids (≥ 1 trans double bond)  G003541	Partially Hydrogenated Oils, Shortenings and Margarines	Raise LDL cholesterol, like saturated fat, may also lower HDL. Associated with increased cardiovascular disease and possible type II diabetes

GC Column Choices

Determining the degree of fatty acid unsaturation of a product is difficult because foods can contain a complex mixture of saturated, monounsaturated, and polyunsaturated fatty acids with a variety of carbon chain lengths.

- Milk and butter contain saturated C4 to C20, monounsaturated C16 and C18, and polyunsaturated C18 fatty acids.
- Vegetable oils contain saturated C6 to C24, monounsaturated C16, and monounsaturated cis C18, C20, and C22 fatty acids.
- Margarines contain the same fatty acids as vegetable oils plus monounsaturated trans C18, C20, and C22, and polyunsaturated C18 fatty acids.
- Fish and meat typically contain saturated and monounsaturated C12 to C24+ fatty acids, plus polyunsaturated omega 3 C18, C20, and C22, and polyunsaturated omega 6 C18 and C20 fatty acids.
- Fish tends to be richer in the polyunsaturated omega 3 fatty acids, whereas meats are richer in the polyunsaturated omega 6 fatty acids.

To confirm identification, very efficient capillary GC columns with the ability to resolve a large number of peaks are required.

- Omegawax columns provide highly reproducible analyses, being specially tested for reproducibility of FAME equivalent chain length (ECL) values and resolution of key components.
- The SLB-IL100 column exhibits one of the highest polarities of any GC phase, providing an alternative selectivity for FAME applications typically performed on Omegawax columns.

For application, USP code, polymer, and temperature limit information, as well as catalog numbers, please refer to page 22.

Chromatograms

The following selected chromatograms for this application are presented here to assist the chromatographer in establishing analytical conditions. For assistance, contact Supelco Technical Service at 800-359-3041 (US and Canada only), 814-359-3041, or at ***techservice@sial.com***

Figure 9. 37-Component FAME Mix on the Omegawax 100

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.: 250 °C
det.: 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

See Figure 7 for list of analytes and concentrations

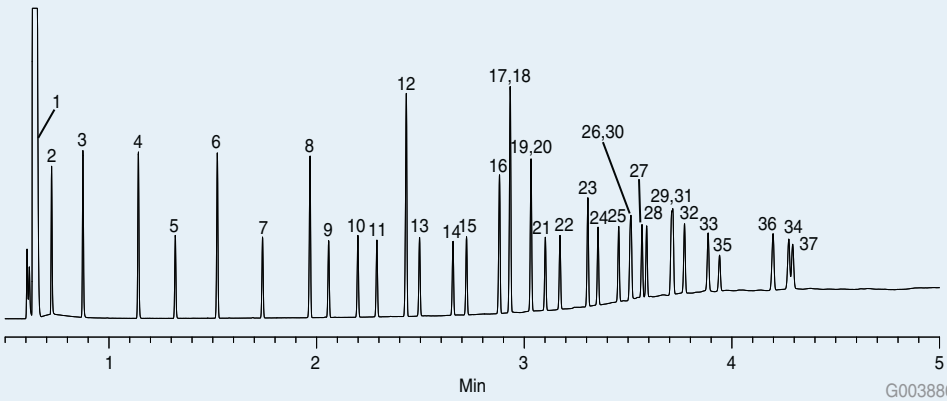


Figure 10. 37-Component FAME Mix on the Omegawax 250

column: Omegawax 250, 30 m x 0.25 mm I.D., 0.25 µm (24136)
oven: 50 °C (2 min.), 4 °C/min. to 220 °C (15 min.)
inj.: 250 °C
det.: FID, 260 °C
carrier gas: helium, 30 cm/sec @ 205 °C
injection: 1 µL, 100:1 split
sample: Supelco 37-Component FAME Mix (47885-U), analytes at concentrations indicated in methylene chloride

See Figure 7 for list of analytes and concentrations

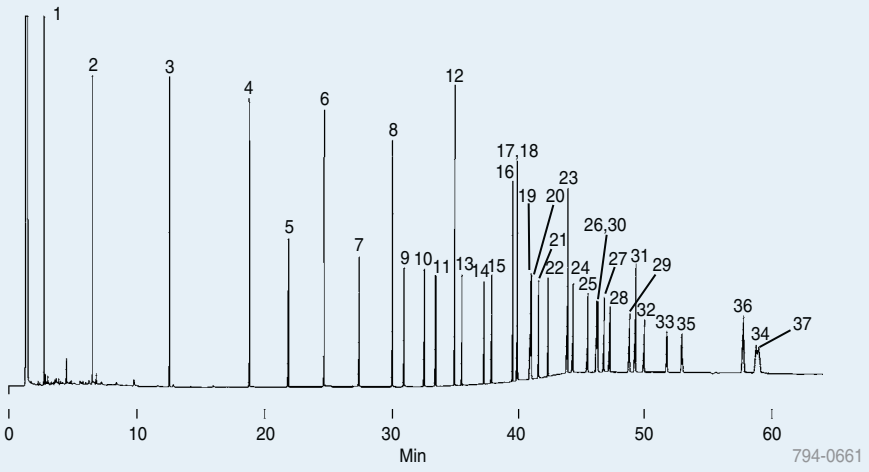
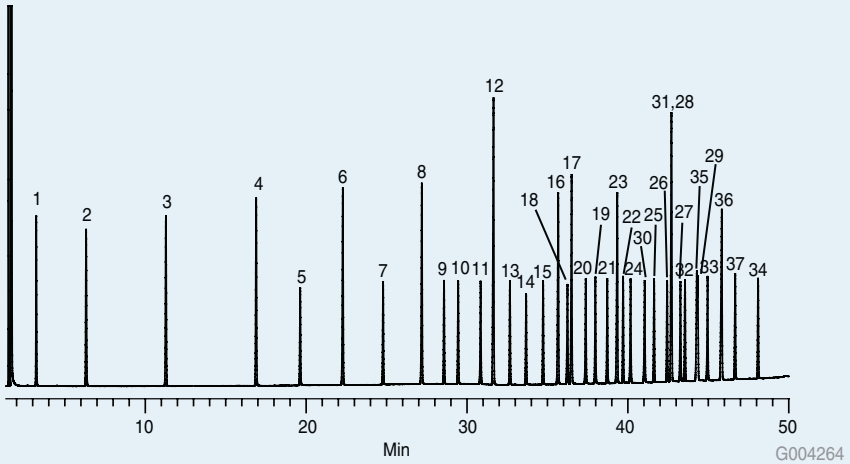


Figure 11. 37-Component FAME Mix on the 30 m SLB-IL100

Chromatogram courtesy of Prof. Luigi Mondello (Univ. of Messina, Italy)

column: SLB-IL100, 30 m x 0.25 mm I.D., 0.20 µm (28884-U)
oven: 50 °C, 3.0 °C/min. to 240 °C
inj.: 240 °C
det.: FID, 240 °C
carrier gas: helium, 40 cm/sec constant
injection: 1 µL, 50:1 split
sample: Supelco 37-Component FAME Mix (47885-U), analytes at concentrations indicated in methylene chloride

See Figure 7 for list of analytes and concentrations

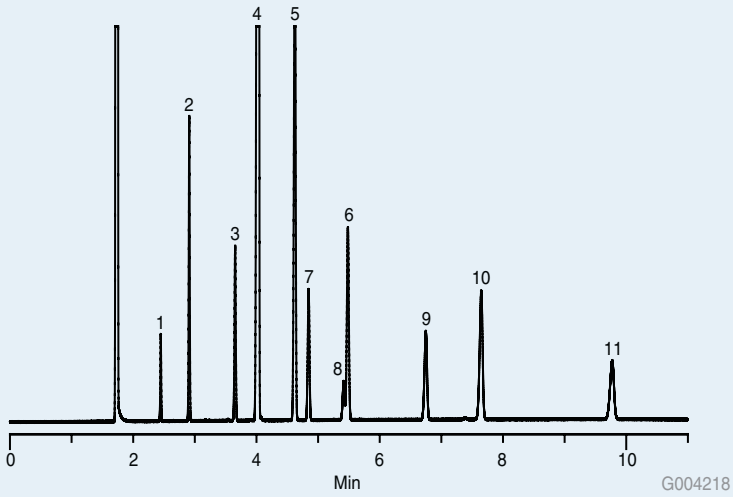


FAMEs by Degree of Unsaturation

Figure 12. Rapeseed Oil FAMEs on the SLB-IL100

column: SLB-IL100, 30 m x 0.25 mm I.D., 0.20 µm (28884-U)
oven: 180 °C
inj.: 250 °C
det.: FID, 250 °C
carrier gas: helium, 30 cm/sec @ 180 °C
injection: 1 µL, 100:1 split
liner: 4 mm I.D., split, cup
sample: Rapeseed oil FAME mix, 5 mg/mL total FAMEs in methylene chloride

1. C14:0
2. C16:0
3. C18:0
4. C18:1n9c
5. C18:2
6. C18:3
7. C20:0
8. C20:1
9. C22:0
10. C22:1
11. C24:0



Chemical Standards

To assist in assigning identifications based on degree of unsaturation, Sigma-Aldrich offers the following standards. One standard is the Supelco 37-Component FAME Mix (47885-U). This standard contains methyl esters of fatty acids ranging from C4 to C24, including key monounsaturated and polyunsaturated fatty acids, making this standard very useful to food analysts since it can be used to identify fatty acids in many different types of foods.

