

Number: 028

Section 1. Product and Company Identification

Product name: Diethylene glycol monobutyl ether
Synonyms: -
Recommended use and Restrictions on use: Serve as nitrocellulose, varnishes, printing ink, oil types, resins and other solvents. Also used as a plasticizer intermediates and hydraulic brake liquid diluents.
Manufacturer, Importer, or Supplier: Shiny Chemical Industrial Co., Ltd. Address: No.5, Yeong Gong 1 st Rd, Yeong An Dist., Kaohsiung 82841, Taiwan, R.O.C. Telephone: +886-7-8619171 ext. 711~714
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Section 2. Hazards Identification

Classification: 1. Flammable liquids, Category 4 2. Acute toxicity (skin), Category 5 3. Serious eye damage/irritation, Category 2A 4. Specific target organ toxicity following repeated exposure, Category 3
Label elements:  Hazard pictograms: Exclamation mark Signal word: Warning Hazard Statements: 1. Combustible liquid 2. Harmful in contact with skin 3. Causes serious eye irritation 4. May cause respiratory irritation Precautionary statements: 1. Keep containers in a well-ventilated place. 2. Keep away from high temperature. 3. If contacted with eyes, flush with plenty of water before seek for medical attention. 4. Wear eye protect or face protect equipment.

Other Hazards: -

Section 3. Composition/Information on Ingredients

Pure substance

Chemical Name: Diethylene glycol monobutyl ether

Synonyms: 2-(2-Butoxyethoxy)ethanol, Butoxyethoxyethanol, Butoxydiethylene glycol, Butoxydiglycol, Butyl carbitol, Butyl dioxitol、o-Butyl diethylene glycol, Diethylene glycol N-butyl ether, Butadigol、Diglycol monobutyl ether, Butyl digol, Butyl diglycol, Butyl oxitol glycol ether, Diethylene glycol butyl ether, 3,6-Dioxa-1-decanol, Diethylene glycol mono-N-butyl ether, 2,2-Oxybis-ethanol, monobutyl ether, DBGE

CAS NO.: 112-34-5

Weight: 100%

Section 4. First Aid Procedures

Description of first aid measures:

• Inhalation:

1. In case of hazardous effect happened, move the affected person to breath fresh air.
2. If the patient stops breathing, give the patient artificial respiration.
3. Seek medical attention immediately.

• Skin contact:

1. Remove contaminated clothing and boots, washing affected area thoroughly with soap and water at least 15 minutes.
2. Seek medical attention immediately.
3. Clean and dry polluted clothing and boots before use again.

• Eye contact:

1. In case of direct contact, flush eyes with clean water at least 15 minutes.
2. Seek medical attention immediately.

• Ingestion:

1. Contact the local toxicology center or physician immediately.
2. If the patient is unconsciousness, do not induce vomiting or feed any liquid food.
3. If the patient spontaneous vomiting, keeps the patient's head lower than the hip in case of inhaling the vomiting materials.
4. If the patient is unconsciousness, turn the patient's head to the right side.
5. Refer for medical attention immediately.

The most Important Symptoms and Hazardous Effects: Irritation respiratory tract, skin irritation and eye irritation.

Protection for emergency personnel: Dress C Class protective apparatus and take first aid in a safety area.

Notes to Physicians: If swallowed, take a considerate to gastric lavage.

Section 5. Firefighting Measures

Suitable extinguishing media:

1. Carbon dioxide, Chemical-resistant powder, Mist, Alcohol resistant foam.
2. Put out the burnout by using anti-alcohol foam or spraying.

Special hazards during firefighting:

1. Moderate Fire Accident hazardous.
2. The vapor is heavier than air and may travel along the ground; distant ignition possible.
3. If the temperature of Vapor/Air mixture higher than the flash point may explosive.

