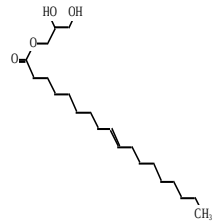
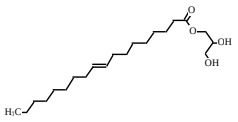
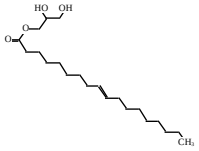
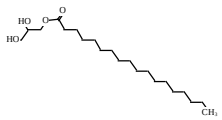
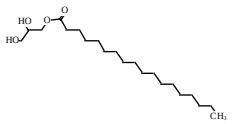
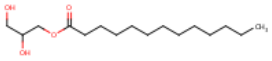
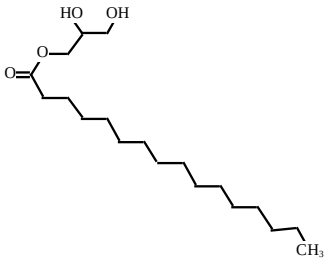
SIDS INITIAL ASSESSMENT PROFILE

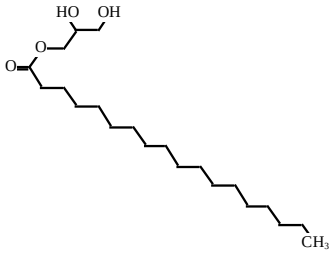
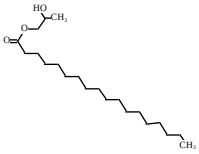
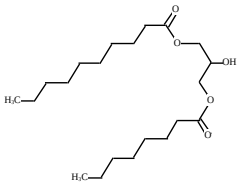
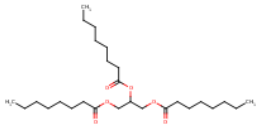
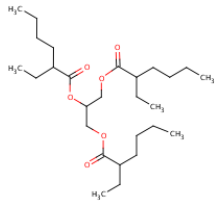
Category name	Glycerides Category		
CAS No(s), Chemical name(s) and structural formula(s) [1]	**CAS No [Class** [2] **]**	**IUPAC or CAS Name**	**Structural Formula**
	Monoglycerides		
	25496-72-4 [2]	Olein, mono-Octadecenoic acid, 1,2,3-propanetriol	
	37220-82-9 [2]	Glycerol oleate	
	68309-32-0 and 61790-12-3 [3] **[2]**	Glycerides,tall-oil	

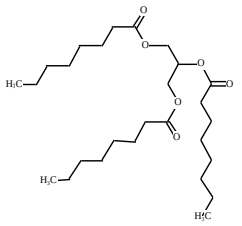
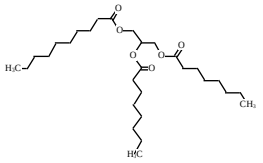
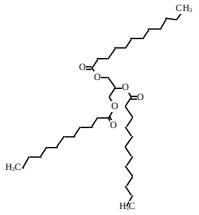
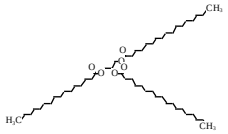
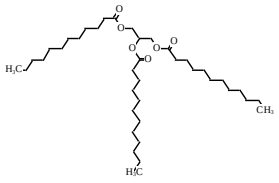
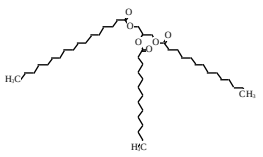
[1] Glycerides are commonly identified by industry and regulatory authorities as mono-, di-, tri, etc. and therefore the logical way to group the information in a manner that makes sense to the reader/reviewer is to provide subcategories (monoglycerides, diglycerides, triglycerides and mixtures of mono-, di- and triglycerides) and is consistent with the way these compounds are referenced in literature and regulatory references.

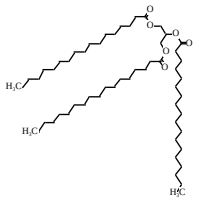
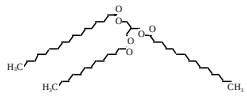
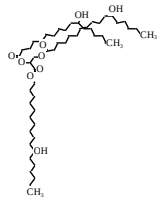
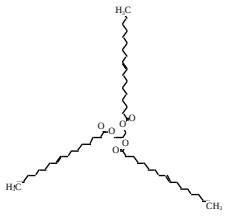
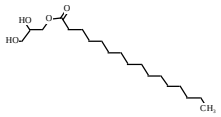
[2] Class 1 = single compounds composed of molecules with particular atoms arranged in a definite, known structure.
Class 2 = CHEMICAL SUBSTANCES OF UNKNOWN OR VARIABLE COMPOSITION, COMPLEX REACTION PRODUCTS AND BIOLOGICAL MATERIALS (UVCB)

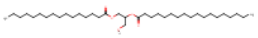
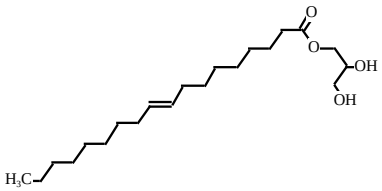
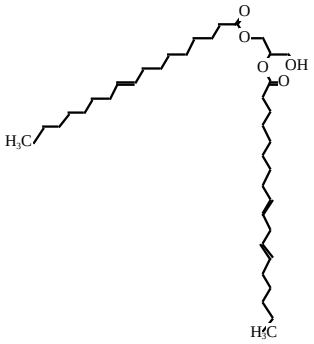
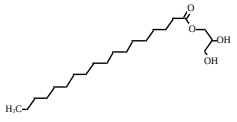
[3] The substances are analogues (the two CAS numbers describe the same substance).