Several convenient kits of either derivatized FAMEs or underivatized fatty acids are also offered, so analysts can formulate their own mixes. These kits contain each individual analyte in a separate vial, with all vials contained in a sturdy storage box.

Description			Cat. No.
Supelco 37-Component FAME Mix 10 mg/mL (total wt.) in methylene chloride, 1 mL *See Figure 7 for list of analytes and concentrations*			47885-U
C6-C24, Even Carbon Number, Saturated FAMEs Kit 10 individual vials, one analyte per vial *Caproic Acid Methyl Ester (C6:0), 1 g* *Caprylic Acid Methyl Ester (C8:0), 1 g* *Capric Acid Methyl Ester (C10:0), 1 g* *Lauric Acid Methyl Ester (C12:0), 1 g*	*Myristic Acid Methyl Ester (C14:0), 1 g* *Palmitic Acid Methyl Ester (C16:0), 1 g* *Stearic Acid Methyl Ester (C18:0), 1 g*	*Arachidic Acid Methyl Ester (C20:0), 1 g* *Behenic Acid Methyl Ester (C22:0), 1 g* *Lignoceric Acid Methyl Ester (C24:0), 1 g*	ME10-1KT
C6-C24, Even Carbon Number, Saturated Fatty Acid Kit 10 individual vials, one analyte per vial *Caproic Acid (C6:0), 10 mL* *Caprylic Acid (C8:0), 10 mL* *Capric Acid (C10:0), 10 g* *Lauric Acid (C12:0), 10 g*	*Myristic Acid (C14:0), 10 g* *Palmitic Acid (C16:0), 10 g* *Stearic Acid (C18:0), 10 g*	*Arachidic Acid (C20:0), 10 g* *Behenic Acid (C22:0), 10 g* *Lignoceric Acid (C24:0), 10 g*	EC10-1KT
C6-C24 Saturated FAMEs Kit 19 individual vials, one analyte per vial *Caproic Acid Methyl Ester (C6:0), 1 g* *Heptanoic Acid Methyl Ester (C7:0), 1 g* *Caprylic Acid Methyl Ester (C8:0), 1 g* *Nonanoic Acid Methyl Ester (C9:0), 1 g* *Capric Acid Methyl Ester (C10:0), 1 g* *Undecanoic Acid Methyl Ester (C11:0), 1 g* *Lauric Acid Methyl Ester (C12:0), 1 g*	*Tridecanoic Acid Methyl Ester (C13:0), 1 g* *Myristic Acid Methyl Ester (C14:0), 1 g* *Pentadecanoic Acid Methyl Ester (C15:0), 1 g* *Palmitic Acid Methyl Ester (C16:0), 1 g* *Heptadecanoic Acid Methyl Ester (C17:0), 1 g* *Stearic Acid Methyl Ester (C18:0), 1 g*	*Nonadecanoic Acid Methyl Ester (C19:0), 1 g* *Arachidic Acid Methyl Ester (C20:0), 1 g* *Heneicosanoic Acid Methyl Ester (C21:0), 1 g* *Behenic Acid Methyl Ester (C22:0), 1 g* *Tricosanoic Acid Methyl Ester (C23:0), 1 g* *Lignoceric Acid Methyl Ester (C24:0), 1 g*	ME19-1KT
C24-C31 Saturated FAMEs Kit 7 individual vials, one analyte per vial *Lignoceric Acid Methyl Ester (C24:0), 1 g* *Pentacosanoic Acid Methyl Ester (C25:0), 1 g* *Hexacosanoic Acid Methyl Ester (C26:0), 100 mg* *Heptacosanoic Acid Methyl Ester (C27:0), 100 mg*	*Octocosanoic Acid Methyl Ester (C28:0), 100 mg* *Triacontanoic Acid Methyl Ester (C30:0), 100 mg* *Hentriacontanoic Acid Methyl Ester (C31:0), 100 mg*		ME7-1KT

Omega 3 and Omega 6 Fatty Acids as FAMEs

Essential fats are nutrients that must be obtained from the diet because humans lack the anabolic processes for their synthesis. Essential fats serve multiple purposes in the body including:

- Production of eicosanoids, which affect inflammation and cellular function.
- Production of lipoxins and resolvins, which affect inflammation.
- Production of endogenous cannabinoids, which affect mood and behavior.
- Influencing cell signaling.
- Regulation of blood pressure, blood clotting, lipid levels, immune response, and gene expression.

There are two closely related groups of essential fats, the omega 3 and omega 6 fatty acids. Both are unsaturated fatty acids, with the initial double bond located directly after the third (omega 3) or the sixth (omega 6) carbon atom as measured from the methyl end. Omega 3 fatty acids are found in fish oils and some nut oils. Seed oils are the primary dietary source of omega 6 fatty acids.

Before the advent of agriculture, human diets were thought to have consisted of an equal amount of omega 3 and omega 6 fatty acids. In contrast, the current western diet has a 1:7 ratio of omega 3 to omega 6 fatty acids. Low levels of omega 3 fatty acids, or an altered ratio of omega 3 to omega 6 fatty acids, may play a key role in a number of human diseases:

- Increased consumption of omega 3 fatty acids has been linked with reducing coronary heart disease.
- An excess of omega 6 fatty acids can interfere with the health benefits of omega 3 fatty acids, and has also been linked with several detrimental health conditions.

As a result of consumers' desire to have 'healthier fat' in the diet, the analysis of the omega 3 and omega 6 fatty acid content of food products has become a very active area of research for many food companies.

GC Column Choices

The omega 3 and omega 6 FAMEs may have very similar physical (such as boiling point) and chemical (such as chain length) properties as other FAMEs that may be present in the sample. Therefore, specialized GC columns with the ability to resolve these specific FAMEs are required for proper identification.

- Omegawax columns provide highly reproducible analyses, being specially tested for reproducibility of FAME equivalent chain length (ECL) values and resolution of key components, specifically the omega 3 and omega 6 FAMEs. This column is specified in AOAC Method 991.39 and AOCS Method Ce 1b-89. (8-9)
- The SLB-IL100 column exhibits one of the highest polarities of any GC phase, providing an alternative selectivity for FAME applications typically performed on Omegawax columns.

For application, USP code, polymer, and temperature limit information, as well as catalog numbers, please refer to page 22.

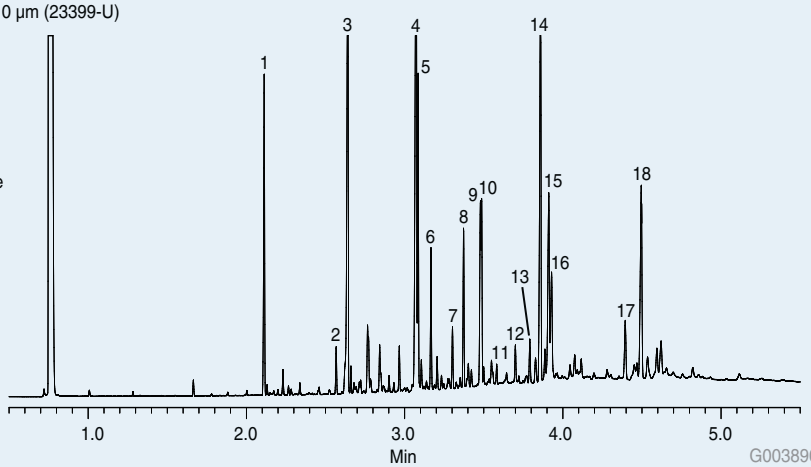
Chromatograms

The following selected chromatograms for this application are presented here to assist the chromatographer in establishing analytical conditions. For assistance, contact Supelco Technical Service at 800-359-3041 (US and Canada only), 814-359-3041, or at ***techservice@sial.com***

Figure 13. Marine Source FAMEs on the Omegawax 100

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.: 250 °C
det.: 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

1. C14:0
2. C16:0
3. C16:1n7
4. C18:1n9
5. C18:1n7
6. C18:2n6
7. C18:3n3
8. C18:4n3
9. C20:1n11
10. C20:1n9
11. C20:1n7
12. C20:4n6
13. C20:4n3
14. C20:5n3
15. C22:1n11
16. C22:1n9
17. C22:5n3
18. C22:6n3

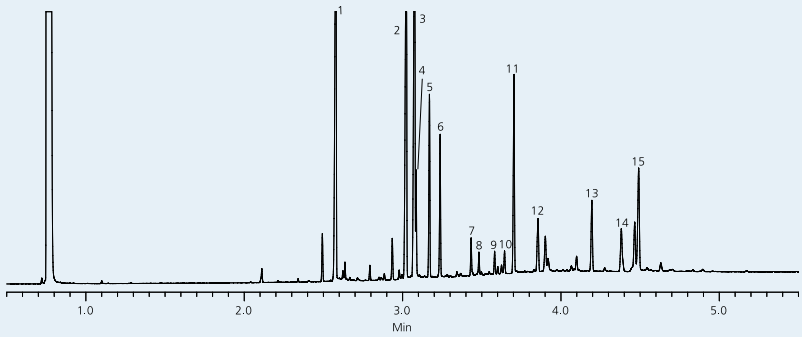


Chromatograms

Figure 14. Animal Source FAMEs on the Omegawax 100

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.: 250 °C
det.: 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

