

Product Safety Assessment

Ethylene Glycol

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Names

- CAS No. 107-21-1
- Ethylene glycol
- Monoethylene glycol
- EG
- MEG
- 1,2-Ethandiol
- Glycol
- Ethylene Alcohol

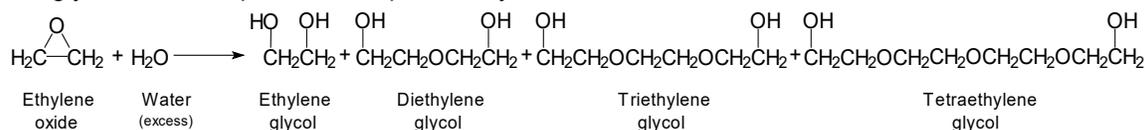
Product Overview

- Ethylene glycol is a colorless, practically odorless, low-volatility, low-viscosity, hygroscopic (picks up water from the air) liquid. It is completely miscible with water and many organic liquids and depresses the freezing point when mixed with water.¹ See [Product Description](#).
- Ethylene glycol is almost entirely used for industrial applications. Most ethylene glycol is consumed in the manufacture of polyester and polyethylene terephthalate (PET) resins, and antifreeze and coolant fluids.² Ethylene glycol is also used as a deicing fluid, a chemical intermediate for solvent production and a solvent coupler.³ MEGlobal has identified numerous non-recommended uses for Ethylene Glycol which can be accessed at their web site at [MEGlobal Non-supported Uses](#). See [Product Uses](#).
- Exposure to ethylene glycol will normally occur in the context of industrial and commercial applications. Occupational exposure can occur in an ethylene glycol production facility or in facilities using ethylene glycol or products containing ethylene glycol. Consumers may come into contact with ethylene glycol when adding antifreeze or coolant to vehicles.⁴ See [Exposure Potential](#).
- Eye contact may cause slight irritation, but corneal injury is unlikely. Brief skin contact is essentially nonirritating. Prolonged or repeated skin contact may cause slight irritation with local redness. Repeated skin exposure to large quantities of material may result in absorption of harmful amounts. The oral toxicity of ethylene glycol is moderate. However, swallowing large amounts (3 oz) of ethylene glycol may cause serious injury, even death. Excessive exposure may result in effects on the central nervous system, kidney failure, and other effects.⁵ See [Health Information](#).
- Ethylene glycol is readily biodegradable. Its bioconcentration potential (accumulation in the food chain) is low, and its potential for mobility in soil is very high. It is not classified as dangerous to aquatic organisms.⁶ See [Environmental Information](#).
- Ethylene glycol is thermally stable at recommended temperatures. Elevated temperatures can result in decomposition and pressure build-up in closed systems. Ethylene glycol is incompatible with strong acids, strong bases, and strong oxidizers.⁷ See [Physical Hazard Information](#).

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Manufacture of Product

- **Capacity**⁸ – Global consumption of ethylene glycol in 2018 was reported to be around 30.5 million metric tons (67.2 billion pounds). MEGlobal production facilities are located in Fort Saskatchewan, Prentiss in Alberta, Canada and Texas, USA. In addition to its own production, MEGlobal also markets ethylene glycol produced by EQUATE (a joint venture between Petrochemical Industries Company (PIC) and The Dow Chemical Company) and ethylene glycol produced by Dow Chemical in the United States.
- **Process**^{9,10} – Ethylene glycol is manufactured by a closed, single reactor process using a catalyzed condensation reaction between ethylene oxide and a controlled amount of water as shown below. Higher glycols (di-, tri-, and tetraethylene glycol) are by-products. Ethylene glycol is then separated and purified by distillation.



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Product Description^{11,12}

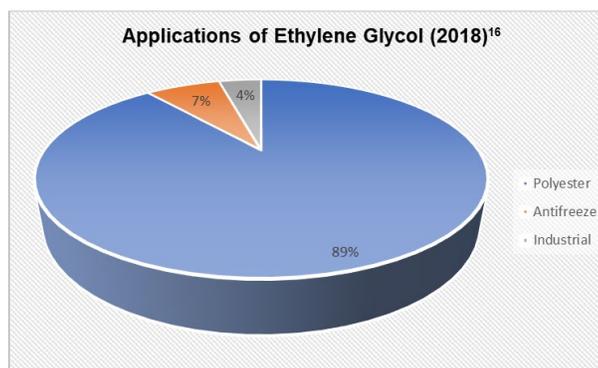
Ethylene glycol is a colorless, practically odorless, low-volatility, low-viscosity, hygroscopic liquid. It is completely miscible with water and many organic liquids. It is manufactured by MEGlobal, EQUATE and DOW and marketed by MEGlobal. At least five grades of ethylene glycol are manufactured: polyester, industrial, low conductivity, and antifreeze.