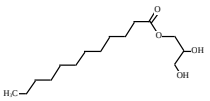
	31566-31-1 [2]	Octadecanoic acid, monoester with 1,2,3-propanetriol	
	61789-09-1 [2]	Monoglycerides, hydrogenated tallow	
	11099-07-3 and 67701-27-3[3] [2]	Glyceryl stearate	 and 
	91744-73-9 [2]	Glycerides, palm-oil mono-, hydrogenated	 and

		
	Diglycerides	
1323-39-3 **[2]**	Octadecanoic acid, 1,2-propanediol monoester	
65381-09-1 **[2]**	Decanoic acid, ester with 1,2,3-propanetriol octanoate	
	Triglycerides	
538-23-8 **[1]**	Octanoin, tri- (Octanoic acid, 1,2,3-propanetriyl ester; Tricaprylin)	
7360-38-5 **[1]**	Hexanoic acid, 2-ethyl-, 1,2,3-propanetriyl ester	

	85409-09-2 **[2]**	Glycerides, C8-10	
	73398-61-5 **[2]**	Glycerides, mixed decanoyl and octanoyl	
	8023-79-8 **[2]**	Oils, glyceridic, palm kernel	
	67701-28-4 **[2]**	Glycerides, C8-18 and C18-unsatd.	
	68334-28-1 **[2]**	Oils, vegetable, hydrogenated	
	67701-26-2 **[2]**	Glycerides, C12-18 (C14:C14:C18)	

	67701-30-8 **[2]**	Glycerides, C16-18 and C18-unsatd. (C18:C18:C18)	
	8030-12-4 **[2]**	Tallow, hydrogenated	
	8001-78-3 **[2]**	Castor oil, hydrogenated	
	122-32-7 **[2]**	Olein, tri - (Octadecenoic acid, 1,2,3-propanetriyl)	
	Mixtures of mono-, di- and triglycerides[1]		
	67701-33-1 **[2]**	Glycerides, C14-18 mono- and di-	
	68606-18-8 **[2]**	Glycerides, mixed coco, decanoyl and octanoyl	UVCB
	68424-61-3 **[2]**	Glycerides, C16-18 and C18-unsatd. mono- and di-	UVCB

	85251-77-0 [2]	Glycerides, C16-18 mono- and di-	
	97722-02-6 [2]	Glycerides, tall-oil mono-, di-, and tri-	 and 
	91744-20-6 [2]	Glycerides, C16-18 and C18-unsatd. mono-, di- and tri-	

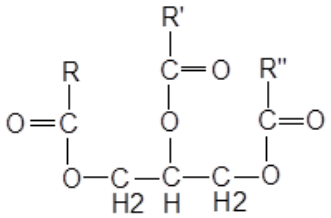
	68991-68-4 and **91052-53-8**[3] **[2]**	Coconut oil, transesterification products with decanoic acid mixed ester with glyceryl octanoate	

SUMMARY CONCLUSIONS OF THE SIAR

Category Rationale

The Glyceride Category contains thirty-one (31) sponsored glyceride substances which are defined as esters of monocarboxylic acids and glycerol bearing one (monoglycerides), two (diglycerides) or three (triglycerides) aliphatic chains, or, a mixture of mono-, di- and triglycerides, each ranging in number of carbons from 8 to 18. The C18 members of the group may be saturated or unsaturated with one carbon-carbon double bond. The glycerides grouping consists of both discrete chemicals with an incremental and constant change across its members (carbon chain length) and commercial mixtures that are composed of glycerides with a range of carbon chain lengths in its aliphatic side groups. The carbon chains do not contain any branching (they are all straight chains).

The chemical structure of the triglyceride members of this Glyceride Category is:



R, R1, and R2 are aliphatic chains containing from 8-18 carbon atoms, and two or three chains may be identical. The monoglycerides and diglycerides in this Glyceride Category have a similar structure except that glycerol is bonded to one and two aliphatic (fatty acid) chains, respectively, and have two and one free hydroxyl groups, respectively.

Glycerides are a group of lipids commonly called fats (solid at room temperature) and oils (liquid at room temperature). Due to the structural similarities of the glycerides, their physico-chemical properties are similar and

a clear correlation with chain length is observed. Melting point and boiling point increase with increasing chain length. The vapor pressures of the glycerides decrease with increasing carbon number and generally are low. Water solubility decreases and partition coefficient between octanol and water increase with increasing carbon number.

Fatty acids are generally ingested as triglycerides, which cannot be absorbed by the small intestine. When ingested, monoglycerides are readily absorbed through the duodenal mucosa and converted to triglycerides. In the small intestine, most triglycerides are split by pancreatic lipases into monoglycerides, free fatty acids, and glycerol, which can be absorbed by the intestinal mucosa. A small fraction of triglycerides are absorbed as free glycerol and as diglycerides. Once across the intestinal barrier, triglycerides are reformed. These resynthesized triglycerides collect into globules along with cholesterol and phospholipids and are encased in a protein coat as chylomicrons. Chylomicrons are transported in the lymph to the thoracic duct and eventually to the venous system. The chylomicrons are removed from the blood as they pass through the capillaries of adipose tissue. Fat is stored in adipose cells until it is transported to other tissues as free fatty acids which are used for cellular energy or incorporated into cell membranes.

Based on similarities in structural, physical chemical and toxicokinetic properties, read across among the sponsored substances is reasonable. The following table presents a summary of the read across approach (**bold text** indicates data are available; Read across is designated as "RA"). Read across results were selected based on the lowest available effects value or most conservative result.

Substance CAS#	**Acute toxicity (oral and inhalation)**	**Repeated dose (oral)**	**Gene mutation *in vitro***	**Chromosome aberration *in vitro***	**Chromosome aberration *in vivo***	**Effects on fertility and reproductive organs**	**Developmental toxicity (oral)**
Monoglycerides							
Olein, mono-Octadecenoic acid, 1,2,3-propanetriol **25496-72-4**	LD50 oral >2,000 (Read across (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Glycerol oleate **37220-82-9**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Glycerides,tall-oil **68309-32-0** and **61790-12-3**	**LD50 oral >10,000**	**NOAEL = 12,500 (90 day)**	**Negative**	**Negative**	Negative (RA)	**NOAEL = 5000 (M/F)**	**NOAEL = 5000**
Octadecanoic acid, monoester with 1,2,3-propanetriol **31566-31-1**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	**Negative**	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Monoglycerides , hydrogenated tallow **61789-09-1**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Glyceryl stearate **11099-07-3** and **67701-27-3**	**LD50 oral >5,000**	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Diglycerides							
Octadecanoic acid, 1,2-propanediol monoester **1323-39-3**	**LD50 oral >5,000**	**NOAEL = 3760 (13 week)**	Negative (RA)	Negative (RA)	Negative (RA)	**NOAEL = 3760 (M/F)**	NOAEL = 5000 (RA)
Decanoic acid, ester with 1,2,3-propanetriol octanoate **65381-09-1**	**LD50 oral >5,000**	**NOAEL = 2500 (90 day)**	Negative (RA)	Negative (RA)	Negative (RA)	**NOAEL = 9800 (M/F)**	NOAEL = 5000 (RA)
Triglycerides							
Octanoin, tri-(Octanoic acid, 1,2,3-propanetriyl ester; Tricaprylin) **538-23-8**	**LD50 oral >5,000**	**NOAEL = 9500 (26 week)**	**Negative**	Negative (RA)	**Negative**	NOAEL = 5000 (M/F) (RA)	**NOAEL = 9500 (M/F)**

