Product Safety Assessment

Diethylene Glycol Monomethyl Ether

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Names

- CAS No. 111-77-3
- Diethylene glycol monomethyl ether
- Methyl CARBITOL™ solvent

Product Overview

- Diethylene glycol monomethyl ether (DEGME) is a type of glycol ether and is sold by Dow under the tradename Methyl CARBITOL™ solvent. DEGME is an ethylene-series or E-series glycol ether. It is primarily used as a de-icing additive for aviation fuel. See Product Uses.
- DEGME is a colorless liquid with a mild odor. Eye contact may cause slight temporary irritation and/or pain disproportionate to the level of irritation to eye tissues. See Product Description and Health Information.
- Consumer exposure to DEGME may occur through the use of silk screen, stamp pad and pen inks, as well as rust, paint and varnish removers. Check the product label for ventilation and protective equipment requirements. See Exposure Potential.
- DEGME has a high dilution ratio and a low evaporation rate. It is stable under recommended storage conditions and readily biodegradable. See Physical Hazard Information.

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Manufacture of Product

- Capacity – In 2004, global industry production for E-series glycol ethers, including DEGME, was 952 thousand metric tons (2,098 million pounds). U.S. consumption of glycol ethers was 309 metric tons (682 million pounds). Dow has glycol ether production facilities in the following U.S. locations: Midland, Michigan; Hahnville and Plaquemine, Louisiana; and Seadrift, Texas. Dow also has production facilities in San Lorenzo, Argentina and Stade, Germany.
- Process – Ethylene glycol monoethers are produced by reacting ethylene oxide with anhydrous (dry) alcohol (usually methyl, ethyl or butyl alcohol). Methanol is used for DEGME production. The chemical reaction is shown on the next page.
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Diethylene glycol monomethyl ether (DEGME) is a type of glycol ether and is sold by Dow under the tradename Methyl CARBITOL solvent. DEGME is an ethylene-series or E-series glycol ether. DEGME is a clear liquid with a mild, pleasant odor. It is miscible with water and most organic solvents. It evaporates slowly because it has a low vapor pressure.

Product Uses

Glycol ethers are primarily used as solvents in various formulations, such as cleaning fluids, paints, coatings and inks. DEGME is used as:

- **De-icing additives** – in aviation fuel
- **Solvents** – in solvent-based silk screen printing inks; stamp pad inks; ball point and felt tip writing pen inks; pastes used in printing cellulose acetate and polyester fabrics;
- **Coupling agents** – for vat dyeing fabrics; rust removers; aluminum brighteners, and paint and varnish removers
- **Deactivators and stabilizers** – for agricultural pesticides

Exposure Potential

DEGME is used in the production of industrial and consumer products. Based on these uses, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a DEGME manufacturing facility or in the various industrial or manufacturing facilities that use it. Those working with DEGME in manufacturing operations could be exposed during maintenance, sampling, testing or other procedures. Adequate ventilation should be used to maintain vapor levels below recommended guidelines. Each manufacturing facility should have a thorough training program for employees, appropriate work processes and safety equipment in place to limit unnecessary exposure. Occupational exposure might also occur during jet refueling because DEGME is used as a jet fuel additive. Workers should ensure there is adequate ventilation when working with jet fuels. See Health Information.
- **Consumer exposure to products containing DEGME** – DEGME may be found in various paints, stains, inks and cleaning products used by consumers. Use safety glasses to protect eyes when using products that contain DEGME. Even though chemical gloves should not be needed when handling pure DEGME, commercial products may have other ingredients that require protective clothing, gloves or other precautions such as adequate ventilation. Follow product instructions carefully to minimize the risk of exposure. See Health Information.
Environmental releases – In the event of a spill, absorb DEGME with materials such as sand or vermiculite. Collect material in suitable and properly labeled containers. Prevent material from reaching surrounding soil, streams or ground water. Use appropriate safety equipment for clean up. 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 captured, collected and re-processed, or disposed of according to applicable governmental requirements. If DEGME is present in a fire situation, it can produce carbon monoxide (highly toxic) and carbon dioxide (an asphyxiant at sufficient concentrations). Containers may rupture from gas generation in a fire situation. Use water spray to cool fire-exposed containers until danger of re-ignition has passed. Violent steam generation may occur upon applications of direct water stream to hot liquids. Deny any unnecessary entry into the area and consider the use of unmanned hose holders. Use of a direct water stream may spread fire. Immediately withdraw all personnel from the area in case of rising sounds from venting safety device or discolorations of the container. Emergency personnel should wear proper protective equipment, including self-contained breathing apparatus (SCBA), and follow emergency procedures carefully. When relevant in scale or risk, the community should be notified of the hazards associated with the specific release event. See Environmental, Health and Physical Hazard Information.

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

Health Information

Eye contact with DEGME may cause slight temporary eye irritation and/or pain disproportionate to the level of irritation to the eye. Prolonged skin exposure is not likely to cause significant irritation or result in absorption of harmful amounts.

No adverse effects are anticipated from single exposure to DEGME vapor. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury due to its low toxicity.

Repeated exposure to DEGME in animals has been reported to produce effects in the liver and kidney and, only after very high oral doses, in the testes and thymus.

Studies in laboratory animals indicate that DEGME is slightly toxic to the fetus at doses nontoxic to the mother following skin contact. Birth defects have been seen only following high oral doses which have little relevance to human exposure.

Animal genetic toxicity studies were negative.

For more information, see the relevant SDS.

Environmental Information

DEGME is readily biodegradable, and its bioconcentration potential is low. Because it is miscible in water, the potential for mobility in soil is very high.

Additional environmental information for DEGME is available in the Ecological and Toxicological Data of DOW Glycol Ethers brochure.

For more information, see the relevant SDS.
Physical Hazard Information\textsuperscript{14}

DEGME is a combustible liquid that is stable under recommended conditions. Storage containers made from carbon steel, stainless steel or phenolic-lined steel are recommended. DEGME should not be stored in containers made from aluminum, copper, galvanized iron or galvanized steel. Contact with strong acids, strong bases and strong oxidizers should also be avoided.

DEGME should not be distilled to dryness because it can form peroxides that are unstable. DEGME can oxidize at elevated temperatures. Thermal decomposition products can include and are not limited to: aldehydes, ketones and organic acids.

Spills of glycol ethers, including DEGME, on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

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

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Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use and/or disposal of DEGME. These regulations may vary by city, state, country or geographic region. Information may be found by consulting the relevant SDS or Contact Us.

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Additional Information

- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.asp)
- Solvent Property Tables (http://www.dow.com/PublishedLiterature/dh_0068/0901b8038006856a.pdf?filepath=oxysolvents/pdfs/noreg/327-00001.pdf&fromPage=GetDoc)

For more business information about DEGME, visit Dow's Oxygenated Solvents web site.

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References

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1 Methyl CARBITOL\textsuperscript{™} Solvent, Material Safety Data Sheet, The Dow Chemical Company, April 18, 2006, page 2.
3 Methyl CARBITOL\textsuperscript{™} Solvent, Material Safety Data Sheet, The Dow Chemical Company, April 18, 2006, page 1.
5 Methyl CARBITOL\textsuperscript{™} Solvent, Material Safety Data Sheet, The Dow Chemical Company, April 18, 2006, page 4-5.
NOTICES:

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