SAFETY DATA SHEET

DDP Specialty Electronic Materials US, LLC

Product name: DuPont™ Brake Fluid 372LB **Issue Date:** 2023.01.11

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DDP Specialty Electronic Materials US, LLC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. PRODUCT AND COMPANY IDENTIFICATION

Product name: DuPont™ Brake Fluid 372LB

Other names: None

Recommended use of the chemical and restrictions on use
Identified uses: A brake fluid - For use in automotive applications.

COMPANY IDENTIFICATION
DDP Specialty Electronic Materials US,
LLC
974 Centre Road, Building 730,
Wilmington DE 19805
UNITED STATES

Customer Information Number: 833-338-7668
SDSQuestion-NA@dupont.com

EMERGENCY TELEPHONE NUMBER
24-Hour Emergency Contact: 1-800-424-9300
Local Emergency Contact: 0800057119

2. HAZARDS IDENTIFICATION

GHS Classification
This product is not hazardous per the Globally Harmonized System of Classification and Labelling (GHS).

Other hazards
No data available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Properties: –
This product is a mixture.

Component	CASRN	Concentration
Triethylene glycol monomethyl ether	112-35-6	> 45.0 - < 55.0 %
Polyethylene glycol monomethyl ether	9004-74-4	> 10.0 - < 20.0 %
Triethylene glycol monobutyl ether	143-22-6	> 10.0 - < 20.0 %
Polyalkylene glycol monobutyl ether	9038-95-3	> 5.0 - < 15.0 %
Diethylene glycol monobutyl ether	112-34-5	< 10.0 %
Polyethylene glycol monobutyl ether	9004-77-7	< 5.0 %
Tetraethylene glycol monomethyl ether	23783-42-8	< 5.0 %
Diethylene glycol monomethyl ether	111-77-3	< 1.0 %
2-Piperazinoethanol	103-76-4	< 1.0 %

4. FIRST AID MEASURES

First aid measures for different exposure routes
General advice:
First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Skin contact: Wash off with plenty of water.

Eye contact: Flush eyes thoroughly with water for several minutes. Remove contact lenses after the initial 1-2 minutes and continue flushing for several additional minutes. If effects occur, consult a physician, preferably an ophthalmologist.

Ingestion: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed:
Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), any additional important symptoms and effects are described in Section 11: Toxicology Information.

Protection of first-aiders
Indication of any immediate medical attention and special treatment needed
Notes to physician: No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. FIREFIGHTING MEASURES

Suitable extinguishing media: Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.

Unsuitable extinguishing media: Do not use direct water stream. May spread fire.

Specific hazards during firefighting
Hazardous combustion products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide. Combustion products may include trace amounts of: Nitrogen oxides.

Unusual Fire and Explosion Hazards: 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.

Advice for firefighters
Fire Fighting Procedures: 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.

Special protective equipment for firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. If protective equipment is not available or not used, fight fire from a protected location or safe distance.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

Methods and materials for containment and cleaning up: Small spills: Absorb with materials such as: Sand. Vermiculite. Collect in suitable and properly labeled containers. Large spills: Contain spilled material if possible. Pump into suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling: Avoid prolonged or repeated contact with skin. 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. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.
Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

Conditions for safe storage: Store in the following material(s): Carbon steel. Stainless steel. Phenolic lined steel drums. Do not store in: Aluminum. Copper. Galvanized iron. Galvanized steel.

Storage stability

Storage temperature:	Shelf life: Use within
10 - 35 °C	24 Month

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters
If exposure limits exist, they are listed below. If no exposure limits are displayed, then no values are applicable.

Component	Regulation	Type of listing	Value
Diethylene glycol monobutyl ether	ACGIH	TWA Inhalable fraction and vapor	10 ppm
	Further information: liver eff: Liver effects; kidney eff: Kidney effects; hematologic eff: Hematologic effects		

Any type of listing among TWA, STEL, Ceiling and BEI which is missing from above Control parameters table, can be considered as no data available.

