

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 1 of 18

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

EPICHLOROHYDRIN

OTHER NAMES

C3-H5-Cl-O, O-CH₂-CH-CH₂Cl, O-CH₂-CH-CH₂Cl, "3-chloro-1, 2-epoxypropane", "3-chloro-1, 2-epoxypropane", epi-chlorohydrin, "(chloromethyl)ethylene oxide", chloromethyloxirane, 2-(chloromethyl)oxirane, 2-(chloromethyl)oxirane, "chloropropylene oxide", "gamma-chloropropylene oxide", "3-chloro-1, 2-propylene oxide", "3-chloro-1, 2-propylene oxide", alpha-epichlorohydrin, epichlorohydrin, "1, 2-epoxy-3-chloropropane", "1, 2-epoxy-3-chloropropane", "2, 3-epoxypropyl chloride", "2, 3-epoxypropyl chloride", "glycerol epichlorohydrin", "oxirane, (chloromethyl)-", "oxirane, 2-(chloromethyl)", "oxirane, 2-(chloromethyl)"

PROPER SHIPPING NAME

EPICHLOROHYDRIN

PRODUCT USE

DANGEROUS POISON.

Major raw material for epoxy and phenoxy resins, manufacture of glycerol, curing propylene-based rubbers, solvent for natural and synthetic resins gums, cellulose esters and ethers, paints, varnishes, nail enamels.

Also used as solvent for high wet strength resins for paper industry and as cement for celluloid.

SUPPLIER

Company: S D FINE- CHEM LIMITED

Address:

315- 317, T.V. INDUSTRIAL ESTATE,
248, WORLI,

MUMBAI- 400030.INDIA.

technical@sdfine.com

Telephone: 91- 22- 24959898

Telephone: 91- 22- 24959899

Fax: 91- 22- 24937232

HAZARD RATINGS

continued...

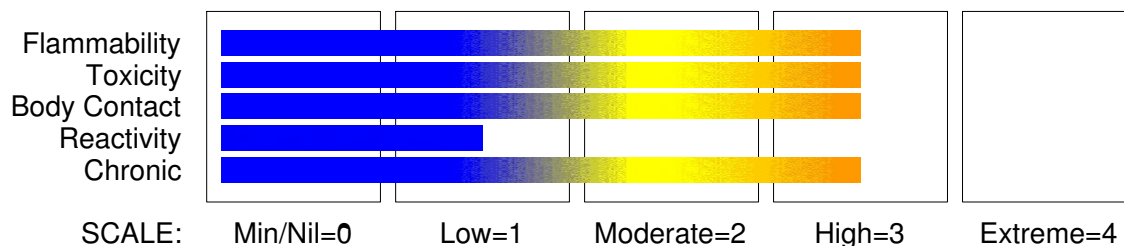
1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 2 of 18

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION



Section 2 - HAZARDS IDENTIFICATION

GHS Classification

Acute Toxicity (Dermal) Category 3
Acute Toxicity (Inhalation) Category 2
Acute Toxicity (Oral) Category 3
Carcinogen Category 1B
Flammable Liquid Category 3
Skin Corrosion/Irritation Category 1C
Skin Sensitizer Category 1



EMERGENCY OVERVIEW

HAZARD

DANGER
Determined by using GHS criteria:
H226 H330 H311 H301 H317 H350 H314
Flammable liquid and vapour
Fatal if inhaled
Toxic in contact with skin
Toxic if swallowed
May cause allergic skin reaction
May cause CANCER
Causes severe skin burns and eye damage

PRECAUTIONARY STATEMENTS

Prevention

Wear protective gloves/clothing
Do not breathe dust or mist.
Contaminated clothing should not be allowed out of the workplace.
Do not eat, drink or smoke when using this product.
Wash hands thoroughly after handling.
Wash thoroughly after handling.
Use only outdoors or in a well ventilated area.

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 3 of 18

Section 2 - HAZARDS IDENTIFICATION

Wear respiratory protection.
Do not breathe dust/fume/gas/mist/vapours/spray.
Wear protective gloves/clothing and eye/face protection.
Avoid breathing dust/fume/gas/mist/vapours/spray.
Ground/bond container and receiving equipment.
Wear protective gloves and eye/face protection.
Use explosion-proof electrical/ventilating/lighting/equipment
Take precautionary measures against static discharge
Keep container tightly closed.
Keep away from heat/sparks/open flame - No smoking.
Use personal protective equipment as required.
Do not handle until all safety precautions have been read and understood.
Obtain special instructions before use.
Use only non-sparking tools.

