

Material Safety Data Sheet

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Version 1.7

According to 91/155/EEC

1 - Product and Company Information

Product Name (+/-)-EPICHLOROHYDRIN
 Product Number 45340

Company Sigma-Aldrich Company Ltd.
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 New Road, Gillingham SP8 4XT
 United Kingdom

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2 - Composition/Information on Ingredients

Product Name	CAS #	EC no	Annex I Index Number
EPICHLOROHYDRIN	106-89-8	203-439-8	603-026-00-6

Formula C3H5ClO
 Molecular Weight 92.53 AMU
 Synonyms 1-Chloor-2,3-epoxy-propaan (Dutch) *
 1-Chlor-2,3-epoxy-propan (German) *
 1-Chloro-2,3-epoxypropane *
 3-Chloro-1,2-epoxypropane *
 1-Chloro-2,3-epoxypropane (OSHA) *
 epi-Chlorohydrin * (Chloromethyl)ethylene oxide
 * Chloromethyloxirane * 2-(Chloromethyl)oxirane
 * 3-Chloro-1,2-propene oxide * Chloropropylene
 oxide * gamma-Chloropropylene oxide *
 3-Chloro-1,2-propylene oxide *
 1-Cloro-2,3-epossipropano (Italian) * ECH *
 Epichloorhydrine (Dutch) * Epichlorhydrin *
 Epichlorhydrine (French) * Epichlorohydrin
 (ACGIH:OSHA) * alpha-Epichlorohydrin *
 (DL)-alpha-Epichlorohydrin * Epichlorohydrina
 (Polish) * Epichlorophydrin * Epicloridrina
 (Italian) * 1,2-Epoxy-3-chloropropane *
 2,3-Epoxypropyl chloride * Glycerol
 epichlorhydrin * Oxirane, (chloromethyl)- *
 Oxirane, 2-(chloromethyl) * RCRA waste number
 U041 * Skekhg

3 - Hazards Identification

SPECIAL INDICATION OF HAZARDS TO HUMANS AND THE ENVIRONMENT

May cause cancer. Flammable. Also toxic by inhalation, in contact with skin and if swallowed. Causes burns. May cause sensitization by skin contact.

Carc. Cat.2

4 - First Aid Measures

AFTER INHALATION

If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

AFTER SKIN CONTACT

In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

AFTER EYE CONTACT

In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

AFTER INGESTION

If swallowed, wash out mouth with water provided person is conscious. Call a physician immediately.

5 - Fire Fighting Measures

EXTINGUISHING MEDIA

Suitable: For small (incipient) fires, use media such as "alcohol" foam, dry chemical, or carbon dioxide. For large fires, apply water from as far as possible. Use very large quantities (flooding) of water applied as a mist or spray; solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water.

SPECIAL RISKS

Specific Hazard(s): Emits toxic fumes under fire conditions. Vapor may travel considerable distance to source of ignition and flash back.

Explosion Hazards: Vapor may travel considerable distance to source of ignition and flash back. Container explosion may occur under fire conditions. Forms explosive mixtures in air.

SPECIAL PROTECTIVE EQUIPMENT FOR FIREFIGHTERS

Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.

SPECIFIC METHOD(S) OF FIRE FIGHTING

Use water spray to cool fire-exposed containers.

6 - Accidental Release Measures

PERSONAL PRECAUTION PROCEDURES TO BE FOLLOWED IN CASE OF LEAK OR SPILL

Evacuate area. Shut off all sources of ignition.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)

Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP

Cover with dry-lime, sand, or soda ash. Place in covered containers using non-sparking tools and transport outdoors. Ventilate area and wash spill site after material pickup is complete.

7 - Handling and Storage

HANDLING

Directions for Safe Handling: Do not breathe vapor. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE

Conditions of Storage: Keep container closed. Keep away from heat, sparks, and open flame.

8 - Exposure Controls / Personal Protection

ENGINEERING CONTROLS

Safety shower and eye bath. Use nonsparking tools. Use only in a chemical fume hood.

GENERAL HYGIENE MEASURES

Wash thoroughly after handling. Remove and wash contaminated clothing promptly. Discard contaminated shoes.