1. C16:0
2. C18:0
3. C18:1n9
4. C18:1n7
5. C18:2n6
6. C18:3n6
7. C20:0
8. C20:1n9
9. C20:2n9
10. C20:3n6
11. C20:4n6
12. C20:5n3
13. C22:5n6
14. C22:5n3
15. C22:6n3

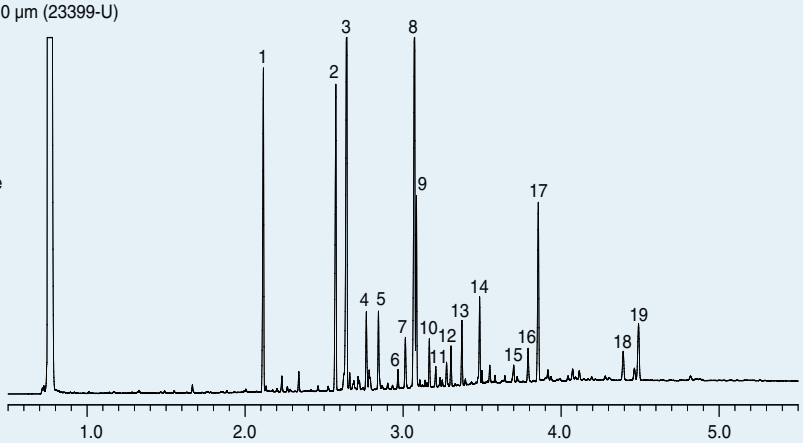


G003892

Figure 15. Menhaden Oil FAMEs on the Omegawax 100

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.: 250 °C
det.: 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

1. C14:0
2. C16:0
3. C16:1n7
4. C16:2n4
5. C16:3n4
6. C16:4n1
7. C18:0
8. C18:1n9
9. C18:1n7
10. C18:2n6
11. C18:3n4
12. C18:3n3
13. C18:4n3
14. C20:1n9
15. C20:4n6
16. C20:4n3
17. C20:5n3
18. C22:5n3
19. C22:6n3



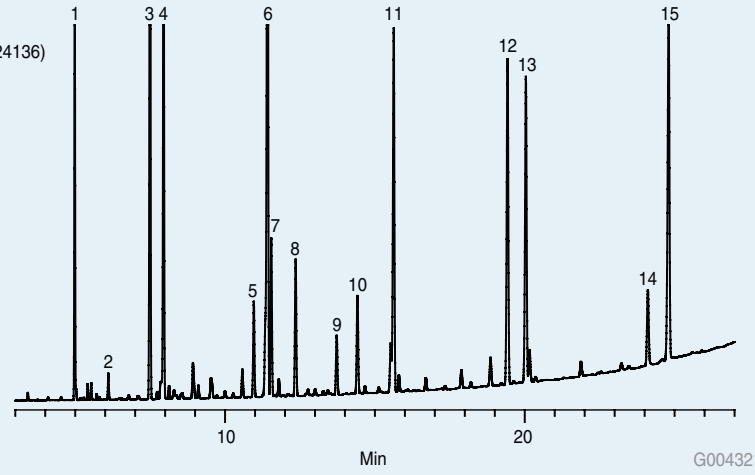
G003891

Figure 16. Cod Liver Oil FAMEs on the Omegawax 250

Chromatogram courtesy of Prof. Luigi Mondello (Univ. of Messina, Italy)

column: Omegawax 250, 30 m x 0.25 mm I.D., 0.25 µm (24136)
oven: 180 °C, 3.0 °C/min. to 270 °C
inj.: 250 °C
det.: FID, 270 °C
carrier gas: hydrogen, 35 cm/sec constant
injection: 1 µL, 50:1 split
sample: cod liver oil FAMEs

1. C14:0
2. C15:0
3. C16:0
4. C16:1n7
5. C18:0
6. C18:1n9
7. C18:1n7
8. C18:2n6
9. C18:3n3
10. C18:4n3
11. C20:1n9
12. C20:5n3
13. C22:1n9
14. C22:5n3
15. C22:6n3



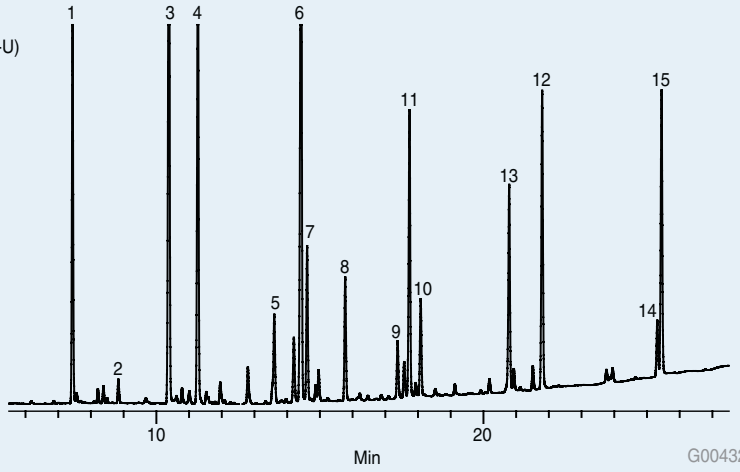
G004321

Figure 17. Cod Liver Oil FAMEs on the SLB-IL100

Chromatogram courtesy of Prof. Luigi Mondello (Univ. of Messina, Italy)

column: SLB-IL100, 30 m x 0.25 mm I.D., 0.20 µm (28884-U)
oven: 120 °C, 3.0 °C/min. to 240 °C
inj.: 240 °C
det.: FID, 240 °C
carrier gas: hydrogen, 35 cm/sec constant
injection: 1 µL, 50:1 split
sample: cod liver oil FAMEs

Same Peak IDs as Figure 16



Chemical Standards

To assist in confirming omega 3 and omega 6 identifications, Sigma-Aldrich offers the following standards. One standard is the Supelco 37-Component FAME Mix (47885-U). This standard contains methyl esters of fatty acids ranging from C4 to C24, including key monounsaturated and polyunsaturated fatty acids, making this standard very useful to food analysts since it can be used to identify fatty acids in many different types of foods.

The PUFA (polyunsaturated fatty acid) methyl ester mixes are complex qualitative standard mixtures, which can be used to verify the presence of omega 3 and omega 6 FAMEs. Because they are extracted from natural materials, relative peak sizes and compositions may vary from lot to lot.

Many omega 3 and omega 6 fatty acids and FAMEs are also available as individual compounds or standards. Each product comes with a Certificate of Analysis that includes a purity determination. Standards are prepared gravimetrically using NIST traceable weights. The availability of small package sizes eliminates the need to buy bulk material as standards.

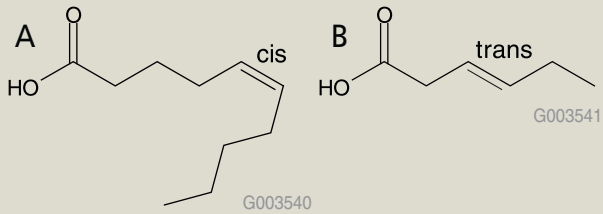
Description	Cat. No.
Supelco 37-Component FAME Mix 10 mg/mL (total wt.) in methylene chloride, 1 mL *See Figure 7 for list of analytes and concentrations*	47885-U
PUFA No. I (Marine Source) 100 mg (total wt.) qualitative standard (individual wt. % not available) *See Figure 13 for a representative distribution*	47033
PUFA No. II (Animal Source) 100 mg (total wt.) qualitative standard (individual wt. % not available) *See Figure 14 for a representative distribution*	47015-U
PUFA No. III (from Menhaden Oil) 100 mg (total wt.) qualitative standard (individual wt. % not available) *See Figure 15 for a representative distribution*	47085-U
Individual Essential Fatty Acids and FAMEs	
Linoleic Acid (C18:2n6) , 5 mL or 25 mL	62230
α-Linolenic Acid (C18:3n3), 1 mL or 5 mL	62160
γ-Linolenic Acid (C18:3n6), 100 mg or 500 mg	62174
Methyl Stearidonate Solution (C18:4n3), 100 mg/mL in ethanol	56463
cis-11,14-Eicosadienoic Acid (C20:2n6), 25 mg or 100 mg	E3127
cis-5,8,11,14-Eicosatetraenoate Acid Methyl Ester (C20:4n6), 1 mL	47572-U
Arachidonic acid, (C20:4n6), 10 mg, 50 mg, 100 mg, 500 mg, 1g	A9673
cis-5,8,11,14,17-Eicosapentaenoic Acid Methyl Ester (C20:5n3), 100 mg	17266
cis-7,10,13,16-Docosatetraenoic Acid (C22:4n6), 10 mg	49557
cis-7,10,13,16,19-Docosapentaenoic Acid Methyl Ester (C22:5n3), 50 mg	17269
cis-4,7,10,13,16-Docosapentaenoic Acid (C22:5n6), 10 mg	18566

Cis/Trans Fatty Acid Isomers as FAMEs

Fatty acids in the cis configuration (Figure 18A) are the dominant form in nature. Correspondingly, enzymes have evolved to efficiently digest and metabolize them with a high degree of specificity. Conversely, trans fatty acids (Figure 18B) are relatively rare in nature. However, because they can increase the shelf life and flavor stability of foods containing them, they have become predominant synthetic additives to processed foods, especially fried foods and baked goods.