Firefighting procedures:

1. Move the container away from the firing place under the safety condition.
2. Apply mist to cool down the tanks or the containers which exposed at the firing place till the fire extinguished.
3. Keep far away from the two sides of the tanks.
4. Apply automatic kits controlling frame or auto-spraying nozzle to cool down the temperature if the fire happened at container or the tank district until the fire be put off. If the procedure does not work, follow the instructions: Expel the unrelated persons, isolate the disaster area, prohibit the unrelated people to enter and let the fire be burned out.
5. Immediately evacuate all people while the tank safety valve alarmed or color changed by firing.
6. The suggestion to the tank, train or reservoirs wagon: Evacuation radius: 800 meters.
7. Do not try to stop the fire unless the leakage can be stop.
8. Spraying large amount of mist.
9. Do not expel the leaking materials with high pressure water column.
10. Spray mist to put out the fire at a safety distance or a protective area.
11. Avoid inhaling the substance or its burned byproducts.
12. Stay at the upper hand place.
13. Water or foam may produce the floating foam to spread out the fire.

Protective equipment for firefighters: -

Section 6. Accidental Release Measures

Personal precautions:

1. Isolate the disaster area and prohibit the unauthorized members from entering.
2. Members should stay at the upper hand area and keep away from the low-lying areas.

Environmental precautions:

1. Avoid the heat, flame, sparks and other ignition.
2. Remove ignition sources.

Methods for cleaning up:

1. Trying to stop or decrease the leakage under the safety circumstance.
2. Apply the mist to decrease the vapors.
3. A small amount of leakage: Absorb leakage substances with sands, dirt or other materials which do not react with the leakage substances and to contain it.
4. Serious Leakage: Contain the leakage into a protecting embankment and dispose it.

Section 7. Handling and Storage

Handling:

- Advice on safe handling:
1. Operate in the well-ventilated place.
 2. Prevent the materials accumulated at depression or drainage holes.
 3. Do not enter the confined space.
 4. Avoid smoking, expose to naked light or ignition sources.
 5. Avoid not contacting incompatible substances.
 6. While operating, do not smoke or diet.
 7. Seal the vessels tightly after the task.
 8. Avoid making the physics damage of the container.
 9. The substance will accumulate per oxidant, which will make damage if volatile, distillation or enrichment processing.
 10. Make sure to finish the chemical substances before it be oxidized when adopt this kind of per oxidant substances.
 11. The authorized person has to manage the substances and label the per oxidation chemical compounds and its expiration date. The chemical substances have to be deoxidized or discarded.
 12. Label the receiving date on the bottle; note the date every time when open it.
 13. The safety storage duration of unopened product is 18 months; the opened product is limited not to use over 12 months.
 14. Avoid personal contact, inhalation included.
 15. Wear personal protective apparatus if situated in over exposed risk.
 16. Wash hands with soaps and water each time finished the work.
 17. Work suits should be washed separately.

18. Keep good professional habits.
19. Detect the air quality periodically to make sure the working environment safety.

Storage:

- Requirements for storage areas and containers:
 1. Stored in metal cans or drums.
 2. Check the containers if labeled clearly and without leakage.
 3. In some cases, glycol ethers may form peroxides.
 4. In the presence of alkali or alkali salt, temperature increasing may enhance the potential out-of-control reaction.
 5. Avoid contacting aluminum, it may release hydrogen.
 6. Avoid reacting with oxidants.
 7. Store in the original vessels.
 8. Keep the vessels sealed tightly.
 9. Abandon smoking, exposed to naked light, heating sources, or ignition sources.
 10. Stored in cool, dry and well ventilated places.
 11. Store away from incompatible substances and the food containers.
 12. Avoid physical damage and check the leakage periodically.

Section 8. Exposure controls

Engineering controls:

1. Provide the local exhaust ventilating system.
2. If the material exceeds the exposure lower limit, the ventilation facilities must be the explosion-proof type.

Control parameters

TWA	STEL	CEILING	BEIs
-	-	-	-

Personal protective equipment:

- Respiratory protection:
 1. Under the circumstance of using or exposing to the highly concentration, dressing the breathing protective device is necessary.
 2. The standard of breathing protection is various with the exposure concentration from the minimum to maximum.
 3. While operating, the warning notes must be confirmed first.
 4. Apply the respiratory protective apparatus with organic vapor filter chemical tank, or full mask type of respiratory protective apparatus with organic vapor filter chemical tank, or full mask type of air cleaner breathing apparatus with organic tank.
 5. Under the circumstance of unknown concentration or fatal concentration : Positive pressure breathing protective portable device, life-saving positive

