

MATERIAL SAFETY DATA SHEET

-----EMERGENCY ASSISTANCE-----

FOR EMERGENCY ASSISTANCE INVOLVING CHEMICALS
CALL CHEMTREC (800) 424-9300

VW&R CODE: LA1233

Union Carbide urges each customer or recipient of this MSDS to study it carefully to become aware of and understand the hazards associated with the product. The reader should consider consulting reference works or individuals who are experts in ventilation, toxicology, and fire prevention, as necessary or appropriate to use and understand the data contained in this MSDS.

To promote safe handling, each customer or recipient should: 1) Notify its employees, agents, contractors and others whom it knows or believes will use this material of the information in this MSDS and any other information regarding hazards or safety; 2) Furnish this same information to each of its customers for the product; and 3) Request its customers to notify their employees, customers, and other users of the product of this information.

1. Chemical Product and Company Identification

1.1 Identification

Product Name NORKOOL(TM) DILUTE SLH 225D

Chemical Name Aqueous Inhibited Ethylene Glycol Solution

Chemical Family Glycols

Formula Not applicable (mixture)

Synonym PM 225

1.2 Company Identification

Supplier: Union Carbide Canada Inc.
Suite 360
7400 Les Galeries d'Anjou Blvd.
Anjou, Quebec H1M 3M2

Manufacturer: Union Carbide Corporation
39 Old Ridgebury Road
Danbury, CT 06817-0001

Prepared By:Product Safety Department

Print Date:2000 12 04

1.3 Emergency Telephone Number

24hours a day: (514) 640-6400

2. Composition Information

Component	CAS #	% W/W	Hazard
Ethylene glycol	107-21-1	>= 45 <= 55	% toxic
Water and processing additives	Not available	>= 45 <= 55	% WHMIS: not hazardous
Dipotassium hydrogen phosphate	7758-11-4	>= 1 <= 3	% WHMIS: not hazardous
Sodium nitrite	7632-00-0	<= 1	% toxic; oxidizer

3. Hazards Identification

3.1 Emergency Overview

Appearance Translucent green

Physical State Liquid

Odor Mild

Hazards of product

Danger!
Harmful or fatal if swallowed.
Causes eye and skin irritation.
Prolonged or repeated breathing of aerosol or vapor is harmful.

May cause kidney and nervous system damage.
Contains ethylene glycol - causes birth defects in laboratory animals.

3.2 Potential Health Effects

Potential Effects of a Single Acute Exposure

Inhalation May cause irritation of the nose and throat with headache, particularly from mist. High vapor concentrations caused, for example, by heating the material in an enclosed and poorly ventilated workplace, may produce nausea, vomiting, headache, dizziness, and irregular eye movements.

Eye Contact Injury to the cornea is not expected. Liquid, vapor, or mist causes irritation, experienced as stinging, excess blinking and tear production, with excess redness of the conjunctiva.

Skin Contact No evidence of harmful effects from available information.

Skin Absorption No evidence of harmful effects from available information.

Swallowing May cause abdominal discomfort or pain, nausea, vomiting, dizziness, drowsiness, malaise, blurring of vision, irritability, lumbar pain, oliguria, uremia, and central nervous system effects, including irregular eye movements, convulsions and coma. Cardiac failure, pulmonary edema, and severe kidney damage may develop. May be fatal. A few reports have been published describing the development of weakness of the facial muscles, diminished hearing, and difficulty with swallowing, during the late stages of severe poisoning.

Chronic, Prolonged or Repeated Exposure

Potential Effects of Repeated Exposure Repeated inhalation of ethylene glycol mist may produce signs of central nervous system involvement, particularly dizziness and nystagmus.

Other Potential Effects of Exposure Repeated skin contact with ethylene glycol may, in a very small proportion of cases, cause sensitization with the development of allergic contact dermatitis. The incidence is significantly less than 1% with the undiluted material.

Medical Conditions Aggravated by Exposure

May aggravate an existing kidney disease.

3.3 Potential Environmental Effects

See Section 12 for Ecological Information.