Unfortunately, trans fatty acids, formed by partial hydrogenation of vegetable oil, interfere with natural metabolic process, resulting in an imbalance of the LDL:HDL ratio, and also increasing lipoprotein(a) levels. Studies have linked their nutritional contribution to be similar to that of saturated fatty acids, possibly playing a role in the heightened risk of coronary artery disease.

Figure 18. Structures of Cis and Trans Fatty Acids



Because trans fatty acids have adverse health consequences and no known nutritional benefits over other fats, consumer groups have pressured manufacturers and restaurants for their elimination. Many regulatory agencies worldwide now require content labeling to inform buyers of 'trans fat' levels of foods and some dietary supplements.

GC Column Choices

Because the differences between cis isomer FAMEs and trans isomer FAMEs of the same carbon length and degree of unsaturation are very small, very efficient capillary GC columns with highly polar phases are required.

- The high polarity of the SP-2380 column allows the separation of geometric (cis/trans) isomers as a group. The phase is stabilized, providing a maximum temperature slightly higher than the popular SP-2560 column.
- The very polar SP-2560 column was specifically designed for the separation of geometric-positional (cis/trans) isomers of FAMEs, and is extremely effective for special FAME applications including the separation of FAMEs in hydrogenated vegetable oil samples. This column is specified in AOAC Method 996.06 and AOCS Method Ce 1h-05. (10-11)
- The SLB-IL100 column exhibits one of the highest polarities of any GC phase, providing an alternative selectivity for FAME applications typically performed on SP-2380 and SP-2560 columns.

For application, USP code, polymer, and temperature limit information, as well as catalog numbers, please refer to page 22.

Chromatograms

The following selected chromatograms for this application are presented here to assist the chromatographer in establishing analytical conditions. For assistance, contact Supelco Technical Service at 800-359-3041 (US and Canada only), 814-359-3041, or at ***techservice@sial.com***

Figure 19. 37-Component FAME Mix on the 30 m SP-2380

column: SP-2380, 30 m x 0.25 mm I.D., 0.20 µm (24110)
oven: 50 °C (2 min.), 4 °C/min. to 250 °C (15 min.)
inj.: 250 °C
det.: FID, 260 °C
carrier gas: helium, 20 cm/sec @ 150 °C
injection: 1 µL, 100:1 split
sample: Supelco 37-Component FAME Mix (47885-U), analytes at concentrations indicated in methylene chloride

See Figure 7 for list of analytes and concentrations

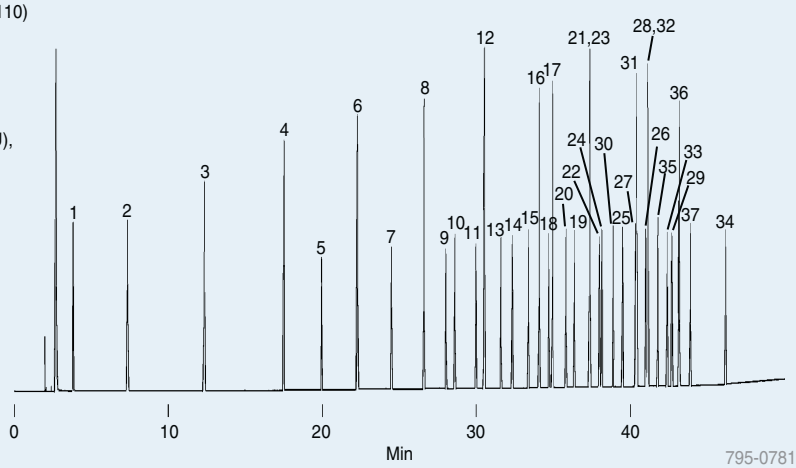


Figure 20. 37-Component FAME Mix on the 75 m SP-2560

column: SP-2560, 75 m x 0.18 mm I.D., 0.14 µm (23348-U)
oven: 140 °C (5 min.), 4 °C/min. to 240 °C (2 min.)
inj.: 250 °C
det.: FID, 250 °C
carrier gas: hydrogen, 40 cm/sec @ 175 °C
injection: 1 µL, 100:1 split
liner: 4 mm I.D, split, cup design
sample: Supelco 37-Component FAME Mix (47885-U), analytes at concentrations indicated in methylene chloride

See Figure 7 for list of analytes and concentrations

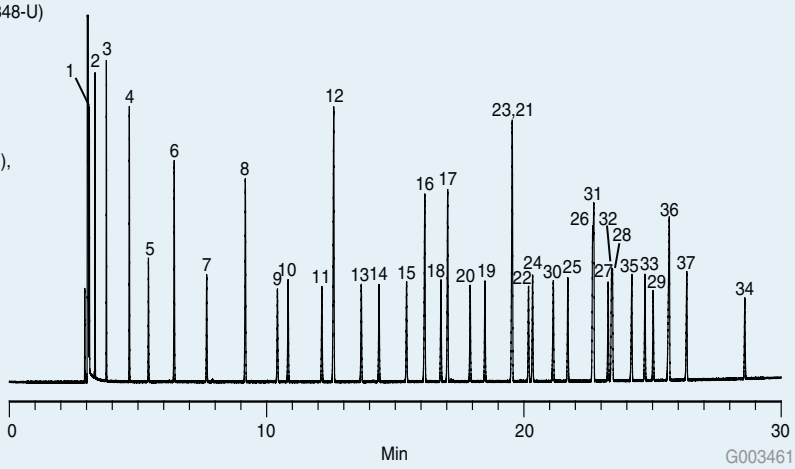


Figure 21. 37-Component FAME Mix on the 100 m SP-2560

column: SP-2560, 100 m x 0.25 mm I.D., 0.20 µm (24056)
oven: 140 °C (5 min.), 4 °C/min. to 240 °C (15 min.)
inj.: 250 °C
det.: FID, 260 °C
carrier gas: helium, 20 cm/sec @ 175 °C
injection: 1 µL, 100:1 split
sample: Supelco 37-Component FAME Mix (47885-U), analytes at concentrations indicated in methylene chloride

See Figure 7 for list of analytes and concentrations

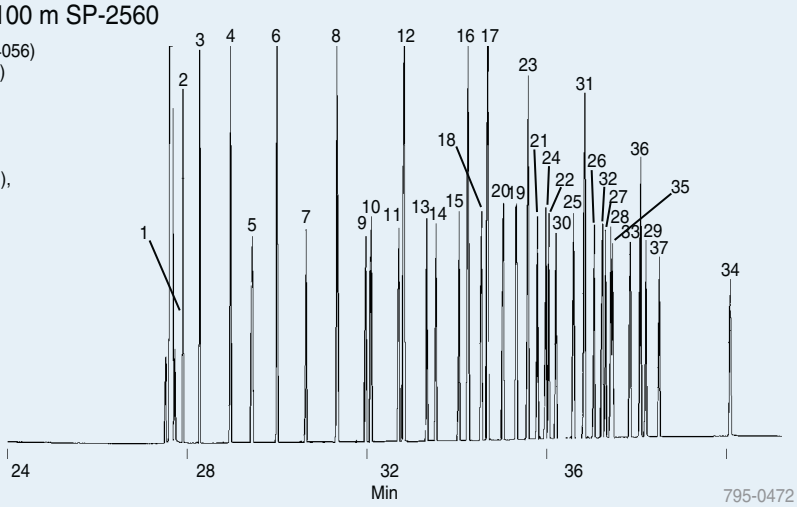
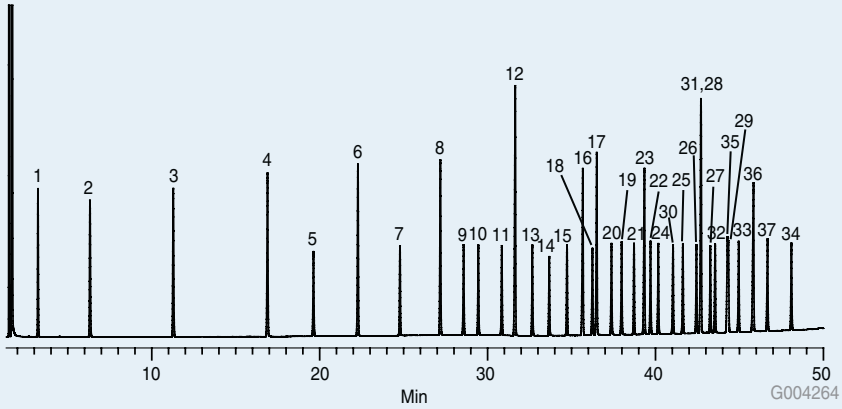


Figure 22. 37-Component FAME Mix on the 30 m SLB-IL100

Chromatogram courtesy of Prof. Luigi Mondello (Univ. of Messina, Italy)

column: SLB-IL100, 30 m x 0.25 mm I.D., 0.20 µm (28884-U)
oven: 50 °C, 3.0 °C/min. to 240 °C
inj.: 240 °C
det.: FID, 240 °C
carrier gas: helium, 40 cm/sec constant
injection: 1 µL, 50:1 split
sample: Supelco 37-Component FAME Mix (47885-U), analytes at concentrations indicated in methylene chloride