Response

If skin irritation or rash occurs, seek medical advice/attention.
IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
If exposed or concerned: Get medical attention advice.
Wash contaminated clothing before reuse.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
If on skin or hair: remove/take off immediately all contaminated clothing. Rinse with water/shower.
Call a POISON CENTER or doctor/physician if you feel unwell.
Remove/Take off immediately all contaminated clothing
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
Specific treatment: refer to Label or MSDS.
Immediately call a POISON CENTER or doctor/physician.
Wash/Decontaminate removed clothing before reuse.
IF ON SKIN: Gently wash with plenty of soap and water.

Storage

Store locked up.

Disposal

Dispose of contents and container in accordance with relevant legislation.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
epichlorohydrin	106-89-8	> 99

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

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 4 of 18

Section 4 - FIRST AID MEASURES

possible) to maintain open airway and prevent aspiration.

- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Transport to hospital or doctor without delay.

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.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

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.
- Transport to hospital, or doctor, without delay.

NOTES TO PHYSICIAN

Treat symptomatically.

For poisons (where specific treatment regime is absent):

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 .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures .
- DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.

ADVANCED TREATMENT

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 5 of 18

Section 4 - FIRST AID MEASURES

- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolaemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary oedema.
- Hypotension with signs of hypovolaemia requires the cautious administration of fluids. Fluid overload might create complications.

• Treat seizures with diazepam.

• Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.

EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994.

Material may produce delayed skin burns and these may be second degree burns with little or no warning.

Liver and kidney function should be followed after a significant exposure.

Lung function should be assessed following a significant single or intermittent inhalation exposure.

If burn is present, treat as any thermal burn, after decontamination.

No special antidote.

Supportive care. Treatment based on judgement of the physician in response to reactions of the patient. [CCOHS, Dow]

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use fire fighting procedures suitable for surrounding area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD

- Liquid and vapour are highly flammable.
 - Severe fire hazard when exposed to heat, flame and/or oxidisers.
 - Vapour may travel a considerable distance to source of ignition.
 - 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 monoxide (CO), carbon dioxide (CO₂), hydrogen chloride, phosgene, other pyrolysis products typical of burning organic material.
- May emit poisonous fumes.

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 6 of 18

Section 5 - FIRE FIGHTING MEASURES

FIRE INCOMPATIBILITY

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

Personal Protective Equipment

- Breathing apparatus.
- Gas tight chemical resistant suit.
- Limit exposure duration to 1 BA set 30 mins.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb small quantities with vermiculite or other absorbent material.
- Wipe up.
- Collect residues in a flammable waste container.

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.
- Prevent, by any means available, spillage from entering drains or water course.
- No smoking, naked lights or ignition sources.
- Increase ventilation.
- Stop leak if safe to do so.
- Water spray or fog may be used to disperse vapour.
- Contain or absorb spill with sand, earth or vermiculite.
- Use only spark-free shovels and explosion proof equipment.
- Collect recoverable product into labelled containers for recycling.
- Collect solid residues and seal in labelled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

epichlorohydrin 100 ppm

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

epichlorohydrin 20 ppm

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 7 of 18

Section 6 - ACCIDENTAL RELEASE MEASURES

other than mild, transient adverse effects without perceiving a clearly defined odour is:
epichlorohydrin 2 ppm

The threshold concentration below which most people will experience no appreciable risk of health effects:
epichlorohydrin 2 ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according to the following cutoffs

Very Toxic (T+)	$\geq 0.1\%$	Toxic (T)	$\geq 3.0\%$
R50	$\geq 0.25\%$	Corrosive (C)	$\geq 5.0\%$
R51	$\geq 2.5\%$		
else	$\geq 10\%$		

where percentage is percentage of ingredient found in the mixture

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



X X X X X +

+: May be stored together

O: May be stored together with specific precautions

X: Must not be stored together

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

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.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
- Containers, even those that have been emptied, may contain explosive vapours.
- Do NOT cut, drill, grind, weld or perform similar operations on or near containers.

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 8 of 18

Section 7 - HANDLING AND STORAGE

SUITABLE CONTAINER

- Lined metal can, lined metal pail/ can.
- Plastic pail.
- Polyliner drum.
- Packing as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks.

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.

For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.):

- Removable head packaging;
- Cans with friction closures and
- low pressure tubes and cartridges may be used.

-

Where combination packages are used, and the inner packages are of glass, there must be sufficient inert cushioning material in contact with inner and outer packages *.