Hexanoic acid, 2-ethyl-, 1,2,3-propanetriyl ester **7360-38-5**	**LD50 oral >48,000**	NOAEL = 2500 (90 day) (RA)	**Positive**	Negative (RA)	**Negative**	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Glycerides, C8-10 **85409-09-2**	**LD50 oral >2,500**	**NOAEL = 2500 (90 day)**	Negative (RA)	Negative (RA)	Negative (RA)	**NOAEL = 9800 (M/F)**	NOAEL = 5000 (RA)
Glycerides, mixed decanoyl and octanoyl **73398-61-5**	**LD50 oral >5,000**	**NOAEL = 2500 (90 day)**	**Negative**	Negative (RA)	Negative (RA)	**NOAEL = 9800 (M/F)**	NOAEL = 5000 (RA)
Oils, glyceridic, palm kernel **8023-79-8**	**LD50 oral >5,000**	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	**NOAEL = 5000 (M/F)**	**NOAEL = 5000 (M/F)**
Glycerides, C8-18 and C18-unsatd. **67701-28-4**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Oils, vegetable, hydrogenated **68334-28-1**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Glycerides, C12-18 **67701-26-2**	**LD50 oral >10,000**	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Glycerides, C16-18 and C18-unsatd. **67701-30-8**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Tallow, hydrogenated **8030-12-4**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Castor oil, hydrogenated **8001-78-3**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	**Negative**	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Olein, tri - (Octadecenoic acid, 1,2,3-propanetriyl) **122-32-7**	**LD50 oral >2,000**	NOAEL = 2500 (90 day) (RA)	**Negative**	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Mixtures of mono-, di- and triglycerides							
Glycerides, C14-18 mono- and di- **67701-33-1**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Glycerides, mixed coco, decanoyl and octanoyl **68606-18-8**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Glycerides, C16-18 mono- and di- **85251-77-0**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Glycerides, tall-oil mono-, di-, and tri- **97722-02-6**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Glycerides, C16-18 and C18-unsatd. mono-, di- and tri- **91744-20-6**	**LD50 oral >2,000**	NOAEL = 2500 (90 day) (RA)	**Negative**	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)
Coconut oil,transesterification products with decanoic acid mixed ester with glyceryl octanoate **68991-68-4** and **91052-53-8**	LD50 oral >2,000 (RA)	NOAEL = 2500 (90 day) (RA)	Negative (RA)	Negative (RA)	Negative (RA)	NOAEL = 5000 (M/F) (RA)	NOAEL = 5000 (RA)

Substance CAS#	Biodegradation	Acute aquatic toxicity (mg/L)		
		Fish 96 hr LC50	Aquatic invertebrate 48 hr EC50	Aquatic plants 72 hr EC50
Monoglycerides				
Olein, mono- Octadecenoic acid, 1,2,3-propanetriol **25496-72-4**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Glycerol oleate **37220-82-9**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Glycerides,tall-oil **68309-32-0** and **61790-12-3**	**Readily biodegradable**	**LL50* >1000 (nominal)**	**EL50* >1000 (nominal)**	**EbL50* = 854.9 (nominal), ErL50* >1000 (nominal)**
Octadecanoic acid, monoester with 1,2,3-propanetriol **31566-31-1**	**Readily biodegradable**	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Monoglycerides, hydrogenated tallow **61789-09-1**	Readily biodegradable (RA)	**>10,000 (nominal)**	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Glyceryl stearate **11099-07-3** and **67701-27-3**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Diglycerides				
Octadecanoic acid, 1,2-propanediol monoester **1323-39-3**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Decanoic acid, ester with 1,2,3-propanetriol octanoate **65381-09-1**	**Readily biodegradable**	**>10,000 (nominal)**	**EL50 >100 (nominal; 21 d)**	**EbL50, ErL50 >100 (nominal)**
Triglycerides				
Octanoin, tri- (Octanoic acid, 1,2,3-propanetriyl ester; Tricaprylin) **538-23-8**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Hexanoic acid, 2-ethyl-, 1,2,3-propanetriyl ester **7360-38-5**	**Readily biodegradable**	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Glycerides, C8-10 **85409-09-2**	**Readily biodegradable**	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Glycerides, mixed decanoyl and octanoyl **73398-61-5**	**Readily biodegradable**	**>53 (measured)**	**EL50 >100 (nominal)**	**EbL50, LLr50 > 1000 (nominal)**
Oils, glyceridic, palm kernel **8023-79-8**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Glycerides, C8-18 and C18-unsatd. **67701-28-4**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Oils, vegetable, hydrogenated **68334-28-1**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Glycerides, C12-18 **67701-26-2**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Glycerides, C16-18 and C18-unsatd. **67701-30-8**	**Readily biodegradable**	**>10,000 (nominal)**	**EL50 >100 (nominal; 21 d)**	**EbL50, ErL50 >100 (nominal)**
Tallow, hydrogenated **8030-12-4**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	**EL50 >100 (nominal)**	**EbL50, ErL50 >100 (nominal)**
Castor oil, hydrogenated **8001-78-3**	**Readily biodegradable**	**>10,000 (nominal)**	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Olein, tri - (Octadecenoic acid, 1,2,3-propanetriyl) **122-32-7**	**Readily biodegradable**	>100 or exceeds water solubility (RA)	**EL50 >100 (nominal)**	>100 or exceeds water solubility (RA)
Mixtures of mono-, di- and triglycerides				
Glycerides, C14-18 mono- and di- **67701-33-1**	**Readily biodegradable**	**>10,000 (nominal)**	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Glycerides, mixed coco, decanoyl and octanoyl **68606-18-8**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Glycerides, C16-18 mono- and di- **85251-77-0**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)

Glycerides, tall-oil mono-, di-, and tri- **97722-02-6**	**Readily biodegradable**	**1700 (nominal)**	**EL50 >100 (nominal)**	**ECr50 = 13.88 (nominal; exceeds the estimated water solubility of the substance)**
Glycerides, C16-18 and C18-unsatd. mono-, di- and tri- **91744-20-6**	**Readily biodegradable**	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)
Coconut oil,transesterification products with decanoic acid mixed ester with glyceryl octanoate **68991-68-4** and **91052-53-8**	Readily biodegradable (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)	>100 or exceeds water solubility (RA)

*WAF sample preparations are reported relative to a loading rate rather than a concentration [LL50 (fish); EL50 (daphnia); EbL50/ErL50 (algae)]

Physical-chemical Properties

The thirty-one (31) sponsored substances are solid or liquid glycerides and include i) two (2) substances composed of molecules with particular atoms arranged in a definite, known structure (defined chain length), and ii) twenty-nine (29) substances that are mixtures with a range of components. It is not possible to estimate values for mixtures with confidence and for the purposes of this assessment have been characterized by a representative chain length.