See Figure 7 for list of analytes and concentrations

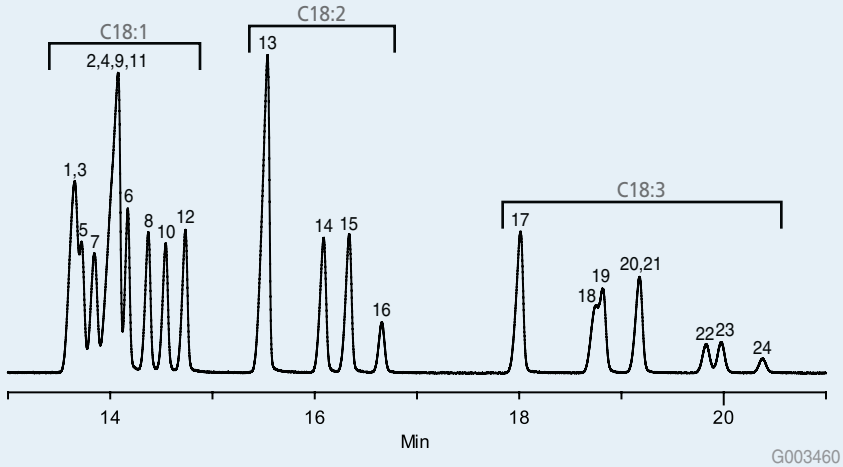


Cis/Trans Fatty Acid Isomers as FAMEs

Figure 23. Detailed Analysis of cis/trans C18 FAME Isomers on the 75 m SP-2560

column: SP-2560, 75 m x 0.18 mm I.D., 0.14 µm (23348-U)
oven: 180 °C
inj.: 220 °C
det.: FID, 220 °C
carrier gas: hydrogen, 25 cm/sec @ 180 °C
injection: 0.5 µL, 100:1 split
liner: 4 mm I.D., split, cup design
sample: Mixture of C18:1, C18:2, and C18:3 FAMEs in methylene chloride

1. C18:1 Δ 6t
2. C18:1 Δ 6c
3. C18:1 Δ 7t
4. C18:1 Δ 7c
5. C18:1 Δ 9t
6. C18:1 Δ 9c
7. C18:1 Δ 11t
8. C18:1 Δ 11c
9. C18:1 Δ 12t
10. C18:1 Δ 12c
11. C18:1 Δ 13t
12. C18:1 Δ 13c
13. C18:2 Δ 9t,12t
14. C18:2 Δ 9c,12t
15. C18:2 Δ 9t,12c
16. C18:2 Δ 9c,12c
17. C18:3 Δ 9t,12t,15t
18. C18:3 Δ 9c,12t,15t
19. C18:3 Δ 9t,12c,15t
20. C18:3 Δ 9c,12c,15t
21. C18:3 Δ 9c,12t,15t
22. C18:3 Δ 9c,12t,15c
23. C18:3 Δ 9t,12c,15c
24. C18:3 Δ 9c,12c,15c

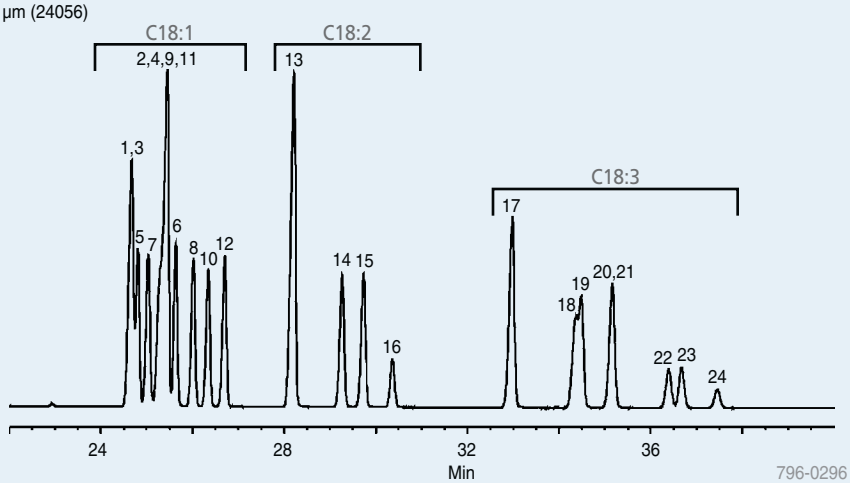


G003460

Figure 24. Detailed Analysis of cis/trans C18 FAME Isomers on the 100 m SP-2560

column: SP-2560, 100 m x 0.25 mm I.D., 0.20 µm (24056)
oven: 175 °C
inj.: 210 °C
det.: FID, 250 °C
carrier gas: helium, 20 cm/sec @ 175 °C
injection: 1.0 µL, 100:1 split
sample: Mixture of C18:1, C18:2, and C18:3 FAMEs in methylene chloride

Same Peak IDs as Figure 23

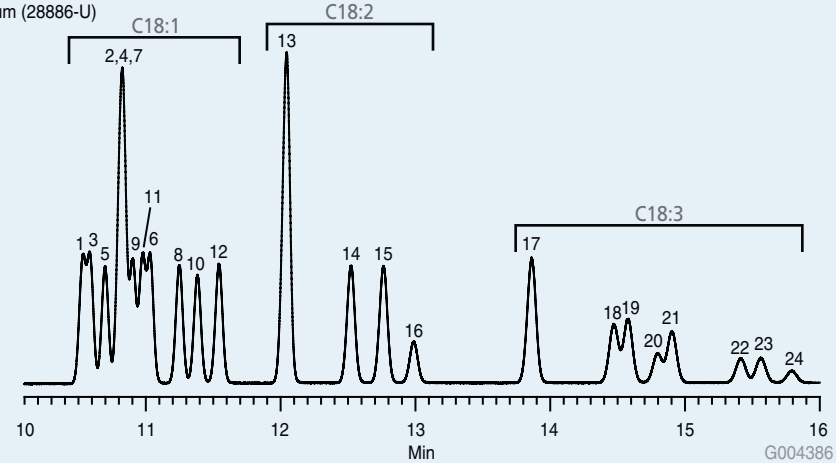


796-0296

Figure 25. Detailed Analysis of cis/trans C18 FAME Isomers on the 60 m SLB-IL100

column: SLB-IL100, 60 m x 0.25 mm I.D., 0.20 µm (28886-U)
oven: 170 °C
inj.: 250 °C
det.: FID, 250 °C
carrier gas: helium, 30 cm/sec
injection: 1 µL, 50:1 split
liner: 4 mm I.D., split, cup design
sample: Mixture of C18:1, C18:2, and C18:3 FAMEs in methylene chloride

Same Peak IDs as Figure 23



G004386

Chemical Standards

To assist in confirming cis/trans identifications, Sigma-Aldrich offers the following standards. One standard is the Supelco 37-Component FAME Mix (47885-U). This standard contains methyl esters of fatty acids ranging from C4 to C24, including key monounsaturated and polyunsaturated fatty acids, making this standard very useful to food analysts since it can be used to identify fatty acids in many different types of foods.