-

In addition, where inner packagings are glass and contain liquids of packing group I and II there must be sufficient inert absorbent to absorb any spillage *.

-

* unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

All inner and sole packagings for substances that have been assigned to Packaging Groups I or II on the basis of inhalation toxicity criteria, must be hermetically sealed.

STORAGE INCOMPATIBILITY

Avoid strong acids, bases.

Avoid reaction with oxidising agents.

STORAGE REQUIREMENTS

- Store in approved flammable liquid storage area.
- No smoking, naked lights/ignition sources.
- Keep containers securely sealed.
- Store away from incompatible materials in a cool, dry, well-ventilated area.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

EMERGENCY EXPOSURE LIMITS

Material	Revised IDLH Value (mg/m3)	Revised IDLH Value (ppm)
epichlorohydrin		75

ODOUR SAFETY FACTOR (OSF)

OSF=0.54 (EPICHLOROHYDRIN)

Exposed individuals are NOT reasonably expected to be warned, by smell, that the Exposure Standard is being exceeded.

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 9 of 18

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

Odour Safety Factor (OSF) is determined to fall into either Class C, D or E.

The Odour Safety Factor (OSF) is defined as:

$OSF = \text{Exposure Standard (TWA) ppm} / \text{Odour Threshold Value (OTV) ppm}$

Classification into classes follows:

Class	OSF	Description
A	550	Over 90% of exposed individuals are aware by smell that the Exposure Standard (TLV- TWA for example) is being reached, even when distracted by working activities
B	26- 550	As " A" for 50- 90% of persons being distracted
C	1- 26	As " A" for less than 50% of persons being distracted
D	0.18- 1	10- 50% of persons aware of being tested perceive by smell that the Exposure Standard is being reached
E	<0.18	As " D" for less than 10% of persons aware of being tested

MATERIAL DATA

Odour Threshold Value: 0.08 ppm

NOTE: Detector tubes for epichlorohydrin, measuring in excess of 5 ppm, are commercially available.

Exposure at or below the recommended TLV-TWA is thought to minimise the potential for adverse respiratory, liver, kidney effects. Epichlorohydrin has been implicated as a human skin sensitiser, hence individuals who are hypersusceptible or otherwise unusually responsive to certain chemicals may NOT be adequately protected from adverse health effects.

PERSONAL PROTECTION



EYE

- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure,

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 10 of 18

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

HANDS/FEET

Suitability and durability of glove type is dependent on usage. Factors such as:

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

are important in the selection of gloves.

Butyl rubber gloves.

When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

NOTE: The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

OTHER

- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.

GLOVE SELECTION INDEX

Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the computer-generated selection: epichlorohydrin

BUTYL	A
TEFLON	A
SARANEX- 23	B
PVA	C
VITON	C
NEOPRENE	C
PE	C
VITON/NITRILE	C

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 11 of 18

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

RESPIRATOR

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	A- AUS	-
1000	50	-	A- AUS
5000	50	Airline *	-
5000	100	-	A- 2
10000	100	-	A- 3
	100+		Airline**

* - Continuous Flow

** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

For further information consult your
Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

Local exhaust ventilation usually required. If risk of overexposure exists, wear approved respirator. Correct fit is essential to obtain adequate protection. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection.

An approved self contained breathing apparatus (SCBA) may be required in some situations. Provide adequate ventilation in warehouse or closed storage area. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:
solvent, vapours, degreasing etc., evaporating from tank (in still air).
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).

Air Speed:
0.25- 0.5 m/s (50- 100 f/min.)

0.5- 1 m/s (100- 200 f/min.)

1- 2.5 m/s (200- 500 f/min.)

2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

1: Room air currents minimal or favourable to capture

Upper end of the range

1: Disturbing room air currents

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 12 of 18

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

2: Contaminants of low toxicity or of nuisance value only.

3: Intermittent, low production.

4: Large hood or large air mass in motion

2: Contaminants of high toxicity

3: High production, heavy use

4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Highly volatile, water-white liquid with chloroform-like odour.

Slightly miscible with water (solubility 6.6% @ 25 C). Miscible with alcohol, ether, chloroform, trichloroethylene, carbon tetrachloride and most organic solvents; immiscible with petroleum hydrocarbons.

PHYSICAL PROPERTIES

Liquid.

Does not mix with water.

Sinks in water.

Toxic or noxious vapours/gas.