<p>pressure breathing protective portable device or the full-face mask portable positive pressure breathing protective portable device.</p> <ul style="list-style-type: none"> • Hand protection: Chemical resistant gloves. • Eye protection: <ol style="list-style-type: none"> 1. Chemical anti-splash spectacle. 2. Supply emergency eyes washing apparatus or rapid shower. • Skin and physical protection: Wear chemical resistant clothing.
<p>Hygiene measures:</p> <ol style="list-style-type: none"> 1. Take off the pollutant clothes quickly after the work, do not dress or abandon before cleaning, and the laundry must be informed the danger of the pollutants. 2. Forbid smoking or dieting in the workplace. 3. After dealing with the material, washing hands thoroughly. 4. Keep the working place clean.

Section 9. Physical and Chemical Properties

Appearance: Colorless liquids (sensitive to humid)	Odor: pleasant flavor
Odor threshold: -	Melting point: -68°C
pH: -	Boiling point/Boiling range: 231°C
Flammability (solid, gas): -	Flash point: 78°C
Decomposition temperature: -	Test method: close cup
Auto-ignition temperature: 204°C	Explosion limits: -
Vapor pressure: 0.01 mmHg (20°C)	Vapor density: 5.6 (air=1)
Density: 0.9553 (water=1)	Solubility: Immiscible with water. Soluble in ethanol, ether, acetone, organic solvents, oil.
Partition coefficient (log K _{ow}): -	Volatility rate: Slower than butyl acetate

Section 10. Stability and Reactivity

<p>Chemical stability:</p> <ol style="list-style-type: none"> 1. Stable in common temperature and pressure. 2. May formed as the explosive peroxides. 3. Avoid being long term stored or contacted with the air, light or stored, used at the temperature higher than the room temperature.
<p>Possibility of hazardous reactions:</p> <ol style="list-style-type: none"> 1. Acid (Strong) ,Base (Strong) : incompatible. 2. Oxidants (Strong) : Fire or explosion disaster.
<p>Conditions to avoid:</p> <ol style="list-style-type: none"> 1. Heat Flame, Sparks or other ignition.

2. Heating the vessels may cause the explosion.
3. Acid (Strong), Base (Strong): incompatible.
4. Oxidants (Strong): Fire or explosion disaster.

Materials to avoid: Acid, Base, Oxidants.

Hazardous decomposition products: Heat decomposition will produce carbon oxides.

Section 11. Toxicological Information

Exposure Route: Inhalation ,Skin, Ingestion, Eye

Symptoms:

Irritation, sore throat, cough, sneezing, headache, nausea, dizziness, drowsiness, loss of consciousness, pulmonary edema, red or rough skin, skin, eyes red and sore, vomiting, diarrhea, seizure, cyanosis, rapid breathing, tachycardia, low blood pressure, muscle pain, bone marrow suppression, unconsciousness, coma, liver and kidney damage.

Acute toxicity:

• Inhalation:

1. Because of the low vapor pressure, the material does not have inhalation hazard, if inhaled, it may be irritant to the chest and lungs, and cause coughing, sneezing, headache, sore throat, and even disgusting.
2. High concentrations may cause central nervous system suppression, headache, dizziness, dizzy, lethargy, loss of consciousness and pulmonary edema.
3. The material may cause by intravascular hemolysis, bone marrow suppression and delayed renal injury.
4. The material may cause respiratory irritant to specific people whose body will react to the irritation and damage the lung.
5. High temperature will increase the inhalation hazard of the material.
6. It had been published that two members proceed the tasks with Diethylene glycol monobutyl ether, took alcoholic drinking when painting, which lead to the damage of kidney and liver.

• Skin:

1. Direct contact may cause slightly stimulation, and lead to skin red, rough, and skin.
2. Long-term exposed to the substances may cause temporarily uncomfortable.
3. Contact to skin will damage health. If absorbed through skin may cause Systemic effect.
4. If the chemical compounds intrude through open wounds, scratches or wear and tear of the skin into the blood flow, which may result in systemic injury.
5. Check the skin before using the materials and make sure all traumatic

metropolises already have appropriate protection.

• Eyes:

1. May cause irritant, causing red eyes, pain, and transient corneal injury.
2. There is evidence shows that the material may be irritated to specific people, and is harmful after drop into eyes for over 24 hours.
3. May cause serious inflammation, corneal injury.
4. To the progressive corneal injury, if not timely and properly treated may cause permanent vision damage.