Exposure controls
Engineering controls: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

Individual protection measures
Eye protection: Use safety glasses (with side shields).
Hand protection: Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials include: Butyl rubber. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyvinyl chloride ("PVC" or "vinyl"). 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.
Skin and body protection: Wear clean, body-covering clothing.
Respiratory protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or

discomfort have been experienced, or where indicated by your risk assessment process. For most conditions no respiratory protection should be needed; however, if discomfort is experienced, use an approved air-purifying respirator.
The following should be effective types of air-purifying respirators: Organic vapor cartridge.

Hygiene measures: No smoking and drinking

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	
Physical state	Liquid.
Color	Colorless to yellow
Odor	Ether
Odor Threshold	No test data available
pH	9.3 *FMVSS 116*
Melting point	No test data available
Freezing point	No test data available
Boiling point/boiling range	253 °C *FMVSS 116* Equilibrium Reflux Boiling Point, dry150 °C *FMVSS 116* Equilibrium Reflux Boiling Point, wetNo test data available
Flash point	**closed cup** 146 °C *ASTM D92*
Evaporation rate	No test data available
Flammability (solid, gas)	No
Explosion limits	
Lower explosion limit	No test data available
Upper explosion limit	No test data available
Vapor Pressure	No test data available
Relative vapour density	No test data available
Relative Density	No test data available
Solubility	No test data available
Partition Coefficient	No data available
Auto-ignition temperature	No test data available
Decomposition temperature	No test data available
Dynamic Viscosity	No test data available
Kinematic Viscosity	2.2 mm2/s *Literature*
Explosive properties	No test data available
Oxidizing properties	No test data available
Molecular weight	No data available
Volatile Organic Compounds	No test data available

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10. STABILITY AND REACTIVITY

Reactivity: No data available

Chemical stability: Stable under recommended storage conditions. See Storage, Section 7.

Possibility of hazardous reactions: Polymerization will not occur.

Conditions to avoid: Do not distill to dryness. Product can oxidize at elevated temperatures. Generation of gas during decomposition can cause pressure in closed systems.

Inhibitor: None

Incompatible materials: Avoid contact with: Strong acids. 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. Ketones. Organic acids.

11. TOXICOLOGICAL INFORMATION

Toxicological information appears in this section when such data is available.

Route of Exposure
Please refer to the information below.

Acute toxicity

Acute oral toxicity
Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.
Single dose oral LD50 has not been determined.

Acute dermal toxicity
Prolonged skin contact is unlikely to result in absorption of harmful amounts.
The dermal LD50 has not been determined.

Acute inhalation toxicity
At room temperature, exposure to vapor is minimal due to low volatility; single exposure is not likely to be hazardous.
The LC50 has not been determined.

Symptoms

Skin corrosion/irritation
Brief contact is essentially nonirritating to skin.

Serious eye damage/eye irritation
May cause slight temporary eye irritation.

Corneal injury is unlikely.

Sensitization
For skin sensitization:
No relevant data found.

For respiratory sensitization:
No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)
Available data are inadequate to determine single exposure specific target organ toxicity.

Chronic toxicity or long term toxicity

Specific Target Organ Systemic Toxicity (Repeated Exposure)
Contains component(s) which have been reported to cause effects on the following organs in animals:
Kidney.
Liver.
Blood.

Carcinogenicity
No relevant data found.

Teratogenicity
In animals, diethylene glycol methyl ether is slightly toxic to the fetus at doses nontoxic to the mother following skin contact; birth defects have been seen only following high oral doses which have little relevance to human exposure. Contains component(s) which did not cause birth defects in animals; other fetal effects occurred only at doses toxic to the mother.

Reproductive toxicity
In animal studies on component(s), effects on reproduction were seen only at doses that produced significant toxicity to the parent animals.

Mutagenicity
For the component(s) tested: In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were negative.

