

Fast Facts

DIETHYLENE GLYCOL (DEG)

Diethylene Glycol (DEG) is a colorless, low-volatility, low viscosity, hygroscopic liquid. Under normal conditions, diethylene glycol has no detectable odor; however, under high vapor concentrations, a slightly sweet odor may be detected.

Diethylene Glycol:
 $\text{HOCH}_2\text{CH}_2\text{OCH}_2\text{CH}_2\text{OH}$

CAS Registry Number:
111-46-6

Synonyms:

DEG
Dihydroxyethyl ether
2,2'-Dihydroxyethyl ether
Glycol ethyl ether
Diglycol
Ethylene diglycol
3-Oxapentane-1,5-diol
2,2' -Oxydiethanol
Bis(beta-hydroxyethyl)ether
Bis(2-hydroxyethyl)ether
2-(2-hydroxyethoxy)ethanol
3-Oxapentamethylene-1,5-diol

DEG is completely miscible with water and many organic liquids.

The hydroxyl groups on glycols undergo alcohol chemistry, thus providing opportunities for production of a wide variety of derivatives. Hydroxyls can be converted to aldehydes, alkyl halides, amines, azides, carboxylic acids, ethers, mercaptans, nitrate esters, nitriles, nitrite esters, organic esters, peroxides, phosphate esters and sulfate esters.

Because of its higher molecular weight, DEG is considerably less volatile than ethylene glycol and differs sufficiently in that it has specialized uses. The reactivity and solubility of diethylene glycol provide the basis for many applications.

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APPLICATIONS OF DIETHYLENE GLYCOL

Properties/Characteristics	Applications/Uses
Hygroscopicity	<ul style="list-style-type: none"> • Gas dehydration • Plasticizer for paper, composition cork, glues, adhesives, bookbinding and coatings
Lubricant	<ul style="list-style-type: none"> • Glass-grinding aids • Fiber-finish component • Cement-grinding aids • Mold release agent
Solvent Coupler	<ul style="list-style-type: none"> • Stabilizer for soluble oil dispersions • Compatibilizer for dye and printing ink components
Solvent	<ul style="list-style-type: none"> • Aromatic and paraffinic hydrocarbon separations • Printing ink/paint pigments/dyes
Low Volatility	<ul style="list-style-type: none"> • Binder for foundry sand-molding
Freezing Point Depression	<ul style="list-style-type: none"> • Latex paint antifreeze • Antifreeze • Deicing fluids • Heat transfer fluids • Drywall joint compound • Belt wetting agent
Chemical Intermediate	<ul style="list-style-type: none"> • Unsaturated polyester resin • Plasticizer intermediate for nitrocellulose lacquers, enamels and adhesives • Polyester polyols for urethane foam • Thermoplastic polyurethanes • Emulsifiers • Lubricants • Morpholine

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PHYSICAL PROPERTIES OF DEG

	Scientific	Common
Autoignition Temperature	364°C	687°F
Critical Pressure	4,605 kPa	34,540.3 mm Hg
Critical Specific Volume	0.312 L/gmol	5.00 ft ³ /lbmol
Critical Temperature	406.85°C	764.33°F
Dielectric Constant	31.69	31.69
Electrical Conductivity at 20°C	0.42 x 10 ⁻⁶ mhos/cm	0.0042 micromhos/cm
Evaporation Rate (Butyl Acetate = 1)	<0.001	<0.001
Flammable Limits in Air, Upper	12.3%(V)	12.3%(V)
Flammable Limits in Air, Lower	2.0%(V)	2.0%(V)
Flash Point, Closed Cup (Pensky-Marten Closed Cup ASTM D93)	154°C	310°F
Flash Point, Open Cup (Cleveland Open Cup ASTM D92)	163°C	325°F
Heat of Combustion at 25°C	-2,154.82 kJ/gmol	-8,730.4 Btu/lb
Heat of Vaporization at 1 atm	57.9 kJ/gmol	234.4 Btu/lb
Molecular Weight	106.12 g/mol	106.12 g/mol
Normal Boiling Point	245.3°C	473.5°F
Δ BP/Δ P (750 to 770 mm Hg)	0.052°C/mm Hg	
Normal Freezing Point	-9.0°C	15.8°F
Onset of Initial Decomposition	240°C	464°F
Refractive Index, nD, at 20°C	1.4472	1.4472
Solubility in Water at 20°C	100.0 wt%	100.0 wt%
Solubility of Water in Diethylene Glycol at 20°C	100.0 wt%	100.0 wt%
Specific Gravity (20/20°C)	1.1182	1.1182
Δ Specific Gravity/Δ T (10 to 40°C)	0.00073/°C	0.00073/°C
Surface Tension at 25°C	44.8 mN/m	44.8 dynes/cm
Vapor Density (air = 1)	3.65	3.65
Vapor Pressure at 20°C	0.0003 kPa	0.002 mm Hg
Viscosity at 20°C	35.7 mPs	35.7 cP

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NON-SUPPORTED APPLICATIONS OF DIETHYLENE GLYCOL PRODUCTS FROM MEGLOBAL

The following applications are NOT supported by MEGlobal for diethylene glycol or where its use is restricted by regulation. This non-inclusive list of applications does not imply a MEGlobal warranty or MEGlobal support of uses in applications not covered by this list.

- *In the production of tobacco and in the manufacture of tobacco products (including but not limited to additives, humectants, filters, inks and paper).*
- *Products for the generation of artificial smoke/theatrical fogs/mist*
- *As an ingredient in fuel for warming foods (Sterno™ -like application) or in fuel for heating an enclosed space where human exposure is possible.*
- *In fire extinguishing sprinkler systems.*
- *In the manufacture of munitions.*
- *In the production of deicers for use on roadways and sidewalks.*
- *As a component of heat transfer fluids in systems where the heat transfer fluids could infiltrate (e.g., via an exchanger leak, backflow prevention failure or other means) a potable water system.*
- *As a non-reacted component in a formulation for direct internal or external human contact, including, but not limited to ingestion, inhalation, and skin contact and in the manufacture of medical devices (Examples of some such applications are uses as a direct component in foods, beverages, pharmaceuticals, cosmetics or personal care products.*
- *For deodorizing or air "purifying" purposes by spraying as an aerosol.*
- *As a non-reacted component in adhesives, plasticizers and softening agents for food packaging that has direct contact with food.*

The reasons for these limitations include areas which MEGlobal has decided not to pursue for general business reasons and to minimize unnecessary risk and liabilities to the company.

To enter into new applications beyond the traditional standard industrial use applications, MEGlobal uses a risk assessment process whereby the application will be reviewed and a determination will be made as to whether the application meets MEGlobal's requirements and can therefore be supported by MEGlobal. Because use conditions and applicable laws may differ from one location to another and may change with time, when an application is supported by MEGlobal, MEGlobal does not warrant and is not responsible for the use in such applications.

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