A property of a mixture of glycerides is therefore a function of that property for each of the discrete chain length components in the mixture. Melting point and boiling point increase with increasing chain length. Measured melting point values range from -32°C (**CAS 122-32-7;** triglyceride) to 85.4 °C (**CAS 8001-78-3,** triglyceride); for glycerides without measured data, estimated melting points range from 57-74 °C (**CAS 91744-20-6,** monoglyceride) to 349.8 °C (**CAS 67701-30-8,** triglyceride). Measured boiling point values range from 233°C at 1013 hPa (**CAS 538-23-8,** triglyceride) to 360-410 °C at 1013-1021 hPa (**CAS 7360-38-5,** triglyceride); for glycerides without measured data, estimated boiling points range from 378.7 °C (**CAS 68991-68-4 and 91052-53-8,** Mixtures of mono-, di- and triglycerides) to 893.4 °C (**CAS 8001-78-3,** triglyceride). Vapor pressure decreases with increasing carbon number and generally are low (5.09E-10 hPa at 25°C for **CAS 538-23-8,** triglyceride**,** measured; for glycerides without measured data, estimated values are <1E-05 hPa. Water solubility increases with decreasing carbon number; measured values range from <0.05 mg/L at 20°C (**CAS 8001-78-3**) to 3020 mg/L at 20 °C (**CAS 7360-38-5**, triglyceride); for glycerides without measured data, estimated values range from 6.52E-21 mg/L (**CAS 67701-30-8,** triglyceride) to 12.7 mg/L (**CAS 68991-68-4 and 91052-53-8,** Mixtures of mono-, di- and triglycerides). Measured partition coefficient values (log Kow) range from >3 at 20°C (**CAS 73398-61-5,** triglyceride) to >6.5 (**CAS 7360-38-5,** triglyceride); for glycerides without measured data, estimated values range from 3.7 (**CAS 68991-68-4 and 91052-53-8,** Mixtures of mono-, di- and triglycerides) to 23.9 (**CAS 67701-30-8,** triglyceride).

Human Health

Most of the available toxicokinetic data (animal and humans) relates to the absorption of triglycerides including **CAS 122-32-7**, **CAS 7360-38-5**, **CAS 8023-79-8** and **CAS 73398-61-5**, following oral administration, with limited data on its absorption after intravenous and dermal dosing. Toxicokinetic data are also available for **CAS 1323-39-3** (diglyceride), Data were not located for the inhalation route.

Glycerides are expected to be readily absorbed following ingestion, with rapid elimination from most tissues (possible exception of adipose, spleen). Glyceride metabolism and re-synthesis play a role in the absorption and distribution of ingested glycerides. Expiration is at least one route of elimination for ingested glycerides. These pathways are relevant for humans as well as other mammals.

Acute oral toxicity studies were located for twelve (12) Glyceride Category members (CAS **61790-12-3 and 11099-07-3** (monoglycerides)**, 1323-39-3 and 65381-09-1** (diglycerides)**, 538-23-8, 7360-38-5, 85409-09-2, 73398-61-5, 8023-79-8, 67701-26-2 and 122-32-7** (triglycerides) and, **91744-20-6** (mixtures of mono-, di- and triglycerides)). The oral LD50s for rats are > 2000 mg/kg bw (**CAS 122-32-7** (triglycerides) and **91744-20-6** (mixtures of mono-, di- and triglycerides)), and range up to > 48,000 mg/kg bw (**CAS 7360-38-5** (triglyceride) (OECD 401, Directive 84/449/EEC, B.1, or no guideline specified)). At doses consistent with recent testing standards (i.e., 2000 to 5000 mg/kg bw), there were no clinical signs, changes in body weight or findings at gross necropsy. Similar findings (LD50s and lack of toxicity) were reported for mice. Acute aerosol inhalation studies

were located for two glycerides (**CAS 85409-09-2** and **73398-61-5,** triglycerides); there were no adverse findings when rats or guinea pigs were exposed to 0.028 mg/L for six hours.

Skin and eye irritation studies were located for six (6) and five (5) members of the Glycerides Category, respectively. The Glycerides (**CAS 11099-07-3** (monoglyceride), **1323-39-3** (diglyceride), **7360-38-5, 73398-61-5** and **8023-79-8** (triglycerides) and **91744-20-6** (mixtures of mono-, di- and triglycerides) are not irritating to slightly irritating to the skin in standard irritation (Draize, OECD 405, FHSLA, or DOT) studies using rabbits. When a single occlusive patch containing an undiluted glyceride (**CAS 11099-07-3,** monoglyceride) was applied to human volunteer skin for 24 hours, no to slight irritation was noted. The Glycerides (**CAS 11099-07-3 (**monoglyceride**), 1323-39-3 (**diglyceride**), 73398-61-5** and **67701-26-2** (triglycerides) and **91744-20-6 (**mixtures of mono-, di- and triglycerides)) are not irritating to slightly irritating to the eyes in standard eye irritation (Draize or similar) studies using rabbits. The untested members of the Glyceride Category are expected to be not or slightly irritating to the skin and eyes. Clinical signs of respiratory tract irritation were not observed following 6 hour inhalation exposures to aerosols of two Glyceride Category members (**CAS 85409-09-2** and **73398-61-5,** triglycerides**)** at 0.028 mg/L.

