

## 1. Material Identification

**Product Name** : Ethylene dichloride

**Catalog Number** : io-2365

**CAS Number** : 107-06-2

**Identified uses** : Laboratory chemicals, manufacture of chemical compounds

**Company** : Ionz

>> R&D Use only

## 2. Hazards Identification

### GHS Classification:

Flammable liquid ( category 2 )

Acute toxicity, oral (Category 3)

Acute toxicity, dermal (Category 3)

Acute toxicity, inhalation (Category 3)

Specific target organ toxicity, single exposure (Category 1)

### Pictogram(s)



### GHS Hazard Statements

- >> H225 (100%): Highly Flammable liquid and vapor [Danger Flammable liquids]
- >> H302 (100%): Harmful if swallowed [Warning Acute toxicity, oral]
- >> H304 (35.8%): May be fatal if swallowed and enters airways [Danger Aspiration hazard]
- >> H315 (100%): Causes skin irritation [Warning Skin corrosion/irritation]
- >> H319 (100%): Causes serious eye irritation [Warning Serious eye damage/eye irritation]
- >> H331 (45.1%): Toxic if inhaled [Danger Acute toxicity, inhalation]
- >> H335 (100%): May cause respiratory irritation [Warning Specific target organ toxicity, single exposure; Respiratory tract irritation]
- >> H350 (100%): May cause cancer [Danger Carcinogenicity]

### Precautionary Statement Codes

- >> P203, P210, P233, P240, P241, P242, P243, P261, P264, P264+P265, P270, P271, P280, P301+P316, P301+P317, P302+P352, P303+P361+P353, P304+P340, P305+P351+P338, P316, P318, P319, P321, P330, P331, P332+P317, P337+P317, P362+P364, P370+P378, P403+P233, P403+P235, P405, and P501

### NFPA 704 Diamond



### NFPA Health Rating

- >> 2 - Materials that, under emergency conditions, can cause temporary incapacitation or residual injury.

### NFPA Fire Rating

- >> 3 - Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions.

#### NFPA Instability Rating

- >> 0 - Materials that in themselves are normally stable, even under fire conditions.

#### Health Hazards:

- >> Inhalation of vapors causes nausea, drunkenness, depression. Contact of liquid with eyes may produce corneal injury. Prolonged contact with skin may cause a burn. (USCG, 1999)

#### ERG 2024, Guide 131 (Ethylene dichloride)

- >> TOXIC; may be fatal if inhaled, ingested or absorbed through skin.
- >> Inhalation or contact with some of these materials will irritate or burn skin and eyes.
- >> Methyl chloroacetate (UN2295) is an eye irritant/lachrymator (causes flow of tears).
- >> Fire will produce irritating, corrosive and/or toxic gases.
- >> Vapors may cause dizziness or asphyxiation, especially when in closed or confined areas.
- >> Runoff from fire control or dilution water may cause environmental contamination.
  
- >> Special Hazards of Combustion Products: Toxic and irritating gases (hydrogen chloride, phosgene) are generated.
- >> Behavior in Fire: Vapor is heavier than air and may travel considerable distance to a source of ignition and flash back. (USCG, 1999)

#### ERG 2024, Guide 131 (Ethylene dichloride)

- >> HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- >> CAUTION: Methanol (UN1230) will burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.)
- >> Vapors may form explosive mixtures with air.
- >> Vapors may travel to source of ignition and flash back.
- >> Most vapors are heavier than air. They will spread along the ground and collect in low or confined areas (sewers, basements, tanks, etc.).
- >> Vapor explosion and poison hazard indoors, outdoors or in sewers.
- >> Those substances designated with a (P) may polymerize explosively when heated or involved in a fire.
- >> Runoff to sewer may create fire or explosion hazard.
- >> Containers may explode when heated.
- >> Many liquids will float on water.
- >> Highly flammable. Gives off irritating or toxic fumes (or gases) in a fire. Vapour/air mixtures are explosive. Heating will cause rise in pressure with risk of bursting.

