Product Safety Assessment

*DOWANOL™ TPnB Glycol Ether [Tripropylene Glycol n-Butyl Ether]*

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Names
- CAS No. 55934-93-5
- EC No. 259-910-3
- (2-(2-Butoxymethylethoxy)methylethoxy) propanol
- ((Butoxymethylethoxy)methylethoxy)propan-1-ol
- 1-[(2-Butoxy-1-methylethoxy)-1-methylethoxy]-2-propanol
- Tripropylene glycol n-butyl ether
- Tripropylene glycol monobutyl ether
- DOWANOL™ TPnB Glycol Ether
- TPnB

Product Overview
- Tripropylene glycol n-butyl ether (TPnB) is a colorless to yellow liquid with a mild odor. It evaporates very slowly and doesn’t mix well with water. The Dow Chemical Company markets TPnB and other propylene oxide-based glycol ethers under the trade name DOWANOL™ Glycol Ethers. For further details, see *Product Description*.
- TPnB is a solvent and coalescing agent for architectural and industrial coatings, including indoor decorative paints. It is also used as a solvent in heavy-duty cleaning formulations, oven cleaners, inks for ball-point and felt-tip pens and stamp pads, and textile printing pastes. For further details, see *Product Uses*.
- Because TPnB is formulated into a broad range of products, consumer contact is possible. Workplace exposure is also possible. For further details, see *Exposure Potential*.
- Eye contact with TPnB may cause slight irritation, tears, and slight corneal injury. Effects are likely to heal readily. Prolonged skin contact may cause slight irritation and local redness, but is not likely to result in absorption of harmful amounts. At room temperature, exposure to TPnB vapor is minimal due to its low volatility. No adverse health effects are anticipated from a single inhalation of vapor. For further details, see *Health Information*.
- TPnB is readily biodegradable, unlikely to accumulate in the food chain, and is practically non-toxic to fish and aquatic organisms. For further details, see *Environmental Information*.
- TPnB is stable under recommended storage conditions. TPnB is incompatible with strong acids, strong bases, and strong oxidizers and contact should be avoided. For further details, see *Physical Hazard Information*.

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Manufacture of Product

- **Capacity** – Western Europe is the largest producer and consumer of propylene oxide-based glycol ethers. The Dow Chemical Company ("Dow") produces propylene oxide-based glycol ethers in the United States at facilities in Plaquemine, Louisiana and Seadrift, Texas in Europe in Stade, Germany, and in China at Zhangjiagang Ltd.

- **Process** – TPnB is manufactured by reacting propylene oxide with n-butanol as shown below.


\[
\begin{align*}
\text{Propylene oxide} & \quad \text{n-Butanol} \\
3 \text{H}_2\text{C}-\text{CH} & + \text{C}_4\text{H}_9\text{OH} \rightarrow \text{C}_4\text{H}_9\text{O}-\text{CH}_2\text{CHO}-\text{CH}_2\text{CHO}-\text{CH}_2\text{CH}_3 \\
& \quad \text{Tripropylene glycol n-buty l ether}
\end{align*}
\]

Product Description

Tripropylene glycol n-butyl ether (TPnB) is a propylene oxide-based, or P-series, glycol ether. TPnB is a colorless liquid with a mild odor. It evaporates very slowly and is hydrophobic (doesn’t mix well with water). Dow markets TPnB and other P-series glycol ethers under the trade name DOWANOL™ Glycol Ethers.

Product Uses

TPnB is used for industrial and residential applications including:

- **Coatings** – as a solvent and coalescing agent for architectural and industrial coatings
- **Cleaners** – as a solvent in heavy-duty cleaning formulations
- **Ink solvents** – for ball-point and felt-tip pens, etc.
- **Mining**

Exposure Potential

TPnB is used in the production of industrial and consumer products. Based on the uses for TPnB, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a TPnB manufacturing facility or in the various industrial or manufacturing facilities that use TPnB. Those working with TPnB 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 TPnB** – Dow does not sell TPnB for direct consumer use, but consumers can be exposed through the use of home-cleaning products, ink pens, or other products containing TPnB. See Health Information.