4. First Aid Procedures

4.1 Inhalation

Remove to fresh air. Obtain medical attention if symptoms persist.

4.2 Eye Contact

Flush eyes thoroughly with water for several minutes. Remove contact lenses, if worn.

4.3 Skin Contact

Remove contaminated clothing. Wash skin with soap and water. If irritation persists or if contact has been prolonged, obtain medical attention.

4.4 Swallowing

If patient is fully conscious, give two glasses of water. Induce vomiting. This should be done only by medical or experienced first-aid personnel. Obtain medical attention without delay. If medical advice is delayed, and if the person has swallowed a moderate volume of material (a few ounces), then give three to four ounces of hard liquor, such as whiskey. For children, give proportionally less liquor, according to weight.

4.5 Notes to Physician

It is estimated that the lethal oral dose to adults is of the order of 1.0 ml/kg. Ethylene glycol is metabolized by alcohol dehydrogenase to various metabolites including glycoaldehyde, glycolic acid and oxalic acid, which cause an elevated anion-gap metabolic acidosis and renal tubular injury. The signs and symptoms in ethylene glycol poisoning are those of metabolic acidosis, CNS depression, and kidney injury. Urinalysis may show albuminuria, hematuria, and oxaluria. Clinical

chemistry may reveal anion-gap metabolic acidosis and uremia. The currently recommended medical management of ethylene glycol poisoning includes elimination of ethylene glycol and metabolites, correction of metabolic acidosis, and prevention of kidney injury. It is essential to have immediate and follow-up urinalysis and clinical chemistry. There should be particular emphasis on acid-base balance and renal function tests. A continuous infusion of 5% sodium bicarbonate with frequent monitoring of electrolytes and fluid balance is used to achieve correction of metabolic acidosis and forced diuresis. As a competitive substrate for alcohol dehydrogenase, ethanol is antidotal. Given in the early stages of intoxication, it blocks the formation of nephrotoxic metabolites. A therapeutically effective blood concentration of ethanol is in the range 100-150 mg/dl, and should be achieved by a rapid loading dose and maintained by intravenous infusion. For severe and/or deteriorating cases, hemodialysis may be required. Dialysis should be considered for patients who are symptomatic, have severe metabolic acidosis, a blood ethylene glycol concentration greater than 25 mg/dl, or compromise of renal functions. A more effective intravenous antidote for physician use is 4-methylpyrazole, a potent inhibitor of alcohol dehydrogenases, which effectively blocks the formation of toxic metabolites of ethylene glycol. It has been used to decrease the metabolic consequences of ethylene glycol poisoning before metabolic acidosis, coma, seizures, and renal failure have occurred. A generally recommended protocol is a loading dose of 15 mg/kg followed by 10 mg/kg every 12 hr for 4 doses, and then 15 mg/kg every 12 hr until ethylene glycol concentrations are below 20 mg/100 ml. Slow intravenous infusion is required. Since 4-methylpyrazole is dialyzable, increased dosage may be necessary during hemodialysis.

Additional therapeutic measures may include the administration of cofactors involved in the metabolism of ethylene glycol. Thiamine (100 mg) and pyridoxine (50 mg) should be given every six hours. Pulmonary edema with hypoxemia has been described in a number of patients following poisoning with ethylene glycol. The mechanism of production has not been elucidated, but it appears to be non-cardiogenic in origin in several cases. Respiratory support with mechanical ventilation and positive end expiratory pressure may be required. There may be cranial nerve involvement in the late stages of toxicity from swallowed ethylene glycol. In particular, effects have been reported involving the seventh, eighth and ninth cranial nerves, presenting with bilateral facial paralysis, diminished hearing, and dysphagia.

5. Fire Fighting Measures

5.1 Flammable Properties

Flash Point - Closed Cup: Pensky-Martens Closed Cup ASTM D 93 None.

Flash Point - Open Cup: Cleveland Open Cup ASTM D 92 None.

Autoignition Temperature: Not currently available.