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	1 MG/M3
Poland		NDSch	-
Poland		NDSP	-

EXPOSURE LIMITS - DENMARK

Source	Type	Value
OEL	TWA	1.9 mg/m3 0.5 ppm

Remarks: HK

EXPOSURE LIMITS - GERMANY

Source	Type	Value
TRGS 900	OEL	12 mg/m3 3 ppm

Remarks: 4

Remarks: H,TRK,TRGS 901-5

EXPOSURE LIMITS - NORWAY

Source	Type	Value
	OEL	1.9 mg/m3 0.5 ppm

Remarks: HKA

EXPOSURE LIMITS - SWEDEN

Source	Type	Value
	LLV (Level	1.9 mg/m3 0.5 ppm

Remarks: H, K, S

EXPOSURE LIMITS - SWITZERLAND

Source	Type	Value
OEL	OEL	8 mg/m3 2 ppm

Remarks: H K

EXPOSURE LIMITS - UNITED KINGDOM

Source	Type	Value
OEL	OEL	1.9 mg/m3 0.5 ppm
OEL	STEL	5.8 mg/m3 1.5 ppm

PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection: Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU). Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator.

Hand Protection: Compatible chemical-resistant gloves.

Eye Protection: Chemical safety goggles.

9 - Physical and Chemical Properties

Appearance	Physical State: Clear liquid Color: Colorless	
Property	Value	At Temperature or Pressure
pH	N/A	
BP/BP Range	115.0 - 117.0 °C	
MP/MP Range	- 57.0 °C	
Flash Point	32 °C	Method: closed cup
Flammability	N/A	
Autoignition Temp	415 °C	
Oxidizing Properties	N/A	
Explosive Properties	N/A	
Explosion Limits	Lower: 3.8 % Upper: 21 %	
Vapor Pressure	13.8 mmHg	21.1 °C
SG/Density	1.18 g/cm ³	
Partition Coefficient	N/A	
Viscosity	N/A	
Vapor Density	3.2 g/l	
Saturated Vapor Conc.	N/A	
Evaporation Rate	N/A	
Bulk Density	N/A	
Decomposition Temp.	N/A	
Solvent Content	N/A	
Water Content	< 0.06 %	
Surface Tension	N/A	
Conductivity	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

10 - Stability and Reactivity

STABILITY

Stable: Stable.

Materials to Avoid: Do not mix with: Acids, Bases, Ammonia, Amines, Sodium, Zinc, Magnesium, Aluminum, and their alloys, Halides.

HAZARDOUS DECOMPOSITION PRODUCTS

Hazardous Decomposition Products: Hydrogen chloride gas, Phosgene gas.

HAZARDOUS POLYMERIZATION

Hazardous Polymerization: May undergo autopolymerization

11 - Toxicological Information

RTECS NUMBER: TX4900000

ACUTE TOXICITY

LD50
Oral
Rat
90 mg/kg

LC50
Inhalation
Rat
250 ppm
8H

LD50
Intraperitoneal
Rat
113 MG/KG

LD50
Subcutaneous
Rat
150 MG/KG
Remarks: Kidney, Ureter, Bladder:Urine volume increased.

LD50
Intravenous
Rat
154 MG/KG

LD50
Oral
Mouse
195 mg/kg
Remarks: Behavioral:Somnolence (general depressed activity).
Behavioral:Tremor. Behavioral:Ataxia.

LD50
Skin
Mouse
250 mg/kg

LD50
Intraperitoneal
Mouse
170 MG/KG

LD50
Oral
Rabbit
345 mg/kg

LD50
Skin
Rabbit
515 mg/kg

LD50
Intraperitoneal
Rabbit
160 MG/KG

LD50
Oral
Guinea pig
280 mg/kg

LD50
Intraperitoneal
Guinea pig
118 MG/KG

IRRITATION DATA

Skin
Rabbit
10 mg
24H
Remarks: Open irritation test

Eyes
Rabbit
100 mg
Remarks: Severe irritation effect

Eyes
Rabbit
100 mg
24H
Remarks: Moderate irritation effect

SENSITIZATION

Skin: May cause allergic skin reaction.

