Product Safety Assessment
VITHANE™ Resins in Toluene–Isobutanol

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Names
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- VITHANE 637 resin
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Product Overview
- VITHANE™ resins in toluene–isobutanol are a family of polyurethane elastomers manufactured and marketed by Rohm and Haas Company, a wholly owned subsidiary of The Dow Chemical Company, and its affiliated companies. “Elastomers” are resilient polymers that can bend or stretch and then return to their original shape. VITHANE resins in toluene–isobutanol are formulated as colorless to yellow, viscous liquids with a solvent odor. For further details, see Product Description.
- VITHANE resins in toluene–isobutanol are used in the production of synthetic leather. Footwear, apparel, and other goods are manufactured from synthetic leathers made with these VITHANE products. For further details, see Product Uses.
- VITHANE resins are for commercial use. Worker exposure is possible during manufacture, transport, or application. Consumers may purchase finished goods, such as footwear or furniture, manufactured with VITHANE resins. For further details, see Exposure Potential.
- The following health information refers to the liquid resin formulations encountered during manufacturing. As resins cure (solidify), the carrier solvent (toluene–isobutanol) is removed, and the resins form a flexible plastic film or “skin.” Eye contact with solvent vapor or mist during processing can cause severe irritation. Skin contact with toluene–isobutanol can cause moderate irritation and reddening. These solvents are harmful if absorbed through intact skin, with initial symptoms of inhalation exposure. Inhalation of solvent vapor or mist during processing may irritate the nose, throat, and lungs. Headache and nausea are also possible. For further details, see Health Information.

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The solvents used in VITHANE™ resins in toluene–isobutanol are readily biodegradable, have a low tendency to bioaccumulate in the food chain, and range from toxic to practically nontoxic to aquatic organisms on an acute basis. The polyurethane resins are expected to slowly degrade in the environment. Due to their high molecular weight, the resins are not expected to accumulate in the food chain and they are not expected to be toxic to fish or other aquatic species. For further details, see Environmental Information.

VITHANE resins in toluene–isobutanol are stable under recommended storage and normal use conditions. These products are flammable and should be stored and used away from potential ignition sources. Solvent vapor is heavier than air and can travel long distances and accumulate in low-lying areas. Ignition or flashback could occur. For further details, see Physical Hazard Information.

Manufacture of Product

- **Locations** – A foreign affiliated company of Rohm and Haas Company, a wholly owned subsidiary of The Dow Chemical Company, produces VITHANE™ resins at facilities in Mozzate, Italy.
- **Process** – VITHANE resins in toluene–isobutanol are formulated in batch operations using proprietary Rohm and Haas materials and technology.

Product Description

VITHANE™ polyurethane resins in toluene–isobutanol are formulated as colorless to yellow viscous liquids with a solvent odor. The toluene–isobutanol solvent blend is removed during processing. Cured (solidified) VITHANE resins are strong flexible films or “skins” that are resistant to scratches, yellowing, and attack by water. VITHANE polyurethane films or “skins” range from very soft and pliable to stiff to suit a wide variety of applications.

Product Uses

VITHANE™ resins in toluene–isobutanol are used as topcoats and basecoats in the production of synthetic leathers. Synthetic leathers made with VITHANE resins are used for the following applications:

- Footwear (e.g., uppers for shoes and safety shoes)
- Upholstery – furniture (e.g., sofa), automotive (e.g., dashboard, gearshift, etc.)
- Apparel and accessories (e.g., handbags, belts, etc.)
- Bags, linings, general purpose
- Garments (e.g., labels, jackets, etc.)

Exposure Potential

VITHANE™ resins in toluene–isobutanol are used in the production of synthetic leather. Based on this, the public could be exposed through:

- **Workplace exposure** – Exposure can occur in facilities that manufacture these resins, during transport, or during synthetic leather manufacture. VITHANE resins in toluene–isobutanol are produced, distributed, and stored in closed systems. Those working with VITHANE resins 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, ventilation, and safety equipment in place to limit exposure. See Health Information.

- **Consumer exposure to VITHANE™ resins in toluene–isobutanol** – These liquid resin formulations are not sold directly to consumers. Synthetic leather manufactured with VITHANE resins may be used to manufacture footwear, furniture, or other consumer goods. Consumers would contact only the cured resin, which is considered harmless. See Health Information.

- **Environmental releases** – Due to the use pattern for these VITHANE resins, releases to the environment are expected to be minimal. In the event of a spill, the focus is on immediate containment to prevent contamination of soil, surface water, or groundwater. If released, the toluene and isobutanol solvents used in the products will exhibit low to moderate tendencies to volatilize from water. In air, the solvents will degrade within days from exposure to photochemically produced hydroxyl radicals. Since these compounds are readily biodegradable, they are expected to be removed from water and soil environments, including biological wastewater-treatment facilities. The polyurethane resins will tend to float in water and will be removed in biological wastewater-treatment facilities by adsorption to biosolids. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, dike the area with sand or soil to contain the spill. Evacuate personnel upwind and away from the spill or leak. Ventilate the area. Ground and bond all containers and handling equipment and extinguish all potential ignition sources. Clean-up personnel must wear personal protective equipment. Spilled product can create slippery conditions. Collect spilled product in suitable and properly labeled containers. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Evacuate personnel and deny unnecessary entry. Use alcohol-resistant foam, carbon-dioxide (CO2) or dry-chemical extinguishers, or a fine water spray or mist to fight the fire. A direct water stream may spread the fire. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Solvent vapor is heavier than air and can travel long distances and accumulate in low-lying areas. Ignition or flashback could occur. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Health Information

Health information for VITHANE™ resins in toluene–isobutanol is summarized on the relevant Safety Data Sheets. It is important to note that health risks associated with individual products may vary based on their formulation or intended use. These products may contain minor components or additives with additional health risks. The Safety Data Sheet is the preferred source for specific information. The following health information refers to the polyurethane resin in toluene–isobutanol solvent encountered during manufacturing. The resulting fully cured polyurethane resin is a solid film or skin that is considered harmless.