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Product Uses^{13,14,15,16}

The commercial uses for ethylene glycol take advantage of its reactivity and its ability to depress the freezing point when mixed with water. Uses include:

- Polyester/PET resins
- All-season automotive antifreeze and coolant formulations
- Heat-transfer fluids and industrial coolants
- Deicing fluids
- Surface coatings (latex paints, alkyd resins, asphalt emulsions)
- Solvents for suspending conductive salts in electrolytic capacitors
- Solvent couplers to stabilize against gel formation
- Humectants to promote moisture retention in textile fibers, paper, leather, and adhesives
- Unsaturated polyester resins
- Hydraulic fluids



MEGlobal has identified numerous non-recommended uses for Ethylene Glycol which can be accessed at their web site - [MEGlobal Non-supported Uses](#).

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Exposure Potential

Based on the uses for ethylene glycol, the public could be exposed through:

- **Workplace exposure**¹⁷ – The use of enclosed equipment, engineering controls, and personal protective equipment during the manufacture of ethylene glycol minimize the potential for human exposure. The most likely route of exposure is industrial, either in an ethylene glycol production facility or facilities using products containing ethylene glycol. Those working with ethylene glycol 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 chemical exposure. See [Health Information](#).
- **Consumer exposure to products containing ethylene glycol**¹⁸ – Consumers could come into contact with ethylene glycol rarely and only for short periods; for example, when adding antifreeze/coolant to vehicles. Consumers may also come into contact with small amounts of ethylene glycol in windshield deicers; caulking, glazing, and drywall compounds; and latex paints. See [Health Information](#).
- **Environmental releases**¹⁹ – Ethylene glycol production or the use of ethylene glycol or products containing ethylene glycol could result in the release of this material to the environment through various waste streams. 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, contain the material if possible. Absorb with materials such as cat litter, sand, or sawdust. Collect in suitable and properly labeled containers and dispose of this material in compliance with all governmental requirements. Additional data is listed in Environmental section See [Environmental Information](#), [Health Information](#), and [Physical Hazard Information](#).
- **Large release**²⁰ – For large spills, dike the area. Pump the recovered material into suitable and properly labeled containers and dispose in compliance with all governmental requirements. Keep unnecessary personnel and wildlife from entering area. Use appropriate safety equipment. Follow emergency procedures carefully. In case of fire, use water fog, fine water spray, or dry-chemical or carbon-dioxide fire extinguishers to extinguish the fire. Burning liquids may be extinguished by dilution with water, but do not use a direct water stream. During a fire, smoke may contain the original material in addition to toxic or irritating combustion products. Fight fire from a protected location or safe distance. Consider the use of unmanned hose holders. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective fire-fighting clothing. See [Environmental Information](#), [Health Information](#), and [Physical Hazard Information](#).

For more information, see the relevant [Safety Data Sheet](#).

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Health Information^{21,22}

Eye contact with the liquid, vapor, or mist may cause slight irritation. Corneal injury is unlikely.

Brief contact is essentially nonirritating to skin. Prolonged or repeated contact may cause slight skin irritation with local redness. Repeated skin exposure to large quantities of ethylene glycol may result in absorption of harmful amounts. Massive contact with damaged skin or with material hot enough to burn the skin may result in absorption of potentially lethal amounts.

At room temperature, exposure to vapor is minimal due to its low volatility. With good ventilation, a single exposure is not expected to cause adverse effects. If the material is heated or areas are poorly ventilated, vapor or mist may accumulate and cause respiratory irritation and symptoms such as headache and nausea.

The oral toxicity of ethylene glycol is moderate. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing large amounts

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of ethylene glycol (3 oz) may cause nausea, vomiting, abdominal effects, diarrhea, and/or serious injury—even death. Excessive exposure may result in central nervous system effects, cardiopulmonary effects, and kidney failure.

Repeated excessive exposure may cause irritation of the upper respiratory tract. In humans, effects have been reported on the central nervous system. In animals, effects have been reported on the kidney and liver.

Ethylene glycol did not cause cancer in long-term animal studies. Based on animal studies, ingestion of very large amounts of ethylene glycol appears to be the major and possibly only route of exposure to produce birth defects. Ingested in large amounts, ethylene glycol has also been shown to interfere with reproduction in animals. In vitro and animal genetic toxicity studies were negative.

For more information, see the relevant [Safety Data Sheet](#).

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Environmental Information²³

Ethylene glycol is practically nontoxic to aquatic organisms on an acute basis. Ethylene glycol is readily biodegradable, its bioconcentration (accumulation in the food chain) potential is low, and its potential for mobility in soil is very high. However due to the fact that Ethylene Glycol is readily biodegradable in water and will consume oxygen in this process it could cause a depletion of oxygen in bodies of water that could harm aquatic organism.

For more information, see the relevant [Safety Data Sheet](#).

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Physical Hazard Information²⁴

Ethylene glycol is thermally stable at recommended storage and use temperatures and pressures. Exposure to elevated temperatures can cause decomposition. Gas generated during decomposition can cause pressure build-up in closed systems. The decomposition products of ethylene glycol depend upon temperature, air supply, and the presence of other materials and may include aldehydes, alcohols, and ethers.

Ethylene glycol is incompatible with strong acids, strong bases, and strong oxidizers. Avoid contact with these materials.

