Product Safety Assessment

UNOXOL™ Diol

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Names

- CAS No. 3971-28-6
- EC No. 223-594-5
- 1,3 Cyclohexanediol
- [3-(hydroxymethyl)cyclohexyl]methanol
- 1,3-Dimethylolcyclohexane
- Cyclohexane-1,3-dimethanol
- UNOXOL™ cyclic dialcohol
- UNOXOL™ Diol
- CAS No. 105-08-8
- EC No. 203-268-9
- 1,4 Cyclohexanediol
- [4-(hydroxymethyl)cyclohexyl]methanol
- 1,4-Dimethylolcyclohexane
- Cyclohexane-1,4-dimethanol
- UNOXOL Diol

Product Overview

- UNOXOL™ cyclic dialcohol, also called UNOXOL™ Diol, is a clear, colorless liquid with a sweet odor. It is a mixture of \((\text{cis}, \text{trans})\)-1,3 cyclohexanediol and \((\text{cis}, \text{trans})\)-1,4 cyclohexanediol in about equal proportions.\(^1\) For further details, see Product Description.
- The two reactive hydroxyl groups on UNOXOL Diol are useful in the preparation of condensation polymers and in the curing of polymers with typical melamine and polyisocyanate cross-linkers. Such resins and polymers are used in industrial coating applications.\(^1\) For further details, see Product Uses.
- Eye contact with cyclohexanediol mixtures may cause severe irritation with chemical burns or corneal injury, which may result in permanent impairment of vision, even blindness. This material has low toxicity if swallowed.\(^2\) For further details, see Health Information.
- Worker exposure to cyclohexanediol mixtures could occur in the manufacturing setting. Dow does not sell these products for direct consumer use, but UNOXOL Diol can be incorporated into automotive and appliance coatings and personal-care products that could be handled by consumers. Because this material is part of a formulation that is cured or reacted with other components, little to no residual amount will remain in the final product. Thus, no significant consumer exposure is expected during normal use. For further details, see Exposure Potential.
- UNOXOL Diol is thermally stable at normal storage and use temperatures. Exposure to elevated temperatures can cause the material to decompose. Avoid contact with strong acids.\(^2\) For further details, see Physical Hazard Information.
- UNOXOL™ Diol is readily biodegradable, unlikely to accumulate in the food chain, and is considered practically non-toxic to fish and other aquatic organisms on an acute basis. For further details, see Environmental Information.

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Product Description

UNOXOL™ Diol is a clear, colorless liquid with a sweet odor. It is a mixture of (cis, trans)-1,3 cyclohexanediol and (cis, trans)-1,4 cyclohexanediol in about equal proportions. Because of its unique structure and consistent composition, this mixture is a liquid at room temperature, making it easier to use than other mixtures of cyclohexanediol isomers. UNOXOL Diol contains two primary hydroxyl (-OH) groups that have excellent reactivity.

Product Uses

UNOXOL™ Diol is used in the preparation of condensation polymers, such as polyester resins, and in the curing of polymers with typical melamine and polyisocyanate cross-linkers. Such resins and polymers are used for automotive coatings, appliance coatings, coil coatings, powder coatings, and other general industrial coating applications.

UNOXOL Diol can also be used in polymer intermediates and solvents for cosmetics and personal-care products.

Exposure Potential

UNOXOL™ Diol is used in the production of industrial and consumer products. Based on the uses for this material, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a UNOXOL Diol manufacturing facility or in the various industrial or manufacturing facilities that use this material. It is produced, distributed, stored, and consumed in closed systems. Those working with this material in manufacturing, downstream formulation or painting/coating 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, ventilation, and safety equipment in place to limit unnecessary exposure. See Health Information.

- **Consumer exposure to products containing UNOXOL Diol** – UNOXOL Diol is not sold for direct consumer use, but it can be used in automotive and appliance coatings that could be handled by consumers. The material could also be incorporated into cosmetics and other personal-care products. Because this material is part of a formulation that is cured or reacted with other components, little to no residual amount should remain in the final product. Thus, no significant consumer exposure is expected during normal use. 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, UNOXOL™ Diol should be carefully collected and placed in suitable and properly labeled containers for disposal. Because it is highly soluble, if the compound reaches water it will tend to remain dissolved in water. However, it is not expected to persist, as it is readily biodegradable and will be removed by sewage treatment. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, the material should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Isolate the area and deny any unnecessary entry. Use water fog and spray, dry-chemical or carbon-dioxide fire extinguishers, or foam. Alcohol-resistant foams are

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preference. Use of a direct water stream may spread the fire. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

**Health Information**

- **Eye contact** – Eye contact with this material may cause severe irritation with chemical burns or corneal injury, which may result in permanent impairment of vision, even blindness.

- **Skin contact** – Brief contact is essentially nonirritating to the skin. Prolonged contact is unlikely to result in absorption of harmful amounts.

- **Inhalation** – At room temperature, exposure to vapor is minimal. A single exposure is not likely to be hazardous.

- **Ingestion** – This material has low toxicity if swallowed. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.

- **Other** – This material contains components that in laboratory animals have been toxic to the fetus only at doses toxic to the mother, but these components did not interfere with reproduction or fertility. This material, or components in this material, were negative in in vitro and animal genetic toxicity studies.

For more information, see the relevant Safety Data Sheet.

**Environmental Information**

As a reactive raw material in the production of industrial and consumer products, UNOXOL™ Diol, is not expected to be released into the environment. Since it is highly soluble in water, once introduced, it will have a tendency to remain in water. It has minimal tendency to bind to soil or sediment.

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

UNOXOL Diol is not likely to accumulate in the food chain (bioconcentration potential is low) and is practically non-toxic to fish and other aquatic organisms on an acute basis.

For more information, see the relevant Safety Data Sheet.

**Physical Hazard Information**

UNOXOL™ Diol is thermally stable at normal storage and use temperatures. Exposure to elevated temperatures can cause the material to decompose. Decomposition products depend on the temperature, air supply, and the presence of other materials.

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Avoid contact with strong acids.

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 UNOXOL™ Diol. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety 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)
- UNOXOL™ Diol 1,3/1,4-Cyclohexanediol (CHDM), Technical Data Sheet, The Dow Chemical Company, Form No. 770-00019-1007 (http://msdssearch.dow.com/PublishedLiteratureDOWCOM/dh_047f/0901b8038047f9b3.pdf?filepath=oxysolvents/pdfs/noreg/770-00019.pdf&fromPage=GetDoc)

For more business information about UNOXOL™ Diol, visit the Dow Oxygenated Solvents web site at http://www.dow.com/oxysolvents/.

References

1 UNOXOL™ Diol 1,3/1,4-Cyclohexanediol (CHDM), Technical Data Sheet, The Dow Chemical Company, Form No. 770-00019-1007
2 UNOXOL Diol Data Safety Sheet for the US, The Dow Chemical Company, Product Code 40475
3 Estimates by The Dow Chemical Company

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