Skin sensitization studies with guinea pigs and/or human volunteers were located for four (4) members of the Glycerides Category. In standard Magnusson and Kligman guinea pig maximization tests, the Glyceride Category members were not skin sensitizers. **CAS 73398-61-5,** triglyceride) was tested only in a guinea pig maximization test). In patch **(CAS 11099-07-3,** monoglyceride, and **7360-38-5,** triglyceride) or chamber studies with human volunteers (**CAS 122-32-7**, triglyceride), the Glyceride Category members were not skin sensitizers. The untested members of the Glyceride Category are expected to also not be skin sensitizers.

Repeated dose oral (gavage or diet studies) have been located for six (6) of the Glyceride Category members (**CAS 61790-12-3 (**monoglyceride**), 1323-39-3** and **65381-09-1 (**diglycerides**), 538-23-8, 85409-09-2** and **73398-61-5** (triglycerides). There were no adverse effects of treatment reported following repeated oral studies with rats, by either gavage or diet route. The NOAELs were =>2500 mg/kg bw, indicating the Glyceride Category members are not toxic. Although the studies do not conform to current, standard guidelines, the substances do not cause systemic toxicity. Similar results are expected for the Glyceride Category members that have not been tested.

In vitro and *in vivo* mutagenicity studies have been located for eight (8) and one (1) of the Glyceride Category members, respectively. The Glyceride Category members are negative for genotoxicity (*in vitro* bacterial reverse mutation assays (**CAS 68309-32-0** and **61790-12-3** and **31566-31-1 (**monoglycerides**), 538-23-8**, **73398-61-5, 8001-78-3** and **122-32-7 (**triglycerides**),** and **91744-20-6 (**mixtures of mono-, di- and triglycerides), *in vivo* host-mediated mutagenicity assay (**CAS 538-23-8,** triglyceride), in vitro (**CAS 68309-32-0** and **61790-12-3**, monoglycerides) or *in vivo* (**CAS 538-23-8,** triglyceride) chromosomal aberration, in vivo micronucleus assay (**CAS 538-23-8,** triglyceride), *in vivo* dominant lethal (**CAS 538-23-8**, triglyceride) and SCE (**CAS 538-23-8,** triglyceride and **CAS 7360-38-5**, triglyceride). One of the substances (CAS **7360-38-5**, triglyceride), was positive in an *in vivo* mouse spot test; the weight of evidence suggests this is not representative of the Glyceride Category members. A lack of genotoxicity is expected for those Glyceride Category members that have not been tested.

A carcinogenicity study has been located for Glyceride Category member **CAS 538-23-8 (**triglyceride**)**. In a two year gavage carcinogenicity study, there were significant dose-related increased incidences of pancreatic exocrine hyperplasia and adenoma, and proliferative lesions of the forestomach of rats administered **CAS 538-23-8 (**triglyceride**)**. Nephropathy and related severity were significantly decreased in high dose rats, and the incidence of mononuclear cell leukemia was decreased. A level of evidence of carcinogenicity was not assigned by NTP. A carcinogenicity study with tobacco-specific nitrosamine 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK) was conducted to test the transplacental carcinogenicity of NNK. Groups of pregnant hamsters were given subcutaneous (s.c.) injections of single or multiple doses of NNK (cumulative dose range, 50–300 mg/kg**),** on day 15 (last day of gestation) or on days 13, 14, and 15 of gestation, three s.c. injections of **CAS 7360-38-5** (triglyceride, 43 males, 40 females, last 3 days of gestation) and the offspring were evaluated for tumor development up to one year later. Within 1 year after treatment, up to 70% of the offspring developed tumors in various organs, including respiratory tract, nasal cavity, adrenal glands, pancreas, and liver. No tumors were found in the control hamsters treated with the vehicle (trioctanoin) alone. The overall tumor incidence was proportional to the cumulative dose. Females had a generally higher tumor incidence than males. **CAS 7360-38-5** (triglyceride) was negative in this study for transplacental carcinogenicity.

Effects on fertility and developmental toxicity studies were located for six (6) and five (5) Glyceride Category members, respectively. There were no effects on fertility (**CAS 61790-12-3** (monoglyceride)**, 1323-39-3** and **65381-09-1** (diglycerides), **85409-09-2, 73398-61-5** and **8023-79-8** (triglycerides**)** or developmental effects (**CAS 61790-12-3**, monoglyceride, **538-23-8, 7360-38-5** and **8023-79-8,** triglycerides**)** in rats, mice or hamsters in studies similar to OECD 416, FDA/WHO/DGHS safety evaluation protocol, 90 day studies examining reproductive organs, three–generation study or developmental studies with no protocol specified. In a developmental toxicity study in rats in which **CAS 538-23-8** was used as the vehicle control (9500 mg/kg bw) and water was used as the negative control, it was evident that the vehicle itself exerted a mild degree of developmental toxicity. There was a statistically significant 8% increase in total soft tissue malformations in the vehicle control group compared to 0% in the water control group. Maternal weight gain and fetal size were also lower in animals receiving **CAS 538-23-8** compared to the water controls, but these were not statistically significant." In a 3-generation study with **CAS 73398-61-5** (triglyceride), during lactation the volume of milk secreted by rats receiving the medium chain triglyceride in the diet at 9800 mg/kg bw was smaller and resulted in slower gain in body weight; after weaning, normal growth of the rats resumed. In this study, the LOAEL for developmental toxicity was 9800 mg/kg bw. Although the studies do not all conform to current, standard guidelines, the NOAELs were all greater than 2000 mg/kg bw. Similar results are expected for the Glyceride Category members which have not been tested.

The Glycerides Category members do not possess properties indicating a hazard for human health. Adequate screening-level data are available to characterize the hazard to human health for the purposes of the OECD Cooperative Chemicals Assessment Programme.

Environment

Hydrolysis (OECD TG 111) studies have not been conducted for the glycerides. The ester group on the glycerides can be hydrolyzed to generate glycerin and the corresponding fatty acid. However, hydrolysis is expected to be very slow (>1 year) at room temperature, and the limited water solubility and steric hindrance of many of these substances will contribute to the lack of hydrolysis. If hydrolysis were to occur, the expected hydrolysis products (glycerin and the fatty acid) would not further hydrolyze, as there are no additional hydrolyzable groups for these substances.

