

(R)-(+)-Glycidol

sc-253406



The Power to Question

Material Safety Data Sheet

Hazard Alert Code
Key:

EXTREME

HIGH

MODERATE

LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

(R)-(+)-Glycidol

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800

EMERGENCY

ChemWatch

Within the US & Canada: 877-715-9305

Outside the US & Canada: +800 2436 2255

(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS

C3-H6-O2, "1-propanol, 2, 3-epoxy-", "epihydrin alcohol", "2, 3-epoxypropanol", "2, 3-epoxy-1-propanol", glycide, "glycidyl alcohol", "3-hydroxy-1, 2-epoxypropane", "methanol, oxiranyl-", oxiranemethanol, "3-hydroxypropylene oxide", NCI-C55549, epoxide

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

| | Min | Max |
|--------------|-----|-----|
| Flammability | 1 | |
| Toxicity | 3 | |
| Body Contact | 3 | |
| Reactivity | 3 | |
| Chronic | 3 | |

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4



CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Risk of explosion by shock, friction, fire or other sources of ignition.

Toxic by inhalation.

Causes burns.

Risk of serious damage to eyes.

May cause CANCER.

May impair fertility.

Possible risk of irreversible effects.

Harmful in contact with skin and if swallowed.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

■ Ingestion of glycidol may result in liver and renal damage.

Rats receiving high doses of glycidol showed oedema and degeneration of the epididymal stroma, atrophy of the testes and granulomatous inflammation of the epididymis.

■ The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.

EYE

■ If applied to the eyes, this material causes severe eye damage.

■ Application of a drop of pure glycidol to the eye of rabbits caused severe but reversible damage to the cornea.

■ The material can produce chemical burns to the eye following direct contact.

Vapors or mists may be extremely irritating.

SKIN

■ Skin contact with the material may be harmful; systemic effects may result following absorption.

■ Open cuts, abraded or irritated skin should not be exposed to this material.

■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.

Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

■ Absorption of glycidol into the body may cause effects on blood, depression of the central nervous system, and weight loss.

Skin exposure in animal testing caused only moderate irritation after a single application, but severe application after repeated exposure.

■ The material can produce chemical burns following direct contact with the skin.

■ The material may cause moderate inflammation of the skin either following direct contact or after a delay of some time.

Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering.

INHALED

■ Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may produce toxic effects; these may be fatal.

■ The material can cause respiratory irritation in some persons.

The body's response to such irritation can cause further lung damage.

■ Inhalation of vapors may cause drowsiness and dizziness.

This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of co-ordination, and vertigo.

■ Inhalation of quantities of liquid mist may be extremely hazardous, even lethal due to spasm, extreme irritation of larynx and bronchi, chemical pneumonitis and pulmonary oedema.

■ Inhalation of high concentrations of gas/vapor causes lung irritation with coughing and nausea, central nervous depression with headache and dizziness, slowing of reflexes, fatigue and inco-ordination.

■ Inhalation of glycidol may cause reversible blood and marrow loss.

Vapor exposure by rats and mice produces pneumonitis and emphysema.

CHRONIC HEALTH EFFECTS

■ Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.

Strong evidence exists that this substance may cause irreversible mutations (though not lethal) even following a single exposure.

There is ample evidence that this material can be regarded as being able to cause cancer in humans based on experiments and other information.

Ample evidence exists from experimentation that reduced human fertility is directly caused by exposure to the material.

Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

There is some evidence that inhaling this product is more likely to cause a sensitization reaction in some persons compared to the general population.

When glycidol was administered by gavage to rats and mice clear evidence of carcinogenicity was found in both sexes.

Testicular atrophy was found in rats receiving 300 mg/kg in both 16-day and 13-week studies and in mice receiving 19 mg/kg for 13-weeks.

A two-year gavage study produced clear evidence of carcinogenic activity in male rats based on an increased incidence of mesotheliomas of the tunica vaginalis, fibroadenomas of the mammary gland, gliomas of the brain and neoplasms of the forestomach, intestine, skin, Zymbal gland, and thyroid gland.

The epoxide group is an alkylating agent and thus destroys nucleotides within the cell. This may cause cancer.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

| NAME | CAS RN | % |
|----------------------------------|------------|-----|
| (R)-(+)-Glycidol | 57044-25-4 | >98 |
| commercial product may contain | | |
| diglycidyl ether | 2238-07-5 | 0.2 |

Section 4 - FIRST AID MEASURES

SWALLOWED

- For advice, contact a Poisons Information Centre or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

EYE

If this product comes in contact with the eyes

- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.

