Product Safety Assessment

*DOW™ Propylene Glycol Highers*

*DOW Tripropylene Glycol Bottoms*

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Names

- DOW™ Propylene Glycol Highers
- DOW PG Highers
- CAS No 25222-69-4
- Tetrapropylene glycol, crude
- DOW Tripropylene Glycol Bottoms
- DOW TPG Bottoms
- Polypropylene glycol

Product Overview

- DOW™ Propylene Glycol Highers and DOW Tripropylene Glycol Bottoms are mixtures of propylene glycols with various molecular weights and varying composition. These products are also called DOW PG Highers in Europe and DOW TPG Bottoms in the United States. They are co-products of the propylene glycol manufacturing process. Each is a dark brown to black, viscous liquid with a slight odor, and completely soluble in water. For further details, see Product Description.

- DOW PG Highers and DOW TPG Bottoms are primarily used in drilling fluid formulations for oil-field applications and in flotation frothing formulations for the metal ore mining industry. These materials are not used in consumer products. For further details, see Product Uses.

- Occupational exposure to these products is possible at propylene glycol production facilities or at facilities that use these materials for industrial applications. Exposure is minimized through engineering controls and the use of personal protective equipment. For further details, see Exposure Potential.

- Eye contact with these products may cause slight, temporary eye irritation and very slight, temporary corneal injury. Prolonged or repeated skin contact may cause irritation, but is not likely to result in the absorption of harmful amounts. Vapors are minimal at room temperature, but heated material may generate sufficient vapor levels to pose an inhalation hazard. For further details, see Health Information.

- These products are stable at normal storage and use temperatures. Avoid contact with oxidizing materials. For further details, see Physical Hazard Information.
Manufacture of Product

- **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** – Water is added to propylene oxide, a petroleum-based raw material, at high temperature and pressure. Monopropylene glycol is formed by reacting one propylene oxide molecule with one water molecule. Subsequent addition of propylene oxide forms higher propylene glycols, such as di-, tri-, tetra and higher propylene glycols, as shown below. The resulting mixture is a blend of approximately 90% monopropylene glycol and 10% of a mixture of dipropylene glycol, tripropylene glycol, and higher molecular weight propylene glycols. This mixture is passed through evaporators and drying towers to remove excess water. It is then separated by high-vacuum distillation in different distillation columns to produce mono-, di-, and tripropylene glycol as separate purified products, with DOW PG Highers or DOW TPG Bottoms as the “bottoms” product after the last TPG distillation column. The reaction scheme below only contains one of different isomers of Di, Tri and Tetrapropylene Glycol.

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Product Description

The commercial products, DOW PG Highers and DOW TPG Bottoms, are mixtures of the various molecular weight propylene glycols produced during propylene glycol manufacture. They are produced as a result of distillations to isolate lower molecular weight propylene glycols such as mono-, di- and tripropylene glycol, and consist of the bottom streams of the TPG distillation. They are dark brown to black, water-soluble, viscous liquids with a slight odor.

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Product Uses

DOW PG Highers and DOW TPG Bottoms are used primarily in the following industrial applications:
- Oil-field drilling fluid
- Flotation frothing agent in the metal ore mining industry

Exposure Potential

These products are marketed for industrial applications only. Based on these uses, the public could be exposed through:

- **Workplace exposure** – Propylene glycols are manufactured in closed systems using engineering controls that minimize the potential for escape of liquid or vapors and release to the environment. The potential for exposure is further reduced through the use of personal protective equipment. Occupational exposure is possible at propylene glycol production facilities or at facilities that use these products. Workers could be exposed during maintenance, sampling, testing, or other procedures. Facilities that manufacture or use these products should have a thorough training program for employees and appropriate work processes, ventilation, and safety equipment in place to limit unnecessary exposure. See Health Information.

- **Consumer exposure to DOW PG Highers and DOW TPG Bottoms** – Because these products are marketed for industrial use only, consumer contact is not likely. See 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. For small spills, clean up the material with absorbent material and collect recovered material in suitable and properly labeled containers. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill should occur, isolate the area. Contain the spilled material with dikes if possible. Pump recovered material into suitable and properly labeled containers. Use appropriate safety equipment. See Environmental and Physical Hazard Information.

- **In case of fire** – Isolate the fire and deny unnecessary entry. Toxic fumes can be released in fire situations. Firefighters should wear positive-pressure, self-contained breathing apparatus and protective firefighting clothing or fight the fire from a safe distance. Use water fog or fine spray, dry-chemical or carbon-dioxide extinguishers, or foam. Alcohol-resistant ATC foams are preferred if available. Do not use a direct water stream as it may spread the fire. See Environmental, Health, and Physical Hazard Information.

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

Health Information

Eye and Skin Contact – Eye contact with these products may cause slight, temporary irritation with very slight, temporary corneal injury. Prolonged or repeated skin contact may cause irritation. A single, prolonged exposure is not likely to result in this material being absorbed through the skin in harmful amounts.

Inhalation – At room temperature, exposure to vapors is unlikely because of physical properties. Higher temperatures may generate vapor levels sufficient to cause adverse effects.

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Ingestion – Swallowing small amounts incidental to normal handling operations is not likely to be harmful.

Repeated exposure – Based on available data, repeated exposure to these products is not anticipated to cause significant adverse effects.

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

Environmental Information

In aerobic laboratory tests, the biodegradation rate of these products is high. Based on information for polypropylene glycol, these products are expected to be practically nontoxic to fish on an acute basis (exposure to a single, large amount). Additionally, these materials are not expected to bioaccumulate through the food chain.

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

Physical Hazard Information

These products are stable at normal storage and use temperatures. When available oxygen is limited, as in a fire or when heated to very high temperatures by hot wire or plate, carbon monoxide and other hazardous compounds, such as aldehydes, might be generated. Avoid contact with oxidizing materials.

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 DOW PG Highers and DOW TPG Bottoms. 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.

In the United States, DOW TPG Bottoms is described for TSCA inventory purposes as polypropylene glycol, CAS No. 25322-69-4. In Europe, the EINECS identity for DOW PG Highers is “No Longer Polymer” 500-039-8 with CAS No. 25322-69-4.
Additional Information

- Tripropylene Glycol Bottoms Material Safety Data Sheet, The Dow Chemical Company (Contact the Dow Customer Information Group at http://www.dow.com/assistance/dowcig.htm to request a Safety Data Sheet.)
- Propylene Glycol Highers Safety Data Sheet, The Dow Chemical Company, Contact Us (http://www.dow.com/propyleneglycol/contact/)

References

1. Tripropylene Glycol Bottoms Material Safety Data Sheet, The Dow Chemical Company
2. Propylene Glycol—Highers Material Safety Data Sheet, The Dow Chemical Company
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.

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