The glycerides are subject to indirect photodegradation in air. Modeled photodegradation rates (half-lives) were estimated using AopWin v1.92 (EPI Suite v4.11). Estimated half-lives (hours; based on 12 hours of light per day; 1.5E+6 OH/cm^3) for hydroxyl radicals generally increase with decreasing chain length and range from ca. 0.5 hours (**CAS 122-32-7,** triglyceride) to 4.7 hours (**CAS 7360-38-5**, triglyceride). No ozone reaction was estimated for most of the glycerides (the model is only applicable to unsaturated molecules); for those Glyceride Category members for which an estimation was made, the half-lives (hours, 7E-11 mol/cm^3) for ozone reaction range from 0.46 to 2.1 hours (**CAS 25496-72-4, 37220-82-9, 68309-32-0** and **61790-12-3** (monoglycerides), **122-32-7** (triglyceride), **68424-61-3** and **97722-02-6** (mixtures of mono-, di- and triglycerides). Level III fugacity modelling using EPI Suite v4.11 indicates that the glycerides will distribute primarily to soil and water, with lesser amounts to air and sediment.

Biodegradation studies generally confirm that the extent of biodegradation observed in 28 days meets the ready biodegradability criterion (**CAS 68309-32-0** and **61790-12-3** (monoglycerides, 56-84% in 28 days)**, 31566-31-1** (monoglyceride, 108% in 51 days), **65381-09-1** (monoglyceride, 73 - 88% in 30 days), **7360-38-5** (triglyceride, >= 70.2 — <= 73.8 in 28 days), **85409-09-2** (triglyceride, 91.2 - 99.6% in 28 days), **73398-61-5** (triglyceride, 93% in 28 days), **67701-30-8** (triglyceride, 73 - 109% in 30 days)**, 8001-78-3** (triglyceride, 64% in 28 days)**, 122-32-7** (triglyceride, 77% in 28 days), **67701-33-1** (69 - 95% in 28 days; 68 - 73% in 30 days), **97722-02-6** (79% in 28 days)**,** and **91744-20-6** (mixtures of mono-, di- and triglycerides, 72% in 28 days)). In one study, biodegradation under anaerobic conditions was also demonstrated (CAS **122-32-7**; triglyceride, 63-106% in 51 days). Glyceride Category members that have not been tested are expected to be readily biodegradable based on read across to other Glyceride Category members.

Measured bioconcentration (BCF) factor data were not located for the Glycerides Category members. Estimated BCF values are calculated using BCFBAF v3.01 (EPI Suite v4.11). The Glyceride Category members have BCF values less than 500, indicating a low potential for bioaccumulation with the exception of **CAS 1323-39-3 (**diglyceride), with estimated BCF value of 1574. However, this value is very likely an overestimate of the substance's bioaccumulation potential since the influence of metabolism (via the common mechanism of β-

oxidation), which will be very high for substances in this category, is not fully represented. Overall, substances in the category have a low potential for bioaccumulation.

Due to the poorly soluble nature of many category members, it was difficult to distinguish whether the toxicity observed was due to the chemical toxicity or the physical presence of the test substance (particulates floating in and on the surface of the water, suds or film on the surface of the water) during aquatic toxicity testing. Therefore, two general strategies were used for testing these substances: (1) the use of a Water Accommodated Fraction (WAF) prepared at a maximum loading rate (i.e. concentrations of the test substance is significantly above its solubility limit) or (2) the use of a direct addition method in which the test substance was added directly to the test vessels, followed by shaking/stirring/use of a homogenizer for an extended period of time to allow for equilibrium. For both of these methods, it is more appropriate to report the nominal loading rate rather than a measured concentration, since the values greatly exceed the water solubility of the test substance. Acute toxicity test results are presented for aquatic species.

Fish

Name and CAS Number	Species/Test method	LC50 (mg/L), 96 hr	
Monoglycerides			
Olein, mono- Octadecenoic acid, 1,2,3-propanetriol **25496-72-4**	No data located		
Glycerol oleate **37220-82-9**	No data located		
Glycerides,tall-oil **68309-32-0** and **61790-12-3**	*Pimephales promelas*/ OECD 203/static	LL50* >1000 (nominal)	
Octadecanoic acid, monoester with 1,2,3-propanetriol **31566-31-1**	No data located		
Monoglycerides, hydrogenated tallow **61789-09-1**	No data located		
Glyceryl stearate **11099-07-3** and **67701-27-3**	No data located		
Glycerides, palm-oil mono-, hydrogenated **91744-73-9**	No data located		
Diglycerides			
Octadecanoic acid, 1,2-propanediol monoester **1323-39-3**	No data located		
Decanoic acid, ester with 1,2,3-propanetriol octanoate **65381-09-1**	*Danio rerio*/Similar to OECD 203/semi-static	>10,000 (nominal)	
Triglycerides			
Octanoin, tri- (Octanoic acid, 1,2,3-propanetriyl ester; Tricaprylin) **538-23-8**	No data located		
Hexanoic acid, 2-ethyl-, 1,2,3-propanetriyl ester **7360-38-5**	No data located		
Glycerides, C8-10 **85409-09-2**	No data located		
Glycerides, mixed decanoyl and octanoyl **73398-61-5**	*Danio rerio*/Directive 92/69/EEC, C.1/semi-static	>53 (measured)	
Oils, glyceridic, palm kernel **8023-79-8**	No data located		
Glycerides, C8-18 and C18-unsatd. **67701-28-4**	No data located		
Oils, vegetable, hydrogenated **68334-28-1**	No data located		
Glycerides, C12-18 **67701-26-2**	No data located		
Glycerides, C16-18 and C18-unsatd. **67701-30-8**	*Danio rerio*/Similar to OECD 203/semi-static daily renewal	>10,000 (nominal)	
Tallow, hydrogenated **8030-12-4**	No data located		
Castor oil, hydrogenated **8001-78-3**	*Danio rerio*/ ISO 7346/2/semi-static daily renewal	>10,000 (nominal)	

Olein, tri - (Octadecenoic acid, 1,2,3-propanetriyl) **122-32-7**	No data located		
Mixtures of mono-, di- and triglycerides			
Glycerides, C14-18 mono- and di- **67701-33-1**	*Danio rerio*/Similar to OECD 203/semi-static daily renewal	>10,000 (nominal)	
Glycerides, mixed coco, decanoyl and octanoyl **68606-18-8**	No data located		
Glycerides, C16-18 and C18-unsatd. mono- and di- **68424-61-3**	No data located		
Glycerides, C16-18 mono- and di- **85251-77-0**	No data located		
Glycerides, tall-oil mono-, di-, and tri- **97722-02-6**	*Danio rerio*/Similar to OECD 203/semi-static daily renewal	1700 (nominal)	
Glycerides, C16-18 and C18-unsatd. mono-, di- and tri- **91744-20-6**	No data located		
Coconut oil,transesterification products with decanoic acid mixed ester with glyceryl octanoate **68991-68-4** and **91052-53-8**	No data located		

