



Technical Data Sheet

Dow Propylene Oxide

General Description

Propylene Oxide (PO) is an extremely versatile chemical intermediate used to produce a wide range of industrial and commercial products. It is among the top 50 chemicals produced, by volume, in the world. Propylene oxide is manufactured globally by The Dow Chemical Company at five integrated sites in the United States, Germany, Thailand and Brazil. Dow supplies PO only in bulk quantities.

Propylene oxide is a colorless, low-boiling and highly volatile liquid with a sweet, ether-like odor. It is highly flammable and reactive, and storage and unloading areas must be appropriately designed and monitored. Dow offers technical support and Product Stewardship for all our customers and includes periodic safe handling and storage reviews, and training.

Typical Component Properties⁽¹⁾

Chemical Name	1,2-epoxypropane
Synonyms	2-methyloxirane 1,2-propylene oxide methyl ethylene oxide
Formula	C ₃ H ₆ O
Molecular Weight (g/mol)	58.08
CAS Number	000075-56-9
EINECS Number	200-879-2
Vapor Density (Air = 1.0)	2.0
Vapor Pressure, 25°C (77°F)	71.7 kPa (538 mm Hg)
Freezing Point	-111.93°C (-169.47°F)
Boiling Point, 101.3 kPa	34.2°C (93.56°F)
Specific Gravity, 25/25°C (77°F)	0.8253
Density 25°C (77°F)	0.821 g/cm ³ (6.861 lb/gal)
Refractive Index n ₂₀ /D°C (68°F)	1.36610
n ₂₅ /D°C (77°F)	1.36335
Viscosity, 25°C (77°F)	0.305 centipoise (mPa.s)
Specific Heat, 0°C (32°F)	2.08 J/(g·K) (0.5 Btu/lb/°F)
Auto-Ignition Temperature, in Air, 101.3 kPa	449°C (840.2°F)
Explosive limits, in Air, 25°C (77°F), 101.3 kPa	2.3-37.0 vol %
Flash Point, TAG-Closed Cup	-37.2°C (-35°F)
Heat of Combustion, 25°C (77°F), 101.3 kPa	-33035 kJ/kg
Heat of Vaporization, 101.3 kPa	465.7 kJ/kg
Solubility in Water, at 20°C (68°F)	40.5 wt %
Solubility of Water in Propylene Oxide at 20°C (68°F)	14.7 wt %

1. These are typical values and should not be construed as specifications.

Applications

Propylene oxide is used worldwide as an intermediate to produce numerous downstream materials. Polyether Polyols consume the largest share of propylene oxide using between 60-70% of the total global volume. Propylene glycols consume another 20% of the total, and propylene glycol ethers consume about 5%.

1. Polyether polyols

- Base or acid catalyzed polymerization of propylene oxide with polyhydric alcohols and/or other alkylene oxides like ethylene or butylene oxide, yields polymers with a wide possible range of molecular weight and structural diversity.
- The primary application for such polyols is in the manufacture of flexible or rigid polyurethane foams.
- Non-polyurethane applications include surface active agents (surfactants) for household and industrial detergents, paints, adhesives, textiles, defoamers, oil field chemicals, cosmetics, functional fluids and lubricants in metal working, heat transfer fluids and automotive brake fluids.

2. Propylene glycols

- Reaction of propylene oxide with water leads to monopropylene glycol (MPG) with subsequent reactions leading to di-(DPG), tri-(TPG) and higher propylene glycols.
- Propylene glycols are used in a wide range of applications, including use as raw materials for unsaturated polyester resins, humectants in pharmaceuticals, cosmetics and food, heat transfer fluids, antifreezes and aircraft deicers.

3. Propylene glycol ethers

- Propylene glycol ethers are formed by base catalyzed reaction of PO with alcohols like methanol, ethanol, propanol, butanol or phenol. Subsequent reaction with additional PO leads to the corresponding di-, tri- and higher glycol ethers.
- Propylene glycol ethers are used as solvents and coupling agents in paints and in the production of coatings, inks, resins and cleaners.

4. Other propoxylated derivatives

- Reaction of propylene oxide with phosphorous compounds yields flame retardants, used, for example, in polyurethane foams, textiles and flooring materials.
- Reaction with ammonia yields isopropanolamines used as solvents in natural gas purification, as metal working fluids, and in cosmetics.
- Reaction with acrylic or methacrylic acid forms hydroxypropylacrylates, which can be used in UV-curable resins, inks, coatings, varnishes, floorings, and automotive parts.
- Propoxylated carbohydrates like cellulose and starch are used in applications in the construction, paint, food and pharmaceutical industries.

Storage and Handling

For more details about product handling and safety information, please refer to the Dow Material Safety Data Sheet (MSDS).

Product Stewardship

The Dow Chemical Company and its subsidiaries ("Dow") has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our Product Stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our Product Stewardship program rests with each and every individual involved with Dow products— from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Safety Considerations

Material Safety Data (MSD) sheets are available from The Dow Chemical Company. MSD sheets are provided to help customers satisfy their own handling, safety and disposal needs and those that may be required by locally applicable health and safety regulations. MSD sheets are updated regularly, therefore, please request and review the most current MSD sheet before handling or using any product. These are available from the nearest Dow sales office.

Customer Notice

Dow encourages its customers to review their application of Dow products from the standpoint of human health and environmental quality. To help ensure that Dow products are not used in ways for which they were not intended or tested, Dow personnel will assist customers in dealing with ecological and products safety. Your Dow sales representative can arrange the proper contacts.

Contact information:

For more information about this product please call The Dow Chemical Company.

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<http://www.dow.com/propyleneglycol/>

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