Flammable Limits In Air:

Lower Not Determined, Aqueous System

Upper Not Determined, Aqueous System

5.2 Extinguishing Media

Non-flammable (aqueous solution): After water evaporates, remaining material will burn. Use alcohol-type or all-purpose-type foam, applied by manufacturer's recommended techniques for large fires. Use carbon dioxide or dry chemical media for small fires.

5.3 Extinguishing Media to Avoid

No information currently available.

5.4 Special Fire Fighting Procedures

No information currently available.

5.5 Special Protective Equipment for Firefighters

Use self-contained breathing apparatus and protective clothing.

5.6 Unusual Fire and Explosion Hazards

During a fire, ammonia and nitrogen-containing compounds may be produced.

5.7 Hazardous Combustion Products

Burning can produce the following products: Carbon monoxide and/or carbon dioxide. Ammonia and nitrogen-containing compounds. Carbon monoxide is highly toxic if inhaled; carbon dioxide in sufficient concentrations can act as an asphyxiant. Acute exposure to the products of combustion may result in irritation of the respiratory tract.

6. Accidental Release Measures

Steps to be taken if Material is Released or Spilled:

Large spills should be contained and collected. Small spills can be collected or may be absorbed with appropriate liquid absorbing material. All spill response and disposal should be carried out in accordance with federal, provincial, and local regulations.

Personal Precautions: Wear suitable protective equipment.

7. Handling and Storage

7.1 Handling

General Handling

Do not swallow.

Avoid contact with eyes, skin and clothing.

Avoid prolonged or repeated breathing of aerosol and vapor.

Keep container closed.

Use with adequate ventilation.

Wash thoroughly after handling.

FOR INDUSTRY USE ONLY.

Ventilation

General (mechanical) room ventilation may be adequate, if handled at ambient temperatures or in covered equipment. If ambient temperatures are exceeded or operations exist which may produce misting, local exhaust ventilation or other engineering controls may be required.

Other Precautions

Do not mix with amines. A nitrosamine, which may cause cancer, may be formed.

7.2 Storage

No information currently available.

8. Exposure Controls and Personal Protection

8.1 Exposure Limits

Component	Exposure Limits	Skin Form
Ethylene glycol	100 mg/m3 CEILING ACGIH	Aerosol
	100 mg/m3 CEILING UCC	Aerosol and Vapor

Consult local authorities for recommended exposure limits

In the Exposure Limits Chart above, if there is no specific qualifier (i.e., Aerosol) listed in the Form Column for a particular limit, the listed limit includes all airborne forms of the substance that can be inhaled.

A "Yes" in the Skin Column indicates a potential significant contribution to overall exposure by the cutaneous (skin) route, including mucous membranes and the eyes, either by contact with vapors or by direct skin contact with the substance. A "Blank" in the Skin Column indicates that exposure by the cutaneous (skin) route is not a potential significant contributor to overall exposure.

8.2 Personal Protection

Respiratory Protection:

If personnel exposure exceeds exposure limits (Section 8.1) for ethylene glycol at any time, select appropriate respiratory protection equipment. NIOSH-approved atmosphere-supplying respirator or a NIOSH-approved air-purifying respirator with organic vapor cartridge and dust/mist pre-filter is recommended.

Ventilation:

General (mechanical) room ventilation may be adequate, if handled at ambient temperatures or in covered equipment. If ambient temperatures are exceeded or operations exist which may produce misting, local exhaust ventilation or other engineering controls may be required.

Eye Protection:

Monogoggles or faceshield

Protective Gloves:

Natural Rubber
 Neoprene
 Nitrile (NBR)
 Butyl
 Polyvinyl chloride coated

Other Protective Equipment:

Eye Bath, Safety Shower

8.3 Engineering Controls

No information currently available.

9. Physical and Chemical Properties

Physical State: Liquid

Appearance: Translucent green

pH: Not currently available.

