Product Safety Assessment

Tripropylene Glycol

Select a Topic:

Names
Product Overview
Manufacture of Product
Product Description
Product Uses
Exposure Potential
Health Information
Environmental Information
Physical Hazard Information
Regulatory Information
Additional Information
References

Names

- CAS No. 24800-44-0
- Tripropylene Glycol (TPG)
- Tripropylene Glycol Regular Grade
- Tripropylene Glycol Acrylate Grade (TPG Ac)
- [(1-methyl-1,2-ethanediyl)bis(oxy)]bispropanol

Product Overview

- Tripropylene glycol (TPG) is a mixture of isomers (compounds that have the same chemical composition, but the atoms are arranged differently). It is a colorless, medium viscosity (consistency of syrup) liquid with a faint odor. TPG is completely soluble in water and hygroscopic (attracts water from the atmosphere). See Product Description.
- The Dow Chemical Company (Dow) manufactures two grades of TPG: Tripropylene Glycol Regular Grade and a high-purity product called Tripropylene Glycol Acrylate Grade (TPG Ac).
- TPG is mainly used as a chemical building block in the production of polyurethane foams. TPG can also be used as a solvent in some applications. High-purity TPG Ac is specifically used as a raw material in the radiation-cure industry for the manufacture of printing inks, varnishes, and paints. See Product Uses.
- TPG is not considered hazardous to human health or the environment. TPG is stable under recommended storage conditions. Avoid contact with strong acids, strong bases, and strong oxidizers, as well as exposure to direct sunlight or ultraviolet sources. See Health Information or Physical Hazard Information.
- Occupational exposure to TPG could occur at a TPG production facility or facilities using TPG to manufacture other products. Consumer contact with TPG is through use of personal-care products containing TPG, such as creams designed to remove ink stains from skin or clear stick and gel deodorants. See Exposure Potential.
- Eye contact with TPG may cause slight, temporary irritation. Prolonged skin contact is not likely to cause irritation. TPG will not be absorbed through the skin in harmful amounts. See Health Information.

Back to top
Product Manufacture

- **Capacity** – The Dow Chemical Company has been producing propylene glycols since 1942. Dow and its global affiliates annually manufacture approximately 900,000 metric tons (1.98 billion pounds) of propylene glycols—including mono-, di-, and tri— at sites in the United States, Germany, Australia, Thailand, and Brazil.

- **Process** – TPG is a co-product from the manufacture of monopropylene glycol. Water is added to propylene oxide, a petroleum-based raw material, at high temperature and pressure. The resulting product is a blend of approximately 90% (mono-) propylene glycol and a 10% mixture of dipropylene glycol and tripropylene glycol. The mixed glycols are passed through evaporators and drying towers to remove excess water, then separated by high vacuum distillation. The three step chemical reaction is as follows:

\[
\begin{align*}
&\text{Propylene Oxide} + \text{Water} \\
&\rightarrow \text{Propylene Glycol}
\end{align*}
\]

\[
\begin{align*}
&\text{Propylene Oxide} + \text{Propylene Glycol} \\
&\rightarrow \text{Dipropylene Glycol}
\end{align*}
\]

\[
\begin{align*}
&\text{Propylene Oxide} + \text{Dipropylene Glycol} \\
&\rightarrow \text{Tripropylene Glycol}
\end{align*}
\]

Product Description

Tripropylene glycol (TPG) is a colorless, medium viscosity (consistency of syrup) liquid with a faint odor. TPG has low volatility, is completely soluble in water, and is hygroscopic (attracts water from the atmosphere). Dow manufactures two grades of TPG: Tripropylene Glycol Regular Grade and Tripropylene Glycol Acrylate Grade (TPG Ac), a high-purity product.

TPG is comprised of 9 carbon atoms, 20 hydrogen atoms and 4 oxygen atoms (chemical formula \(\text{C}_9\text{H}_{20}\text{O}_4\)). Although all TPG has the same chemical formula, the atoms can be arranged in four different ways to form four different TPG isomers. The commercial material is a mixture of these isomers, with the CAS No 24800-44-0.

Product Uses

The commercial uses for tripropylene glycol (TPG) include:
- Chemical intermediate in the manufacture of polyurethane foams
- Textile lubricant
- Printing ink – TPG is used as a resin solvent
Latex paints – TPG provides freeze/thaw protection in latex paint formulations

High-purity TPG Ac is mainly used as a raw material for radiation-curable formulations. It is typically reacted with acrylic acid to form tripropylene glycol diacrylate. These products are cured using ultraviolet, visible, or electron-beam radiation. Radiation-curable products made from TPG Ac include printing inks, varnishes, paints, and coatings.

Exposure Potential

Tripropylene glycol (TPG) is used in the production of industrial and consumer products. Based on the uses for TPG, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a TPG production facility or in facilities using TPG to manufacture other products. Those working with TPG in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each manufacturing facility should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit unnecessary exposure. See Health Information.

- **Consumer exposure to products containing TPG** – TPG is not a hazardous chemical. TPG is used mainly as a raw material in polyurethane foams and radiation-curable polyacrylates. TPG is also used in a limited number of personal-care products. Follow product guidelines for use. See Product Uses and Health Information.