SIGNS AND SYMPTOMS OF EXPOSURE

Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Inhalation may result in spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Direct contact of liquid epichlorohydrin may cause clouding of the cornea and tissue death. Avoid high concentrations of unreacted epichlorohydrin in reaction systems. Rubber or neoprene are slowly penetrated by epichlorohydrin. Use polyethylene.

ROUTE OF EXPOSURE

Skin Contact: Causes burns.
Skin Absorption: Readily absorbed through skin. Toxic if absorbed through skin.
Eye Contact: Causes burns.
Inhalation: Toxic if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion: Toxic if swallowed.

TARGET ORGAN INFORMATION

Kidneys. Liver. Lungs.

CHRONIC EXPOSURE - CARCINOGEN

Result: This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Rat
Route of Application: Oral
Exposure Time: 81W
Result: Gastrointestinal:Tumors. Tumorigenic:Carcinogenic by RTECS criteria.

Rat
Route of Application: Inhalation
Exposure Time: 6H/30D
Result: Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors. Lungs, Thorax, or Respiration:Acute pulmonary edema. Tumorigenic:Carcinogenic by RTECS criteria.

Mouse
Route of Application: Intraperitoneal
Exposure Time: 8W
Result: Lungs, Thorax, or Respiration:Tumors. Tumorigenic:Neoplastic by RTECS criteria.

Mouse
Route of Application: Subcutaneous
Exposure Time: 18W
Result: Tumorigenic:Tumors at site or application. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Mouse
Route of Application: Unreported
Result: Skin and Appendages: Other: Tumors. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Blood:Lymphomas including Hodgkin's disease.

Mouse
Route of Application: Subcutaneous
Exposure Time: 69W
Result: Tumorigenic:Neoplastic by RTECS criteria. Tumorigenic:Tumors at site or application.

Rat
Route of Application: Inhalation
Exposure Time: 6H/6W
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Lungs, Thorax, or Respiration:Tumors.

Rat
Route of Application: Inhalation
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors.

Rat
Route of Application: Inhalation
Exposure Time: 6H/57W
Result: Lungs, Thorax, or Respiration:Chronic pulmonary edema. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Olfaction:Tumors. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Rat
Route of Application: Oral
Exposure Time: 81W
Result: Gastrointestinal:Tumors. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Rat
Route of Application: Oral
Exposure Time: 81W
Result: Gastrointestinal:Tumors. Tumorigenic:Neoplastic by RTECS criteria.

Rat
Route of Application: Oral
Exposure Time: 81W
Result: Gastrointestinal:Tumors. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Rat
Route of Application: Oral
Exposure Time: 2Y
Result: Endocrine:Tumors. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal:Tumors.

IARC CARCINOGEN LIST

Rating: Group 2A

CHRONIC EXPOSURE - MUTAGEN

Result: May alter genetic material.

Human
32 UG/L
Cell Type: fibroblast
Unscheduled DNA synthesis

Human
500 UMOL/L
Cell Type: lymphocyte
Unscheduled DNA synthesis

Human
2700 UMOL/L
Cell Type: HeLa cell
DNA inhibition

Human
5 MMOL/L
Cell Type: lymphocyte
DNA inhibition

Human
10 UMOL/L
24H
Cell Type: lymphocyte
Cytogenetic analysis

Human
1 UMOL/L
Cell Type: leukocyte
Cytogenetic analysis

Human
10 NMOL/L
Cell Type: lymphocyte
Sister chromatid exchange

Human
500 UMOL/L
Cell Type: Other cell types
Mutation in mammalian somatic cells.

