Product Safety Assessment

Tetraethylene Glycol

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Names
- CAS No. 112-60-7
- Tetraethylene glycol
- Tegraglycol
- TetraEG
- T4EG
- TTEG
- TETRA
- 2,2-(oxybis(1,2-ethanediyl)oxy)bis-ethanol
- Ethanol, 2,2’-(oxybis(2,1-ethanediyl)oxy))bis
- Ethanol, 2,2’-(oxybis(ethyleneoxy))di-
- 3,6,9-trioxaoctadecane-1,11-diol
- 2,2’[oxybis(ethyleneoxy)]diethanol

Product Overview
- Tetraethylene glycol is a colorless liquid with low volatility and a mild odor. ¹ See Product Description.
- Tetraethylene glycol is primarily used as a solvent for aromatics extraction from hydrocarbon processing. It is also used in the oil and gas industry as a drying agent for natural gas processing, and in the manufacture of plasticizers, polyols, solvents, automotive fluids, and other industrial fluids. Consumer brake fluids may contain tetraethylene glycol.²,³,⁴ See Product Uses.
- Tetraethylene glycol is used industrially, with limited chance of exposure through consumer products. Occupational exposure can occur in an ethylene glycols manufacturing facility, in facilities using tetraethylene glycol, or from products that contain tetraethylene glycol.⁵ See Exposure Potential.
- Tetraethylene glycol does not cause adverse health or environmental effects at levels typically found in the workplace. See Health Information.
- Tetraethylene glycol is stable at room temperature. Elevated temperatures can cause tetraethylene glycol to decompose, resulting in pressure build-up in closed systems. Avoid contact with strong acids and strong oxidizers.¹ See Physical Hazard Information.

Manufacture of Product
- Capacity – The Dow Chemical Company (Dow) is the world’s largest producer of ethylene oxide and glycols, including tetraethylene glycol. About 9.6 million pounds (4355 metric tons) of tetraethylene glycol is produced in the United States annually.⁶
- Process – Tetraethylene glycol is a co-product in the manufacture of ethylene glycol. Ethylene oxide is reacted with a controlled amount of water in a closed, continuous process. Ethylene glycol (EG) then further reacts with ethylene oxide producing diethylene glycol (DEG), triethylene glycol (TEG), tetraethylene glycol, and pentaethylene glycol. The lower molecular weight glycols (EG, DEG, and TEG) are separated and purified by distillation.
Tetraethylene glycol and pentaethylene glycol are then separated from each other by distillation. The chemical reaction is as follows:

\[
\text{Ethylene oxide + Water (excess)} \rightarrow \text{Ethylene glycol + Diethylene glycol + Triethylene glycol + Tetraethylene glycol}
\]

**Product Description**

Tetraethylene glycol is a colorless liquid with very low volatility and a mild odor. It is hygroscopic (picks up water from the air), completely water soluble, and mixes readily with many organic solvents. The chemical/physical properties of tetraethylene glycol are similar to mono-, di-, and triethylene glycol, but it may be preferred in certain applications because of its higher boiling point or molecular weight.

**Product Uses**

The main commercial uses for tetraethylene glycol are:

- **Gas dehydration and treating** – Used to remove water and other impurities from natural gas
- **Separations** – Used to separate aromatic hydrocarbons (benzene, toluene, xylene) from nonaromatic hydrocarbons
- **Brake fluids** – Used with pentaethylene glycol and other components as a brake fluid
- **Plasticizer** – Used in the manufacture of safety glass, polymer membranes, and certain ceramic materials
- **Solvent** – Used to solubilize resins, clean equipment, and in application such as steam-set printing inks and cleaning compounds
- **Chemical intermediate** – Used to make polyester resins, polyols, adhesives, coatings, lacquers, polyurethane foams, silicone compounds, emulsifiers, and lubricants
- **Freeze point depressant** – Mixed with heat transfer fluids to lower the freezing point

**Exposure Potential**

Based on the uses for tetraethylene glycol, the public could be exposed through:

