



SAFETY DATA SHEET

THE DOW CHEMICAL COMPANY

Product name: BUTANOL RECYCLE

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THE DOW CHEMICAL COMPANY 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. IDENTIFICATION

Product name: BUTANOL RECYCLE

Recommended use of the chemical and restrictions on use

Identified uses: For industrial use. We recommend that you use this product in a manner consistent with the listed use. If your intended use is not consistent with the stated use, please contact your sales or technical service representative.

COMPANY IDENTIFICATION

THE DOW CHEMICAL COMPANY
2030 WILLARD H DOW CENTER
MIDLAND MI 48674-0000
UNITED STATES

Customer Information Number:

800-258-2436
SDSQuestion@dow.com

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact: CHEMTREC +1 800-424-9300

Local Emergency Contact: 800-424-9300

2. HAZARDS IDENTIFICATION

Hazard classification

This material is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

Flammable liquids - Category 3

Acute toxicity - Category 4 - Oral

Skin irritation - Category 2

Serious eye damage - Category 1

Carcinogenicity - Category 2

Specific target organ toxicity - single exposure - Category 3

Label elements

Hazard pictograms



Signal word: **DANGER!**

Hazards

Flammable liquid and vapour.
Harmful if swallowed.
Causes skin irritation.
Causes serious eye damage.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Suspected of causing cancer.

Precautionary statements

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. No smoking.
Keep container tightly closed.
Ground/bond container and receiving equipment.
Use explosion-proof electrical/ ventilating/ lighting equipment.
Use only non-sparking tools.
Take precautionary measures against static discharge.
Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
Wash skin thoroughly after handling.
Do not eat, drink or smoke when using this product.
Use only outdoors or in a well-ventilated area.
Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response

IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. Rinse mouth.
IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
IF exposed or concerned: Get medical advice/ attention.
If skin irritation occurs: Get medical advice/ attention.
Take off contaminated clothing and wash before reuse.
In case of fire: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide to extinguish.

Storage

Store in a well-ventilated place. Keep container tightly closed.
Store in a well-ventilated place. Keep cool.

Store locked up.

Disposal

Dispose of contents/ container to an approved waste disposal plant.

Other hazards

Static-accumulating flammable liquid.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature: Alcohol Ester

This product is a mixture.

Component	CASRN	Concentration
Butanol	71-36-3	85.0 - 100.0 %
Ethylene glycol monobutyl ether	111-76-2	<= 6.0 %
Diethylene glycol monobutyl ether	112-34-5	<= 5.0 %
Butyl ether	142-96-1	<= 3.0 %
Acetaldehyde	75-07-0	<= 1.0 %
Butyraldehyde	123-72-8	<= 1.0 %
1,4-Dioxane	123-91-1	<= 1.0 %
Ethanol	64-17-5	<= 1.0 %
Triethylene glycol monobutyl ether	143-22-6	<= 1.0 %

4. FIRST AID MEASURES

Description of first aid measures**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 not breathing, give artificial respiration; if by mouth to mouth use rescuer protection (pocket mask, etc). If breathing is difficult, oxygen should be administered by qualified personnel. Call a physician or transport to a medical facility.

Skin contact: Immediately flush skin with water while removing contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Destroy contaminated leather items such as shoes, belts, and watchbands. Suitable emergency safety shower facility should be immediately available.

Eye contact: Immediately flush eyes with water; remove contact lenses, if present, after the first 5 minutes, then continue flushing eyes for at least 15 minutes. Obtain medical attention without delay, preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available.

Ingestion: Do not induce vomiting. Call a physician and/or transport to emergency facility immediately.

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.

Indication of any immediate medical attention and special treatment needed

Notes to physician: Maintain adequate ventilation and oxygenation of the patient. 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. 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. Because rapid absorption may occur through the lungs if aspirated and cause systemic effects, the decision of whether to induce vomiting or not should be made by a physician. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient. Skin contact may aggravate preexisting dermatitis.

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. Straight or direct water streams may not be effective to extinguish fire.