SKIN

If skin or hair contact occurs

- Immediately flush body and clothes with large amounts of water, using safety shower if available.
- Quickly remove all contaminated clothing, including footwear.
- Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre.
- Transport to hospital, or doctor.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Inhalation of vapors or aerosols (mists, fumes) may cause lung oedema.
- Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs).
- As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete rest (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested.
- Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered.

NOTES TO PHYSICIAN

- for corrosives

BASIC TREATMENT

- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary oedema .

for poisons (where specific treatment regime is absent)

BASIC TREATMENT

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Section 5 - FIRE FIGHTING MEASURES

| | |
|----------------------------|----------------|
| Vapor Pressure (mmHg) | 0.9 @ 25 C |
| Upper Explosive Limit (%) | Not available. |
| Specific Gravity (water=1) | 1.117 |
| Lower Explosive Limit (%) | Not available. |

EXTINGUISHING MEDIA

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Use fire fighting procedures suitable for surrounding area.

When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 800 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Combustible.
- Slight fire hazard when exposed to heat or flame.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- On combustion, may emit toxic fumes of carbon monoxide (CO).

Combustion products include carbon dioxide (CO₂), other pyrolysis products typical of burning organic material.

May emit corrosive fumes.

FIRE INCOMPATIBILITY

- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.
- Check regularly for spills and leaks.
- Clean up all spills immediately.
- Avoid breathing vapors and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.

MAJOR SPILLS

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full body protective clothing with breathing apparatus.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- DO NOT allow clothing wet with material to stay in contact with skin
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- WARNING To avoid violent reaction, ALWAYS add material to water and NEVER water to material.

RECOMMENDED STORAGE METHODS

- Lined metal can, lined metal pail/ can.

- Plastic pail.
- Polyliner drum.
- Packing as recommended by manufacturer.

For low viscosity materials

- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.

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STORAGE REQUIREMENTS

- Polymerization may occur slowly at room temperature.
- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

| Source | Material | TWA ppm | TWA mg/m ³ | STEL ppm | STEL mg/m ³ | Peak ppm | Peak mg/m ³ | TWA F/CC | Notes |
|---|--|------------|--------------------------|-------------|---------------------------|-------------|---------------------------|-------------|---------------------------------------|
| US NIOSH Recommended Exposure Limits (RELs) | glycidol () | 25 | 75 | | | | | | |
| Canada - Alberta Occupational Exposure Limits | glycidol (2,3-Epoxy- 1-propanol (Glycidol)) | 2 | 6.1 | | | | | | |
| Canada - British Columbia Occupational Exposure Limits | glycidol (Glycidol) | 2 | | | | | | | 2A |
| Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English) | glycidol (Glycidol) | 25 | 76 | | | | | | |
| US OSHA Permissible Exposure Levels (PELs) - Table Z1 | glycidol (Glycidol) | 50 | 150 | | | | | | |
| US ACGIH Threshold Limit Values (TLV) | glycidol (Glycidol) | 2 | | | | | | | TLV® Basis URT, eye, & skin irr |
| US - Minnesota Permissible Exposure Limits (PELs) | glycidol (Glycidol) | 25 | 75 | | | | | | |
| US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants | glycidol (Glycidol) | 25 | 75 | | | | | | |
| US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for | glycidol (Glycidol) | 50 | 150 | | | | | | |

