

Polyoxyethylene sorbitan fatty acid esters

The document of the safety summary provides usage of chemical substances and safety information to the general public. The safety summary is NOT intended to be an alternative document of Safety Data Sheet which is described from the recommendable detailed safety measures for each use. The safety summary is NOT intended to be an alternate document of the instructions for use nor the warning of consumer products including this substance. The contents of this summary are based on the laws, documents, information, and data available at present, without any warranty.

1. Chemical Identity

Category Name	Polyoxyethylene sorbitan fatty acid esters
Substance Name	Polyoxyethylene sorbitan fatty acid (C12-C18) esters
CAS Number	9005-64-5、9005-66-7、66794-58-9、9005-67-8、9005-65-6、9005-71-4、9005-70-3

2. Product Uses and Benefits

Polyoxyethylene sorbitan fatty acid esters are nonionic surfactants. Polyoxyethylene sorbitane fatty acid esters have the characteristic of being a cleaner that does not foam excessively, and used in facial wash, body soap, shampoo, toothpaste and others. Polyoxyethylene sorbitan fatty acid esters are used as cleaning agents and emulsifiers for industrial applications.

3. Physical/Chemical Properties

As the representative structure of Polyoxyethylene sorbitan fatty acid esters, the physicochemical properties of C C12EO4, C18EO4, C12EO20, C16EO20 and C18EO20 with the numbers of carbon of the fatty acid of 12, 16 and 18 with the numbers of moles of ethylene oxide (EO) of 4 or 20 were calculated using computer software EPI suite 4.11 of the U.S. Environmental Protection Agency are shown below.

Physicochemical properties of Polyoxyethylene sorbitan fatty acid esters

Property	Representative structure				
	C12 EO4	C18 EO4	C12 EO20	C16 EO20	C18 EO20
Molecular weight	522.68	606.85	1227.72	1255.59	1311.70
Boiling point (°C)	613.91	683.53	1178.10	1201.31	1247.72
Melting point (°C)	265.81	298.33	349.84	349.84	349.84
Vapor pressure (Pa) 25°C	8.90×10^{-16}	1.40×10^{-18}	3.00×10^{-37}	3.97×10^{-38}	6.86×10^{-40}
Water solubility (mg/L)	72.91	6.29×10^{-2}	7.11	0.66	5.64×10^{-3}
Octanol/water partition coefficient (Log Kow)	0.99	3.94	-3.40	-2.42	-0.45
Soil adsorption coefficient (Log Koc)	0.131	1.763	-2.478	-1.936	-0.846

4. Human Health Safety Assessment

Consumer: The exposure to Polyoxyethylene sorbitan fatty acid esters is at safe levels.

Worker: The repeated exposure of Polyoxyethylene sorbitan fatty acid esters does not cause any toxic effects

Effect Assessment	Result
Acute Toxicity oral/ dermal	No acute toxicity after oral/ dermal exposure in practical use The substance does not cause damage to any organs following single exposure
Irritation skin/ eye	Undiluted substance causes mild skin irritation Based on the available data, unlikely to cause damage to eyes
Sensitization	Based on the available data, unlikely to cause allergic skin reaction
Toxicity after repeated exposure	Unlikely to cause any toxic effects through prolonged or repeated oral exposure in practical use
Genotoxicity	Based on the available data, unlikely to cause genetic defects
Carcinogenicity	Based on the available data, unlikely to cause cancer
Toxicity for reproduction	Based on the available data, unlikely to be damaging to fertility or the unborn child

5. Environmental Safety Assessment

The test results with fish, aquatic invertebrates and algae suggest that Polyoxyethylene sorbitan fatty acid esters are harmful to aquatic organism. However, Polyoxyethylene sorbitan

fatty acid esters are unlikely to persist in the environment because of the readily biodegradation. Polyoxyethylene sorbitan fatty acid esters does not bioaccumulate in the food chain.

Effect Assessment	Result
Aquatic Toxicity	Suggests to cause toxicity for aquatic organism and toxic to aquatic life with long lasting effects
Biodegradation	Readily biodegradable
PBT/ vPvB conclusion	Not persistent in the environment, not bioaccumulating in organisms and not toxic nor very persistent and very bioaccumulating

6. Exposure

- **Consumer**

The consumer can come into contact with the substance in use of the detergents etc., but the concentration of Polyoxyethylene sorbitan fatty acid esters in use is below the level which would give rise harmful effects of concern. When it's used as the recommended use, consumer should always read product information before use and follow the label/ use instructions.