Special hazards arising from the substance or mixture

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.

Unusual Fire and Explosion Hazards: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. When product is stored in closed containers, a flammable atmosphere can develop. Electrically ground and bond all equipment. Flammable mixtures of this product are readily ignited even by static discharge. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Flammable concentrations of vapor can accumulate at temperatures above flash point; see Section 9.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Stay upwind. Keep out of low areas where gases (fumes) can accumulate. Water may not be effective in extinguishing fire. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Do not use direct water stream. May spread fire. Eliminate ignition sources. 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. Avoid accumulation of water. Product may be carried across water surface spreading fire or contacting an ignition source.

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: Isolate area. Keep unnecessary and unprotected personnel from entering the area. Refer to section 7, Handling, for additional precautionary measures. Keep personnel out of low areas. Keep upwind of spill. Ventilate area of leak or spill. No smoking in area. Eliminate all sources of ignition in vicinity of spill or released vapor to avoid fire or explosion. Vapor explosion hazard. Keep out of sewers. For large spills, warn public of downwind explosion hazard. Check area with combustible gas detector before reentering area. Ground and bond all containers and handling equipment. 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. Ground and bond all containers and handling equipment. Pump with

explosion-proof equipment. If available, use foam to smother or suppress. Pump into suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

7. HANDLING AND STORAGE

Precautions for safe handling: No smoking, open flames or sources of ignition in handling and storage area. Avoid contact with eyes, skin, and clothing. Do not swallow. Avoid breathing vapor. Wash thoroughly after handling. Use with adequate ventilation. Keep container closed. Never use air pressure for transferring product. Vapors are heavier than air and may travel a long distance and accumulate in low lying areas. Ignition and/or flash back may occur. Electrically bond and ground all containers, personnel and equipment before transfer or use of material. Containers, even those that have been emptied, can contain vapors. Do not cut, drill, grind, weld, or perform similar operations on or near empty containers. Use of non-sparking or explosion-proof equipment may be necessary, depending upon the type of operation. Keep away from heat, sparks and flame. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION. This product is a poor conductor of electricity and can become electrostatically charged, even in bonded or grounded equipment. If sufficient charge is accumulated, ignition of flammable mixtures can occur. Handling operations that can promote accumulation of static charges include but are not limited to mixing, filtering, pumping at high flow rates, splash filling, creating mists or sprays, tank and container filling, tank cleaning, sampling, gauging, switch loading, vacuum truck operations.

Conditions for safe storage: Flammable mixtures may exist within the vapor space of containers at room temperature. Keep container closed. Minimize sources of ignition, such as static build-up, heat, spark or flame.

Storage stability

Shelf life: Use within
Bulk 12 Month
Steel drums. 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/Notation
Butanol	ACGIH	TWA	20 ppm
	OSHA Z-1	TWA	300 mg/m3 100 ppm
Ethylene glycol monobutyl ether	ACGIH	TWA	20 ppm
	OSHA Z-1	TWA	240 mg/m3 50 ppm
Diethylene glycol monobutyl ether	OSHA Z-1	TWA	SKIN
	Dow IHG	TWA	35 ppm
Acetaldehyde	ACGIH	TWA Inhalable fraction and vapor	10 ppm
	Dow IHG	C	10 ppm

Butyraldehyde	ACGIH	C	25 ppm
	OSHA Z-1	TWA	360 mg/m3 200 ppm
	US WEEL	TWA	25 ppm
	Dow IHG	TWA	5 ppm
	Dow IHG	TWA	SKIN
1,4-Dioxane	ACGIH	TWA	20 ppm
	ACGIH	TWA	SKIN
	OSHA Z-1	TWA	360 mg/m3 100 ppm
	OSHA Z-1	TWA	SKIN
	ACGIH	TWA	1,000 ppm
Ethanol	ACGIH	STEL	1,000 ppm
	OSHA Z-1	TWA	1,900 mg/m3 1,000 ppm
	CAL PEL	PEL	1,900 mg/m3 1,000 ppm
			ppm

Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Butanol	71-36-3				100 mg/g 300 mg/g	
Ethylene glycol monobutyl ether	111-76-2				240 mg/g	
		Butoxyacetic acid (BAA)	Urine	End of shift (As soon as possible after exposure ceases)	200 mg/g Creatinine	ACGIH BEI
1,4-Dioxane	123-91-1				100 mg/g 100 mg/g 100 mg/g	

Exposure controls

Engineering controls: Use engineering controls to maintain airborne level below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, use only with adequate ventilation. Local exhaust ventilation may be necessary for some operations.

