
	Material Safety Data Sheet (MSDS) <i>According to the Directives 91/155/CEE-2001/58/CE-ISO 11014-1</i>	Page: 1 of 9 Revision Number: 1
	Product Name: <p style="text-align: center;">DEG (DIETHYLENE GLYCOL)</p>	

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/ UNDERTAKING

Identification of the substance or preparation: **DIETHYLENE GLYCOL (DEG)**

CAS Number: 111-46-6
Synonyms: Bis(2-Hydroxyethyl) Ether; Dihydroxydiethyl Ether; Beta,Beta'-Dihydroxydiethyl Ether; 2,2'-Dihydroxyethyl Ether; 2,2'-Oxydiethanol; Ethylene Diglycol; Diglycol; Glycol Ether; Glycol Ethyl Ether; 2-Hydroxyethyl Ether; 3-Oxapentane-1,5-Diol; 3-Oxa-1,5-Pentanediol; 2,2-Oxybisethanol; Brecolane NDG; Carbitol; Deactivator E; Deactivator H; DEG; Dicol; Dissolvant APV; TL4N

Manufacturer subcontractor: None

Association/Organization: None
Use of the substance/Preparation: This compound is used in the production of polyurethane, unsaturated polyester resins and triethylene glycol. It is also used as a textile softener, in petroleum solvent extraction, in the dehydration of natural gas, as a plasticizer, in surfactants and as a solvent for nitrocellulose, resins, dyes, oils and many other organic compounds. It is used as a humectant for tobacco, cork, printing ink and glue. It is also used in casein, in synthetic sponges and paper products, in bookbinding adhesives, as a dyeing assistant, in cosmetics, in antifreeze solutions, in lacquers, in lubricants and in brake fluids.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous substances: Harmful if swallowed. May be harmful if absorbed through skin. Isolate area. Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Hazardous label(s): 1


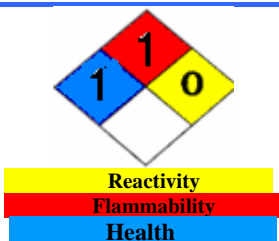
Toxicological characteristics: Diethylene glycol: ORAL (LD50): Acute: 12565 mg/kg [Hamster.]. DERMAL (LD50): Acute: 11890 mg/kg [Hamster.].

Substances present at a concentration below the minimum danger:

CAS NUMBER	%	TWAEV (ppm)	LD ₅₀ ORAL	(mg/kg) SKIN	LC ₅₀ ppm INHALATION
111-46-6	100%	not listed	3300	11,900	not known

NOTE: Oral LD₅₀ differs widely between species. See (4) below. The lowest value is given above.

Other component: None

	Material Safety Data Sheet (MSDS)	Page: 2 of 9
	<i>According to the Directives 91/155/CEE-2001/58/CE-ISO 11014-1</i>	Revision Number: 1
	Product Name: DEG (DIETHYLENE GLYCOL)	



3. IDENTIFICATION OF HAZARDS

Risk phrases:	The risk and danger of this is greater than the risk of poisoning through absorption of this product.
Skin contact:	Prolonged contact is essentially nonirritating to skin.
Eye contact:	May cause slight temporary eye irritation. Corneal injury is unlikely.
Inhalation :	At room temperature, exposure to vapor is minimal due to low volatility. With good ventilation, single exposure is not expected to cause adverse effects. If material is heated or areas are poorly ventilated, vapor/mist may accumulate and cause respiratory irritation and symptoms such as headache and nausea.
If swallowed:	Oral toxicity is expected to be moderate in humans due to diethylene glycol even though tests with animals show a lower degree of toxicity. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause serious injury, even death. May cause nausea and vomiting. May cause abdominal discomfort or diarrhea. Excessive exposure may cause central nervous system effects, cardiopulmonary effects (metabolic acidosis), and kidney failure.
Other information:	Diethylene glycol has caused toxicity to the fetus and some birth defects at maternally toxic, high doses in animals. Other animal studies have not reproduced birth defects even at much higher doses that caused severe maternal toxicity.

4. FIRST AID MEASURES

As a general rule, in case of doubt or if symptoms persist, always call a doctor
NEVER induce swallowing in an unconscious person.

Skin contact :	<p>After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin.</p> <p>Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention.</p> <p>Wash contaminated clothing before reusing.</p>
In case of exposure by inhalation:	<p>Allow the victim to rest in a well ventilated area. Seek immediate medical attention.</p>
In case of splashes or contact with eyes:	<p>Flush eyes thoroughly with water for several minutes.</p> <p>Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects</p>

	Material Safety Data Sheet (MSDS) <small>According to the Directives 91/155/CEE-2001/58/CE-ISO 11014-1</small>	Page: 3 of 9
	Product Name: DEG (DIETHYLENE GLYCOL)	Revision Number: 1
		 Reactivity Flammability Health