Air Contaminants

| | | | | | |
|---|---|----|-----|----|---|
| US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants | glycidol (Glycidol) | 25 | 75 | | |
| US - California Permissible Exposure Limits for Chemical Contaminants | glycidol (Glycidol; 2,3-epoxy- 1-propanol) | 2 | 6.1 | | |
| US - Idaho - Limits for Air Contaminants | glycidol (Glycidol) | 50 | 150 | | |
| Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits | glycidol (Glycidol) | 2 | | 4 | |
| US - Hawaii Air Contaminant Limits | glycidol (Glycidol) | 25 | 75 | | |
| US - Alaska Limits for Air Contaminants | glycidol (Glycidol) | 25 | 75 | | |
| Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances | glycidol (2,3-Epoxy- 1-propanol, see Glycidol) | 50 | 150 | 75 | 225 |
| Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances | glycidol (Glycidol (2,3-Epoxy- 1-propanol)) | 50 | 150 | 65 | 190 |
| US - Washington Permissible exposure limits of air contaminants | glycidol (2, 3-Epoxy- 1-propanol (Glycidol)) | 25 | | 38 | |
| US - Michigan Exposure Limits for Air Contaminants | glycidol (Glycidol) | 25 | 75 | | |
| Canada - Nova Scotia Occupational Exposure Limits | glycidol (Glycidol) | 2 | | | TLV Basis upper respiratory tract, eye & skin irritation |
| US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants | glycidol (Glycidol) | 50 | 150 | | |
| US - Oregon Permissible Exposure Limits (Z-1) | glycidol (Glycidol) | 50 | 150 | | |

| | | | | | | |
|---|--|--------|--------|-----|-----|---|
| Canada - Northwest Territories Occupational Exposure Limits (English) | glycidol (2,3-epoxy-1-propanol (Glycidol)) | 25 | 76 | 100 | 303 | |
| Canada - Prince Edward Island Occupational Exposure Limits | glycidol (Glycidol) 2 | | | | | TLV® Basis URT, eye, & skin irr |
| Canada - Alberta Occupational Exposure Limits | diglycidyl ether (Diglycidyl ether) | 0.1 | 0.5 | | | |
| Canada - British Columbia Occupational Exposure Limits | diglycidyl ether (Diglycidyl ether (DGE) Revised 2007) | 0.01 | | | | R |
| US NIOSH Recommended Exposure Limits (RELs) | diglycidyl ether () | 0.1 | 0.5 | | | Ca See Appendix A |
| US OSHA Permissible Exposure Levels (PELs) - Table Z1 | diglycidyl ether (Diglycidyl ether (DGE)) | | | 0.5 | 2.8 | |
| US ACGIH Threshold Limit Values (TLV) | diglycidyl ether (Diglycidyl ether (DGE)) | 0.01 | | | | TLV® Basis Eye & skin irr; male repro dam |
| US - Minnesota Permissible Exposure Limits (PELs) | diglycidyl ether (Diglycidyl ether (DGE)) | 0.1 | 0.5 | | | |
| US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants | diglycidyl ether (Diglycidyl ether (DGE)) | (C)0.5 | (C)2.8 | | | |
| US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants | diglycidyl ether (Diglycidyl ether (DGE)) | 0.1 | 0.5 | | | |
| US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants | diglycidyl ether (Diglycidyl ether (DGE)) | 0.1 | 0.5 | | | |
| US - California Permissible Exposure Limits for Chemical Contaminants | diglycidyl ether (Diglycidyl ether; DGE; bis(2,3-epoxypropyl) ether) | 0.1 | 0.5 | | | |
| US - Idaho - Limits for Air Contaminants | diglycidyl ether (Diglycidyl ether (DGE)) | | | 0.5 | 2.8 | |

| | | | | | | |
|--|---|------|------|-----|-----|--|
| Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English) | diglycidyl ether (Diglycidyl ether (DGE)) | 0.1 | 0.53 | | | |
| US - Hawaii Air Contaminant Limits | diglycidyl ether (Diglycidyl ether (DGE)) | 0.1 | 0.5 | | | |
| US - Alaska Limits for Air Contaminants | diglycidyl ether (Diglycidyl ether (DGE)) | 0.1 | 0.5 | | | |
| Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits | diglycidyl ether (Diglycidyl ether (DGE)) | 0.1 | | 0.3 | | |
| Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances | diglycidyl ether (Diglycidyl ether (DGE)) | 0.5 | 2.8 | - | - | |
| US - Washington Permissible exposure limits of air contaminants | diglycidyl ether (Diglycidyl ether (DGE)) | 0.1 | | 0.3 | | |
| US - Michigan Exposure Limits for Air Contaminants | diglycidyl ether (Diglycidyl ether (DGE)) | 0.1 | 0.5 | | | |
| Canada - Prince Edward Island Occupational Exposure Limits | diglycidyl ether (Diglycidyl ether (DGE)) | 0.01 | | | | TLV® Basis Eye & skin irr; male repro dam |
| US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants | diglycidyl ether (Diglycidyl ether (DGE)) | | | 0.5 | 2.8 | |
| Canada - Nova Scotia Occupational Exposure Limits | diglycidyl ether (Diglycidyl ether [DGE]) | 0.01 | | | | TLV Basis Eye & skin irritation; male reproductive system damage |
| US - Oregon Permissible Exposure Limits (Z-1) | diglycidyl ether (Diglycidyl ether (DGE)) | | | 0.5 | 2.8 | |
| Canada - Northwest Territories Occupational Exposure Limits (English) | diglycidyl ether (Diglycidyl ether (DGE)) | 0.1 | 0.5 | 0.3 | 1.5 | |