Aquatic Invertebrates

Name and CAS Number	**Species/Test method**	**EC50 (mg/L) 48 hr**	
Monoglycerides			
Olein, mono- Octadecenoic acid, 1,2,3-propanetriol **25496-72-4**	No data located		
Glycerol oleate **37220-82-9**	No data located		
Glycerides,tall-oil **68309-32-0** and **61790-12-3**	*Daphnia magna*/OECD 202/static	EL50*>1000 (nominal)	
Octadecanoic acid, monoester with 1,2,3-propanetriol **31566-31-1**	No data located		
Monoglycerides, hydrogenated tallow **61789-09-1**	No data located		
Glyceryl stearate **11099-07-3** and **67701-27-3**	No data located		
Glycerides, palm-oil mono-, hydrogenated **91744-73-9**	No data located		
Diglycerides			
Octadecanoic acid, 1,2-propanediol monoester **1323-39-3**	No data located		
Decanoic acid, ester with 1,2,3-propanetriol octanoate **65381-09-1**	*Daphnia magna*/OECD 202/semi-static renewal every 2-3 days	EL50>100 (nominal; 21 d)	
Triglycerides			
Octanoin, tri- (Octanoic acid, 1,2,3-propanetriyl ester; Tricaprylin) **538-23-8**	No data located		
Hexanoic acid, 2-ethyl-, 1,2,3-propanetriyl ester **7360-38-5**	No data located		
Glycerides, C8-10 **85409-09-2**	No data located		
Glycerides, mixed decanoyl and octanoyl **73398-61-5**	*Daphnia magna*/EU Guideline 92/69/EWG/static	EL50>100 (nominal)	
	Daphnia magna/EU Guideline 92/69/EWG/static	EL50>100 (nominal)	
Oils, glyceridic, palm kernel **8023-79-8**	No data located		
Glycerides, C8-18 and C18-unsatd. **67701-28-4**	No data located		

Oils, vegetable, hydrogenated **68334-28-1**	No data located		
Glycerides, C12-18 **67701-26-2**	No data located		
Glycerides, C16-18 and C18-unsatd. **67701-30-8**	*Daphnia magna*/similar to OECD 202/semi-static renewal every 2-3 days	EL50>100 (nominal; 21 d)	
Tallow, hydrogenated **8030-12-4**	*Daphnia magna*/similar to OECD 202/static	EL50>100 (nominal)	
Castor oil, hydrogenated **8001-78-3**	No data located		
Olein, tri - (Octadecenoic acid, 1,2,3-propanetriyl) **122-32-7**	*Daphnia magna*/EU Guideline 92/69/EWG/static	EL50>100 (nominal)	
Mixtures of mono-, di- and triglycerides			
Glycerides, C14-18 mono- and di- **67701-33-1**	No data located		
Glycerides, mixed coco, decanoyl and octanoyl **68606-18-8**	No data located		
Glycerides, C16-18 and C18-unsatd. mono- and di- **68424-61-3**	No data located		
Glycerides, C16-18 mono- and di- **85251-77-0**	No data located		
Glycerides, tall-oil mono-, di-, and tri- **97722-02-6**	*Daphnia magna*/similar to OECD 202/static	EL50>100 (nominal)	
Glycerides, C16-18 and C18-unsatd. mono-, di- and tri- **91744-20-6**	No data located		
Coconut oil,transesterification products with decanoic acid mixed ester with glyceryl octanoate **68991-68-4** and **91052-53-8**	No data located		

Aquatic plants

Name and CAS Number	**Species/Test method**	**EC50 (mg/L), 72 hr**	
Monoglycerides			
Olein, mono- Octadecenoic acid, 1,2,3-propanetriol **25496-72-4**	No data located		
Glycerol oleate **37220-82-9**	No data located		
Glycerides,tall-oil **68309-32-0** and **61790-12-3**	*Pseudokirchnerella subcapitata*/ OECD 201/static	EbL50* = 854.9, ErL50 >1000 (nominal) NOELr = 500	
Octadecanoic acid, monoester with 1,2,3-propanetriol **31566-31-1**	No data located		
Monoglycerides, hydrogenated tallow **61789-09-1**	No data located		
Glyceryl stearate **11099-07-3** and **67701-27-3**	No data located		
Glycerides, palm-oil mono-, hydrogenated **91744-73-9**	No data located		
Diglycerides			
Octadecanoic acid, 1,2-propanediol monoester **1323-39-3**	No data located		
Decanoic acid, ester with 1,2,3-propanetriol octanoate **65381-09-1**	*Desmodesmus subspicatus*/ OECD 201/static	EbL50, ErL50 >100 (nominal), NOEL = 100	
Triglycerides			
Octanoin, tri- (Octanoic acid, 1,2,3-propanetriyl ester; Tricaprylin) **538-23-8**	No data located		

Hexanoic acid, 2-ethyl-, 1,2,3-propanetriyl ester **7360-38-5**	No data located		
Glycerides, C8-10 **85409-09-2**	No data located		
Glycerides, mixed decanoyl and octanoyl **73398-61-5**	*Desmodesmus subspicatus*/ OECD 201/static	EbL50, ErL50 >1000 (nominal loading), NOEC = 1000	
Oils, glyceridic, palm kernel **8023-79-8**	No data located		
Glycerides, C8-18 and C18-unsatd. **67701-28-4**	No data located		
Oils, vegetable, hydrogenated **68334-28-1**	No data located		
Glycerides, C12-18 **67701-26-2**	No data located		
Glycerides, C16-18 and C18-unsatd. **67701-30-8**	*Desmodesmus subspicatus*/ similar to OECD 201/static	EbL50, ErL50 >100 (nominal), NOEL =100	
Tallow, hydrogenated **8030-12-4**	*Desmodesmus subspicatus*/ similar to OECD 201/static	EbL50, ErL50 >100 (nominal), NOEL = 100	
Castor oil, hydrogenated **8001-78-3**	No data located		
Olein, tri - (Octadecenoic acid, 1,2,3-propanetriyl) **122-32-7**	No data located		
Mixtures of mono-, di- and triglycerides			
Glycerides, C14-18 mono- and di- **67701-33-1**	No data located		
Glycerides, mixed coco, decanoyl and octanoyl **68606-18-8**	No data located		
Glycerides, C16-18 and C18-unsatd. mono- and di- **68424-61-3**	No data located		
Glycerides, C16-18 mono- and di- **85251-77-0**	No data located		
Glycerides, tall-oil mono-, di-, and tri- **97722-02-6**	*Skeletonema costatum*/ ISO 10253 1995/static	ECr50 = 13.88 (nominal; exceeds the estimated water solubility of the substance)	
Glycerides, C16-18 and C18-unsatd. mono-, di- and tri- **91744-20-6**	No data located		
Coconut oil,transesterification products with decanoic acid mixed ester with glyceryl octanoate **68991-68-4** and **91052-53-8**	No data located		

