
Product Safety Assessment

Diethylene Glycol Butyl Ether

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Names

- CAS No. 112-34-5
- Diethylene glycol monobutyl ether
- Diethylene glycol butyl ether (DGBE)
- Diglycol monobutyl ether
- 2-(2-Butoxyethoxy)ethanol
- EC No. 203-961-5
- Butyl CARBITOL™ solvent
- Butoxydiglycol
- Butyl diglycol ether

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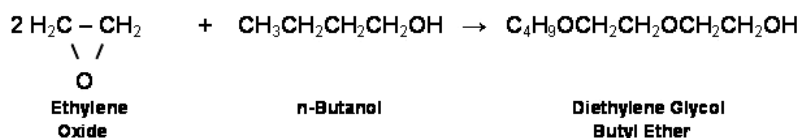
Product Overview

- Diethylene glycol butyl ether (DGBE) is a type of glycol ether. It is primarily used as a solvent in coatings, inks, cleaners and specialty fluids, or to produce diethylene glycol butyl acetate.¹ It evaporates slowly and is completely water soluble.² Dow sells DGBE under the trade name Butyl CARBITOL™ solvent. See [Product Uses](#), [Product Description](#) and [Manufacture of Product](#).
- Although some glycol ethers have been shown to cause adverse reproductive effects and birth defects in laboratory animals, DGBE does not show the same pattern of toxicity as these other glycol ethers. DGBE has low oral, dermal and inhalation toxicity. Still, when used improperly, DGBE can cause severe eye irritation and slight corneal injury.³ See [Health Information](#).
- Occupational and consumer exposure is possible because DGBE is used in a wide variety of industrial and consumer products like cleaning products, paints, and inks. Skin exposure is the most likely route for human exposure.⁴ See [Exposure Potential](#).
- DGBE studies show it is unlikely to cause adverse environmental impact because it readily biodegrades, does not bioaccumulate and has low acute toxicity to aquatic organisms.^{3,5} See [Environmental Information](#) and [Health Information](#).

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Manufacture of Product

- **Capacity** – Dow is a full-spectrum supplier of glycol ethers,⁶ and is the world's leading producer of ethylene-oxide-based glycol ethers.⁷ Dow has a production facility for ethylene glycol butyl ethers production in Seadrift, Texas.
- **Process** – DGBE is produced by reacting two ethylene oxide molecules along with [normal butanol](#) (n-butanol) using a catalyst. If the ratio of ethylene oxide to n-butanol is greater than two, tri-ethylene glycol monoethers are produced along with the DGBE.



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Product Description^{3,8}

Butyl CARBITOL™ solvent is a clear, liquid with a mild ether odor. It evaporates slowly and is completely water soluble.

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Product Uses^{2,9,10}

DGBE is used as a solvent in coatings and cleaner applications for industrial and consumer markets. It is also used as a chemical intermediate to produce diethylene glycol monobutyl ether acetate (DBA) and some herbicides, insecticides and plasticizers. DGBE is also used in hydraulic brake fluid applications.

Specifically, Butyl CARBITOL™ solvent is used as:

- Latex coalescent in water-based architectural and industrial coatings
- Coupling agent and solvent in household and industrial cleaners, rust removers, hard surface cleaners and disinfectants
- Primary solvent in solvent-based silk screen printing inks
- Coupling solvent for resins and dyes in water-based printing inks
- Solvent for ball point and felt tip pen inks, and textile dyeing and printing
- Coalescent for latex adhesives
- Deactivator and stabilizer for agricultural pesticides
- Diluent in hydraulic brake fluid applications

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Exposure Potential³

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

- **Workplace exposure** – Exposure can occur either in a DGBE manufacturing facility or in the various industrial or consumer product manufacturing facilities that use DGBE. Each manufacturing or application facility should have appropriate work processes and safety equipment policies in place to limit unnecessary DGBE exposure. See [Health Information](#).
- **Consumer exposure to products containing DGBE** – Dow does not sell DGBE for direct consumer use, but it is used as a component in coatings, paints, cleaners, adhesives, pesticides, etc. Consumers will likely have contact with DGBE. Skin exposure is the most likely route for human exposure.⁴ Please review product labels and follow all instructions and guidelines for proper use to help prevent unnecessary exposure. 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. For small spills, the DGBE should be absorbed with materials such as sand or vermiculite. This material is considered practically non-toxic to aquatic organisms on an acute basis. The low vapor pressure helps reduce inhalation risk,⁴ however adequate ventilation is recommended to control airborne levels below any exposure guidelines. Keep away from heat, sparks and flame. Consult the relevant [SDS](#) for more information about protective equipment and procedures. 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 DGBE 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 application 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](#).

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Health Information^{3,11,12,13}

DGBE has low acute oral, dermal and inhalation toxicity, and is not a skin sensitizer. When used improperly, DGBE can cause severe eye irritation and slight corneal injury. Prolonged contact may cause slight skin irritation with local redness, but is unlikely to result in absorption of harmful amounts.

High oral repeated doses in rats caused red blood cell damage as well as changes in the liver, kidneys and stomach. DGBE has not been found to be mutagenic, teratogenic, fetotoxic or neurotoxic. It did not cause birth defects, interfere with reproduction or show toxicity to fetuses. However, body weights of newborn animals were decreased.

