Product Safety Assessment

Toluenediamine Propoxylated/Ethoxylated Polyols

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Names
- CAS No. 67800-94-6
- Propylene oxide/ethylene oxide-toluenediamine polymer
- Toluenediamine propoxylated/ethoxylated polyol
- ortho-Diaminotoluene, propoxylated/ethoxylated
- VORANOL™ polyether polyols
- TERCAROL™ polyether polyols

Product Overview
- Toluenediamine propoxylated/ethoxylated polyols are yellow to brown viscous liquids with a characteristic odor. These materials belong to a category of materials called polyether polyols and are produced by reacting ortho-toluenediamine (o-TDA) with propylene oxide and ethylene oxide. Dow markets these polyols under the trade name VORANOL™ and TERCAROL™ polyether polyols. For further details, see Product Description.
- Toluenediamine propoxylated/ethoxylated polyols are used as chemical building blocks in the manufacture of pour-in-place polyurethane foams used for insulation and packaging. For further details, see Product Uses.
- Exposure to toluenediamine propoxylated/ethoxylated polyols could occur at a production facility for these polyols or at facilities that use these materials to manufacture other products. These polyols are manufactured for industrial use, making direct consumer exposure unlikely. For further details, see Exposure Potential.
- Toluenediamine propoxylated/ethoxylated polyols may cause severe eye irritation, accompanied by corneal injury and permanent impairment of vision is possible. They are stable under recommended storage conditions. Avoid contact with oxidizing materials and strong acids. Avoid unintended contact with isocyanates. Because of their low vapor pressure, these products are not likely to be inhaled when handled at room temperature. Vapor from heated materials may cause respiratory irritation. For further details, see Health Information or Physical Hazard Information.
- Toluenediamine propoxylated/ethoxylated polyols are expected to biodegrade slowly in the environment and are practically nontoxic to fish. Bioconcentration is not likely because the high water solubility of this material. For further details, see Environmental Information.

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Consumer exposure to products containing polyols is the initiator in this reaction. Polyols are reacted with propylene oxide and ethylene oxide as shown in the reaction below. o-TDA is the initiator in this reaction.

\[
\begin{align*}
\text{o-Toluenediamine} & \quad \text{Ethylene} \\
& \quad \text{oxide} \\
& \quad \text{Propylene} \\
& \quad \text{oxide} \\
\rightarrow & \quad \text{Amine-terminated polyl}
\end{align*}
\]

Manufacture of Product

- **Process** – ortho-Toluenediamine (o-TDA) is reacted with propylene oxide and ethylene oxide as shown in the reaction below. o-TDA is the initiator in this reaction.

Product Description

Toluenediamine propoxylated/ethoxylated polyether polyols are yellow to brown viscous liquids with a characteristic odor. They are slightly hygroscopic (attract water from the atmosphere and environment). The benefit of these polyols is that due to the active amine initiator, when blended with other polyols, they require less additional catalyst for reaction. The Dow Chemical Company markets these products under the trade name VORANOL™ polyether polyols and TERCAROL™ polyether polyols.

Product Uses

Toluenediamine propoxylated/ethoxylated polyether polyols are reacted with isocyanates to produce pour-in-place polyurethane foam materials. The primary uses for the resulting polyurethane foams are as insulation and packaging materials.

Exposure Potential

Toluenediamine propoxylated/ethoxylated polyols are manufactured for industrial use only. Based on the uses for these materials, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a production facility for these polyols or in the various industrial or manufacturing facilities that use these polyols or products that contain them. Those working with polyols 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 toluenediamine propoxylated/ethoxylated polyols** – Because these polyols are used as chemical building blocks for the manufacture of other products, direct consumer exposure is unlikely. There would be no unreacted polyol in the polyurethane products produced. See Health Information.
Environmental releases — In the event of a spill, the focus is on containing the spill to prevent contamination of soil, surface or ground water. At ambient temperatures, polyols are practically nonvolatile, making evaporation to the atmosphere unlikely. Spills of polyol on tile, concrete or metal surfaces can cause slipping hazards. For small spills, polyols should be absorbed with materials such as dirt and sand, then swept up for disposal according to governmental requirements. See Environmental, Health and Physical Hazard Information.