- **Environmental releases** – In the event of a spill, the focus is on containing the spill to prevent contamination of soil and surface or ground water. Small spills of TPG can be absorbed with any absorbent material. Due to its low volatility at ambient temperatures, TPG is not likely to accumulate in the air. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent. If a large spill does occur, TPG should be contained by creating ditches or dikes and collected and disposed of according to applicable governmental requirements. Prevent material from reaching soil, ditches, sewage systems, and/or groundwater. Personnel engaged in clean up of spills should observe proper skin and eye protection practices. Fires involving TPG can be extinguished with water fog or fine spray, carbon-dioxide or dry-chemical extinguishers, or foam. Do not use a direct water stream. Because combustion products may include carbon monoxide and carbon dioxide, firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA). Emergency procedures should be followed carefully. See Environmental, Health, and Physical Hazard Information.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.
Health Information

TPG is not considered hazardous to human health or the environment. Eye contact with tripropylene glycol (TPG) may cause slight temporary irritation. Skin contact with TPG is not likely to cause irritation, or result in absorption in harmful amounts. Due to its low vapor pressure, inhalation of TPG is unlikely at ambient temperatures. However, vapor from heated material may cause respiratory irritation and other effects. TPG has a low toxicity if swallowed. However, swallowing large amounts may cause injury. TPG does not cause mutations \textit{in vitro} or birth defects in laboratory animals.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

Environmental Information

There are several ways to measure biodegradability that can give varying results. Tripropylene glycol (TPG) has been shown to meet current OECD criteria for "ready biodegradability" in the Manometric Respirometry Test. This recent test, based on biological oxygen demand (BOD), showed that TPG was biodegraded by 50% in just 8.7 days, and by 81.9% over a 28-day test period. TPG is practically nontoxic to fish and other aquatic organisms on an acute basis. It has low potential for accumulation in aquatic organisms due to high water solubility.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

Physical Hazard Information

TPG is stable under recommended storage conditions. When not in use, store this material in tightly closed containers at ambient temperatures and use within 6 months. Exposure to elevated temperatures can cause this material to decompose. Generation of gas during decomposition can build pressure in closed systems. Nitrogen padding is recommended. Avoid direct sunlight or ultraviolet sources. Avoid contact with strong acids, strong bases, and strong oxidizers.

Spills of this organic material on hot, fibrous insulation may reduce the autoignition temperature, resulting in the potential for spontaneous combustion.

For more information, request the relevant Safety Data Sheet from the Dow Customer Information Group.

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of TPG. These regulations may vary by city, state, country, or geographic region. Information may be found by requesting the relevant Safety Data Sheet or using Contact Us.

Back to top
Additional Information

- TPG IUCLID file on ECHA dissemination webpage:
- Safety Data Sheet http://www.dow.com/webapps/msds/msdssearch.aspx
- Contact Us (http://www.dow.com/propyleneglycol/contact/)
- About Propylene Glycols, Martin, Alton E., and Murphy, Frank H., The Dow Chemical Company, Form No. 117-01785-0306
- Dow Tripropylene Glycol, Regular Grade Technical Data Sheet, The Dow Chemical Company
- Dow Tripropylene Glycol, Acrylate Grade Technical Data Sheet, The Dow Chemical Company,

For more business information about TPG, visit Dow’s Propylene Glycols web site.
http://www.dow.com/propyleneglycol/

References

1 Tripropylene Glycol, Acrylate Grade, Technical Data Sheet, The Dow Chemical Company
2 Tripropylene Glycol, Regular Grade, Technical Data Sheet, The Dow Chemical Company
3 The Dow Chemical Company, Propylene Glycols webpage: Applications: http://www.dow.com/propyleneglycol/app/
4 Tripropylene Glycol Regular Grade, Material Safety Data Sheet, The Dow Chemical Company
6 About Propylene Glycols, Martin, Alton E., and Murphy, Frank H., The Dow Chemical Company, Form No. 117-01785-0306
7 The Dow Chemical Company, Propylene Glycols webpage: About Propylene Glycols: http://www.dow.com/propyleneglycol/about/
9 A Guide to Glycols, The Dow Chemical Company, Form No. 117-01682-0804XSI
11 About Propylene Glycols, Martin, Alton E., and Murphy, Frank H., The Dow Chemical Company, Form No. 117-01785-0306

Back to top
NOTICES:

As part of its 2015 Sustainability Goals, Dow has committed to make publicly available safety assessments for its products globally. This product safety assessment 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 relevant Safety Data Sheet, which should be consulted before use of the chemical. This product safety assessment does not replace required communication documents such as the Safety Data Sheet.

The information herein is supplied upon the condition that the persons receiving same will make their own determination as to its suitability for their purposes prior to use. In no event will Dow be responsible for damages of any nature whatsoever resulting from the use of or reliance upon the information herein or the product to which that information refers.

Nothing contained herein is to be construed as a recommendation to use any product, process, equipment or formulation in conflict with any patent, and Dow makes no representation or warranty, express or implied, that the use thereof will not infringe any patent.

NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH INFORMATION REFERS.

Dow makes no commitment to update or correct any information that appears on the Internet or on its World-Wide Web server. The information contained in this document is supplemental to the Internet Disclaimer, http://www.dow.com/homepage/term.htm

Form No. 233-00400-0916X