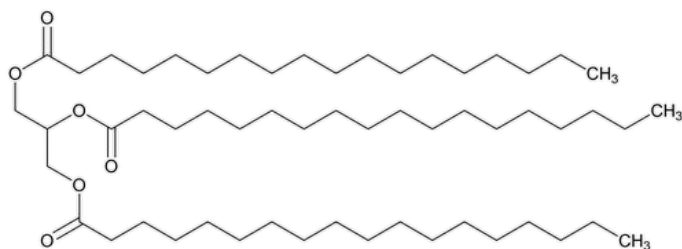


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Glycerol Tristearate



$C_{57}H_{110}O_6$ 891.48

Octadecanoic acid, 1,1',1''-(1,2,3-propanetriyl) ester;

Octadecanoic acid, 1,2,3-propanetriyl ester;

Glycerol trioctadecanoate;

Tristearoylglycerol CAS RN®: 555-43-1.

DEFINITION

Glycerol Tristearate contains NLT 90.0% of triglycerides of saturated fatty acids, chiefly glycerol tristearate ($C_{57}H_{110}O_6$).

IDENTIFICATION

• FATTY ACID COMPOSITION

Boron trifluoride methanol solution: 140 mg/mL of boron trifluoride in methanol

Saturated sodium chloride solution: Mix 1 part of sodium chloride with 2 parts of water, shake from time to time, and allow to stand. Before use, decant the solution from any undissolved substance and filter, if necessary.

Standard solution 1: 0.5 mg/mL of [USP Methyl Myristate RS](#), 2.0 mg/mL of [USP Methyl Stearate RS](#), and 2.0 mg/mL of [USP Methyl Oleate RS](#) in *n*-heptane

Standard solution 2: 0.05 mg/mL of [USP Methyl Myristate RS](#), 0.2 mg/mL of [USP Methyl Stearate RS](#), and 0.2 mg/mL of [USP Methyl Oleate RS](#) in *n*-heptane, diluted from *Standard solution 1*

Standard solution 3: Dissolve a quantity of an ester mixture¹ containing methyl hexanoate, methyl caprylate, methyl caprate, methyl laurate, methyl myristate, methyl palmitate, methyl palmitoleate, methyl stearate, methyl oleate, methyl linoleate, and methyl arachidate in *n*-heptane to make a solution of about 9.0 mg/mL for methyl stearate and 0.1–0.2 mg/mL for each other methyl ester.

Sample solution: Transfer 100 mg of Glycerol Tristearate to a 25-mL conical flask fitted with a suitable water-cooled reflux condenser and a magnetic stir bar. Add 2 mL of a 20-mg/mL solution of sodium hydroxide in methanol, mix, and reflux for about 30 min. Add 2 mL of *Boron trifluoride methanol solution* through the condenser, and reflux for about 30 min. Add 4 mL of *n*-heptane through the condenser, and reflux for 5 min. Cool, remove the condenser, add about 10 mL of *Saturated sodium chloride solution*, and shake. Add a quantity of *Saturated sodium chloride solution* to bring the upper layer up to the neck of the flask, and allow the layers to separate. Collect 2 mL of the *n*-heptane layer (the upper layer); wash with three quantities of water (2 mL each), and dry the *n*-heptane phase over anhydrous sodium sulfate.

Chromatographic system

(See [Chromatography \(621\)](#), [System Suitability](#).)

Mode: GC

Detector: Flame ionization

Column: 0.53-mm × 30-m capillary, bonded with a 1.0-μm layer of phase G16

Temperatures

Injection port: 250°

Detector: 250°

Column: See [Table 1](#).

Table 1

Initial Temperature (°)	Temperature Ramp (°/min)	Final Temperature (°)	Hold Time at Final Temperature (min)
50	20	180	—
180	9	240	12

Carrier gas: Helium

Flow rate: 10 mL/min

Injection volume: 2 µL

Injection type: Split ratio, 4:1

System suitability

Samples: *Standard solution 1* and *Standard solution 2*

[NOTE—The relative retention times for methyl myristate, methyl stearate, and methyl oleate are about 0.70, 1.00, and 1.01, respectively.]

Suitability requirements

Resolution: NLT 1.5 between methyl stearate and methyl oleate, *Standard solution 1*

Signal-to-noise ratio: NLT 5 for methyl myristate, *Standard solution 2*

Analysis

Samples: *Standard solution 3* and *Sample solution*

Measure the areas for the peaks of the methyl esters of the fatty acids. Disregard any peak with an area less than 0.05% of the total area and any peak due to the solvent. [NOTE—Relative retention times for several methyl esters are summarized in [Table 2](#).]

Table 2

Carbon-Chain Length	Number of Double Bonds	Relative Retention Times
12	0	0.58
14	0	0.70
16	0	0.83
18	0	1.00
18	1	1.01
20	0	1.14

Take the main component of *Standard solution 3* as a reference component, and calculate the calibration factor, $F_{FA'}$, for each fatty acid methyl ester:

$$\text{Result} = (F_{MC} \times P_{FA1} \times A_{MC}) / (P_{MC} \times A_{FA1})$$

F_{MC} = factor for the main component, 1

P_{FA1} = percentage by weight of the fatty acid methyl ester in *Standard solution 3*

A_{MC} = peak area of the main component in *Standard solution 3*

P_{MC} = percentage by weight of the main component of *Standard solution 3*

A_{FA1} = peak area of the fatty acid methyl ester in *Standard solution 3*

Calculate the percentage of the fatty acid methyl ester by weight in the portion of Glyceryl Tristearate taken:

$$\text{Result} = [(A_{FA2} \times F_{FA'}) / A_T] \times 100$$