PERSONAL PROTECTION



RESPIRATOR

- Type A-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

EYE

- Safety glasses with unperforated side shields may be used where continuous eye protection is desirable, as in laboratories; spectacles are not sufficient where complete eye protection is needed such as when handling bulk-quantities, where there is a danger of splashing, or if the material may be under pressure
- Chemical goggles whenever there is a danger of the material coming in contact with the eyes; goggles must be properly fitted
- Full face shield (20 cm, 8 in minimum) may be required for supplementary but never for primary protection of eyes; these afford face protection.
- Alternatively a gas mask may replace splash goggles and face shields.

HANDS/FEET

- Elbow length PVC gloves
- When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity
- Neoprene gloves

OTHER

- Employees working with confirmed human carcinogens should be provided with, and be required to wear, clean, full body protective clothing (smocks, coveralls, or long-sleeved shirt and pants), shoe covers and gloves prior to entering the regulated area. [AS/NZS ISO 65292006 or national equivalent]
- Employees engaged in handling operations involving carcinogens should be provided with, and required to wear and use half-face filter-type respirators with filters for dusts, mists and fumes, or air purifying canisters or cartridges. A respirator affording higher levels of protection may be substituted. [AS/NZS 1715 or national equivalent]
- Emergency deluge showers and eyewash fountains, supplied with potable water, should be located near, within sight of, and on the same level with locations where direct exposure is likely.
- Prior to each exit from an area containing confirmed human carcinogens, employees should be required to remove and leave protective clothing and equipment at the point of exit and at the last exit of the day, to place used clothing and equipment in impervious containers at the point of exit for purposes of decontamination or disposal. The contents of such impervious containers must be identified with suitable labels. For maintenance and decontamination activities, authorized employees entering the area should be provided with and required to wear clean, impervious garments, including gloves, boots and continuous-air supplied hood.
- Prior to removing protective garments the employee should undergo decontamination and be required to shower upon removal of the garments and hood.
- Overalls.
- PVC Apron.
- PVC protective suit may be required if exposure severe.
- Eyewash unit.

ENGINEERING CONTROLS

■ Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

The basic types of engineering controls are

Process controls which involve changing the way a job activity or process is done to reduce the risk.

Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Does not mix with water.

Sinks in water.

Corrosive.

Toxic or noxious vapors/gas.

| | | | |
|---------------------------|------------------|--------------------------------|-----------------|
| State | LIQUID | Molecular Weight | 74.08 |
| Melting Range (°F) | Not available. | Viscosity | Not Available |
| Boiling Range (°F) | 142- 144 (15 mm) | Solubility in water (g/L) | Partly miscible |
| Flash Point (°F) | 178 | pH (1% solution) | Not available. |
| Decomposition Temp (°F) | Not Available | pH (as supplied) | Not applicable |
| Autoignition Temp (°F) | 780 | Vapor Pressure (mmHg) | 0.9 @ 25 C |
| Upper Explosive Limit (%) | Not available. | Specific Gravity (water=1) | 1.117 |
| Lower Explosive Limit (%) | Not available. | Relative Vapor Density (air=1) | >1 |
| Volatile Component (%vol) | Not available | Evaporation Rate | Not available |

APPEARANCE

Liquid; does not mix well with water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