Molecular Weight: 92.53

Melting Range (°C): - 57

Solubility in water (g/L): Immiscible

pH (1% solution): Not applicable

Volatile Component (%vol): Not available.

Relative Vapour Density (air=1): 3.3

Lower Explosive Limit (%): 3.8

Autoignition Temp (°C): 411

State: Liquid

Boiling Range (°C): 116

Specific Gravity (water=1): 1.18 @ 20 C

pH (as supplied): Not applicable

Vapour Pressure (kPa): 1.59 @ 20 C

Evaporation Rate: 1.35 (BuAc=1)

Flash Point (°C): 33

Upper Explosive Limit (%): 21

Decomposition Temp (°C): Not Available

Viscosity: Not Available

log Kow (Prager 1995):

0.26

log Kow: 0.3

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

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

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 13 of 18

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.

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

EYE

The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.

When applied to the eye(s) of animals, the material produces severe ocular lesions which are present twenty-four hours or more after instillation.

Irritation of the eyes may produce a heavy secretion of tears (lachrymation).

SKIN

Skin contact with the material may produce toxic effects; systemic effects may result following absorption.

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

Reactions may not occur on exposure but response may be delayed with symptoms only appearing many hours later.

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.

INHALED

Evidence shows, or practical experience predicts, that the material produces irritation of the respiratory system in a substantial number of individuals following inhalation.

Inhalation of vapours or aerosols (mists, fumes), generated by the material during the course of normal handling, may produce toxic effects.

Inhalation hazard is increased at higher temperatures.

At sufficiently high doses the material may be cardiotoxic (i.e. poisonous to the heart).

At sufficiently high doses the material may be nephrotoxic (i.e. poisonous to the kidney).

At sufficiently high doses the material may be hepatotoxic (i.e. poisonous to the liver).

CHRONIC HEALTH EFFECTS

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw.

Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Gastrointestinal disturbances may also occur. Chronic exposures may result in dermatitis and/or conjunctivitis.

Practical experience shows that skin contact with the material is capable either of inducing a sensitisation reaction in a substantial number of individuals, and/or of producing a positive response in experimental animals.

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 14 of 18

Section 11 - TOXICOLOGICAL INFORMATION

On the basis, primarily, of animal experiments, the material may be regarded as carcinogenic to humans. There is sufficient evidence to provide a strong presumption that human exposure to the material may result in cancer on the basis of:

- appropriate long-term animal studies
- other relevant information.

When administered by gavage, epichlorohydrin induced carcinomas and papillomas of the fore-stomach in male rats. When administered by inhalation, the compound induced carcinomas and papillomas of the nasal cavity in male rats. Subcutaneous injection produced local sarcomas in female mice. Epichlorohydrin also was active as an initiator in the two-stage skin carcinogenesis study of female mice but did not induce tumors when applied alone to the skin. One study of factory workers shows a significant excess of respiratory cancer. However, some of the workers may also have been exposed to diisopropyl sulfate.

TOXICITY AND IRRITATION

TOXICITY

Oral (rat) LD50: 90 mg/kg
Inhalation (human) TCLo: 40 ppm/2h
Inhalation (human) TCLo: 20 ppm
Inhalation (rat) LC50: 250 ppm/8h
Dermal (rabbit) LD50: 515 mg/kg
Intraperitoneal (Rat) LD50: 113 mg/kg
Subcutaneous (Rat) LD50: 150 mg/kg
Intravenous (Rat) LD50: 154 mg/kg
Oral (Mouse) LD50: 195 mg/kg
Intraperitoneal (Mouse) LD50: 170 mg/kg
Subcutaneous (Mouse) LD: 250 mg/kg
Oral (Rabbit) LD50: 345 mg/kg
Intraperitoneal (Rabbit) LD50: 160 mg/kg
Intraperitoneal (Guinea pig) LD50: 118 mg/kg

IRRITATION

Skin (rabbit): 10 mg/24 hr (open)
Eye (rabbit): 23 mg
Eye (rabbit): 100 mg/24 hr- Moderate

Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitisation potential: the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitising substance which is widely distributed can be a more important allergen than one with stronger sensitising potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested. The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis. 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. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6
Page 15 of 18

Section 11 - TOXICOLOGICAL INFORMATION

occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

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. of Health & Human Services 2002].