Individual protection measures

Eye/face protection: Use chemical goggles. If exposure causes eye discomfort, use a full-face respirator.

Skin protection

Hand protection: Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Natural rubber ("latex"). Neoprene. Polyethylene. Ethyl vinyl alcohol laminate ("EVAL"). Polyvinyl chloride ("PVC" or "vinyl"). Examples of acceptable glove barrier materials include: Nitrile/butadiene rubber ("nitrile" or "NBR"). 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.

Other protection: 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.

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, use an approved respirator. Selection of air-purifying or positive-pressure supplied-air will depend on the specific operation and the potential airborne concentration of the material. For emergency conditions, use an approved positive-pressure self-contained breathing apparatus.

The following should be effective types of air-purifying respirators: Organic vapor cartridge.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance

Physical state	Liquid.
Color	Colorless
Odor	Ether
Odor Threshold	No test data available
pH	No test data available
Melting point/range	Not applicable
Freezing point	-100 °C (-148 °F) <i>Literature</i> Approximately
Boiling point (760 mmHg)	120 °C (248 °F) <i>Literature</i> Approximately
Flash point	closed cup 32.2 °C (90.0 °F) <i>Tag Closed Cup ASTM D56</i> Estimated.
Evaporation Rate (Butyl Acetate = 1)	0.4 <i>Literature</i>
Flammability (solid, gas)	Not expected to form explosive dust-air mixtures.
Lower explosion limit	1 % vol <i>Literature</i>
Upper explosion limit	12 % vol <i>Literature</i>
Vapor Pressure	5 mmHg at 20 °C (68 °F) <i>Literature</i>
Relative Vapor Density (air = 1)	2.6 <i>Literature</i> Approximately
Relative Density (water = 1)	0.8 <i>Literature</i>
Water solubility	7.45 % at 25 °C (77 °F) <i>Literature</i>
Partition coefficient: n-octanol/water	No data available
Auto-ignition temperature	365 °C (689 °F) <i>Literature</i> Approximately
Decomposition temperature	No test data available
Kinematic Viscosity	No test data available
Explosive properties	No test data available
Oxidizing properties	No test data available
Molecular weight	<i>Not reported</i>

Percent volatility 100 % *Literature* Approximately

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: Thermally stable at typical use temperatures.

Possibility of hazardous reactions: Polymerization will not occur.

Conditions to avoid: Exposure to elevated temperatures can cause product to decompose. Avoid static discharge.

Incompatible materials: Avoid contact with: Halogens. Strong acids. Strong oxidizers. Strong bases.

Hazardous decomposition products: Decomposition products depend upon temperature, air supply and the presence of other materials.

11. TOXICOLOGICAL INFORMATION

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

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. Massive ingestion of ethylene glycol monobutyl ether (attempted suicides) may produce metabolic acidosis and subsequent secondary effects such as hemolysis, central nervous system and kidney effects.

Single dose oral LD50 has not been determined.

For the major component(s):
LD50, Rat, 700 - 4,400 mg/kg

Acute dermal toxicity

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

Acute inhalation toxicity

Brief exposure (minutes) to easily attainable concentrations may cause adverse effects. Prolonged excessive exposure may cause serious adverse effects, even death. Excessive exposure may cause irritation to upper respiratory tract (nose and throat). May cause central

nervous system effects. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed.