### 3. Composition/Information On Ingredients

**Chemical name** : Ethylene dichloride  
**CAS Number** : 107-06-2  
**Molecular Formula** : C<sub>2</sub>H<sub>4</sub>Cl<sub>2</sub>  
**Molecular Weight** : 98.9600 g/mol

### 4. First Aid Measures

#### First Aid:

- >> EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments,

oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

- >> SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas.
- >> INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.
- >> INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital.
- >> OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

#### **ERG 2024, Guide 131 (Ethylene dichloride)**

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- >> General First Aid:
- >> Call 911 or emergency medical service.
- >> Ensure that medical personnel are aware of the material(s) involved, take precautions to protect themselves and avoid contamination.
- >> Move victim to fresh air if it can be done safely.
- >> Administer oxygen if breathing is difficult.
- >> If victim is not breathing:
  - >> DO NOT perform mouth-to-mouth resuscitation; the victim may have ingested or inhaled the substance.
  - >> If equipped and pulse detected, wash face and mouth, then give artificial respiration using a proper respiratory medical device (bag-valve mask, pocket mask equipped with a one-way valve or other device).
  - >> If no pulse detected or no respiratory medical device available, provide continuous compressions. Conduct a pulse check every two minutes or monitor for any signs of spontaneous respirations.
- >> Remove and isolate contaminated clothing and shoes.
- >> For minor skin contact, avoid spreading material on unaffected skin.
- >> In case of contact with substance, remove immediately by flushing skin or eyes with running water for at least 20 minutes.
- >> For severe burns, immediate medical attention is required.
- >> Effects of exposure (inhalation, ingestion, or skin contact) to substance may be delayed.
- >> Keep victim calm and warm.
- >> Keep victim under observation.
- >> For further assistance, contact your local Poison Control Center.
- >> Note: Basic Life Support (BLS) and Advanced Life Support (ALS) should be done by trained professionals.
- >> Specific First Aid:
  - >> Wash skin with soap and water.
  - >> In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
  - >> In Canada, an Emergency Response Assistance Plan (ERAP) may be required for this product. Please consult the shipping paper and/or the "ERAP" section.

#### **First Aid Measures**

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##### **Inhalation First Aid**

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>> Fresh air, rest. Half-upright position. Administration of oxygen may be needed. Artificial respiration may be needed. Refer immediately for medical attention.

#### **Skin First Aid**

>> Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer immediately for medical attention.

#### **Eye First Aid**

>> First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

#### **Ingestion First Aid**

>> Rinse mouth. Do NOT induce vomiting. Give one or two glasses of water to drink. Refer immediately for medical attention.

## **5. Fire Fighting Measures**

>> Vapors are heavier than air and will collect in low areas. Vapors may travel long distances to ignition sources and flashback. Vapors in confined areas may explode when exposed to fire. Containers may explode in fire. Storage containers and parts of containers may rocket great distances, in many directions.

>> Excerpt from ERG Guide 131 [Flammable Liquids - Toxic]:

>> CAUTION: The majority of these products have a very low flash point. Use of water spray when fighting fire may be inefficient. CAUTION: Methanol (UN1230) will burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.).

>> SMALL FIRE: Dry chemical, CO<sub>2</sub>, water spray or alcohol-resistant foam.

>> LARGE FIRE: Water spray, fog or alcohol-resistant foam. If it can be done safely, move undamaged containers away from the area around the fire. Dike runoff from fire control for later disposal. Avoid aiming straight or solid streams directly onto the product.

>> FIRE INVOLVING TANKS, RAIL TANK CARS OR HIGHWAY TANKS: Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks in direct contact with flames. For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2024)

>> Use water spray, foam, powder, carbon dioxide. In case of fire: keep drums, etc., cool by spraying with water.

## **6. Accidental Release Measures**

### **Isolation and Evacuation:**

Isolation and evacuation measures to take when a large amount of this chemical is accidentally released in an emergency.

>> Excerpt from ERG Guide 131 [Flammable Liquids - Toxic]:

>> IMMEDIATE PRECAUTIONARY MEASURE: Isolate spill or leak area for at least 50 meters (150 feet) in all directions.

>> SPILL: Increase the immediate precautionary measure distance, in the downwind direction, as necessary.

>> FIRE: If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2024)

### **Evacuation: ERG 2024, Guide 131 (Ethylene dichloride)**

>> Immediate precautionary measure

>> Isolate spill or leak area for at least 50 meters (150 feet) in all directions.