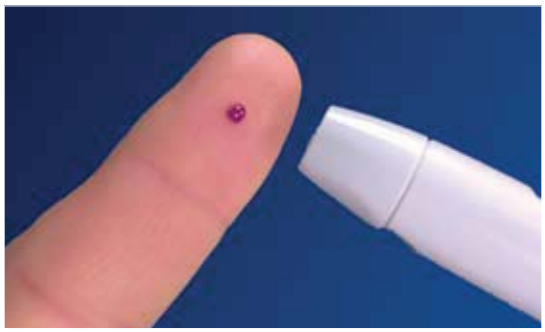
Description	Cat. No.
trans-9-Tetradecenoic Acid Methyl Ester (C14:1n9t), 100 mg	70055
trans-9-Hexadecenoic Acid Methyl Ester (C16:1n9t), 100 mg	76117
cis-6-Octadecenoic Acid Methyl Ester (C18:1n6c), 10 mg/mL in heptane, 1 mL	47198
trans-6-Octadecenoic Acid Methyl Ester (C18:1n6t), 10 mg/mL in heptane, 1 mL	47199
cis-9-Octadecenoic Acid Methyl Ester (C18:1n9c), 10 mg/mL in heptane, 1 mL	46902-U
trans-9-Octadecenoic Acid Methyl Ester (C18:1n9t), 10 mg/mL in heptane, 1 mL	46903
cis-11-Octadecenoic Acid Methyl Ester (C18:1n11c), 10 mg/mL in heptane, 1 mL	46904
trans-11-Octadecenoic Acid Methyl Ester (C18:1n11t), 10 mg/mL in heptane, 1 mL	46905-U
Methyl cis-12-Octadecenoate, (C18:1n12c), 50 mg	02817
Linoleic Acid Methyl Ester (C18:2) Isomer Mix 10 mg/mL (total wt.) in methylene chloride, 1 mL *cis-9,cis-12-Octadecadienoic Acid Methyl Ester (C18:2Δ9c,12c), ~10% w/w* *cis-9,trans-12-Octadecadienoic Acid Methyl Ester (C18:2Δ9c,12t), ~20% w/w* *trans-9,cis-12-Octadecadienoic Acid Methyl Ester (C18:2Δ9t,12c), ~20% w/w* *trans-9,trans-12-Octadecadienoic Acid Methyl Ester (C18:2Δ9t,12t), ~50% w/w*	47791
Linolenic Acid Methyl Ester (C18:3) Isomer Mix 10 mg/mL (total wt.) in methylene chloride, 1 mL *cis-9,cis-12,cis-15-Octadecatrienoic Acid Methyl Ester (C18:3Δ9c,12c,15c), ~3% w/w* *cis-9,cis-12,trans-15-Octadecatrienoic Acid Methyl Ester (C18:3Δ9c,12c,15t), ~7% w/w* *cis-9,trans-12,cis-15-Octadecatrienoic Acid Methyl Ester (C18:3Δ9c,12t,15c), ~7% w/w* *cis-9,trans-12,trans-15-Octadecatrienoic Acid Methyl Ester (C18:3Δ9c,12t,15t), ~15% w/w* *trans-9,cis-12,cis-15-Octadecatrienoic Acid Methyl Ester (C18:3Δ9t,12c,15c), ~7% w/w* *trans-9,cis-12,trans-15-Octadecatrienoic Acid Methyl Ester (C18:3Δ9t,12c,15t), ~15% w/w* *trans-9,trans-12,cis-15-Octadecatrienoic Acid Methyl Ester (C18:3Δ9t,12t,15c), ~15% w/w* *trans-9,trans-12,trans-15-Octadecatrienoic Acid Methyl Ester (C18:3Δ9t,12t,15t), ~30% w/w*	47792
Supelco 37-Component FAME Mix 10 mg/mL (total wt.) in methylene chloride, 1 mL *See Figure 7 for list of analytes and concentrations*	47885-U
C4-C24 FAME Mix Neat mixture of 37 analytes, 100 mg total wt. *Butyric Acid Methyl Ester (C4:0) at 4 wt %* *Caproic Acid Methyl Ester (C6:0) at 4 wt %* *Caprylic Acid Methyl Ester (C8:0) at 4 wt %* *Capric Acid Methyl Ester (C10:0) at 4 wt %* *Undecanoic Acid Methyl Ester (C11:0) at 2 wt %* *Lauric Acid Methyl Ester (C12:0) at 4 wt %* *Tridecanoic Acid Methyl Ester (C13:0) at 2 wt %* *Myristic Acid Methyl Ester (C14:0) at 4 wt %* *Myristoleic Acid Methyl Ester (C14:1) at 2 wt %* *Pentadecanoic Acid Methyl Ester (C15:0) at 2 wt %* *cis-10-Pentadecenoic Acid Methyl Ester (C15:1) at 2 wt %* *Palmitic Acid Methyl Ester (C16:0) at 6 wt %* *Palmitoleic Acid Methyl Ester (C16:1) at 2 wt %* *Heptadecanoic Acid Methyl Ester (C17:0) at 2 wt %* *cis-10-Heptadecenoic Acid Methyl Ester (C17:1) at 2 wt %* *Stearic Acid Methyl Ester (C18:0) at 4 wt %* *Oleic Acid Methyl Ester (C18:1n9c) at 4 wt %* *Elaidic Acid Methyl Ester (C18:1n9t) at 2 wt %* *Linoleic Acid Methyl Ester (C18:2n6c) at 2 wt %* *Linolelaidic Acid Methyl Ester (C18:2n6t) at 2 wt %* *γ-Linolenic Acid Methyl Ester (C18:3n6) at 2 wt %* *α-Linolenic Acid Methyl Ester (C18:3n3) at 2 wt %* *Arachidic Acid Methyl Ester (C20:0) at 4 wt %* *cis-11-Eicosenoic Acid Methyl Ester (C20:1n9) at 2 wt %* *cis-11,14-Eicosadienoic Acid Methyl Ester (C20:2) at 2 wt %* *cis-8,11,14-Eicosatrienoic Acid Methyl Ester (C20:3n6) at 2 wt %* *cis-11,14,17-Eicosatrienoic Acid Methyl Ester (C20:3n3) at 2 wt %* *Arachidonic Acid Methyl Ester (C20:4n6) at 2 wt %* *cis-5,8,11,14,17-Eicosapentaenoic Acid Methyl Ester (C20:5n3) at 2 wt %* *Heneicosanoic Acid Methyl Ester (C21:0) at 2 wt %* *Behenic Acid Methyl Ester (C22:0) at 4 wt %* *Erucic Acid Methyl Ester (C22:1n9) at 2 wt %* *cis-13,16-Docosadienoic Acid Methyl Ester (C22:2) at 2 wt %* *cis-4,7,10,13,16,19-Docosahexaenoic Acid Methyl Ester (C22:6n3) at 2 wt %* *Tricosanoic Acid Methyl Ester (C23:0) at 2 wt %* *Lignoceric Acid Methyl Ester (C24:0) at 4 wt %* *Nervonic Acid Methyl Ester (C24:1n9) at 2 wt %*	18919-1AMP
C8-C22 FAME Mix Neat mixture of 19 analytes, 100 mg total wt. *Caprylic Acid Methyl Ester (C8:0) at 1.9 wt %* *Capric Acid Methyl Ester (C10:0) at 3.2 wt %* *Lauric Acid Methyl Ester (C12:0) at 6.4 wt %* *Tridecanoic Acid Methyl Ester (C13:0) at 3.2 wt %* *Myristic Acid Methyl Ester (C14:0) at 3.2 wt %* *Myristoleic Acid Methyl Ester (C14:1) at 1.9 wt %* *Pentadecanoic Acid Methyl Ester (C15:0) at 1.9 wt %* *Palmitic Acid Methyl Ester (C16:0) at 13 wt %* *Palmitoleic Acid Methyl Ester (C16:1) at 6.4 wt %* *Heptadecanoic Acid Methyl Ester (C17:0) at 3.2 wt %* *Stearic Acid Methyl Ester (C18:0) at 6.5 wt %* *Oleic Acid Methyl Ester (C18:1n9c) at 19.6 wt %* *Elaidic Acid Methyl Ester (C18:1n9t) at 2.6 wt %* *Linoleic Acid Methyl Ester (C18:2n6c) at 13 wt %* *Linolenic Acid Methyl Ester (C18:3) at 6.4wt %* *Arachidic Acid Methyl Ester (C20:0) at 1.9 wt %* *cis-11-Eicosenoic Acid Methyl Ester (C20:1n9) at 1.9 wt %* *Behenic Acid Methyl Ester (C22:0) at 1.9 wt %* *cis-13-Docosanoic Acid Methyl Ester (C22:1) at 1.9 wt %*	18920-1AMP

Chemical Standards (Contd.)

Description	Cat. No.
C14-C22 FAME Mix Neat mixture of 10 analytes, 100 mg total wt. *Myristic Acid Methyl Ester (C14:0), 4% w/w* *Palmitic Acid Methyl Ester (C16:0), 10% w/w* *Stearic Acid Methyl Ester (C18:0), 6% w/w* *Oleic Acid Methyl Ester (C18:1n9c), 25% w/w* *Elaidic Acid Methyl Ester (C18:1n9t), 10% w/w* *Linoleic Acid Methyl Ester (C18:2n6c), 34% w/w* *Linolelaidic Acid Methyl Ester (C18:2n6t), 2% w/w* *Linolenic Acid Methyl Ester (C18:3), 5% w/w* *Arachidic Acid Methyl Ester (C20:0), 2% w/w* *Behenic Acid Methyl Ester (C22:0), 2% w/w*	18917-1AMP
C18-C20 FAME Mix Neat mixture of 6 analytes, 100 mg total wt. *Stearic Acid Methyl Ester (C18:0), 10% w/w* *Oleic Acid Methyl Ester (C18:1n9c), 20% w/w* *Elaidic Acid Methyl Ester (C18:1n9t), 20% w/w* *Linoleic Acid Methyl Ester (C18:2n6c), 20% w/w* *Linolelaidic Acid Methyl Ester (C18:2n6t), 20% w/w* *Arachidic Acid Methyl Ester (C20:0), 10% w/w*	18916-1AMP
Grain Fatty Acid Methyl Ester Mix 10 mg/mL (total wt.) in methylene chloride, 1 mL *Caprylic Acid Methyl Ester (C8:0), 1.9 wt. %* *Capric Acid Methyl Ester (C10:0), 3.2 wt. %* *Lauric Acid Methyl Ester (C12:0), 6.4 wt. %* *Tridecanoic Acid Methyl Ester (C13:0), 3.2 wt. %* *Myristic Acid Methyl Ester (C14:0), 3.2 wt. %* *Myristoleic Acid Methyl Ester (C14:1n9c), 1.9 wt. %* *Pentadecanoic Acid Methyl Ester (C15:0), 1.9 wt. %* *Palmitic Acid Methyl Ester (C16:0), 13.0 wt. %* *Palmitoleic Acid Methyl Ester (C16:1n9c), 6.4 wt. %* *Heptadecanoic Acid Methyl Ester (C17:0), 3.2 wt. %* *Stearic Acid Methyl Ester (C18:0), 6.5 wt. %* *Oleic Acid Methyl Ester (C18:1n9c), 19.6 wt. %* *Elaidic Acid Methyl Ester (C18:1n9t), 2.6 wt. %* *Linoleic Acid Methyl Ester (C18:2n6c), 13.0 wt. %* *α-Linolenic Acid Methyl Ester (C18:3n3), 6.4 wt. %* *Arachidic Acid Methyl Ester (C20:0), 1.9 wt. %* *cis-11-Eicosenoic Acid Methyl Ester (C20:1c), 1.9 wt. %* *Behenic Acid Methyl Ester (C22:0), 1.9 wt. %* *Erucic Acid Methyl Ester (C22:1n9), 1.9 wt. %*	47801

