Shell Chemicals

Propylene oxide Product Stewardship Summary

CAS number
75-56-9

Chemical formula
C3H6O

What is propylene oxide?

Propylene oxide is a colourless, reactive liquid with an ether-like odour.
It is used primarily as a building block for the manufacture of a versatile range of derivative products. There are a number of known technologies to produce propylene oxide but Shell chemicals companies and their joint ventures employ the Shell proprietary 'SM/PO' technology.

How is propylene oxide used?

Propylene oxide is used as a chemical building block in a range of products. Examples of these so-called PO-derivative products are:

- polyether polyols (poly-alcohols) for use in urethane applications such as rigid foam, flexible foam, and Coatings, Adhesives, Sealants & Elastomer (CASE) systems;
- polyether polyols for use in non-urethane applications such as surfactants and oil demulsifiers;
- propylene glycol for aeroplane de-icers, fibreglass-reinforced unsaturated polyester resins, and hydraulic fluids;
- propylene oxide glycol ethers and propylene carbonate solvents;
- butanediol for engineering plastics and fibres;
- polyalkylene glycol fuel additives and lubricants;
- modified starches and allyl alcohols.

Health, Safety and Environmental considerations

Propylene oxide may be harmful from inhalation, contact with skin and if swallowed. Its vapours may have effects on the central nervous system. It is irritating to the eyes, skin and respiratory system. Some cases of sensitisation in humans have been reported.

Propylene oxide is classified by the International Agency for Research on Cancer (IARC) as a Group 2-B possible carcinogen. In the EU, propylene oxide has been classified as a category 2 carcinogen and it is considered as a germ cell mutagen.

The American Congress of Governmental Hygienists (ACGIH) Threshold Limit Value (TLV) is two parts per million (2 ppm). This is based on an eight-hour day or 40 hours per week.

Propylene oxide is harmful to aquatic organisms. It is biodegradable and has a low potential to bio-accumulate.

Propylene oxide is extremely flammable and there is an extreme risk of vapour ignition at normal handling temperatures. The vapour is heavier than air and will spread along the ground if released, so care needs to be taken to ensure that the vapour is not ignited by a distant source. It will float and can be ignited on surface water. Electrostatic charges may be generated during handling.

Storing and transporting propylene oxide

Propylene oxide is mainly transported by rail and road in dedicated containers made from stainless steel and fitted with nitrogen (inert/fire prevention) blanketing. The temperature during storage and transportation should not exceed 30°C/86°F.

Precautionary measures against static discharges must be undertaken during loading and unloading and all operators must wear personal protective equipment.

Storage tanks must be clean, dry and rust free and protected from direct sunlight, ignition sources or other sources of heat. Vapours from the storage tank should not be released to the environment but controlled through a suitable vapour treatment system. Propylene oxide nitrogen systems must not be shared with supplies of acids, amines, or catalysts in order to avoid accidental product contamination and potential uncontrolled polymerization.

Risk Characterization Summary

Risks associated with exposure to this product have been evaluated for the following "chain-of-commerce" activities: manufacture, storage, product transfer, transportation, and customers/markets. Due to health, safety and environmental considerations, it is only manufactured, stored and transported to customers in closed systems. Likewise, customers are limited to those who only use the product in closed systems as an intermediate for the manufacture of other chemicals. Proper equipment design and handling procedures maintain low risk from exposure to the product where the product is used as a chemical intermediate.

This product stewardship summary is intended to give general information about the chemical or categories of chemicals addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the chemical's applicable Material Safety Data Sheet, which should be consulted before use of the chemical. This product stewardship summary does not supplant or replace required regulatory and/or legal communication documents.