**In case of swallowing:
Note of physician:**

occur, consult a physician, preferably an ophthalmologist. Due to structural analogy and clinical data, this material may have a mechanism of intoxication similar to ethylene glycol. On that basis, treatment similar to ethylene glycol intoxication may be of benefit. In cases where several ounces (60 - 100 ml) have been ingested, consider the use of ethanol and hemodialysis in the treatment. Consult standard literature for details of treatment. If ethanol is used, a therapeutically effective blood concentration in the range of 100 - 150 mg/dl may be achieved by a rapid loading dose followed by a continuous intravenous infusion. Consult standard literature for details of treatment. 4-Methyl pyrazole (Antizol®) is an effective blocker of alcohol dehydrogenase and should be used in the treatment of ethylene glycol (EG), di- or triethylene glycol (DEG, TEG), ethylene glycol butyl ether (EGBE), or methanol intoxication if available. Fomepizole protocol (Brent, J. et al., New England Journal of Medicine, Feb. 8, 2001, 344:6, p. 424-9): loading dose 15 mg/kg intravenously, follow by bolus dose of 10 mg/kg every 12 hours; after 48 hours, increase bolus dose to 15 mg/kg every 12 hours. Continue fomepizole until serum methanol, EG, DEG, TEG or EGBE are undetectable. The signs and symptoms of poisoning include anion gap metabolic acidosis, CNS depression, renal tubular injury, and possible late stage cranial nerve involvement. Respiratory symptoms, including pulmonary edema, may be delayed. Persons receiving significant exposure should be observed 24-48 hours for signs of respiratory distress. Maintain adequate ventilation and oxygenation of the patient. In severe poisoning, respiratory support with mechanical ventilation and positive end expiratory pressure may be required. If lavage is performed, suggest endotracheal and/or esophageal control. Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

**In case of swallowing:
Note of physician:**

5. FIRE FIGHTING MEASURES


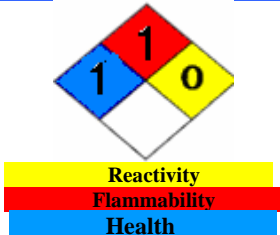
Flammable class:

1

Suitable extinguishing media:

Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Do not use direct water stream. May spread fire. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective. During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating.

Special exposure hazards arising from the substance or preparation itself, combustion products, resulting

	Material Safety Data Sheet (MSDS) <i>According to the Directives 91/155/CEE-2001/58/CE-ISO 11014-1</i>	Page: 4 of 9 Revision Number: 1
	Product Name: DEG (DIETHYLENE GLYCOL)	

gases:

Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

Special protective equipment for fire fighting :

Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage.

Other information:

Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions:

Isolate area. Keep unnecessary and unprotected personnel from entering the area. Use appropriate safety equipment. Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

Environmental precautions:

Small Spill:

Methods for cleaning up and disposal:



Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Absorb with an inert material and put the spilled material in an appropriate waste disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Other information:

None

	Material Safety Data Sheet (MSDS) <i>According to the Directives 91/155/CEE-2001/58/CE-ISO 11014-1</i>	Page: 5 of 9
	Product Name:	Revision Number: 1
	DEG (DIETHYLENE GLYCOL)	 Reactivity Flammability Health



7. HANDLING AND STORAGE

The regulations relating to storage premises apply to workshop where the product is handled:

- Handling:** Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/vapour/spray. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes Do not swallow. Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.
- Storage:** Do not store near food, foodstuffs, drugs or potable water supplies. Additional storage and handling information on this product may be obtained by calling your sales or customer service contact. Ask for a product brochure.
- Specific use(s):** None

8. EXPOSURE CONTROLS/PERSONAL PROTECTION


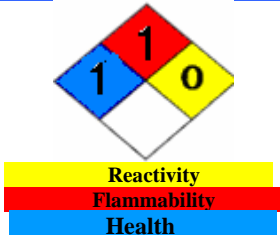
Exposure limit values:	Exposure Limits			
	Component	List	Type	Value
	Diethylene glycol	WEEL	TWA	10 mg/m ³
Exposure controls:	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.			
Personal protective equipment:	Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.			
Eye protection:	Use safety glasses.			
Respiratory protection:	Atmospheric levels should be maintained below the exposure guideline. When respiratory protection is required for certain operations, use an approved air-purifying respirator. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.			
Hand protection:	If hands are cut or scratched, use gloves chemically resistant to this material even for brief exposures. Examples of preferred glove barrier materials include: Butyl rubber. Polyethylene. Neoprene. Natural rubber			

	Material Safety Data Sheet (MSDS) <small>According to the Directives 91/155/CEE-2001/58/CE-ISO 11014-1</small>	Page: 6 of 9
	Product Name:	Revision Number: 1
	DEG (DIETHYLENE GLYCOL)	 Reactivity Flammability Health

Skin and body protection:	<p>("latex"). Polyvinyl chloride ("PVC" or "vinyl"). Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyvinyl alcohol ("PVA"). Ethyl vinyl alcohol laminate ("EVAL"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.</p> <p>Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task. Remove contaminated clothing immediately, wash skin area with soap and water, and launder clothing before reuse or dispose of properly. When handling hot material, protect skin from thermal burns as well as from skin absorption.</p>
Health measures:	1
Environmental exposure controls:	Local exhaust ventilation recommended if generating vapor, dust, or mist. If exhaust ventilation is not available or inadequate, use MSHA or NIOSH approved respirator as appropriate.