STORAGE INCOMPATIBILITY

- Glycidol
 - may polymerize or exothermically decompose when in contact with strong acids, caustic, chemically active metals (aluminium, copper, zinc, etc.), metal salts, trichloroethylene, especially in the presence of heat
 - is incompatible with nitrates
 - attacks some plastics, rubber and coatings
 - High pressure, bench scale experiments, involving 1,2-epoxides require a well-designed agitated reactor, with adequate provision for reaction heat removal and emergency pressure relief, prevention of back-flow from the reactor to oxide storage vessels, avoidance of a reaction atmosphere of 100% ethylene oxide vapor and/or presence of air and the avoidance of the use of excess oxides.
 - A range of exothermic decomposition energies for epoxides is given as 45-80 kJ/mol. The relationship between energy of decomposition and processing hazards has been the subject of discussion; it is suggested that values of energy released per unit of mass, rather than on a molar basis (J/g) be used in the assessment. For example, in "open vessel processes" (with man-hole size openings, in an industrial setting), substances with exothermic decomposition energies below 500 J/g are unlikely to present a danger, whilst those in "closed vessel processes" (opening is a safety valve or bursting disk) present some danger where the decomposition energy exceeds 150 J/g.

BRETHERRICK Handbook of Reactive Chemical Hazards, 4th Edition.

- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous

Epoxides

- are highly reactive with acids, bases, and oxidizing and reducing agents.
- react, possibly violently, with anhydrous metal chlorides, ammonia, amines and group 1 metals.
- may polymerize in the presence of peroxides or heat - polymerization may be violent
- may react, possibly violently, with water in the presence of acids and other catalysts.
- Segregate from alcohol, water.
- Avoid reaction with oxidizing agents

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

glycidol

TOXICITY AND IRRITATION

- Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound.

The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

WARNING This substance has been classified by the IARC as Group 2A Probably Carcinogenic to Humans.
Tenth Annual Report on Carcinogens Substance anticipated to be Carcinogen
[National Toxicology Program U.S. Dep.

CARCINOGEN

| | | | |
|---|---|---------------------|--|
| Glycidol (NB Overall evaluation upgraded to Group 2A with supporting evidence from other relevant data) | International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs | Group | 2A |
| Glycidol | US ACGIH Threshold Limit Values (TLV) - Carcinogens | Carcinogen Category | A3 |
| glycidol | US - Rhode Island Hazardous Substance List | IARC | |
| 2,3-EPOXY 1-PROPANOL | US Environmental Defense Scorecard Recognized Carcinogens | Reference(s) | P65 |
| 2,3-EPOXY 1-PROPANOL | US Environmental Defense Scorecard Suspected Carcinogens | Reference(s) | P65 |
| glycidol | US - Maine Chemicals of High Concern List | Carcinogen | A3 |
| glycidol | US - Maine Chemicals of High Concern List | Carcinogen | CA Prop 65; IARC; NTP 11th ROC |
| glycidol | Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens | Notes | TLV® Basis URT, eye, & skin irr |
| glycidol | Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens | Notes | TLV Basis upper respiratory tract, eye & skin irritation |
| Diglycidyl ether (DGE) | US ACGIH Threshold Limit Values (TLV) - Carcinogens | Carcinogen Category | A4 |
| diglycidyl ether | US - Rhode Island Hazardous Substance List | IARC | |
| diglycidyl ether | US - Maine Chemicals of High Concern List | Carcinogen | A4 |
| diglycidyl ether | Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens | Notes | TLV® Basis Eye & skin irr; male repro dam |
| diglycidyl ether | Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens | Notes | TLV Basis Eye & skin irritation; male reproductive system damage |
| Diallyl ether dioxide; DGE; Di(2,3-epoxypropyl) ether; 2-Epoxypropyl ether; bis(2,3-Epoxypropyl) ether | US NIOSH Recommended Exposure Limits (RELs) - Carcinogens | Notes | Ca See Appendix A |

REPROTOXIN

| | | | |
|------------------|---|--------------------------------|---|
| diglycidyl ether | ILO Chemicals in the electronics industry that have toxic effects on reproduction | Reduced fertility or sterility | A |
| diglycidyl ether | US - California Proposition 65 - Reproductive Toxicity | NSRL or MADL (µg/day) | |

Section 12 - ECOLOGICAL INFORMATION

This material and its container must be disposed of as hazardous waste.