Blood Assessment Kits

Monitoring a patient's fatty acid profile is an important step in accurately managing wellness, allowing the health provider to verify the adherence to and effectiveness of a dietary strategy. Quick and accurate results are desirable so that any necessary changes to the dietary strategy can be made in a timely manner. It has been shown that blood samples collected as a small drop from the fingertip can be analyzed to provide sufficient data for such as assessment. (13)



Sigma-Aldrich offers convenient kits for the collection of blood drops, their storage/shipment, and processing to prepare samples for fatty acid analysis via gas chromatography. One kit is designed for collection and subsequent storage/shipment. The other kit is designed for derivatization of the fatty acids in the blood prior to GC analysis. Combined, these kits allow efficient sample collection and processing for quick compilation of analytical information on the fatty acid content in blood samples. They are tools that care providers can use in the development and application of adequate dietary strategies for their patients.

The Blood Collection Kit includes blood collection dipsticks, desiccant packs, foil-barrier ziplock bags, 50 mL BHT solution, and complete instructions. The Derivatization Kit includes a 1.25 M methanolic HCl solution, a saturated KCl solution, distilled water, and a working instruction sheet.

Description	Cat. No.
Blood Collection Kit, enough supplies for 100 tests	11312
Derivatization Kit, enough supplies for 100 tests	05904

GC Columns by Phase

Looking for information or specifications for a particular phase? This section provides application, USP code, polymer, and temperature limit information in addition to catalog numbers. (12) Where two maximum temperatures are listed (such as 200/220 °C), the first is for isothermal oven analyses, whereas the second is for oven temperature programmed analyses. Where only one maximum temperature is listed, it can be used for either isothermal or temperature programmed oven analyses.

This section is organized primarily in order of increasing phase polarity to assist in phase selection when performing method development. To learn more about any phases listed, or to inquire about a phase not listed, contact Technical Service at 800-359-3041 (US and Canada only), 814-359-3041, or at ***techservice@sial.com***

Equity-1

- **Application:** This column is designed for 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.
- **Polymer:** Bonded; poly(dimethylsiloxane)
- **Temperature Limits:**
  -60 °C to 325/350 °C for 0.10 - 0.32 mm I.D.
  -60 °C to 300/320 °C for 0.53 mm I.D. (≤1.5 µm)
  -60 °C to 260/280 °C for 0.53mm I.D. (>1.5 µm)

Description	Cat. No.
15 m x 0.10 mm I.D., 0.10 µm	28039-U
12 m x 0.20 mm I.D., 0.33 µm	28041-U
25 m x 0.20 mm I.D., 0.33 µm	28042-U
10 m x 0.20 mm I.D., 1.20 µm	28043-U
30 m x 0.25 mm I.D., 0.10 µm	28044-U
15 m x 0.25 mm I.D., 0.25 µm	28045-U
30 m x 0.25 mm I.D., 0.25 µm	28046-U
60 m x 0.25 mm I.D., 0.25 µm	28047-U
15 m x 0.25 mm I.D., 1.00 µm	28048-U
30 m x 0.25 mm I.D., 1.00 µm	28049-U
60 m x 0.25 mm I.D., 1.00 µm	28050-U
100 m x 0.25 mm I.D., 1.00 µm	28052-U
30 m x 0.32 mm I.D., 0.10 µm	28053-U
15 m x 0.32 mm I.D., 0.25 µm	28054-U
30 m x 0.32 mm I.D., 0.25 µm	28055-U
60 m x 0.32 mm I.D., 0.25 µm	28056-U
30 m x 0.32 mm I.D., 1.00 µm	28057-U
60 m x 0.32 mm I.D., 1.00 µm	28058-U
100 m x 0.32 mm I.D., 1.00 µm	28060-U
30 m x 0.32 mm I.D., 2.00 µm	28061-U
30 m x 0.32 mm I.D., 5.00 µm	28062-U
60 m x 0.32 mm I.D., 5.00 µm	28063-U
15 m x 0.53 mm I.D., 0.10 µm	28064-U
30 m x 0.53 mm I.D., 0.10 µm	28065-U
15 m x 0.53 mm I.D., 0.50 µm	28067-U
30 m x 0.53 mm I.D., 0.50 µm	28068-U
15 m x 0.53 mm I.D., 1.00 µm	28069-U
30 m x 0.53 mm I.D., 1.00 µm	28071-U
15 m x 0.53 mm I.D., 1.50 µm	28072-U
30 m x 0.53 mm I.D., 1.50 µm	28073-U
60 m x 0.53 mm I.D., 1.50 µm	28074-U
15 m x 0.53 mm I.D., 3.00 µm	28075-U
30 m x 0.53 mm I.D., 3.00 µm	28076-U
60 m x 0.53 mm I.D., 3.00 µm	28077-U
15 m x 0.53 mm I.D., 5.00 µm	28079-U
30 m x 0.53 mm I.D., 5.00 µm	28081-U
60 m x 0.53 mm I.D., 5.00 µm	28082-U

Nukol

- **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.
- **Polymer:** Bonded; acid-modified poly(ethylene glycol)
- **Temperature Limits:**
  60 °C to 200/220 °C

Description	Cat. No.
15 m x 0.25 mm I.D., 0.25 µm	24106-U
30 m x 0.25 mm I.D., 0.25 µm	24107
60 m x 0.25 mm I.D., 0.25 µm	24108
15 m x 0.32 mm I.D., 0.25 µm	24130
30 m x 0.32 mm I.D., 0.25 µm	24131
60 m x 0.32 mm I.D., 0.25 µm	24132
15 m x 0.32 mm I.D., 1.00 µm	24206-U
30 m x 0.32 mm I.D., 1.00 µm	24207
60 m x 0.32 mm I.D., 1.00 µm	24208
15 m x 0.53 mm I.D., 0.50 µm	25326
30 m x 0.53 mm I.D., 0.50 µm	25327
60 m x 0.53 mm I.D., 0.50 µm	25386
30 m x 0.53 mm I.D., 1.00 µm	25357

Omegawax

- **Application:** This column allows highly reproducible analyses of fatty acid methyl esters (FAMEs), specifically omega 3 and omega 6 groups. It is tested to ensure reproducible FAME equivalent chain length (ECL) values and resolution of key components. This column is specified in AOAC Method 991.39 and AOCS Method Ce 1b-89.
- **USP Code:** This column meets USP G16 requirements.
- **Polymer:** Bonded; poly(ethylene glycol)
- **Temperature Limits:**
  50 °C to 280 °C

Description	Cat. No.
15 m x 0.10 mm I.D., 0.10 µm	**23399-U**
30 m x 0.25 mm I.D., 0.25 µm	**24136**
30 m x 0.32 mm I.D., 0.25 µm	**24152**
30 m x 0.53 mm I.D., 0.50 µm	**25374**

SP-2560

- **Application:** This highly polar biscyanopropyl column was specifically designed for the detailed separation of geometric (cis/trans) isomers of fatty acid methyl esters (FAMEs). It is extremely effective for FAME isomer applications. This column is specified in AOAC Method 996.06 and AOCS Method Ce 1h-05.
- **USP Code:** This column meets USP G5 requirements.
- **Polymer:** Non-bonded; poly(biscyanopropyl siloxane)
- **Temperature Limits:**
  Subambient to 250 °C

Description	Cat. No.
75 m x 0.18 mm I.D., 0.14 µm	**23348-U**
100 m x 0.25 mm I.D., 0.20 µm	**24056**
100 m x 0.25 mm I.D., 0.20 µm*	**23362-U**

* Wound onto a 5" cage to fit an Agilent® 6850 GC.