The major metabolite of DGBE is 2-(2-butoxyethoxy) acetic acid (BEAA). Both DGBE and BEAA are excreted primarily in the urine following DGBE oral, dermal and intravenous exposure in rats.

For specific health information, review the Safety Data Sheet ([SDS](#)).

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Environmental Information^{3,5}

DGBE is practically non-toxic to aquatic organisms on an acute basis. It is readily biodegradable and does not bioaccumulate (build up in the food chain). DGBE moves to water when it is released because of its high solubility, low volatility and high soil mobility. It degrades rapidly in water. Because of these properties, DGBE poses a low risk to the environment.

Ethylene glycol ethers have only rarely been measured in the environment, and when found, their concentrations are generally in the low part-per-billion (ppb) range.

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Physical Hazard Information³

Store DGBE in carbon steel, stainless steel or phenolic-lined steel drums. Do not store in aluminum, copper, galvanized iron or galvanized steel. Avoid contact with strong acids, strong bases and strong oxidizers. DGBE can oxidize at elevated temperatures.

DGBE is thermally stable at typical use temperatures, but can oxidize at elevated temperatures. It should not be distilled to dryness, as it may form peroxides. Decomposition can cause gas generation and pressure in closed systems. Thermal decomposition products can include and are not limited to: aldehydes, ketones and organic acids.

Spills of DGBE on hot, fibrous insulations may result in spontaneous combustion by lowering the auto-ignition temperatures.

Additional physical property information for DGBE is available on the [SDS](#).

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Regulatory Information

Governmental requirements may exist that govern the manufacture, sale, transportation, use and/or disposal of DGBE. These requirements may vary by city, state, country or geographic region. Information may be found by consulting the relevant [Safety Data Sheet](#) or [Contact Us](#).

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Additional Information

- Safety Data Sheet (<http://www.dow.com/webapps/msds/msdssearch.aspx>)
- *Butyl CARBITOL™ Solvent* [Technical Data Sheet](#), The Dow Chemical Company, Form No. 110-00624-0812
- The American Chemical Council Ethylene Glycol Ethers Panel (<http://www.americanchemistry.com/ProductsTechnology/Glycol-Ethers>)
- Dow's *Glycol Ethers* brochure, Form No. 110-00965-1101 AMS (http://msdssearch.dow.com/PublishedLiteratureDOWCOM/dh_0032/0901b80380032bc8.pdf?filepath=oxysolvents/pdfs/noreg/110-00965.pdf&fromPage=GetDoc)
- *Ecological and Toxicological Data of DOW Glycol Ethers*, Form No. 170-00761-0304 (http://msdssearch.dow.com/PublishedLiteratureDOWCOM/dh_0058/0901b8038005889d.pdf?filepath=oxysolvents/pdfs/noreg/110-00761.pdf&fromPage=GetDoc)
- *Solvent Property Tables* (http://msdssearch.dow.com/PublishedLiteratureDOWCOM/dh_012d/0901b8038012d976.pdf?filepath=oxysolvents/pdfs/noreg/110-00977.pdf&fromPage=GetDoc)

For more business information about DGBE, visit Dow's [Oxygenated Solvents web site](#).

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References

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- ¹ "CEH Marketing Research Report: Glycol Ethers," *Chemical Economics Handbook*, SRI Consulting, July 2004, page 46
- ² *Butyl CARBITOL Diethylene Glycol Monobutyl Ether Technical Data Sheet*
- ³ *Butyl CARBITOL™ Solvent Safety Data Sheet*
- ⁴ Boatman, R.J., and Knaak, J.B., "Ethers of Ethylene Glycol and Derivatives," *Patty's Toxicology*, 5th Edition, John Wiley & Sons, Inc., New York, 2001, page 202
- ⁵ "Ethylene Glycol Ethers Information Update: Ethylene Glycol Ethers Expected to Present Low Environmental Risk"
- ⁶ "CEH Marketing Research Report: Glycol Ethers," *Chemical Economics Handbook*, SRI Consulting, July 2004, pages 18, 43 and 80
- ⁷ *Glycol Ethers*, Dow Form No. 110-00965-1101 AMS, page 1
- ⁸ *Glycol Ethers*, Dow Form No. 110-00965-1101 AMS, pages 1 and 5
- ⁹ *Glycol Ethers*, Dow Form No. 110-00965-1101 AMS, page 5
- ¹⁰ "CEH Marketing Research Report: Glycol Ethers," *Chemical Economics Handbook*, SRI Consulting, July 2004, pages 44 and 48

¹¹ *Ecological and Toxicological Data of DOW Glycol Ethers*, Form No. 170-00761-0304

¹² "The Toxicology of Glycol Ethers and Its Relevance to Man," European Centre for Ecotoxicology and Toxicology of Chemicals, Vol. II – Substance Profiles, Technical Report No. 95, pages 283-296

¹³ Boatman, R.J., and Knaak, J.B., "Ethers of Ethylene Glycol and Derivatives," *Patty's Toxicology*, 5th Edition, John Wiley & Sons, Inc., New York, 2001, pages 201-206

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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