Spills of ethylene glycol on hot fibrous insulation may lead to a reduction of the autoignition temperature, resulting in the potential for spontaneous combustion.

For more information, see the relevant [Safety Data Sheet](#).

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Regulatory Information²⁵

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of ethylene glycol. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant [Safety Data Sheet](#) or by contacting [MEGlobal](#).

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Additional Information

- Safety Data Sheet (<https://www.meglobal.biz/products/monoethylene-glycol/msds/>)
- Contact Us (<https://www.meglobal.biz/contact-us/customer-care/>)
- *Ethylene Glycol Product Brochure*, MEGlobal, Form No. 001-00005-0508-CRCG, 2019, (<https://www.meglobal.biz/products-and-applications/product-literature/>)
- *SIAR Ethylene Glycols*, SIDS Initial Assessment Report for SIAM 18, Paris, France, April 20–23, 2004 (revised January 26, 2007)

For more business information about ethylene glycol, visit MEGlobal's web site at <http://www.meglobal.biz/>

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References

- ¹ *Ethylene Glycol Product Guide*, MEGlobal, Form No. 001-00005-0508-CRCG, April 2012, page 3.
- ² *SIAR Ethylene Glycols*, SIDS Initial Assessment Report for SIAM 18, Paris, France, January 26, 2007, page 12.
- ³ *Ethylene Glycol Product Guide*, MEGlobal, Form No. 001-00005-0508-CRCG, April 2012, pages 3–4.
- ⁴ *SIAR Ethylene Glycols*, SIDS Initial Assessment Report for SIAM 18, Paris, France, January 26, 2007, page 22.
- ⁵ *Ethylene Glycol Polyester Grade, Safety Data Sheet*, MEGlobal, Canada version, “4. First Aid Measures” and “11. Toxicological Information”.
- ⁶ *Ethylene Glycol Polyester Grade, Safety Data Sheet*, MEGlobal, Canada version, “12. Ecological Information”.
- ⁷ *Ethylene Glycol Polyester Grade, Safety Data Sheet*, MEGlobal, Canada version, “2. Hazards Identification” and “10. Stability and Reactivity”
- ⁸ “*Wood Mackenzie Chemicals - Xylenes & Polyesters Ltd – Client database*”, MEG World Consumption Data. Subscription are required to access the data
- ⁹ *SIAR Ethylene Glycols*, SIDS Initial Assessment Report for SIAM 18, Paris, France, January 26, 2007, page 11.
- ¹⁰ MEGlobal: Products and Applications: EG Manufacture web site: (<https://www.meglobal.biz/products/monoethylene-glycol/>)
- ¹¹ *Ethylene Glycol Product Guide*, MEGlobal, Form No. 001-00005-0508-CRCG, April 2012, page 3.
- ¹² MEGlobal: Products and Applications: MEG Products and Applications: (<https://www.meglobal.biz/products-and-applications/>)
- ¹³ *SIAR Ethylene Glycols*, SIDS Initial Assessment Report for SIAM 18, Paris, France, January 26, 2007, page 13.
- ¹⁴ MEGlobal: Products and Applications: MEG Products and Applications web site: (<https://www.meglobal.biz/products/monoethylene-glycol/applications/>)
- ¹⁵ *Ethylene Glycol Product Guide*, MEGlobal, Form No. 001-00005-0508-CRCG, April 2012, pages 3–4.
- ¹⁶ “*Wood Mackenzie Chemicals Xylenes & Polyesters Ltd – Client database*”, MEG World Consumption Data 2018. Subscription are required to access the data.
- ¹⁷ *SIAR Ethylene Glycols*, SIDS Initial Assessment Report for SIAM 18, Paris, France, January 26, 2007, pages 20–21.
- ¹⁸ *SIAR Ethylene Glycols*, SIDS Initial Assessment Report for SIAM 18, Paris, France, January 26, 2007, page 22.
- ¹⁹ *Ethylene Glycol Polyester Grade, Safety Data Sheet*, MEGlobal, Canada version, “6. Accidental Release Measures” and “12. Ecological Information”.

- ²⁰ *Ethylene Glycol Polyester Grade, Safety Data Sheet*, MEGlobal, Canada version, “6. Accidental Release Measures”, “8. Exposure Controls”, “11. Toxicological Information” and “12. Ecological Information”.
- ²¹ *SIAR Ethylene Glycols*, SIDS Initial Assessment Report for SIAM 18, Paris, France, January 26, 2007, pages 24–38.
- ²² *Ethylene Glycol Polyester Grade, Safety Data Sheet*, MEGlobal, Canada version, “2. Hazards Identification” and “4. First Aid Measures”.
- ²³ *Ethylene Glycol Polyester Grade, Safety Data Sheet*, MEGlobal, Canada version, “8. Exposure Controls” and “11. Toxicological Information”.
- ²⁴ *Ethylene Glycol Polyester Grade, Safety Data Sheet*, MEGlobal, Canada version, “10. Stability and Reactivity”.
- ²⁵ *Ethylene Glycol Polyester Grade, Safety Data Sheet*, MEGlobal, Canada version, “14. Transport Information” and “15. Regulatory Information”.

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