- **Worker**

The exposure can occur either in Polyoxyethylene sorbitan fatty acid esters manufacturing facilities or in the various industrial facilities when Polyoxyethylene sorbitan fatty acid esters is used. Those workers in industrial operations during maintenance, sampling, testing, or other procedures could be exposed with Polyoxyethylene sorbitan fatty acid esters. Only qualified and trained workers handle the undiluted substance. The manufacturing facilities offer thorough training program for employees and appropriate work processes, as well as safety equipment (goggles and gloves) in place to prevent an unnecessary exposure. Safety showers and eye-wash stations are accessible nearby. Workers are required to be trained in accordance with the safety measures in the Safety Data Sheet.

- **Environment**

Since this substance is used extensively, it is discharged to waste water treatment plants from industrial sites such as manufacturing, preparation, handling, storage and use of the substance as well as from consumer households. However, the substance is readily biodegradable, so that it is removed efficiently in waste water treatment plants. The substance is biologically degraded in the surface water and is rapidly removed even if it is remained slightly in the waste water. Hence, the chronic exposure to aquatic organisms of the substance is unlikely to occur. Furthermore, the substance does not accumulate in the food chain, so that there is no concern of human exposure through environmental pathway.

7. Risk management recommendations for industrial use

When you use the substance, make sure to be measured the adequate ventilation. Always use appropriate chemical-resistant gloves to protect your hands and skin and always wear

eye protection equipment. Do not eat, drink or smoke where the substance is handled, processed or stored. Wash hands and skin after contact with the substance. When the substance attaches to skin (or hair), take off the contaminated clothes. Wash with a large amount of water and soap. When it causes your skin irritation, consult doctor (medical diagnosis/therapy). If the substance gets into your eyes, rinse your eyes thoroughly for several minutes. If you wear contact lens, and you can take it off easily, take it off and continue to rinse your eyes. Contact to a doctor immediately.

Waste water containing the substance must be passed the waste water treatment plants in order to remove the substance. No specific measures are needed, because it is not expected to be released into the air.

8. Regulatory Information/Classification and Labelling

Under GHS classification chemical substances are classified in hazards for physical properties, human health and environment. The hazard information for industrial products are transmitted via specific labels and Safety Data Sheet. GHS offers the standardization for hazard communication. The subjects who could be assumed to be exposed to the substance, workers, consumers, transport workers, and emergency responders, can better understand the hazards of the chemicals in use through the transmission.

Labelling according to UN GHS

UN GHS is the basis for country specific GHS labelling.

Polyoxyethylene sorbitan fatty acid esters are assigned to GHS classification.

Classification and labelling information

Aquatic Acute 3

Hazard Statements:

H402: Harmful to aquatic life

The laws of manufacturing, sale, transport, use and disposal are different among countries or areas. Details are referred to Safety Data Sheet provided by the supplier.

9. Conclusion

Though Polyoxyethylene sorbitan fatty acid esters are suggested to cause toxicity to aquatic organisms, the risk to environment organisms is negligible due to the rapid degradation of Polyoxyethylene sorbitan fatty acid esters. In the PBT/vPvB assessments for Polyoxyethylene sorbitan fatty acid esters, the substance is not applicable to PBT/vPvB. Contact with the undiluted Polyoxyethylene sorbitan fatty acid esters may cause irritation to the skin. When handling the substance, workers should follow the standard safety measures and refer to the Safety Data Sheet. Consumers will usually not come into contact with the substance bulk and the substance is used diluted in consumer products, therefore, it is considered that Polyoxyethylene sorbitan fatty acid esters give rise no hazardous effects to human health.

10. Contact

For further information on this substance or Safety Summaries in general, please contact us.

Name	Kao Corporation
URL	https://chemical.kao.com/global/

11. Glossary

Acute Toxicity	Adverse effects that result from a single exposure
Sensitization	Inducibility of allergy
Genotoxicity	Effects to induce gene mutations
Carcinogenicity	Action influence to cause a cancer
Toxicity for Reproduction	Adverse effects for teratogenicity, embryotoxicity, and reproductivity
Biodegradation	Biological degradation of a substance in environments
PBT (Persistent, Bioaccumulative and Toxic)	Substances that are environmentally persistent, bioaccumulative, and toxic
vPvB (Very Persistent and Very Bioaccumulative)	Substances with high persistence in the environment and high accumulation in ecology
GHS	Globally Harmonized System of Classification and Labelling of Chemicals

12. Date of Issue

October 8, 2021