Skin corrosion/irritation

Brief contact may cause slight skin irritation with local redness.
Prolonged contact may cause moderate skin irritation with local redness.
May cause more severe response on covered skin (under clothing, gloves).
May cause drying and flaking of the skin.

Serious eye damage/eye irritation

May cause severe eye irritation.
May cause moderate corneal injury.
Vapor may cause eye irritation experienced as mild discomfort and redness.

Sensitization

For skin sensitization:
No relevant data found.

For respiratory sensitization:
No relevant data found.

Specific Target Organ Systemic Toxicity (Single Exposure)

Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Specific Target Organ Systemic Toxicity (Repeated Exposure)

Contains component(s) which have been reported to cause effects on the following organs in animals:
Central nervous system.

Kidney.

Liver.

Lung.

Nasal tissue.

Heart.

Blood.

In animals, effects have been reported on the following organs: blood (hemolysis) and secondary effects on the kidney and liver.

Human red blood cells have been shown to be significantly less sensitive to hemolysis than those of rodents and rabbits.

Butanol has been reported to cause eye effects (tearing, blurred vision, sensitivity to light, temporary corneal effects), hearing loss and vertigo.

Carcinogenicity

Contains component(s) which have caused cancer in laboratory animals. In long-term animal studies with ethylene glycol butyl ether, small but statistically significant increases in tumors were observed in mice but not rats. The effects are not believed to be relevant to humans. If the material is handled in accordance with proper industrial handling procedures, exposures should not pose a carcinogenic risk to man. Human epidemiology studies have shown no indication that exposures to 1,4-dioxane in industrial situations have caused an increased incidence of tumors even though it has been shown to cause cancer in some laboratory animals.

Teratogenicity

n-Butanol has caused birth defects and has been toxic to the fetus in laboratory animals at doses nontoxic to the mother. Dose levels producing these effects were many times higher than any dose levels expected from exposure due to use.

Reproductive toxicity

For some component(s): In laboratory animal studies, effects on reproduction have been seen only at doses that produced significant toxicity to the parent animals. In animal studies, did not interfere with reproduction.

Mutagenicity

Contains component(s) which were negative in some in vitro genetic toxicity studies and positive in others. Contains component(s) which were negative in some animal genetic toxicity studies and positive in others.

Aspiration Hazard

Aspiration into the lungs may occur during ingestion or vomiting, resulting in rapid absorption and injury to other body systems.

COMPONENTS INFLUENCING TOXICOLOGY:**Butanol****Acute dermal toxicity**

LD50, Rabbit, male, 3,430 mg/kg OECD Test Guideline 402

Acute inhalation toxicity

LC50, Rat, male and female, 4 Hour, vapour, > 17.76 mg/l OECD Test Guideline 403 No deaths occurred at this concentration.

Ethylene glycol monobutyl ether**Acute dermal toxicity**

Humans and guinea pigs are resistant to blood effects that are seen for rodents and rabbits. For this reason, the guinea pig data is used as the basis for the acute toxicity classification as it is a better model to assess acute toxicity to humans. LD50, Guinea pig, > 2,000 mg/kg

Acute inhalation toxicity

In animals, effects have been reported on the following organs: blood (hemolysis) and secondary effects on the kidney and liver. Human red blood cells have been shown to be significantly less sensitive to hemolysis than those of rodents and rabbits. LC0, Guinea pig, 1 Hour, vapour, > 3.1 mg/l No deaths occurred at this concentration.

Diethylene glycol monobutyl ether**Acute dermal toxicity**

LD50, Rabbit, 2,764 mg/kg

Acute inhalation toxicity

As product: The LC50 has not been determined.

Butyl ether**Acute dermal toxicity**

LD50, Rabbit, 7,660 mg/kg

Acute inhalation toxicity

Vapor concentrations are attainable which could be hazardous on single exposure. Vapor may cause irritation of the upper respiratory tract (nose and throat). For narcotic effects: No relevant data found.

LC50, Rat, male, 4 Hour, vapour, > 4000 ppm

Acetaldehyde**Acute dermal toxicity**

The dermal LD50 has not been determined.