Ecotoxicity

| Ingredient | Persistence: Water/Soil | Persistence: Air | Bioaccumulation | Mobility |
|------------------|-------------------------|-------------------|-----------------|----------|
| diglycidyl ether | HIGH | No Data Available | LOW | HIGH |

GESAMP/EHS COMPOSITE LIST - GESAMP Hazard Profiles

| Name / EHS Cas No / RTECS No | TRN | A1a | A1b | A1 | A2 | B1 | B2 | C1 | C2 | C3 | D1 | D2 | D3 | E1 | E2 | E3 |
|---|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Alcoholic beverages / CAS:556-52-5 / Legend: EHS=EHS Number (EHS=GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships) NRT=Net Register Tonnage, A1a=Bioaccumulation log Pow, A1b=Bioaccumulation BCF, A1=Bioaccumulation, A2=Biodegradation, B1=Acuteaquatic toxicity LC/ECIC50 (mg/l), B2=Chronic aquatic toxicity NOEC (mg/l), C1=Acute mammalian oral toxicity LD50 (mg/kg), C2=Acute mammalian dermal toxicity LD50 (mg/kg), C3=Acute mammalian inhalation toxicity LC50 (mg/kg), D1=Skin irritation & corrosion, D2=Eye irritation& corrosion, D3=Long-term health effects, E1=Tainting, E2=Physical effects on wildlife & benthic habitats, E3=Interference with coastal amenities, For column A2: R=Readily biodegradable, NR=Not readily biodegradable. For column D3: C=Carcinogen, M=Mutagenic, R=Reprotoxic, S=Sensitizing, A=Aspiration hazard, T=Target organ systemic toxicity, L=Lunginjury, N=Neurotoxic, I=Immunotoxic. For column E1: NT=Not tainting (tested), T=Tainting test positive. For column E2: Fp=Persistent floater, F=Floater, S=Sinking substances. The numerical scales start from 0 (no hazard), while higher numbers reflect increasing hazard. (GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships) | 293 | 85 | 0 | 0 | R | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | | D | 1 |

Legend: EHS=EHS Number (EHS=GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships) NRT=Net Register Tonnage, A1a=Bioaccumulation log Pow, A1b=Bioaccumulation BCF, A1=Bioaccumulation, A2=Biodegradation, B1=Acuteaquatic toxicity LC/ECIC50 (mg/l), B2=Chronic aquatic toxicity NOEC (mg/l), C1=Acute mammalian oral toxicity LD50 (mg/kg), C2=Acute mammalian dermal toxicity LD50 (mg/kg), C3=Acute mammalian inhalation toxicity LC50 (mg/kg), D1=Skin irritation & corrosion, D2=Eye irritation& corrosion, D3=Long-term health effects, E1=Tainting, E2=Physical effects on wildlife & benthic habitats, E3=Interference with coastal amenities, For column A2: R=Readily biodegradable, NR=Not readily biodegradable. For column D3: C=Carcinogen, M=Mutagenic, R=Reprotoxic, S=Sensitizing, A=Aspiration hazard, T=Target organ systemic toxicity, L=Lunginjury, N=Neurotoxic, I=Immunotoxic. For column E1: NT=Not tainting (tested), T=Tainting test positive. For column E2: Fp=Persistent floater, F=Floater, S=Sinking substances. The numerical scales start from 0 (no hazard), while higher numbers reflect increasing hazard. (GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships)

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information

Corrosivity characteristic: use EPA hazardous waste number D002 (waste code C)

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorized landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable

treatment or disposal facility can be identified.

- Treat and neutralise at an approved treatment plant. Treatment should involve: Neutralisation followed by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION

DOT:

| | | | |
|---|--------|---|------------------|
| Symbols: | None | Hazard class or Division: | 8 |
| Identification Numbers: | UN2922 | PG: | II |
| Label Codes: | 8, 6.1 | Special provisions: | B3, IB2, T7, TP2 |
| Packaging: Exceptions: | 154 | Packaging: Non-bulk: | 202 |
| Packaging: Exceptions: | 154 | Quantity limitations: Passenger aircraft/rail: | 1 L |
| Quantity Limitations: Cargo aircraft only: | 30 L | Vessel stowage: Location: | B |
| Vessel stowage: Other: | 40 | | |

Hazardous materials descriptions and proper shipping names:
Corrosive liquids, toxic, n.o.s.

