

Global Product Strategy (GPS) Safety Summary

Propylene Oxide

This GPS Safety Summary is a high-level summary intended to provide the general public with an overview of product safety information on this chemical substance. It is not intended to provide emergency response, medical or treatment information, nor to provide an overview of all safety and health information. This summary is not intended to replace the Safety Data Sheet. For detailed guidance on the use or regulatory status of this substance, please consult the Safety Data Sheet, the Product Safety Bulletin and the Product Stewardship Bulletin.

Chemical Identity

Name: Propylene Oxide (PO)
Brand names: Propylene Oxide
Chemical name (IUPAC): 1,2-Epoxypropane
CAS number: 75-56-9
EC number: 200-879-2
Molecular formula: C₃H₆O

Uses and Applications

Propylene oxide is used as an intermediate and/or monomer in polymerization reactions in the production of various specialty materials, such as:

- Polyether polyols that are further reacted with various di-isocyanates to form polyurethane foams and resins;
- Propylene glycols widely used in diverse applications such as the manufacture of polyesters for building boats, home construction components, additives for human and animal foods, pharmaceutical excipients, in cosmetics and laundry detergents, aircraft deicing and anti-icing fluids;
- Functional fluids including heat transfer fluids, hydraulic fluids, and lubricants;
- Block copolymers of propylene oxide and ethylene oxide that are efficient and versatile surfactants;
- Propoxylated carbohydrates, or starches, used in a variety of applications in the construction, paint, food and pharmaceutical industries.

There are no supported uses of propylene oxide in consumer products.

Physical / Chemical Properties

Propylene oxide is a colorless, low molecular weight, extremely flammable liquid of high volatility with a sweet, ether-like odor. The flash point for PO is -38°C (-36°F). The atmospheric boiling and freezing points of PO are 35°C (95°F) and -112°C (-170°F) respectively.

Propylene oxide reacts violently with oxidants, organic and inorganic acids, organic and inorganic bases, anhydrides, anhydrous metal chlorides, chlorine, amines, ammonia and alkali metals with risk of fire and explosion.

Propylene oxide has been classified as hazardous under the Globally Harmonized System on classification and labeling (GHS) for its flammability.

Health Effects

Propylene oxide is classified as hazardous to health under GHS for its acute toxicity, irritancy, mutagenicity and carcinogenicity.

The table below gives an overview of the health effects assessment results for propylene oxide.

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Acutely toxic by oral, dermal and inhalation routes of exposure
Irritation / corrosion Skin / eye/ respiratory tract	Irritating to Eye and respiratory tract from contact to liquid and exposure to vapors. New test data demonstrate that propylene oxide is not irritating to the skin (see note 1)
Sensitisation	May cause sensitization by skin contact
Toxicity after repeated exposure Oral / inhalation / dermal	Target organ toxicity associated with repeated exposure to propylene oxide is limited to local tissue injury at the site of initial contact, and for vapor resulted in upper respiratory tract effects and lesions
Genotoxicity / Mutagenicity	Weakly mutagenic / genotoxic
Carcinogenicity	Animal and possible human carcinogen. Local site of contact tumors
Toxicity for reproduction	No adverse effects on fertility and not toxic to the developing embryo/fetus

Note 1) In Europe a harmonized classification exists for propylene oxide, under which propylene oxide is classified as a skin irritant category 2.

Environmental Effects

Propylene oxide is a low-ecotoxicity hazard based on the results of acute studies. Propylene oxide is not classified as environmentally hazardous under EU CLP. However, under UN GHS propylene oxide data results in classification under the lowest ranking of aquatic toxicity.

The table below gives an overview of the environmental assessment results for propylene oxide.

Effect Assessment	Result
Aquatic Toxicity	Low toxicity to water organisms

Fate and behaviour	Result
Biodegradation	Readily biodegradable
Bioaccumulation potential	Not bioaccumulative
PBT / vPvB conclusion	Not considered to be either PBT nor vPvB.

PBT = Persistent, Bio-accumulative and Toxic in the environment.
vPvB = very Persistent and very Bio-accumulative in the environment.

Exposure

Human health

Consumers generally will not come into contact with propylene oxide as there are no supported uses of propylene oxide in consumer products.

Exposure to propylene oxide of personnel in industrial settings and manufacturing facilities is considered low because the process, storage and handling operations are predominantly enclosed. Also, transfer (loading and transport) of propylene oxide is done with dedicated equipment in dedicated containers to prevent any release from the system. However, worker exposure can potentially occur during operations like product transfer, product sampling, or maintenance / repair activities on product containing systems. The risk of accidental exposure should be controlled by selecting and applying the appropriate Risk Management Measures.