Acute inhalation toxicity

LC50, Rat, 4 Hour, vapour, 24 mg/l

Butyraldehyde**Acute dermal toxicity**

LD50, Rabbit, > 1,000 - 5,000 mg/kg

Acute inhalation toxicity

Vapor concentrations are attainable which could be hazardous on single exposure. Vapor may cause irritation of the upper respiratory tract (nose and throat). Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed.

LC50, Rat, 4 Hour, vapour, 16400 ppm

1,4-Dioxane**Acute dermal toxicity**

LD50, Rabbit, > 7,000 mg/kg

Acute inhalation toxicity

Prolonged excessive exposure may cause serious adverse effects, even death. May cause central nervous system effects. Excessive exposure may cause irritation to upper respiratory tract (nose and throat) and lungs. Symptoms of excessive exposure may be anesthetic or narcotic effects; dizziness and drowsiness may be observed. May cause pulmonary edema (fluid in the lungs.)

LC50, Rat, 4 Hour, vapour, 51.3 mg/l

Lethal Dose, Humans, 470 ppm Estimated.

Ethanol**Acute dermal toxicity**

LD50, Rabbit, > 15,800 mg/kg

Acute inhalation toxicity

LC50, Rat, 4 Hour, vapour, 124.7 mg/l

Triethylene glycol monobutyl ether**Acute dermal toxicity**

LD50, Rabbit, 3,540 mg/kg

Acute inhalation toxicity

As product: The LC50 has not been determined.

Carcinogenicity Component	List	Classification
Ethylene glycol monobutyl ether	ACGIH	A3: Confirmed animal carcinogen with unknown relevance to humans.
Acetaldehyde	IARC	Group 2B: Possibly carcinogenic to humans
	US NTP	Reasonably anticipated to be a human carcinogen
1,4-Dioxane	ACGIH	A2: Suspected human carcinogen
	IARC	Group 2B: Possibly carcinogenic to humans
	US NTP	Reasonably anticipated to be a human carcinogen
	ACGIH	A3: Confirmed animal carcinogen with unknown relevance to humans.

12. ECOLOGICAL INFORMATION

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

Toxicity

Butanol

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), flow-through test, 96 Hour, 1,376 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), static test, 48 Hour, 1,328 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants

EC50, Pseudokirchneriella subcapitata (green algae), static test, 96 Hour, Growth rate inhibition, 225 mg/l, OECD Test Guideline 201 or Equivalent

Toxicity to bacteria

EC50, Pseudomonas putida, static test, 17 Hour, Growth inhibition, > 1,000 mg/l, DIN 38412

Chronic toxicity to aquatic invertebrates

NOEC, Daphnia magna (Water flea), semi-static test, 21 d, number of offspring, 4.1 mg/l

Toxicity to Above Ground Organisms

Material is practically non-toxic to birds on an acute basis (LD50 > 2000 mg/kg).

Ethylene 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, Oncorhynchus mykiss (rainbow trout), static test, 96 Hour, 1,464 mg/l, OECD Test Guideline 203

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), static test, 48 Hour, 1,550 mg/l, OECD Test Guideline 202

Acute toxicity to algae/aquatic plants

EbC50, Pseudokirchneriella subcapitata (green algae), static test, 72 Hour, Biomass, 911 mg/l, OECD Test Guideline 201

Toxicity to bacteria

IC50, Bacteria, Growth inhibition, > 1,000 mg/l

Chronic toxicity to fish

NOEC, Danio rerio (zebra fish), semi-static test, 21 d, > 100 mg/l

Chronic toxicity to aquatic invertebrates

NOEC, Daphnia magna (Water flea), semi-static test, 21 d, Other, 100 mg/l

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

Butyl ether

Acute toxicity to fish

Material is slightly toxic to aquatic organisms on an acute basis (LC50/EC50 between 10 and 100 mg/L in the most sensitive species tested).
LC50, Pimephales promelas (fathead minnow), 96 Hour, 32 mg/l
LC50, Leuciscus idus (Golden orfe), 48 Hour, 120 mg/l