Aspiration Hazard
Based on physical properties, not likely to be an aspiration hazard.

COMPONENTS INFLUENCING TOXICOLOGY:

Triethylene glycol monomethyl ether

Acute oral toxicity
LD50, Rat, > 10,500 mg/kg OECD Test Guideline 401

Acute dermal toxicity
LD50, Rabbit, 7,100 mg/kg

Acute inhalation toxicity
An LC50/inhalation/4h/rat could not be determined because no mortality of rats was observed at the maximum achievable concentration. LC50, Rat, 8 Hour, vapour, > 10 mg/l OECD Test Guideline 403

Polyethylene glycol monomethyl ether

Acute oral toxicity
Typical for this family of materials. LD50, Rat, > 4,000 mg/kg Estimated. No deaths occurred at this concentration.

Acute dermal toxicity
Typical for this family of materials. LD50, Rabbit, > 17,460 mg/kg Estimated.

Acute inhalation toxicity
The LC50 has not been determined.

Triethylene glycol monobutyl ether

Acute oral toxicity
LD50, Rat, 5,170 mg/kg

Acute dermal toxicity
LD50, Rabbit, 3,540 mg/kg

Acute inhalation toxicity
As product: The LC50 has not been determined.

Polyalkylene glycol monobutyl ether

Acute oral toxicity
LD50, Rat, > 5,000 mg/kg

Acute dermal toxicity
LD50, Rabbit, > 5,000 mg/kg

Acute inhalation toxicity
LC50, Rat, 4 Hour, dust/mist, 4.67 mg/l

Diethylene glycol monobutyl ether

Acute oral toxicity
LD50, Mouse, 2,410 mg/kg

LD50, Rat, 3,305 mg/kg

Acute dermal toxicity
LD50, Rabbit, 2,764 mg/kg

Acute inhalation toxicity
As product: The LC50 has not been determined.

Polyethylene glycol monobutyl ether

Acute oral toxicity
Single dose oral LD50 has not been determined.

Based on information for a similar material: May cause nausea and vomiting. May cause abdominal discomfort or diarrhea. May cause dizziness and drowsiness. LD50, Rat, 2,630 mg/kg

Acute dermal toxicity
Based on information for a similar material: LD50, Rabbit, 3,540 mg/kg

The dermal LD50 has not been determined.

Acute inhalation toxicity
As product: The LC50 has not been determined.

Tetraethylene glycol monomethyl ether

Acute oral toxicity
LD50, Rat, > 10,500 mg/kg

Acute dermal toxicity
LD50, Rabbit, 7,100 mg/kg Estimated.

Acute inhalation toxicity
As product: The LC50 has not been determined.

Diethylene glycol monomethyl ether

Acute oral toxicity
LD50, Mouse, 7,128 mg/kg

Acute dermal toxicity
LD50, Rabbit, 9,404 mg/kg

Acute inhalation toxicity
The LC50 value is greater than the Maximum Attainable Concentration. LC0, Rat, 6 Hour, vapour, > 1.2 mg/l No deaths occurred at this concentration.

2-Piperazinoethanol

Acute oral toxicity

LD50, Rabbit, 3,350 mg/kg

Acute dermal toxicity
LD50, Rabbit, > 5,300 mg/kg

Acute inhalation toxicity
At room temperature, exposure to vapor is minimal due to low volatility. Vapor from heated material may cause respiratory irritation and other effects.

As product: The LC50 has not been determined.

12. ECOLOGICAL INFORMATION

Ecotoxicological information appears in this section when such data is available.

Ecotoxicity

Triethylene glycol monomethyl ether

Acute toxicity to fish
LC50, Danio rerio (zebra fish), 96 Hour, > 5,000 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates
LC50, Daphnia magna (Water flea), 48 Hour, > 500 mg/l, Directive 67/548/EEC, Annex V, C.2.