*WAF sample preparations are reported relative to a loading rate rather than a concentration [LL50 (fish); EL50 (daphnia); EbL50/ErL50 (algae)]

There were no acute effects of the Glycerides Category members on fish, aquatic invertebrates or algae with LC50/LL50 or EC50/EL50 values less than the water solubility of the substance or that were less than 100 mg/L; similar results are expected for the Glycerides Category members that have not been tested.

There were no chronic reproductive effects of **CAS 65381-09-1** (diglyceride) or **67701-30-8** (triglyceride) on *Daphnia magna* (OECD 202), with NOEL (for reproduction) values > 100 mg/L; a concentration which exceeds the water solubility of the substances. Similar results are expected for the Glyceride Category members that have not been tested.

The Glycerides Category members do not possess properties indicating a hazard for the environment. Category members are rapidly biodegradable and have a low potential for bioaccumulation. Adequate screening-level data are available to characterize the hazard for the environment for the purposes of the

OECD Cooperative Chemicals Assessment Programme.

Exposure

The 2012 production volumes reported by the US EPA (Chemical Data Reporting (CDR)) for the sponsored Glycerides in the United States is as follows:

Name and CAS Number	Production volume (Tonnes/year)
Monoglycerides	
Olein, mono- Octadecenoic acid, 1,2,3-propanetriol **25496-72-4**	454 – 4,536
Glycerol oleate **37220-82-9**	454 – 4,536
Glycerides,tall-oil **68309-32-0** and **61790-12-3**	1,076
Octadecanoic acid, monoester with 1,2,3-propanetriol **31566-31-1**	454 – 4,536
Monoglycerides, hydrogenated tallow **61789-09-1**	28
Glyceryl stearate **11099-07-3** and **67701-27-3**	31 and 423
Glycerides, palm-oil mono-, hydrogenated **91744-73-9**	(b)
Diglycerides	
Octadecanoic acid, 1,2-propanediol monoester **1323-39-3**	(b)
Decanoic acid, ester with 1,2,3-propanetriol octanoate **65381-09-1**	(c)
Triglycerides	
Octanoin, tri- (Octanoic acid, 1,2,3-propanetriyl ester; Tricaprylin) **538-23-8**	(b)
Hexanoic acid, 2-ethyl-, 1,2,3-propanetriyl ester **7360-38-5**	35
Glycerides, C8-10 **85409-09-2**	(b)
Glycerides, mixed decanoyl and octanoyl **73398-61-5**	454 – 4,536
Oils, glyceridic, palm kernel **8023-79-8**	22,680 -45,359
Glycerides, C8-18 and C18-unsatd. **67701-28-4**	113,398 - 226,796
Oils, vegetable, hydrogenated **68334-28-1**	454 – 4,536
Glycerides, C12-18 **67701-26-2**	Not listed on CDR
Glycerides, C16-18 and C18-unsatd. **67701-30-8**	(c)
Tallow, hydrogenated **8030-12-4**	17
Castor oil, hydrogenated **8001-78-3**	5885
Olein, tri - (Octadecenoic acid, 1,2,3-propanetriyl) **122-32-7**	45-227
Mixtures of mono-, di- and triglycerides	
Glycerides, C14-18 mono- and di- **67701-33-1**	4,536 - 22,680
Glycerides, mixed coco, decanoyl and octanoyl **68606-18-8**	(b)
Glycerides, C16-18 and C18-unsatd. mono- and di- **68424-61-3**	454- 4536
Glycerides, C16-18 mono- and di- **85251-77-0**	(c)
Glycerides, tall-oil mono-, di-, and tri- **97722-02-6**	445
Glycerides, C16-18 and C18-unsatd. mono-, di- and tri- **91744-20-6**	(b)
Coconut oil,transesterification products with decanoic acid mixed ester with glyceryl octanoate **68991-68-4** and **91052-53-8**	(b)

(b) No production volumes reported to the EPA either because the substance is not produced in the US or substance or manufacturers are exempt from reporting.
(c) Production Information withheld in order to maintain Confidential Business Information (CBI)

In U.S., the main applications are in personal care products, cosmetics, cleaning products, industrial intermediates and in pharmaceuticals.

Glycerides are naturally occurring substances. Exposures to those used in industry could arise in association with production, formulation and industrial use of these substances.

Glycerides are manufactured in established chemical manufacturing facilities that have standard engineering controls and procedures in place to ensure safe handling and use of chemicals. The precautions used includes corrosion-resistant vessels and piping of the type used for any quality-controlled chemical reaction. Glycerides have a low volatility and as a rule engineering controls are available that prevent the need for respiratory protection. For routine operations, including those involving a breach of the closed system, goggles or safety glasses, gloves, safety boots and helmets are worn, and a higher level of respiratory protection is applied and extra measures may be taken to prevent breathing of vapours, if (local) ventilation is inadequate. Formulation of large volumes of product occurs in a continuous process using a closed system; for smaller volumes, a batch process is used. Closed reactors and/or mixing tanks with closed charging systems are typically used for the formulation of

glycerides.

Exposure to glycerides through the use of formulated products in industry and commerce is mitigated by following the recommended use and precaution instructions detailed in the material safety data sheet (MSDS). MSDS' reflect the hazard potential of the chemical ingredients in the product and provide details on the precautions necessary when handling these products and the instructions for first aid in case of an accidental exposure.

Major routes of consumer exposure to glycerides are from the use of glycerides in personal care products and cosmetics. Indirect consumer exposure to glycerides may occur from exposures to residual levels of down-the-drain products in receiving waters from effluents of sewage treatment plants.