Air Transport IATA:

| | | | |
|---------------------|------|--------------------|-----|
| ICAO/IATA Class: | 8 | ICAO/IATA Subrisk: | 6.1 |
| UN/ID Number: | 2922 | Packing Group: | II |
| Special provisions: | A3 | | |

Cargo Only

| | | | |
|---|------|---|-------|
| Packing Instructions: | 855 | Maximum Qty/Pack: | 30 L |
| Passenger and Cargo | | Passenger and Cargo | |
| Packing Instructions: | 851 | Maximum Qty/Pack: | 1 L |
| Passenger and Cargo Limited Quantity | | Passenger and Cargo Limited Quantity | |
| Packing Instructions: | Y840 | Maximum Qty/Pack: | 0.5 L |

Shipping name:CORROSIVE LIQUID, TOXIC, N.O.S.(contains glycidol)

Maritime Transport IMDG:

| | | | |
|-------------|---------|---------------------|-----|
| IMDG Class: | 8 | IMDG Subrisk: | 6.1 |
| UN Number: | 2922 | Packing Group: | II |
| EMS Number: | F-A,S-B | Special provisions: | 274 |

Limited Quantities: 1 L

Shipping name:CORROSIVE LIQUID, TOXIC, N.O.S.(contains glycidol)

Section 15 - REGULATORY INFORMATION

glycidol (CAS: 556-52-5,57044-25-4,60456-23-7) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada CEPA Environmental Registry Substance Lists - Other DSL substances that are priorities for human health (English)","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs","International Chemical Secretariat (ChemSec) SIN List (*Substitute It Now!)","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for Which Production, Use, or Other Presence Must be Reported","US - California Occupational

Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - California Proposition 65 - Priority List for the Development of NSRLs for Carcinogens", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "US - Maine Chemicals of High Concern List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances (English)", "US - North Dakota Air Pollutants - Guideline Concentrations", "US - Oregon Permissible Exposure Limits (Z-1)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Permissible exposure limits of air contaminants", "US - Wisconsin Control of Hazardous Pollutants - Emission Thresholds, Standards and Control Requirements (Hazardous Air Contaminants)", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Master Testing List - Index I Chemicals Listed", "US National Toxicology Program (NTP) 12th Report Part A Known to be Human Carcinogens", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

Regulations for ingredients

diglycidyl ether (CAS: 2238-07-5) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits", "Canada - British Columbia Occupational Exposure Limits", "Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "US - Alaska Limits for Air Contaminants", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - California Proposition 65 - Reproductive Toxicity", "US - Connecticut Hazardous Air Pollutants", "US - Delaware Pollutant Discharge Requirements - Reportable Quantities", "US - Hawaii Air Contaminant Limits", "US - Idaho - Limits for Air Contaminants", "US - Massachusetts Oil & Hazardous Material List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances (English)", "US - North Dakota Air Pollutants - Guideline Concentrations", "US - Oregon Permissible Exposure Limits (Z-1)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Permissible exposure limits of air contaminants", "US - Wisconsin Control of Hazardous Pollutants - Substances of Concern for Sources of Incidental Emissions of Hazardous Air Contaminants", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Master Testing List - Index I Chemicals Listed", "US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US SARA Section 302 Extremely Hazardous Substances", "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory", "US TSCA Section 8 (d) - Health and Safety Data Reporting"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Cumulative effects may result following exposure*.
 - Possible respiratory sensitizer*.
 - Vapors potentially cause drowsiness and dizziness*.
- * (limited evidence).

Denmark Advisory list for selfclassification of dangerous substances

| Substance | CAS | Suggested codes |
|------------------|-------------|-----------------------------------|
| diglycidyl ether | 2238- 07- 5 | Carc3; R40 Xn; R22 R43 Xi; R38 |

Ingredients with multiple CAS Nos

| Ingredient Name | CAS |
|-----------------|----------------------------------|
| glycidol | 556-52-5, 57044-25-4, 60456-23-7 |

- Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee can be found at:
www.chemwatch.net/references.

- The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings.

- For detailed advice on Personal Protective Equipment, refer to the following U.S. Regulations and Standards:
 OSHA Standards - 29 CFR:
 1910.132 - Personal Protective Equipment - General requirements

1910.133 - Eye and face protection
1910.134 - Respiratory Protection
1910.136 - Occupational foot protection
1910.138 - Hand Protection
Eye and face protection - ANSI Z87.1
Foot protection - ANSI Z41
Respirators must be NIOSH approved.

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