Large release — If released to the environment, Toluenediamine propoxylated/ethoxylated polyols will partition to water, due to their high water solubility and low volatility. Since they are inherently biodegradable, they will likely be removed in biological wastewater treatment facilities as well as from other water and soil environments. Industrial spills or releases are infrequent and are generally contained. If a large spill does occur, the material should be contained by creating ditches or dikes. The polyol can then be transferred to containers for disposal. The remaining spill may be absorbed with absorbent materials such as sand or soil, cleaned up, and disposed of according to governmental requirements. Personnel engaged in clean up of spills should observe proper skin and eye protection practices.

In case of fire — Fires involving polyols can be readily extinguished with water fog or water spray or carbon dioxide, alcohol-resistant foam, or dry-chemical extinguishers. Because incomplete combustion may lead to the build-up of toxic by-products, firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA). Emergency procedures should be followed carefully. See Environmental Information, Health and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

Health Information

Health information for toluenediamine propoxylated/ethoxylated polyols is summarized on the relevant Safety Data Sheets. The Safety Data Sheet is the preferred source for specific health information. An overview of health information for toluenediamine propoxylated/ethoxylated polyols appears below:

Eye contact — Toluenediamine propoxylated/ethoxylated polyols may cause severe eye irritation accompanied by corneal injury.

Skin contact - Prolonged skin contact toluenediamine propoxylated/ethoxylated polyols is unlikely to result in absorption of harmful amounts. Prolonged skin exposure is not likely to cause significant skin irritation; however, repeated contact may cause skin irritation with local redness.

Inhalation - Because of their low vapor pressure, these products are not likely to be inhaled when handled at room temperature. Vapor from heated material may cause respiratory irritation.

Ingestion - Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.

For more information, see the relevant Safety Data Sheet.

Environmental Information

Toluenediamine propoxylated/ethoxylated polyols are water soluble and nonvolatile. If released to the environment, they will have a tendency to remain in water with minimal tendency to bind to soil or sediment.
Toluenediamine propoxylated polyols are unlikely to persist in the environment. They are inherently biodegradable, which suggests that they will likely be removed in biological wastewater treatment facilities as well as in other water and soil environments. Toluenediamine propoxylated/ethoxylated polyols are not likely to accumulate in the food chain (bioconcentration potential is low), due to their high water solubility and high molecular weight. Propoxylated/ethoxylated ethylenediamine polyols are practically non-toxic to fish and other aquatic organisms on an acute basis (LC50/EC50 > 100 mg/L in the most sensitive species tested).

For more information, see the relevant Safety Data Sheet.

Physical Hazard Information

Toluene diamine propoxylated/ethoxylated polyols are stable under recommended storage conditions. Avoid contact with oxidizing materials (such as peroxides or hypochlorite salts) and strong acids. Avoid unintended contact with isocyanates. The reaction of polyols and isocyanates generates heat. Fires involving polyols can be readily extinguished with water fog or fine spray or carbon dioxide, alcohol-resistant foam, or dry-chemical extinguishers. Evacuate personnel and deny unnecessary entry. Because incomplete combustion may lead to the build-up of toxic by-products, firefighters should wear positive-pressure, self-contained breathing apparatus.

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 toluenediamine propoxylated/ethoxylated polyols. 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

- Contact Us (http://www.dow.com/polyurethane/contact/index.htm)

For more business information about polyols and related products, visit Dow’s Polyurethanes web site at: www.polyurethanes.com.
References

1. VORANOL™ 391 Polyol, Material Safety Data Sheet, The Dow Chemical Company
3. Estimates by The Dow Chemical Company.
5. Market overview: 2001 IAL Consulting, 204 Skiest

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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