SP-2380

- **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.
- **Polymer:** Stabilized; poly(90% biscyanopropyl/10% cyanopropylphenyl siloxane)
- **Temperature Limits:**
  Subambient to 275 °C

Description	Cat. No.
15 m x 0.25 mm I.D., 0.20 µm	**24109**
30 m x 0.25 mm I.D., 0.20 µm	**24110-U**
60 m x 0.25 mm I.D., 0.20 µm	**24111**
100 m x 0.25 mm I.D., 0.20 µm	**24317**
30 m x 0.32 mm I.D., 0.20 µm	**24116-U**
60 m x 0.32 mm I.D., 0.20 µm	**24117**
30 m x 0.53 mm I.D., 0.20 µm	**25319**

SLB-IL100

- **Application:** This ionic liquid phase has a polarity/selectivity roughly equivalent to that of the TCEP phase, higher than any of the polysiloxane polymer and polyethylene glycol phases. The combination of high polarity/selectivity, low bleed, and a maximum temperature of 230 °C results in a column very effective for analyses of FAMEs, aromatics, and PCB congeners.
- **USP Code:** None.
- **Polymer:** Non-bonded; 1,9-di(3-vinyl-imidazolium) nonane bis(trifluoromethyl) sulfonyl imidate
- **Temperature Limits:**
  Subambient to 230 °C

Description	Cat. No.
15 m x 0.10 mm I.D., 0.08 µm	**28882-U**
20 m x 0.18 mm I.D., 0.14 µm	**28883-U**
30 m x 0.25 mm I.D., 0.20 µm	**28884-U**
60 m x 0.25 mm I.D., 0.20 µm	**28886-U**
30 m x 0.32 mm I.D., 0.26 µm	**28887-U**
60 m x 0.32 mm I.D., 0.26 µm	**28888-U**

References

1. A. Ascherio, W. Willett, "Health Effects of Trans Fatty Acids" Am. J. Clin. Nutr. (1997) 66 (supplement), 1006S-1010S.
2. S. Stender, J. Dyerberg, "Influence of Trans Fatty Acids on Health" Annals of Nutrition and Metabolism (2004) 48 (2), 61-66.
3. American Heart Association Web Page, http://www.americanheart.org/presenter.jhtml?identifier= 1728 (accessed Jan. 4, 2006).
4. 21 CFR Part 101, "Food Labeling: Trans Fatty Acids in Nutrition Labeling" Federal Register (July 11, 2003) Volume 68, Number 133, http://www.cfsan.fda.gov/~lrd/fr03711a.html (accessed Jan. 4, 2006).
5. W. W. Christie, "Gas Chromatography and Lipids" The Lipid Library, http://www.lipidlibrary.co.uk/GC_lipid/gc_lip.html (accessed Jun 26, 2008).
6. W. W. Christie, "Why I Dislike Boron Trifluoride-Methanol" Lipid Technology (1994) 6, 66-68.
7. AOCS Method Ce 1-62, "Fatty Acid Composition by Gas Chromatography" AOCS Official Methods (2005) American Oil Chemists Society.
8. AOAC Method 991.39, "Fatty Acids in Encapsulated Fish Oils and Fish Oil Methyl and Ethyl Esters" Official Methods of Analysis, 18th Edition (on-line) Association of Official Analytical Chemists, Inc.
9. AOCS Method Ce 1b-89, "Fatty Acid Composition by GLC Marine Oils" AOCS Official Methods (2005) American Oil Chemists Society.
10. AOAC Method 996.06, "Fat (Total, Saturated, and Unsaturated) in Foods" Official Methods of Analysis, 18th Edition (on-line) Association of Official Analytical Chemists, Inc.
11. AOCS Method Ce 1h-05, "Determination of cis-, trans-, Saturated, Monounsaturated and Polyunsaturated Fatty Acids in Vegetable or Non-ruminant Animal Oils and Fats by Capillary GLC" AOCS Official Methods (2005) American Oil Chemists Society.
12. USP, "Chromatographic Reagents" United States Pharmacopeia 31 / National Formulary 26, First Supplement (August 1, 2008) 3596-3598.
13. F. Marangoni, C. Colombo, C. Galli, "A Method for the Direct Evaluation of the Fatty Acid Status in a Drop of Blood from a Fingertip in Humans: Applicability to Nutritional and Epidemiological Studies" Anal. Biochem. (2004) 326, 267-272.

Product Literature

The following list of Sigma-Aldrich/Supelco literature provides additional product information than what is presented in this brochure. To obtain any of these literature pieces at no-charge, either visit our web site at *sigma-aldrich.com* or contact Supelco Technical Service: 800-359-3041 (US and Canada only), 814-359-3041, or at ***techservice@sial.com***

Title	Identification
GC Columns	
GC Column Selection Guide	T407133 KCX
Analyzing Fatty Acids by Capillary GC	T110855 AYC
37-Component FAME Mix on Four Capillary Columns	T196907 AZC
Fast GC Brochure	T407096 JTW
Capillary GC Troubleshooting Guide	T112853 AIP
GC-Related	
GC Accessories and Gas Purification/Management	T407103 JWE
Molded Thermogreen™ LB-2 Septa	T407082 JQV
Selecting the Appropriate Inlet Liner (Poster)	T404081 HCH
Gas Management Systems for GC	T196898 AYW
Gas Generators Brochure	T407110 JXP
Syringes Brochure	T406108 JCS
Vials Brochure	IXH
Chemical Standards	
Fluka Analytical Reagents & Standards Catalog	003
SPE Tubes	
Discovery Ag-Ion SPE for cis/trans FAME Fractionation	T406062 IRV
Supelco Solid Phase Extraction Products	T402150 FEB
Derivatization Reagents	
Derivatization Reagents Brochure	T407138 KDI
BCl_3-Methanol (12% w/w)	T496123 BAX
BF_3-Methanol (10% w/w)	T496125 BAZ
BF_3-Butanol (10% w/w)	T496124 BAY
Methanolic Base (0.5N)	T497007 BEG
Methanolic HCl (0.5N and 3N)	T497099 BIV
Methanolic H_2SO_4 (10% v/v)	T497018 BDO

Additional Reading

Consult these references, written by experts and researchers, to learn more about the many facets of fatty acids, FAMEs, and their analysis.

1. William W. Christie, "Lipid Analysis: Isolation, Separation, Identification and Structural Analysis of Lipids" Third Edition (2003) The Oily Press, ISBN 0-9531949-5-7.
2. William W. Christie, "Gas Chromatography and Lipids" The Lipid Library, http://www.lipidlibrary.co.uk/GC_lipid/gc_lip.html.
3. Frank D. Gunstone, "Lipids for Functional Foods and Nutraceuticals" (2003) The Oily Press, ISBN 0-9531949-3-0.
4. Daniel R. Knapp, "Handbook of Analytical Derivatization Reactions" (1979) Wiley, ISBN 978-0-471-03469-8.
5. Karl Blau and John M. Halket, "Handbook of Derivatives for Chromatography" Second Edition (1993) Wiley, ISBN 978-0-471-92699-3.
6. Harold McNair and James Miller, "Basic Gas Chromatography" (1998) Wiley, ISBN 0-471-17261-8.
7. David Grant, "Capillary Gas Chromatography" (1996) Wiley, ISBN 0-471-95377-6.
8. Robert L. Grob and Eugene F. Barry, "Modern Practices of Gas Chromatography" Fourth Edition (2004) Wiley, ISBN 0-471-22983-0.
9. Eugene F. Barry and Robert L. Grob, "Columns for Gas Chromatography: Performance and Selection" (2007) Wiley, ISBN 978-0-471-74043-8.
10. Konrad Grob, "Split and Splitless Injection in Capillary GC" (1993) Hüthig, ISBN 3-7785-2151-9.
11. Dean Rood, "A Practical Guide to the Care, Maintenance, and Troubleshooting of Capillary Gas Chromatographic Systems" (1991) Hüthig, ISBN 3-7785-1898-4.

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SIGMA-ALDRICH DE ARGENTINA S.A.
Free Tel: 0810 888 7446
Tel: (+54) 11 4556 1472
Fax: (+54) 11 4552 1698

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SIGMA-ALDRICH PTY LTD.
Free Tel: 1800 800 097
Free Fax: 1800 800 096
Tel: (+61) 2 9841 0555
Fax: (+61) 2 9841 0500

Austria
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Free Fax: 0800 031 052
Tel: (+33) 474 82 28 00
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SIGMA-ALDRICH CHEMIE GmbH
Free Tel: 0800 51 55 000
Free Fax: 0800 64 90 000
Tel: (+49) 89 6513 0
Fax: (+49) 89 6513 1160

Greece
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Tel: (+30) 210 994 8010
Fax: (+30) 210 994 3831

Hungary
SIGMA-ALDRICH Kft
Ingyenes telefonszám: 06 80 355 355
Ingyenes fax szám: 06 80 344 344
Tel: (+36) 1 235 9055
Fax: (+36) 1 235 9050

India
SIGMA-ALDRICH CHEMICALS
PRIVATE LIMITED
Telephone
Bangalore: (+91) 80 6621 9600
New Delhi: (+91) 11 4358 8000
Mumbai: (+91) 22 2570 2364
Hyderabad: (+91) 40 4015 5488
Fax
Bangalore: (+91) 80 6621 9650
New Delhi: (+91) 11 4358 8001
Mumbai: (+91) 22 2579 7589
Hyderabad: (+91) 40 4015 5466

Ireland
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Free Tel: 1800 200 888
Free Fax: 1800 600 222
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Fax: + 353 (0) 402 20375

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SIGMA-ALDRICH ISRAEL LTD.
Free Tel: 1 800 70 2222
Tel: (+972) 8 948 4100
Fax: (+972) 8 948 4200

Italy
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Numero Verde: 800 827018
Tel: (+39) 02 3341 7310
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SIGMA-ALDRICH JAPAN K.K.
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Fax: (+81) 3 5796 7315

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SIGMA-ALDRICH KOREA
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Tel: (+82) 31 329 9000
Fax: (+82) 31 329 9090

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Fax: (+41) 81 755 2815

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Free Tel: 0800 717 181
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St. Louis, Missouri 63178
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