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), static test, 48 Hour, 26 mg/l
EC50, Daphnia magna (Water flea), 24 Hour, > 150 mg/l

Acute toxicity to algae/aquatic plants

EC50, Pseudokirchneriella subcapitata (green algae), 72 Hour, 19.1 mg/l, OECD Test Guideline 201

NOEC, Pseudokirchneriella subcapitata (green algae), 72 Hour, 8.91 mg/l, OECD Test Guideline 201

Toxicity to bacteria

EC50, 30 min, $\geq 1,000$ mg/l, OECD Test Guideline 209

Acetaldehyde**Acute toxicity to fish**

LC50, Pimephales promelas (fathead minnow), flow-through test, 96 Hour, 30.8 - 37.2 mg/l
Material is slightly toxic to aquatic organisms on an acute basis (LC50/EC50 between 10 and 100 mg/L in the most sensitive species tested).

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), 48 Hour, 48.3 mg/l

Acute toxicity to algae/aquatic plants

EC50, Freshwater algae (Anabaena fols-aquae), 240 Hour, 4,528 - 16,244 mg/l

Toxicity to bacteria

EC50, Photobacterium phosphoreum, 0.08 Hour, 342 mg/l

Butyraldehyde**Acute toxicity to fish**

Material is slightly toxic to aquatic organisms on an acute basis (LC50/EC50 between 10 and 100 mg/L in the most sensitive species tested).

LC50, Pimephales promelas (fathead minnow), 96 Hour, 18 mg/l

LC50, Pimephales promelas (fathead minnow), Static, 96 Hour, 25.8 mg/l, EPA-660-75-009

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), 24 Hour, 195 mg/l, DIN 38412

LC50, Daphnia magna (Water flea), 24 Hour, 340 mg/l

Chronic toxicity to fish

LC50, Poecilia reticulata (guppy), semi-static test, 14 d, mortality, 13.7 mg/l

1,4-Dioxane**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, 13,000 mg/l, OECD Test Guideline 203 or Equivalent

Acute toxicity to aquatic invertebrates

EC50, Daphnia magna (Water flea), static test, 24 Hour, 8,450 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants

EC50, *Pseudokirchneriella subcapitata* (green algae), 72 Hour, > 1,000 mg/l, OECD Test Guideline 201

Chronic toxicity to fish

NOEC, *Pimephales promelas* (fathead minnow), 32 d, > 103 mg/l

Chronic toxicity to aquatic invertebrates

NOEC, *Daphnia magna* (Water flea), 21 d, 1,000 mg/l

Ethanol**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, *Oncorhynchus mykiss* (rainbow trout), flow-through test, 96 Hour, 11,200 - 13,000 mg/l

Acute toxicity to aquatic invertebrates

EC50, *Daphnia magna* (Water flea), 48 Hour, 5,414 mg/l, OECD Test Guideline 202 or Equivalent

Acute toxicity to algae/aquatic plants

Ec50, *Skeletonema costatum* (marine diatom), 5 d, Biomass, 10,943 - 11,619 mg/l, OECD Test Guideline 201 or Equivalent

Chronic toxicity to aquatic invertebrates

NOEC, *Daphnia magna* (Water flea), 9 d, 9.6 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

Persistence and degradability**Butanol**

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

10-day Window: Pass

Biodegradation: 98 %

Exposure time: 19 d

Method: OECD Test Guideline 301E or Equivalent

Theoretical Oxygen Demand: 2.59 mg/mg Estimated.

Chemical Oxygen Demand: 2.45 mg/mg Estimated.

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	68 %
10 d	87 %
15 d	92 %
20 d	92 %

Photodegradation

Test Type: Half-life (indirect photolysis)

Sensitization: OH radicals

Atmospheric half-life: 55.9 Hour

Method: Estimated.