- **Environmental releases** – TPnB will evaporate very slowly from coatings or other products containing it. Once TPnB is introduced to water, the compound will tend to remain dissolved because it is moderately soluble in water. TPnB is readily biodegradable and the compound will be removed by sewage treatment plants.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, contain the spilled material if possible. Pump contained material into suitable and properly labeled containers using appropriate safety equipment.

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- **In case of fire** – Keep people away and deny unnecessary entry. Wear positive-pressure, self-contained breathing apparatus (SCBA) and protective fire-fighting clothing or fight the fire from a safe distance. *Do not use* a direct water stream; it may spread the fire. Use water fog or fine spray, carbon-dioxide or dry-chemical extinguishers, or foam. Follow all emergency procedures carefully. See **Environmental Information**, **Health Information**, and **Physical Hazard Information**.

For more information, see the relevant **Safety Data Sheet**.

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**Health Information**

Eye contact with TPnB may cause slight irritation, tears, and corneal injury. Effects are likely to heal readily. Prolonged skin contact may cause slight irritation and local redness but is not likely to result in absorption of harmful amounts. At room temperature, exposure to TPnB vapor is minimal due to its low volatility. No adverse health effects are anticipated from a single inhalation of vapor. TPnB has low toxicity if swallowed. Swallowing small amounts incidental to normal handling is unlikely to cause injury. However, swallowing larger amounts may cause injury.

Repeated-dose studies are not anticipated to cause significant adverse effects. Genetic toxicity studies were negative. Based on testing of similar products, TPnB is not anticipated to cause cancer, birth defects or developmental effects.

For more information, see the relevant **Safety Data Sheet**.

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**Environmental Information**

TPnB has very low volatility, and may evaporate slowly from products containing it. Because it is moderately soluble in water, once introduced, it has a tendency to remain in water. It has minimal tendency to bind to soil or sediment.

TPnB is unlikely to persist in the environment. TPnB is readily biodegradable, which suggests the chemical will be rapidly and completely removed from water and soil environments, including biological wastewater treatment plants.

TPnB is not likely to accumulate in the food chain (bioconcentration potential is low) and is practically nontoxic to fish and other aquatic organisms on an acute basis.

For more information, see the relevant **Safety Data Sheet**.

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**Physical Hazard Information**

TPnB is stable under recommended storage conditions. Store in carbon steel, stainless steel, or phenolic-lined steel drums. Do not store in aluminum, copper, galvanized steel, or galvanized iron. TPnB can decompose at elevated temperatures. Generation of gas during decomposition can cause pressure build-up in closed systems. Decomposition products depend on temperature, air supply, and the presence of other materials, but may include aldehydes, ketones, organic acids, and other compounds.

TPnB is incompatible with strong acids, strong bases, and strong oxidizers and contact should be avoided.
During a fire, smoke may contain the original material in addition to toxic or irritating combustion products, which may include carbon monoxide and carbon dioxide. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

For more information, see the relevant Safety Data Sheet.

Regulatory Information

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

Additional Information

- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (http://www.dow.com/oxysolvents/contact/index.htm)
- DOWANOL™ TPnB Glycol Ether Technical Data Sheet, The Dow Chemical Company

For more business information about TPnB, visit Dow’s Oxygenated Solvents web site. (http://www.dow.com/oxysolvents/index.htm)

References

1 DOWANOL™ TPnB Glycol Ether Safety Data Sheet, The Dow Chemical Company.
2 DOWANOL TPnB Glycol Ether Product Information, The Dow Chemical Company.
5 Dow Oxygenated Solvents website – Applications Center: (http://www.dow.com/oxysolvents/app/index.htm).
6 Estimates by 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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