Product Safety Assessment

**VORANOL™ VORACTIV™ Polyols**

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**Names**
- Polyether polyol
- Reactive polyether polyol
- VORANOL™ VORACTIV™ polyols

**Product Overview**
- Most VORANOL™ VORACTIV™ polyols are clear to white viscous liquids. They range from nearly odorless to a slightly sweet odor. These materials belong to a category of materials called polyether polyols.¹ See Product Description.
- VORANOL VORACTIV polyols are primarily used as chemical building blocks in the manufacture of polyurethane foams for automotive and furniture applications.² See Product Uses.
- VORANOL VORACTIV polyols are not considered hazardous chemicals.¹ They can be slightly irritating to eyes and skin, but have low oral toxicity. At room temperature, exposure to vapor is minimal due to low volatility; vapor from heated material may cause respiratory irritation.¹ They are stable under recommended storage conditions. However, these polyols can oxidize at elevated temperatures. Avoid contact with oxidizing materials and strong acids. Avoid unintended contact with isocyanates. See Health Information or Physical Hazard Information.
- VORANOL VORACTIV polyols are expected to slowly biodegrade in the environment, are unlikely to accumulate in the food chain (bioconcentration potential is low) and are slightly toxic to aquatic organisms on an acute basis. See Environmental Information.
- Exposure to these 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.³ See Exposure Potential.

**Manufacture of Product**
- **Process** – The materials used to make these polyols are proprietary. In general, however, polyols are produced by reacting either amines or materials with terminal –OH groups with propylene oxide and/or ethylene oxide using a catalyst.

¹Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow

Revised: August 11, 2014
Product Description

Most VORANOL™ VORACTIV™ polyols are clear to white viscous liquids. They range from odorless to a mild or slightly sweet odor and are hygroscopic (attract water from the atmosphere and environment). They are unique in that a multifunctional amine catalyst is bonded to the polyol. A separate amine catalyst is sometimes required for the reaction to form polyurethanes. Some of the polyols in the VORANOL VORACTIV product line also contain styrene-acrylonitrile copolymer dispersions to enhance final cushioning properties.

Product Uses

VORANOL™ VORACTIV™ polyols are mainly used to produce polyurethane materials by reaction with isocyanates. Uses for the resulting polyurethanes include production of flexible, standard, and high-resilience slabstock and molded foams. The high-resilience foams are used in the automotive industry for seating, trim, and noise reduction or high-quality furniture and mattress cushioning.

Exposure Potential

VORANOL™ VORACTIV™ 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 VORANOL VORACTIV 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 VORANOL VORACTIV 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** – If released to the environment, VORANOL VORACTIV polyols will partition to water, due to their high water solubility and low volatility. They are expected to slowly biodegrade in the environment, and are expected to be removed in biological wastewater treatment facilities. 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 or sand, then swept up for disposal according to governmental requirements. See Environmental, Health and Physical Hazard Information.

- **Large release** – 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 pumped into containers, such as drums or tank trucks for disposal. The remaining spill may be absorbed with absorbent materials such as dirt or sand, cleaned up...
and disposed of according to governmental requirements. Personnel engaged in clean up of spills should observe proper skin and eye protection practices. Fires involving polyols can be readily extinguished with water fog, carbon dioxide, 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, Health and Physical Hazard Information.

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

Health Information ¹

Health information for VORANOL™ VORACTIV™ 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 VORANOL* VORACTIV* polyols appears below:

Eye contact - VORANOL VORACTIV polyols may cause slight irritation to the eyes accompanied by slight, temporary corneal injury.

Skin contact - Prolonged skin exposure is not likely to cause significant skin irritation, although irritation may be more severe if the skin is abraded. Prolonged skin contact is unlikely to result in absorption of harmful amounts. Contains component(s) that did not cause skin sensitization in laboratory animal studies.

Inhalation - 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.

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 SDS.

Environmental Information ¹

VORANOL™ VORACTIV™ polyols are water soluble and nonvolatile. If released to the environment, they will have a tendency to remain in water with only moderate tendency to bind to soil or sediment.

These polyols products are unlikely to persist in the environment. They are expected to slowly biodegrade in water and soil, and to be efficiently removed in biological wastewater treatment facilities through a combination of adsorption and biodegradation in activated sludge biosolids.

VORANOL VORACTIV polyols are not likely to accumulate in the food chain (bioconcentration potential is low), due to their high water solubility and high molecular weight. These polyols are slightly toxic to fish and other aquatic organisms on an acute basis (LC50/EC50 10 -100 mg/L in the most sensitive species tested.

For more information, see the relevant SDS.

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Physical Hazard Information
VORANOL™ VORACTIV™ polyols are stable under recommended storage conditions. Avoid contact with oxidizing materials (such as peroxides and 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, carbon dioxide, foam, or dry chemical extinguishers. Evacuate personnel and deny unnecessary entry. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Do not use direct water stream as it may spread fire. Because incomplete combustion may lead to the buildup of toxic by-products, firefighters should wear positive-pressure, self-contained breathing apparatus.

For more information, see the relevant SDS.

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

Additional Information
- Safety Data Sheet
- Contact Us (http://www.dow.com/voractiv/contact.htm)
- Technical Data Sheets (http://www.dow.com/voractiv/lit/index.htm)
  - VORANOL™ VORACTIV™ VV 6340 Technical Data Sheet, The Dow Chemical Company, Form No. 109-01636-1003PCG
  - VORANOL VORACTIV VV 7013 Technical Data Sheet, The Dow Chemical Company, Form No. 109-51911
  - VORANOL VORACTIV VV 8106 Technical Data Sheet, The Dow Chemical Company, Form No. 109-51911-0706MJ

For more business information about VORANOL VORACTIV polyols, visit the Dow VORANOL VORACTIV polyols website. (http://www.dow.com/voractiv/index.htm or www.polyurethanes.com)
References

1. VORANOL™ VORACTIV™ VV 8109 Polyol, Material Safety Data Sheet, The Dow Chemical Company
4. VORANOL VORACTIV VV 6340 Technical Data Sheet, The Dow Chemical Company, Form No. 109-01636-1003PCG
5. Polyurethanes market overview, IAL Consulting, 2006 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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