Environment

The manufacture of propylene oxide is a closed and automated process with no aqueous effluent or gaseous effluent released to the environment. Also, transfer (loading and transport) of propylene oxide is conducted with dedicated equipment in dedicated containers to prevent any release from the system.

However, exposure to the environment can potentially happen during operations like product transfer, product sampling, maintenance / repair activities on product containing systems, or laboratory uses. The risk of accidental exposure should be controlled by selecting and applying the appropriate Risk Management Measures.

Risk Management Measures

For detailed guidance on the use of propylene oxide, the Safety Data Sheet and the Product Safety Bulletin should be consulted.

Propylene oxide should only be handled by knowledgeable and trained personnel.

Flammability

Because of its flammability potential, propylene oxide should always be handled and stored under inert (nitrogen) atmosphere. Also, equipment should be grounded to prevent build-up of static electricity.

Human health

When using chemicals, make sure that there is adequate ventilation. Always use appropriate chemical-resistant gloves to protect your hands and skin, always wear eye protection such as chemical goggles and always wear flame-retardant clothing. Do not eat, drink, or smoke where chemicals are handled, processed, or stored. Wash hands and skin following contact.

If the substance gets into your eyes, rinse eyes thoroughly for at least 15 minutes with tap water and seek medical attention.

In the case of transfer or maintenance operations, always clear transfer lines prior to decoupling, and flush/drain to a closed system for recycle prior to opening equipment.

In cases where engineering controls cannot maintain airborne substance concentrations below exposure limits, or in cases with a risk of accidental exposure, additional risk management measures may be necessary for safe use such as the use of a complete suit protecting against chemicals and supplied air, a self-contained breathing apparatus or respirator.

Environmental

In case of accidental release or spill, do not allow the product to enter sewers, surface or ground water. Clean up contamination/spills as soon as they occur. Sludge should be incinerated, contained or reclaimed. Do not use clay based absorbent materials for clean up.

Regulatory Information / Classification and Labeling

This substance has been registered under REACH by relevant companies of LyondellBasell in the European Union.

For a detailed overview of the regulatory status of this substance, please refer to the Product Stewardship Bulletin, which is available from the LyondellBasell corporate website.

Under the Globally Harmonized System on classification and labeling (GHS) substances are classified according to their physical, health and environmental hazards. The hazards are communicated via specific labels on the product packaging and the Safety Data Sheet. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use.

For a detailed overview of the classification and labeling of this substance, please refer to the regional Safety Data Sheet, which can be found on the LyondellBasell corporate website.

Conclusion Statements

- Propylene oxide is mainly used as a chemical intermediate and monomer for industrial purposes only. It has no supported uses in consumer products.
- Propylene oxide has been classified as hazardous. The main hazards are extreme flammability; acutely toxic via oral, dermal and inhalation exposure routes; eye and respiratory irritant; mutagen and carcinogen.

- Exposure to human health and environment is considered low if propylene oxide is properly handled. Also the manufacturing process, storage and handling operations are predominantly enclosed.

Contact Information within Company

For further information on this product in general, please consult the LyondellBasell corporate website (www.lyb.com).

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Disclaimer

Before using a product sold by a company of the LyondellBasell family of companies, users should make their own independent determination that the product is suitable for the intended use and can be used safely and legally.

SELLER MAKES NO WARRANTY; EXPRESS OR IMPLIED (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY WARRANTY) OTHER THAN AS SEPARATELY AGREED TO BY THE PARTIES IN A CONTRACT.

This product(s) may not be used in:

- (i) any U.S. FDA Class I, Health Canada Class I, and/or European Union Class I medical devices, without prior notification to Seller for each specific product and application; or
 - (ii) the manufacture of any of the following, without prior written approval by Seller for each specific product and application: U.S. FDA Class II Medical Devices; Health Canada Class II or Class III Medical Devices; European Union Class II Medical Devices; film, overwrap and/or product packaging that is considered a part or component of one of the aforementioned medical devices; packaging in direct contact with a pharmaceutical active ingredient and/or dosage form that is intended for inhalation, injection, intravenous, nasal, ophthalmic (eye), digestive, or topical (skin) administration; tobacco related products and applications, electronic cigarettes and similar devices, and pressure pipe or fittings that are considered a part or component of a nuclear reactor.
- Additionally, the product(s) may not be used in: (i) U.S. FDA Class III Medical Devices; Health Canada Class IV Medical Devices; European Class III Medical Devices; (ii) applications involving permanent implantation into the body; (iii) life-sustaining medical applications; and (iv) lead, asbestos or MTBE related applications. All references to U.S. FDA, Health Canada, and European Union regulations include another country's equivalent regulatory classification.

Users should review the applicable Safety Data Sheet before handling the product.

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