Ethylene 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: Pass

Biodegradation: 90.4 %

Exposure time: 28 d

Method: OECD Test Guideline 301B or Equivalent

Theoretical Oxygen Demand: 2.30 mg/mg

Chemical Oxygen Demand: 2.21 mg/g Dichromate

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	5.2 %
10 d	57 %
20 d	72.2 %

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.

Butyl ether

Biodegradability: Material is expected to biodegrade very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability.

10-day Window: Not applicable

Biodegradation: 3 - 4 %

Exposure time: 28 d

Method: OECD Test Guideline 301C or Equivalent

10-day Window: Fail

Biodegradation: 5 %

Exposure time: 28 d

Method: OECD Test Guideline 301D

Theoretical Oxygen Demand: 2.95 mg/mg

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	3 %
10 d	2 %
20 d	1 %

Photodegradation
Test Type: Half-life (indirect photolysis)
Sensitization: OH radicals
Atmospheric half-life: 5.2 Hour
Method: Estimated.

Acetaldehyde

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

10-day Window: Not applicable

Biodegradation: 80 %

Exposure time: 14 d

Method: OECD Test Guideline 301C or Equivalent

Theoretical Oxygen Demand: 1.82 mg/mg

Chemical Oxygen Demand: 0.63 mg/mg Dichromate
0.14 mg/mg

Photodegradation

Test Type: Half-life (indirect photolysis)

Sensitization: OH radicals

Atmospheric half-life: 7.6 Hour

Method: Estimated.

Butyraldehyde

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: 14 d

Method: OECD Test Guideline 301C or Equivalent

10-day Window: Not applicable

Biodegradation: > 95 %

Exposure time: 5 d

Method: OECD Test Guideline 302B or Equivalent

Theoretical Oxygen Demand: 2.44 mg/mg

Photodegradation

Test Type: Half-life (indirect photolysis)

Sensitization: OH radicals

Atmospheric half-life: 0.421 d

Method: Estimated.

1,4-Dioxane

Biodegradability: Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

10-day Window: Not applicable

Biodegradation: 29 %

Exposure time: 28 d

Method: OECD Test Guideline 301C or Equivalent

Theoretical Oxygen Demand: 1.82 mg/mg

Biological oxygen demand (BOD)

Incubation Time	BOD
5 d	20 %
10 d	23 %
20 d	30 %

Photodegradation**Test Type:** Half-life (indirect photolysis)**Sensitization:** OH radicals**Atmospheric half-life:** 0.382 d**Method:** Estimated.**Ethanol****Biodegradability:** Material is readily biodegradable. Passes OECD test(s) for ready biodegradability.

10-day Window: Pass

Biodegradation: > 70 %**Exposure time:** 5 d**Method:** OECD Test Guideline 301D or Equivalent**Theoretical Oxygen Demand:** 2.08 mg/mg**Photodegradation****Test Type:** Half-life (indirect photolysis)**Sensitization:** OH radicals**Atmospheric half-life:** 2.99 d**Method:** Estimated.**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**Bioaccumulative potential****Butanol****Bioaccumulation:** Bioconcentration potential is low (BCF < 100 or Log Pow < 3).**Partition coefficient: n-octanol/water(log Pow):** 1 at 25 °C OECD Guideline 117 (Partition Coefficient (n-octanol / water), HPLC Method)**Bioconcentration factor (BCF):** 3.16 Fish Estimated.**Ethylene glycol monobutyl ether**

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 0.81 Measured
Bioconcentration factor (BCF): 3.2

Diethylene glycol monobutyl ether

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

Butyl ether

Bioaccumulation: Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5).
Partition coefficient: n-octanol/water(log Pow): 3.21 Measured
Bioconcentration factor (BCF): 47 - 114 Cyprinus carpio (Carp) 42 d Measured

Acetaldehyde

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): -0.34 Measured

Butyraldehyde

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): 1.3 Measured
Bioconcentration factor (BCF): 3.1 Estimated.