Solubility in Water (by weight): 20 °C 100 %

Odor: Mild

Percent Volatiles : 98.0 Wt%

Boiling Point (760 mmHg): 107.3 °C 225.14 °F

Freezing Point: -38 °C -36 °F

Specific Gravity (H₂O = 1): 1.079 20 °C / 20 °C

Vapor Pressure at 20°C: 1.77 kPa 13.3 mmHg

Vapor Density (air = 1): 1

Evaporation Rate (Butyl Acetate = 1): 0.79

Melting Point: Not applicable (for liquids)

10. Stability and Reactivity

10.1 Stability/Instability Stable

Conditions to Avoid: None known.

Incompatible Materials: Explosive decomposition may occur if combined with strong acids or strong bases and subjected to elevated temperatures. Therefore, avoid strong acids and strong bases at elevated temperatures. Avoid contamination with strong oxidizing agents and materials reactive with hydroxyl compounds.

10.2 Hazardous Polymerization Will Not Occur.

10.3 Inhibitors/Stabilizers Not applicable.

11. Toxicological Information

Acute Toxicity

Peroral Toxicology for the Component

Ethylene glycol Rat; LD50 = 4700 mg/kg

Sodium nitrite Rat; LD50 = 1267 mg/kg

Rat; LD50 = 180 mg/kg

Percutaneous Toxicology for the Component

Ethylene glycol Rabbit; LD50 = 9530 ul/kg

Inhalation Toxicology for the Component

Sodium nitrite ; Rat; 5500 mg/m³; 4 hour; LC50

Significant Data with Possible Relevance to Humans

Ethylene glycol has been shown to produce dose-related teratogenic effects in rats and mice when given by gavage or in drinking water at high concentrations or doses. The no-effect doses for developmental toxicity for ethylene glycol given by gavage over the period of organogenesis has been shown to be 150 mg/kg/day for the mouse and 500 mg/kg/day for the rat. Also, in a preliminary study to assess the effects of exposure of pregnant rats and mice to aerosols at concentrations of 150, 1000 and 2500 mg/m³ for 6 hours a day throughout the period of organogenesis, teratogenic effects were produced at the highest concentration, but only in mice. The conditions of these latter experiments did not allow a conclusion as to whether the developmental toxicity was mediated by inhalation of aerosol, percutaneous absorption of ethylene glycol from contaminated skin, or swallowing of ethylene glycol as a result of grooming the wetted coat. In a further study, comparing effects from high aerosol concentration by whole-body or nose-only exposure, it was shown that nose-only exposure resulted in

maternal toxicity (1000 and 2500 mg/m³) and developmental toxicity with minimal evidence of teratogenicity (2500 mg/m³). The no-effects concentration (based on maternal toxicity) was 500 mg/m³. In a further study in mice, no teratogenic effects could be produced when ethylene glycol was applied to skin of pregnant mice over the period of organogenesis. The above observations suggest that ethylene glycol is to be regarded as an animal teratogen. There is currently no available information to suggest that ethylene glycol has caused birth defects in humans. Cutaneous application of ethylene glycol is ineffective in producing developmental toxicity. Exposure to high aerosol concentrations is only minimally effective in producing developmental toxicity. The major route for producing developmental toxicity is perorally. Two chronic feeding studies, using rats and mice, have not produced any evidence that ethylene glycol causes dose-related increases in tumor incidence, or a different pattern of tumors compared with untreated controls. The absence of a carcinogenic potential for ethylene glycol has been supported by numerous in vitro genotoxicity studies showing that it does not produce mutagenic or clastogenic effects. Contains an inorganic nitrite which may react with amines to form a nitrosamine. Some nitrosamines have been shown to be carcinogenic in laboratory animals.

12. Ecological Information

12.1 Environmental Fate

Partial information may be available, call Union Carbide.

12.2 Ecotoxicity

Partial information may be available, call Union Carbide.

Ecotoxicity to Micro-organisms Ecotoxicity to Aquatic
Invertebrates Ecotoxicity to Aquatic Plants Ecotoxicity to Fish

12.3 Further Information

None.