9. PHYSICAL AND CHEMICAL PROPERTIES

General information: Appearance (at 20°C): Colour: Odour: PH (at 20°C): Boiling point/range (°C): Flash point (°C): Flammability: Auto-ignition temperature: Explosive properties: Oxidising properties: Vapour pressure (at 20°C): Density (at 20°C): Solubility (at 20°C): Viscosity (40°C): Evaporation rate: Other information:	None Clear, odourless viscous liquid Colorless Odorless 7 245.8°C (474.4°F) 124 °C Lower: 2.0 %(V) <i>Calculated</i> Upper: 12.3 %(V) <i>Estimated</i> 364 °C <i>Literature</i> Above the flash point, explosive vapor-air mixtures may be formed. strong oxidising agents and hydroxyl compounds below 0.01 mmHg (20°C) 1.12 (Water = 1) water solubility: complete; also soluble in ketones & alcohols, but not alipatic hydrocarbons . Easily soluble in cold water, hot water, methanol, diethyl ether. solubility in fats: None 43 cSt at 20°C (68°F) NA None
--	--



	Material Safety Data Sheet (MSDS) <i>According to the Directives 91/155/CEE-2001/58/CE-ISO 11014-1</i>	Page: 7 of 9 Revision Number: 1
	Product Name: DEG (DIETHYLENE GLYCOL)	

10. STABILITY AND REACTIVITY

Stability:	Thermally stable at recommended temperatures and pressures.
Conditions to avoid:	Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems.
Material to avoid:	Strong oxidizers.
Hazardous decomposition products:	Decomposition products depend upon temperature, air supply and the presence of other materials. Decomposition products can include and are not limited to: Aldehydes. Alcohols. Ethers.

11. TOXICOLOGICAL INFORMATION

Acute toxicity:	- LD ₅₀ , oral, rat (mg.kg ⁻¹) : 25,244 - LD ₅₀ , oral, mouse (mg.kg ⁻¹): - LD ₅₀ , dermal (mg.kg ⁻¹): 11890
Sub chronic – chronic toxicity:	Diethylene glycol has been tested for carcinogenicity in animal studies and is not believed to pose a carcinogenic risk to man.
Sensibilization:	Did not cause allergic skin reactions when tested in humans. Did not cause allergic skin reactions when tested in guinea pigs.
Carcinogenicity:	NA
Reproductive effects:	Diethylene glycol did not interfere with reproduction in animal studies except at very high doses.
Human experience:	NA
Other information:	None

	Material Safety Data Sheet (MSDS) <i>According to the Directives 91/155/CEE-2001/58/CE-ISO 11014-1</i>	Page: 8 of 9
	Product Name:	Revision Number: 1
	DEG (DIETHYLENE GLYCOL)	 Reactivity Flammability Health

12. ECOLOGICAL INFORMATION

Ecotoxicity:

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50 >100 mg/L in the most sensitive species tested).
Fish Acute & Prolonged Toxicity
 LC50, rainbow trout (*Oncorhynchus mykiss*), 96 h: > 1,000 mg/l
 Aquatic Invertebrate Acute Toxicity EC50, water flea *Daphnia magna*, 48 h, immobilization: 48,900 mg/l
 Aquatic Plant Toxicity EC50, diatom *Skeletonema costatum*, biomass growth inhibition, 72 h: > 1,000 mg/l
 Toxicity to Micro-organisms IC50, OECD 209 Test; activated sludge, respiration inhibition, 3 h: > 1,000 mg/l
 EC50; bacteria, Growth inhibition, 16 h: > 10,000 mg/l

Bioaccumulative potential:

NA

Mobility:

Not determined.

Persistence and degradability:

Not determined.

Other adverse effects:

None

13. DISPOSAL CONSIDERATIONS

Disposal of product:

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator .

Disposal of packaging:

14. TRANSPORT INFORMATION

Land transport:

ADR/RID:

NOT REGULATED

Packaging group:

Maritime transport:

Air transport:

	Material Safety Data Sheet (MSDS) <small>According to the Directives 91/155/CEE-2001/58/CE-ISO 11014-1</small>	Page: 9 of 9
	Product Name: <p style="text-align: center;">DEG (DIETHYLENE GLYCOL)</p>	Revision Number: 1
		<p style="text-align: center;"> Reactivity Flammability Health </p>

15. REGULATORY INFORMATION

Hazardous label(s):	Hazard Rating System			
	NFPA	Health	Fire	Reactivity
Safety phrases:	NA	1	1	0
Risk phrases:	NA			

16. OTHER INFORMATION



The contents and format of this MSDS are in accordance with EEC Commission Directive 2001/58/EC

Disclaimer of liability:

The information in this MSDS was obtained from different sources, which National Petrochemical Company (NPC) and Iran Petrochemical Commercial Company (IPCC) believe, are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness. The conditions or methods of handling, storage, use or disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, National Petrochemical Company (NPC) and Iran Petrochemical Commercial Company (IPCC) do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. This MSDS was prepared and is to be used only for this product. If the product is used as a component in another product, this MSDS information may not be applicable.