1,4-Dioxane

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): -0.27 Measured
Bioconcentration factor (BCF): 0.2 - 0.6 Cyprinus carpio (Carp) 42 d

Ethanol

Bioaccumulation: Bioaccumulation is unlikely. Bioconcentration potential is low (BCF < 100 or Log Pow < 3).
Partition coefficient: n-octanol/water(log Pow): -0.31 Measured

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

Mobility in soil

Butanol

Potential for mobility in soil is very high (Koc between 0 and 50).
Partition coefficient (Koc): 2.4 Estimated.

Ethylene glycol monobutyl ether

Potential for mobility in soil is high (Koc between 50 and 150).
Partition coefficient (Koc): 67 Estimated.

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.

Butyl ether

Potential for mobility in soil is high (Koc between 50 and 150).

Partition coefficient (Koc): 51 Estimated.

Acetaldehyde

Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient (Koc): 1.5 Estimated.

Butyraldehyde

Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient (Koc): 5.09 Estimated.

1,4-Dioxane

Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient (Koc): 1.23 Estimated.

Ethanol

Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient (Koc): 1.0 Estimated.

Triethylene glycol monobutyl ether

Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient (Koc): 10 Estimated.

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.

14. TRANSPORT INFORMATION

DOT

Proper shipping name	Alcohols, n.o.s.(Butanol, 1,4-Dioxane)
UN number	UN 1987
Class	3
Packing group	III
Reportable Quantity	Butanol, 1,4-Dioxane

Classification for SEA transport (IMO-IMDG):

Proper shipping name	ALCOHOLS, N.O.S.(Butanol, 1,4-Dioxane)
UN number	UN 1987
Class	3
Packing group	III
Marine pollutant	No
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	Alcohols, n.o.s.(Butanol, 1,4-Dioxane)
UN number	UN 1987
Class	3
Packing group	III

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

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Flammable (gases, aerosols, liquids, or solids)
Hazard not otherwise classified (physical hazards)
Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation
Carcinogenicity
Specific target organ toxicity (single or repeated exposure)

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

This product contains the following substances which are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and which are listed in 40 CFR 372.

Components	CASRN
Butanol	71-36-3
Ethylene glycol monobutyl ether	111-76-2
Diethylene glycol monobutyl ether	112-34-5
Triethylene glycol monobutyl ether	143-22-6

Acetaldehyde	75-07-0
Butyraldehyde	123-72-8
1,4-Dioxane	123-91-1

Pennsylvania Worker and Community Right-To-Know Act:

The following chemicals are listed because of the additional requirements of Pennsylvania law:

Components	CASRN
Ethylene glycol monobutyl ether	111-76-2
Butyl ether	142-96-1
1,4-Dioxane	123-91-1
Ethanol	64-17-5

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

WARNING: This product contains a chemical(s) known to the State of California to cause cancer.

Components	CASRN
Acetaldehyde	75-07-0
1,4-Dioxane	123-91-1
Ethanol	64-17-5

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

WARNING: This product contains a chemical(s) known to the State of California to cause birth defects or other reproductive harm.

Components	CASRN
Ethanol	64-17-5

United States TSCA Inventory (TSCA)

All components of this product are in compliance with the inventory listing requirements of the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

16. OTHER INFORMATION

Product Literature

Additional information on this product may be obtained by calling your sales or customer service contact. Additional information on this and other products may be obtained by visiting our web page.

Hazard Rating System**NFPA**

Health	Flammability	Instability
2	3	0

Revision

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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)
ACGIH BEI	ACGIH - Biological Exposure Indices (BEI)
C	Ceiling limit
CAL PEL	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
Dow IHG	Dow Industrial Hygiene Guideline
OSHA Z-1	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
PEL	Permissible exposure limit
SKIN	Absorbed via skin
STEL	Short-term exposure limit
TWA	Time weighted average
US WEEL	USA. Workplace Environmental Exposure Levels (WEEL)

Full text of other abbreviations

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; 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; HMIS - Hazardous Materials Identification System; 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; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; 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; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance 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

Information Source and References

This SDS is prepared by Product Regulatory Services and Hazard Communications Groups from information supplied by internal references within our company.

THE DOW CHEMICAL COMPANY urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

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