**Eye contact** – Contact with solvent vapor or mist during processing may cause severe irritation, conjunctivitis, or corneal opacity.

**Skin contact** – Contact with the solvent blend can cause moderate irritation, reddening, and defatting and drying of the skin, which can lead to irritation and dermatitis. Prolonged or repeated contact may result in severe irritation, swelling, and burns. The solvents in these formulations can be absorbed through intact skin with symptoms of inhalation exposure.

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**Inhalation** – Inhalation of solvent vapor or mist during processing can cause irritation of the nose, throat, and lungs. Other symptoms may include headache, nausea, lack of coordination, drowsiness, dizziness, or slow respiration. Prolonged excessive inhalation of solvent vapor or mist may result in abdominal pain, unconsciousness, coma, fluid in the lungs (pulmonary edema), or death.

**Ingestion** – These products may be harmful if swallowed. The solvents in these formulations can cause drowsiness, dizziness, vomiting, nausea, diarrhea, gastrointestinal irritation, and central nervous system effects. Aspiration into the lungs could occur during ingestion or vomiting leading to lung injury, inflammation, or pulmonary edema.

**Repeated exposure** – Prolonged or repeated overexposure to toluene can irritate the respiratory tract, damage the liver and kidneys, and cause cardiac sensitization. Animal studies have shown that prolonged or repeated exposure to high concentrations of isobutanol can affect the liver and central nervous system. Observations in animals include anesthetic or narcotic effects.

**Reproductive effects** – Reproductive effects have been reported in pregnant toluene inhalant abusers following very high (intentional abuse) exposures. In animal studies, evidence of developmental toxicity has been observed, but no teratogenicity or significant effects on fertility have been observed. Reproductive and developmental toxicity have not been observed in animals exposed to isobutanol.

For more information, request the Safety Data Sheet from the **Dow Customer Information Group**.

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**Environmental Information**

The solvents used in VITHANE™ resins in toluene–isobutanol exhibit a range of volatility and water solubility. When introduced, the solvents will have a low to moderate tendency to evaporate from water with minimal tendency to bind to soil and sediment. The polyurethane resins are insoluble and will tend to float in water and bind to soil, suspended particles, or sediment.

The toluene and isobutanol solvents used in these VITHANE products are unlikely to persist in the environment. In the atmosphere, the solvents will degrade within days by reaction with photochemically produced hydroxyl radicals. The solvents are readily biodegradable, which suggests that they will be removed from water and soil environments, including biological wastewater-treatment facilities. Although the polyurethane resins are essentially nonbiodegradable, they are expected to slowly degrade in the environment, including degradation by physical action or exposure to sunlight. The resins would likely be removed in biological wastewater-treatment facilities by adsorption to biosolids.

The toluene and isobutanol solvents used in these VITHANE products are not likely to accumulate in the food chain (bioconcentration potential is low) and range from toxic to practically nontoxic to fish and other aquatic organisms on an acute basis. The polyurethane resins are not expected to accumulate in the food chain due to their high molecular weight, and they are not expected to be toxic to fish or other aquatic species.

For more information, request the Safety Data Sheet from the **Dow Customer Information Group**.

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Physical Hazard Information

VITHANE™ resins in toluene–isobutanol are stable under recommended storage and normal use conditions. These products are flammable and should be stored and used away from potential ignition sources. Solvent vapor is heavier than air and can travel long distances and accumulate in low-lying areas. Ignition or flashback could occur. Ground and bond all containers and handling equipment before transferring or using these products.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of VITHANE™ resins in toluene–isobutanol. 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

- Request the relevant Safety Data Sheet from the Dow Customer Information Group (www.dow.com/assistance/dowcig.htm)
- Contact Us (www.dow.com/assistance/thoughts.htm)
- VITHANE™ 654 One-Component Solvent-Based Aliphatic Polyurethane Top Coat, Technical Data Sheet, Rohm and Haas Europe Services APS, Edition No. 6, reviewed June 29, 2010
- VITHANE™ Resins Product Line Leaflet, ed 6, Rohm and Haas Europe Services, April 2011


References

2. VITHANE™ 637 One-Component Solvent-Based Aliphatic Polyurethane Top Coat, Technical Data Sheet, Rohm and Haas Europe Services APS, Edition No. 6, reviewed June 29, 2010.
3. VITHANE™ Resins Product Line Leaflet, ed 6, Rohm and Haas Europe Services, April 2011.


VITHANE™ 637 One-Component Solvent-Based Aliphatic Polyurethane Top Coat, Technical Data Sheet, Rohm and Haas Europe Services APS, Edition No. 6, reviewed June 29, 2010.

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VITHANE™ Resins Product Line Leaflet, ed 6, Rohm and Haas Europe Services, April 2011.


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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