Section 12 - ECOLOGICAL INFORMATION

Marine Pollutant:Yes	
Hazardous Air Pollutant:	Yes
Fish LC50 (96hr.) (mg/l):	18- 35
Algae IC50 (72hr.) (mg/l):	5.4- 6.0
log Kow (Prager 1995):	0.26
Half- life Soil - High (hours):	672
Half- life Soil - Low (hours):	168
Half- life Air - High (hours):	1458
Half- life Air - Low (hours):	146
Half- life Surface water - High (hours):	672
Half- life Surface water - Low (hours):	168
Half- life Ground water - High (hours):	1344
Half- life Ground water - Low (hours):	336
Aqueous biodegradation - Aerobic - High (hours):	672
Aqueous biodegradation - Aerobic - Low (hours):	168
Aqueous biodegradation - Anaerobic - High (hours):	2688
Aqueous biodegradation - Anaerobic - Low (hours):	672
Aqueous biodegradation - Removal secondary treatment - High (hours):	89%
Photooxidation half- life air - High (hours):	1458
Photooxidation half- life air - Low (hours):	146
First order hydrolysis half- life (hours):	197
Acid rate constant [M(H+)- HR]- 1:	1.46

DO NOT discharge into sewer or waterways.

log Kow: 0.3

Koc: 123

Half-life (hr) air: 96

Half-life (hr) H2O surface water: 29-128

Henry's atm m³ /mol: 1.18E-03

BOD 5 if unstated: 0.03-0.16,3%

COD: 1.16

BCF: 4.6

log BCF: -0.032- 0.968

Toxicity Fish: LC50(96)0.34-6ug/L

Toxicity invertebrate: LC50(96) insct 0.03-2.4ug/L

Bioaccumulation: very significant

Degradation Biological: resistant

processes Abiotic: resist hydrol&photol,RxnOH*

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 16 of 18

Section 13 - DISPOSAL CONSIDERATIONS

- 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.
 - Dispose of by: Burial in a licenced land-fill or Incineration in a licenced apparatus (after admixture with suitable combustible material).
 - Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.
 - 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 authorised landfill.
 - Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

Section 14 - TRANSPORTATION INFORMATION



Labels Required: TOXIC,FLAMMABLE LIQUID
HAZCHEM: 2W

UNDG:

Dangerous Goods Class: 6.1
UN Number: 2023
Shipping Name:EPICHLOROHYDRIN

Subrisk: 3
Packing Group: II

Air Transport IATA:

ICAO/IATA Class: 6.1
UN/ID Number: 2023
ERG Code: 6F
Shipping name:EPICHLOROHYDRIN

ICAO/IATA Subrisk: 3
Packing Group: II

Maritime Transport IMDG:

IMDG Class: 6.1
UN Number: 2023
EMS Number: F- E, S- D
Shipping name:EPICHLOROHYDRIN

IMDG Subrisk: 3
Packing Group: II
Marine Pollutant: Yes

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 17 of 18

Section 15 - REGULATORY INFORMATION

REGULATIONS

epichlorohydrin (CAS: 106-89-8) is found on the following regulatory lists;
IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk
International Agency for Research on Cancer (IARC) Carcinogens
International Council of Chemical Associations (ICCA) - High Production Volume List
OECD Representative List of High Production Volume (HPV) Chemicals
WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water

No data available for epichlorohydrin as CAS: 51594-55-9, CAS: 67843-74-7, CAS: 13403-37-7, CAS: 4741-80-4, CAS: 109351-74-8, CAS: 9009-12-5, CAS: 36250-81-4.

Section 16 - OTHER INFORMATION

INGREDIENTS WITH MULTIPLE CAS NUMBERS

Ingredient Name	CAS
epichlorohydrin	106- 89- 8, 51594- 55- 9, 67843 - 74- 7, 13403- 37- 7, 4741- 80- 4, 109351- 74- 8, 9009- 12- 5, 36250- 81- 4

REPRODUCTIVE HEALTH GUIDELINES

Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for the reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
epichlorohydrin	0.38 mg/m3	NA	NA	1.5	Yes

These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGS represent an 8-hour time-weighted average unless specified otherwise.

CR = Cancer Risk/10000; UF = Uncertainty factor:

TLV believed to be adequate to protect reproductive health:

LOD: Limit of detection

Toxic endpoints have also been identified as:

D = Developmental; R = Reproductive; TC = Transplacental carcinogen

Jankovic J., Drake F.: A Screening Method for Occupational Reproductive

American Industrial Hygiene Association Journal 57: 641-649 (1996).

continued...

1-CHLORO-2,3-EPOXYPROPANE

GHS Safety Data Sheet

Version No:6

Page 18 of 18

Section 16 - OTHER INFORMATION

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

Issue Date: 16-Aug-2017