Acute toxicity to algae/aquatic plants
EC50, Desmodesmus subspicatus (green algae), 72 Hour, > 500 mg/l
NOEC, No species specified, 96 Hour, 1,068 mg/l

Toxicity to bacteria
EC0, activated sludge, static test, 0.5 Hour, Respiration rates., > 2,000 mg/l, activated sludge test (OECD 209)

Polyethylene glycol monomethyl ether

Acute toxicity to fish
For this family of materials:
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
For this family of materials:
LC50, Pimephales promelas (fathead minnow), 96 Hour, > 10,000 mg/l

Acute toxicity to aquatic invertebrates
For this family of materials:
LC50, Daphnia magna (Water flea), 48 Hour, > 10,000 mg/l

Triethylene glycol monobutyl ether

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Leuciscus idus (Golden orfe), static test, 96 Hour, 2,200 - 4,600 mg/l, DIN 38412

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), static test, 48 Hour, > 500 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants
EC50, Desmodesmus subspicatus (green algae), static test, 72 Hour, Growth rate inhibition, 62.5 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria
IC50, Bacteria, static test, 16 Hour, > 5,000 mg/l

Polyalkylene glycol monobutyl ether

Acute toxicity to fish
No relevant data found.

Diethylene glycol monobutyl ether

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Lepomis macrochirus (Bluegill sunfish), static test, 96 Hour, 1,300 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), static test, 48 Hour, > 100 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants

ErC50, alga Scenedesmus sp., static test, 96 Hour, Growth rate inhibition, > 100 mg/l, OECD Test Guideline 201 or Equivalent
ErC50, alga Scenedesmus sp., static test, 96 Hour, Biomass, > 100 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria
EC50, Bacteria, static test, 255 mg/l

Polyethylene glycol monobutyl ether

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
Based on information for a similar material:
LC50, Fish, semi-static test, 96 Hour, > 1,800 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
Based on information for a similar material:
EC50, Daphnia magna (Water flea), static test, 48 Hour, > 3,200 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants
Based on information for a similar material:
ErC50, Scenedesmus capricornutum (fresh water algae), static test, 72 Hour, Growth rate inhibition, 2,490 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria
IC50, activated sludge, static test, 16 Hour, Growth inhibition, > 5,000 mg/l

Tetraethylene glycol monomethyl ether

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Danio rerio (zebra fish), static test, 96 Hour, > 10,000 mg/l

Acute toxicity to aquatic invertebrates
LC50, Daphnia magna (Water flea), static test, 48 Hour, > 10,000 mg/l

Acute toxicity to algae/aquatic plants
EC50, alga Scenedesmus sp., 72 Hour, Biomass, > 500 mg/l

Toxicity to bacteria
IC50, Bacteria, 16 Hour, > 5,000 mg/l
EC50, activated sludge, 3 Hour, > 12,500 mg/l, OECD 209 Test

Diethylene glycol monomethyl ether

Acute toxicity to fish
Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).
LC50, Pimephales promelas (fathead minnow), static test, 96 Hour, 5,741 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
EC50, Daphnia magna (Water flea), static test, 48 Hour, 1,192 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants
EC50, Pseudokirchneriella subcapitata (green algae), static test, 96 Hour, Biomass, > 1,000 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria
EC50, activated sludge, 0.5 Hour, > 1,000 mg/l

2-Piperazinoethanol

Acute toxicity to fish
Material is practically non-toxic to fish on an acute basis (LC50 > 100 mg/L).
LC50, Pimephales promelas (fathead minnow), flow-through test, 96 Hour, 6,410 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates
LC50, Daphnia magna (Water flea), 48 Hour, 384 mg/l, OECD Test Guideline 202 or Equivalent

Toxicity to bacteria
EC50, Bacteria, 16 Hour, > 5,000 mg/l, hUCC

Persistence and degradability

Triethylene glycol monomethyl ether

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

Biodegradation: 100 %
Exposure time: 13 d
Method: OECD Test Guideline 301B

Theoretical Oxygen Demand: 1.75 mg/mg

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	29 %
10 d	33 %
20 d	71 %

Photodegradation
Atmospheric half-life: 3.2 Hour
Method: Estimated.