13. Disposal Considerations

13.1 Waste Disposal Method

Ethylene glycol from many applications is readily reclaimed; reclamation of ethylene glycol from spent fluids is encouraged where possible. At low concentrations in water this product is biodegradable in a biological wastewater treatment plant. Where ethylene glycol reclamation or sewerage are not viable, this product may be incinerated where permitted under appropriate federal, provincial, and local regulations. Dispose in accordance with all applicable federal, provincial, and local environmental regulations. Empty containers should be recycled or disposed of through an approved waste management facility.

13.2 Disposal Considerations

See Section 13.1

Disposal methods identified are for the product as sold. For proper disposal of used material, an assessment must be completed to determine the proper and permissible waste management options permissible under applicable rules, regulations and/or laws governing your location.

14. Transport Information

14.1 TDG - Canada

Small container

Proper Shipping Name : NOT REGULATED

Large container

Proper Shipping Name : ENVIRONMENTALLY HAZARDOUS SUBSTANCES LIQUID,
NOS

Technical Name : CONTAINS SODIUM NITRITE

ID Number : UN3082

Hazard Class : 9.2

Packing Group : PG III

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product.

Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information

15.1 Federal/Provincial

WHMIS Classification

D2A Very Toxic Materials Causing Other Effects

D2B Toxic Materials Causing Other Effects

Accelerated Reduction/Elimination of Toxics

None of the components of this product are listed on the Accelerated Reduction/Elimination of Toxics (ARET) lists A-1, B-2, or B-3.

CEPA - National Pollutants Release Inventory

At least one component of this product is on the National Pollutant Release Inventory (NPRI) Part 1 but at a concentration lower than the reportable threshold :

Component	CAS #	Amount
Acetaldehyde	75-07-0	<= 0.0100 %
Ethylene oxide	75-21-8	<= 0.0100 %
Propylene oxide	75-56-9	<= 0.0100 %
1,4-Dioxane	123-91-1	<= 0.0100 %

At least one component of this product is on the National Pollutant Release Inventory (NPRI) Part 1:

Component	CAS #	Amount
Ethylene glycol	107-21-1	<= 55.0000 %
Sodium nitrite	7632-00-0	<= 1.0000 %

CEPA - Toxic Substances

None of the components of this product are on the CEPA lists of toxic substances (Schedule 1, Schedule 3-1, or Schedule 3-2).

CPR Compliance

This product has been classified with the hazard criteria of the CPR, and the MSDS contains all the information required by CPR.

Toxic Substances Control Act (TSCA)

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements.

European Inventory of Existing Commercial Chemical Substances (EINECS)

The components of this product are on the EINECS inventory.

CEPA - Domestic Substances List (DSL)

The components of this product are on the DSL.

VOC : Vapor pressure 13.3 mmHg at 20 °C
538 g/l
1117 g/l less water and less exempted solvents

This section provides selected regulatory information on this product including its components. This is not intended to include all regulations. It is the responsibility of the user to know and comply with all applicable rules, regulations and laws relating to the product being used.

16. Other Information

16.1 Available Literature and Brochures

ADDITIONAL INFORMATION: There may be additional product safety information on this product, which may be obtained by calling your Union Carbide Sales or Customer Service contact.

16.2 Specific Hazard Rating System

NFPA ratings for this product are:

H - 1
F - 1
S - 0
T

HMIS ratings for this product are:

H - 2
F - 1
S - 0

These ratings are part of specific hazard communications program(s) and should be disregarded where individuals are not trained in the use of these hazard rating systems. You should be familiar with the hazard communication applicable to your workplace.

16.3 Recommended Uses and Restrictions

Heat transfer fluid

FOR INDUSTRY USE ONLY

16.4 Revision

Version: 2.1
Revision: 2000.02.01

16.5 Legend

TS Trade Secret
N/A Not available
W/W Weight/Weight

The opinions expressed herein are those of qualified experts within Union Carbide. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and the conditions of the use of the product are not under the control of Union Carbide, it is the user's obligation to determine conditions of safe use of the product.

===== END OF MSDS =====