- **Workplace exposure** – The use of enclosed equipment, engineering controls, and personal protective equipment during the manufacture of tetraethylene glycol minimize the opportunity for human exposure. The most likely exposure is industrial, either in a tetraethylene glycol manufacturing facility or facilities using products containing tetraethylene glycol. Those working with tetraethylene glycol could be exposed during such uses as a solvent, industrial extractant, plasticizer, or humectant (drying agent). Processing of mixtures containing tetra- and pentaethylene glycol to make brake fluids may also contribute to limited workplace exposure. Each manufacturing facility should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit unnecessary chemical exposure. See [Health Information](#).
- **Consumer exposure to products containing tetraethylene glycol** – Most uses of tetraethylene glycol are industrial, with little direct exposure through consumer products. However, some brake fluids may contain tetraethylene glycol. See [Health Information](#).
- **Environmental releases** – Tetraethylene glycol manufacture or use of tetraethylene glycol and products containing tetraethylene glycol could result in a release to the environment. The use of brake fluids could also contribute to gradual environmental release. In the event of a spill, the focus is on containing the spill to prevent contamination of soil, surface or ground.
water. For small spills, absorb tetraethylene glycol with materials such as dirt, sand, sawdust, vermiculite, or equivalent filler. See Environmental, Health and Physical Hazard Information.

- **Large release**¹ – For large spills, dike the area of the spill. Pump material into suitable and properly labeled containers. Keep unnecessary personnel from entering area. Use appropriate safety equipment. Follow emergency procedures carefully. In case of fire, do not use direct water stream. Use dry chemical or carbon dioxide fire extinguisher, water fog, or fine spray. Alcohol-resistant foams (ATC type) are preferred. See Environmental, Health and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet (SDS).

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**Health Information**¹,⁷

The most likely exposure to tetraethylene glycol is skin contact in the workplace. Brief skin contact is not likely to cause irritation. However, the response may be more severe if skin is scratched or cut. Prolonged contact may result in skin irritation and redness. Absorption of harmful amounts through the skin is unlikely. However, massive contact with damaged skin, or material sufficiently hot to burn skin, may result in absorption of potentially lethal amounts.

Eye contact may cause slight temporary irritation.

The risk of inhalation of tetraethylene glycol at room temperature is minimal because of its low volatility. Inhalation of mists may result in irritation of nose and throat. Repeated exposures to tetraethylene glycol vapors are not expected to cause significant adverse effects. However, repeated excessive aerosol exposures may cause respiratory tract irritation or death.

There are no animal studies indicating that tetraethylene glycol would act as a carcinogen or that it would affect reproduction.

For more information, see the relevant SDS.

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**Environmental Information**¹,⁷

Tetraethylene glycol is practically nontoxic to aquatic organisms on an acute basis. Atmospheric tetraethylene glycol concentrations would be expected to be low because of the low volatility. Tetraethylene glycol is expected to undergo photodegradation with a short half-life. Concentrations in water and soil are also likely to be low since tetraethylene glycol has high potential for mobility in soil. Although it is inherently biodegradable, biodegradation can be relatively slow.

For more information, see the relevant SDS.

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**Physical Hazard Information**¹

Tetraethylene glycol is a stable liquid at room temperature. Exposure to elevated temperatures can cause tetraethylene glycol to decompose. Gas generated during decomposition can cause pressure build-up in closed systems. Decomposition products may include, but not limited to, aldehydes, ketones, and organic acids.

Avoid contact with strong acids and strong oxidizers.

For more information, see the relevant SDS.

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

Additional Information
- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (http://www.dow.com/ethyleneglycol/contact/index.htm)
- Tetraethylene Glycol brochure, The Dow Chemical Company, Form No. 612-00005-0207X CRCG

For more business information about tetraethylene glycol, visit Dow’s Ethylene Glycol web site. (http://www.dow.com/ethyleneglycol/index.htm)

References
1 Tetraethylene Glycol Material Safety Data Sheet, The Dow Chemical Company
2 Tetraethylene Glycol, The Dow Chemical Company, Form No. 612-00005-0207X CRCG, February 2007
6 Estimates by The Dow Chemical Company.
NOTICES:

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