• Ingestion:

1. Ingest the material is harmful to personal health.
2. Ingest the material may cause nausea, vomiting, diarrhea, and Central nervous system inhibition which will lead to headache, dizziness, sleepiness, seizure.
3. Large amount of intake the material may cause toxic, which lead to kidney damage, and influence the blood flow, thus make cyanosis, rapidly breathing and hear beating, low blood pressure, muscle pain, bone marrow suppression, unconsciousness, coma, even death.

• LD₅₀ (animal test, entry): 450 mg/kg (rat, ingestion)

• LD₅₀ (animal test, entry): 2,700 mg/kg (lapin, skin)

• LC₅₀ (animal test, entry): 20 mg/4 hour(s) (rat, eye)

Chronic/Long-term toxicity:

1. Excessive and repeat expose to the material may damage the liver and kidney.
2. Repeat or long-term expose skin or eyes to the substance may cause dermatitis or conjunctivitis.
3. In animal model, long-term feeding will cause poor appetites, and the pathology injuries of liver, kidney, spleen and testes.
4. Intake large amount of the material or long-term intake will influence the kidney function.

Section 12. Ecological Information

Ecological toxicity:

1. LC₅₀ (fish): 1,300,000 µg/L/96 hour(s) (Lepomis Macrochirus)
2. EC₅₀ (aquatic invertebrates): -
3. Bioconcentration factor (BCF): 3 (Estimation)

Persistence and degradability:

- If released to the soil, the material is expected not to volatile from the surface of dry soil, volatile from wet soil surface is also not an important flow mechanism.
- Released to the water, the material will not be absorbed by the suspension or precipitation particles.
- Released to the air, the material will exist in the atmosphere with gas phase, which

will react with the hydroxyl free radical of photon chemical products, the half-life is 7.2 hours.

- Half-life (Air): 7.2 hour(s)
- Half-life (Water surface): -
- Half-life (Groundwater): -
- Half-life (Soil): -

Bioaccumulative potential: The biological organism of bio-concentration is expected to be low.

Mobility in soil: It is expected to have highly mobility in the soils.

Other adverse effects: -

Section 13. Disposal Considerations

Waste disposal:

1. Consult the relevant regulation to deal with.
2. Evaluate the possibility of reduction, re-use, recycling, waste (if all methods do not work). If the material is not used or pollutant, recycle it; if contaminated, recycle it by filtration, distillation or other methods. Check the expiration date and notice that if the properties had been changed, do not recycle it.
3. Do not let washed water or processed equipment to enter drain system.
4. The washed water should be collected and processed and then discard.
5. If want to discharge the discarded materials into the sewer, must follow the relevant laws. If any questions, query the local authority units.
6. Retrieve as much as possible or consult manufacturers, if no suitable processing company, ask the local waste processing unit.
7. Buried or incinerated residual material in qualified places.
8. If possible, recycle the vessels or discard the vessels in qualified landfill.

Section 14. Transport Information

United Nations Number (UN No.): -

UN Proper Shipping Name: -

Transport Hazard classes: -

Packaging Group: -

Marine pollutant (Yes/No): No

Specific Transport Measures and Precautionary Conditions: -

Section 15. Regulatory Information

Applicable Regulations:

1. Occupational Safety and Health Act
2. Regulations for the Labeling and Hazard Communication of Hazardous

Chemicals 3. Ordinance on Prevention of Organic Solvent Poisoning 4. Standards of Permissible Exposure Limits of Airborne Hazardous Substances in Workplace 5. Rules on Road Traffic Safety 6. Methods and Facilities Standards for the Storage, Clearance and Disposal of Industrial Waste 7. Public Hazardous Substances & Flammable Pressurized Gases Establishment Standards & Safety Control Regulations

Section 16. Other Information

References	1. RTECS Database, 2008 2. ChemWatch Database, 2008-1 3. OHS MSDS Database, 2008 4. HSDB Database, 2008
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Revision Date	2022/09/01
Notes	The symbol " - " in this sheet indicates no available information; the symbol " / " indicates the information is not applicable to the substance.