Rat
300 UMOL/L
Cell Type: liver
DNA damage

Rat
50 MG/KG
Oral
Unscheduled DNA synthesis

Rat
10 MG/L
Cell Type: liver
Cytogenetic analysis

Rat
50 MG/KG
Oral
sperm

Mouse
120 MG/KG
Intraperitoneal
16D
Micronucleus test

Mouse
1040 UMOL/L
Cell Type: lymphocyte
DNA damage

Mouse
140 MG/KG
Intraperitoneal
DNA damage

Mouse
5 MG/KG
Intraperitoneal
Cytogenetic analysis

Mouse
20 MG/KG
Oral
Cytogenetic analysis

Mouse
5 MG/M3
Inhalation
Cytogenetic analysis

Mouse
5500 UG/KG
Intraperitoneal
Sister chromatid exchange

Mouse

7500 UG/L
Cell Type: lymphocyte
Mutation in mammalian somatic cells.

Mouse
50 MG/KG
Cell Type: S. typhimurium
Host-mediated assay

Mouse
180 MG/KG
Cell Type: E. coli
Host-mediated assay

Mouse
5 MG/M3
Inhalation
sperm

Hamster
25 MG/L
Cell Type: kidney
Morphological transformation.

Hamster
15 MG/L
Cell Type: ovary
Cytogenetic analysis

Hamster
47 MG/L
Cell Type: lung
Cytogenetic analysis

Hamster
33 UL/L
Cell Type: ovary
Sister chromatid exchange

Hamster
100 MG/L
Cell Type: lung
Sister chromatid exchange

Hamster
30 MG/L
Cell Type: ovary
Mutation in mammalian somatic cells.

CHRONIC EXPOSURE - TERATOGEN

Species: Mouse
Dose: 1200 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 180 MG/KG

Route of Application: Oral
Exposure Time: (12D MALE)
Result: Effects on Fertility: Male fertility index (e.g., # males impregnating females per # males exposed to fertile nonpregnant females).

Species: Rat
Dose: 25 MG/KG
Route of Application: Oral
Exposure Time: (1D MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Species: Rat
Dose: 1050 MG/KG
Route of Application: Oral
Exposure Time: (21D MALE)
Result: Paternal Effects: Testes, epididymis, sperm duct.
Effects on Fertility: Male fertility index (e.g., # males impregnating females per # males exposed to fertile nonpregnant females). Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Species: Rat
Dose: 288 MG/KG
Route of Application: Oral
Exposure Time: (23D MALE)
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea).

Species: Rat
Dose: 50 PPM/6H
Route of Application: Inhalation
Exposure Time: (50D MALE)
Result: Effects on Fertility: Male fertility index (e.g., # males impregnating females per # males exposed to fertile nonpregnant females).

Species: Rat
Dose: 100 PPM/7H
Route of Application: Inhalation
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
Maternal Effects: Other effects.

Species: Rat
Dose: 75 MG/KG
Route of Application: Subcutaneous
Exposure Time: (1D MALE)
Result: Paternal Effects: Testes, epididymis, sperm duct.
Paternal Effects: Spermatogenesis (including genetic material, sperm morphology, motility, and count).

Species: Rabbit
Dose: 100 PPM/7H
Route of Application: Inhalation
Exposure Time: (6-18D PREG)
Result: Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).
Maternal Effects: Other effects.

12 - Ecological Information

No data available.

13 - Disposal Considerations

SUBSTANCE DISPOSAL

Contact a licensed professional waste disposal service to dispose of this material. Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Observe all federal, state, and local environmental regulations.

14 - Transport Information

RID/ADR

UN#: 2023
Class: 6.1
PG: II
Subrisk: 3
Proper Shipping Name: Epichlorohydrin

IMDG

UN#: 2023
Class: 6.1
PG: II
Subrisk: 3
Proper Shipping Name: Epichlorohydrin
Marine Pollutant: Yes
Severe Marine Pollutant: No

IATA

UN#: 2023
Class: 6.1
PG: II
Subrisk: 3
Proper Shipping Name: Epichlorohydrin
Inhalation Packing Group I: No

15 - Regulatory Information

CLASSIFICATION AND LABELING ACCORDING TO EU DIRECTIVES

ANNEX I INDEX NUMBER: 603-026-00-6

NOTA: E

INDICATION OF DANGER: T

Toxic.

R-PHRASES: 45-10-23/24/25-34-43

May cause cancer. Flammable. Also toxic by inhalation, in contact with skin and if swallowed. Causes burns. May cause sensitization by skin contact.

S-PHRASES: 53-45

Restricted to professional users. Attention - Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

COUNTRY SPECIFIC INFORMATION

Germany

WGK: 3

16 - Other Information

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2007 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

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