Polyethylene glycol monomethyl ether

Biodegradability: For this family of materials: Biodegradation under aerobic static laboratory conditions is low (BOD20 or BOD28/ThOD between 2.5 and 10%).

Triethylene glycol monobutyl ether

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Material is ultimately biodegradable (reaches > 70% mineralization in OECD test(s) for inherent biodegradability).
10-day Window: Fail
Biodegradation: 85 %
Exposure time: 28 d
Method: OECD Test Guideline 301D or Equivalent

Theoretical Oxygen Demand: 2.10 mg/mg

Diethylene glycol monobutyl ether

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.
10-day Window: Not applicable
Biodegradation: 89 - 93 %
Exposure time: 28 d
Method: OECD Test Guideline 301C or Equivalent
10-day Window: Not applicable
Biodegradation: 100 %
Exposure time: 28 d
Method: OECD Test Guideline 302B or Equivalent

Theoretical Oxygen Demand: 2.17 mg/mg

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	27 %
10 d	60 %
20 d	81 %

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 11 Hour
Method: Estimated.

Polyethylene glycol monobutyl ether

Biodegradability: Based on information for a similar material: Material is expected to be readily biodegradable.
10-day Window: Pass
Biodegradation: 76 %
Exposure time: 28 d
Method: OECD Test Guideline 301D or Equivalent

Photodegradation
Sensitization: OH radicals
Atmospheric half-life: 0.21 d
Method: Estimated.

Tetraethylene glycol monomethyl ether

Biodegradability: Material is inherently biodegradable (reaches > 20% biodegradation in OECD test(s) for inherent biodegradability).
10-day Window: Fail
Biodegradation: 63.9 %
Exposure time: 28 d
Method: OECD Test Guideline 301B or Equivalent
10-day Window: Not applicable
Biodegradation: 99 %
Exposure time: 8 d
Method: OECD Test Guideline 302B or Equivalent

Diethylene glycol monomethyl ether

Biodegradability: Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Material is ultimately biodegradable (reaches > 70% mineralization in OECD test(s) for inherent biodegradability).
10-day Window: Pass
Biodegradation: 100 %
Exposure time: 28 d
Method: OECD Test Guideline 301B or Equivalent

Theoretical Oxygen Demand: 1.73 mg/mg

Photodegradation
Atmospheric half-life: 4.9 Hour
Method: Estimated.

2-Piperazinoethanol

Biodegradability: Biodegradation under aerobic static laboratory conditions is moderate (BOD20 or BOD28/ThOD between 10 and 40%).

Theoretical Oxygen Demand: 2.83 mg/mg Calculated.

Chemical Oxygen Demand: 1.81 mg/mg Dichromate

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	3 - 5 %
10 d	3 - 6 %
20 d	6 - 13 %

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 0.057 d
Method: Estimated.

Bioaccumulative potential

Triethylene glycol monomethyl ether

Bioaccumulation: Bioaccumulation is unlikely. Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): -1.12 at 25 °C

Polyethylene glycol monomethyl ether
Bioaccumulation: For this family of materials: No bioconcentration is expected because of the relatively high water solubility.

Triethylene glycol monobutyl ether
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 0.51 at 20 °C Measured

Polyalkylene glycol monobutyl ether
Bioaccumulation: For this family of materials: No bioconcentration is expected because of the relatively high water solubility.

Diethylene glycol monobutyl ether
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 1 Measured

Polyethylene glycol monobutyl ether
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 0.436 at 20 °C Measured

Tetraethylene glycol monomethyl ether
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): -1.73 Estimated.

Diethylene glycol monomethyl ether
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): -0.47 at 20 °C Measured

2-Piperazinoethanol
Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): -1.56 Estimated.

Mobility in soil

Triethylene glycol monomethyl ether
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): 10 Estimated.

Polyethylene glycol monomethyl ether
No data available.

Triethylene glycol monobutyl ether
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): 10 Estimated.

Polyalkylene glycol monobutyl ether
No relevant data found.

Diethylene glycol monobutyl ether

Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): 2 Estimated.

Polyethylene glycol monobutyl ether
No data available.

Tetraethylene glycol monomethyl ether
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): 10 Estimated.

Diethylene glycol monomethyl ether
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): < 1 Estimated.

2-Piperazinoethanol
Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): 7 Estimated.

Results of PBT and vPvB assessment
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

Other adverse effects

Triethylene glycol monomethyl ether
This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Polyethylene glycol monomethyl ether
This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Triethylene glycol monobutyl ether
This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Polyalkylene glycol monobutyl ether
This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Diethylene glycol monobutyl ether
This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Polyethylene glycol monobutyl ether
This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Tetraethylene glycol monomethyl ether
This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

Diethylene glycol monomethyl ether
This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

2-Piperazinoethanol
This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

13. DISPOSAL CONSIDERATIONS

Disposal methods: 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. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device.

Treatment and disposal methods of used packaging: Empty containers should be recycled or otherwise disposed of by an approved waste management facility. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. Do not re-use containers for any purpose.

14. TRANSPORT INFORMATION

Classification for ROAD and Rail transport:

Proper shipping name	Not regulated for transport
UN number	Not applicable
Class	Not applicable
Packing group	Not applicable

Classification for SEA transport (IMO-IMDG):

Proper shipping name	Not regulated for transport
UN number	Not applicable
Class	Not applicable
Packing group	Not applicable
Marine pollutant	Not applicable
Transport in bulk according to Annex I or II of MARPOL 73/78 and the IBC or IGC Code	Consult IMO regulations before transporting ocean bulk

Classification for AIR transport (IATA/ICAO):

Proper shipping name	Not regulated for transport
UN number	Not applicable
Class	Not applicable
Packing group	Not applicable

Specific transport measures and precautionary conditions: No

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Transportation classifications may vary by container volume and may be influenced by regional or country variations in regulations. 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

Taiwan Chemical Substance Inventory (TCSI)
All intentional components are either listed on the Inventory or exempted by regulations, or certified by venders of their supply chemicals.

Applicable regulations determined by the registration authorities

Regulations on Labelling and Hazard Communication of Hazardous Chemicals

Components	CASRN	Concentration
Triethylene glycol monomethyl ether	112-35-6	> 45.0 - < 55.0 %
Polyethylene glycol monomethyl ether	9004-74-4	> 10.0 - < 20.0 %
Triethylene glycol monobutyl ether	143-22-6	> 10.0 - < 20.0 %
Polyalkylene glycol monobutyl ether	9038-95-3	> 5.0 - < 15.0 %
Diethylene glycol monobutyl ether	112-34-5	< 10.0 %
Polyethylene glycol monobutyl ether	9004-77-7	< 5.0 %
Tetraethylene glycol monomethyl ether	23783-42-8	< 5.0 %
Diethylene glycol monomethyl ether	111-77-3	< 1.0 %
2-Piperazinoethanol	103-76-4	< 1.0 %

Occupational Safety and Health Act

Waste Disposal Act.

Establishment Standard and Safety Control Regulation for Manufacturing, Storing, Processing Public Hazardous Substances and Flammable Pressurized Gases Places

16. OTHER INFORMATION

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Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

ACGIH	USA. ACGIH Threshold Limit Values (TLV)
TWA	8-hour, time-weighted average

Full text of other abbreviations

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

Information Source and References

This SDS is prepared in Taiwan by the Product Regulatory Management group from information supplied by our parent company.

Date that the SDS was prepared: Please refer to issue date.

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Prepared by	Title: Responsible Department	Name: Product Stewardship and Regulatory Affairs (PS&R), AP

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