>> Spill

>> For non-highlighted materials: increase the immediate precautionary measure distance, in the downwind direction, as necessary.

>> Fire

>> If tank, rail tank car or highway tank is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

## Spillage Disposal:

Methods for containment and safety measures to protect workers dealing with a spillage of this chemical.

- >> Evacuate danger area! Consult an expert! Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Ventilation. Do NOT let this chemical enter the environment. Do NOT wash away into sewer. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

## Accidental Release Measures

### Public Safety: ERG 2024, Guide 131 (Ethylene dichloride)

- >> CALL 911. Then call emergency response telephone number on shipping paper. If shipping paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- >> Keep unauthorized personnel away.
- >> Stay upwind, uphill and/or upstream.
- >> Ventilate closed spaces before entering, but only if properly trained and equipped.

### Spill or Leak: ERG 2024, Guide 131 (Ethylene dichloride)

- >> ELIMINATE all ignition sources (no smoking, flares, sparks or flames) from immediate area.
- >> All equipment used when handling the product must be grounded.
- >> Do not touch or walk through spilled material.
- >> Stop leak if you can do it without risk.
- >> Prevent entry into waterways, sewers, basements or confined areas.
- >> A vapor-suppressing foam may be used to reduce vapors.
- >> Small Spill
  - >> Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal.
  - >> Use clean, non-sparking tools to collect absorbed material.
- >> Large Spill
  - >> Dike far ahead of liquid spill for later disposal.
  - >> Water spray may reduce vapor, but may not prevent ignition in closed spaces.

## 7. Handling And Storage

### Safe Storage:

- >> Fireproof. Separated from food and feedstuffs and incompatible materials. See Chemical Dangers. Cool. Dry. Well closed. Store in an area without drain or sewer access.

### Storage Conditions:

- >> Fireproof. Separated from food and feedstuffs and incompatible materials. See Chemical Dangers. Cool. Dry. Well closed. Store in an area without drain or sewer access.

## 8. Exposure Control/ Personal Protection

### REL-TWA (Time Weighted Average)

- >> 1 ppm (4 mg/m<sup>3</sup>)

### REL-STEL (Short Term Exposure Limit)

- >> 2 ppm (8 mg/m<sup>3</sup>)
- >> Ca TWA 1 ppm (4 mg/m<sup>3</sup>) ST 2 ppm (8 mg/m<sup>3</sup>) See Appendix A See Appendix C (Chloroethanes)
- >> 50.0 [ppm], Ceiling(OSHA) = 100 ppm (200 ppm for 5-min peak in any 3 hrs)

### PEL-TWA (8-Hour Time Weighted Average)

>> 50 ppm (200 mg/m<sup>3</sup>)

#### **PEL-C (Ceiling)**

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>> 100 ppm [5 min any 3 hrs]; 200 ppm (Peak)

>> 10.0 [ppm]

>> 10 ppm as TWA; A4 (not classifiable as a human carcinogen).

#### **TLV-TWA (Time Weighted Average)**

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>> 10 ppm [1977]

#### **EU-OEL**

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>> 8.2 mg/m

#### **MAK (Maximale Arbeitsplatz Konzentration)**

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>> skin absorption (H); carcinogen category: 2.

#### **Emergency Response: ERG 2024, Guide 131 (Ethylene dichloride)**

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>> CAUTION: The majority of these products have a very low flash point. Use of water spray when fighting fire may be inefficient.

>> CAUTION: Methanol (UN1230) will burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.)

>> Small Fire

>> Dry chemical, CO<sub>2</sub>, water spray or alcohol-resistant foam.

>> Large Fire

>> Water spray, fog or alcohol-resistant foam.

>> If it can be done safely, move undamaged containers away from the area around the fire.

>> Dike runoff from fire control for later disposal.

>> Avoid aiming straight or solid streams directly onto the product.

>> Fire Involving Tanks, Rail Tank Cars or Highway Tanks

>> Fight fire from maximum distance or use unmanned master stream devices or monitor nozzles.

>> Cool containers with flooding quantities of water until well after fire is out.

>> Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.

>> ALWAYS stay away from tanks in direct contact with flames.

>> For massive fire, use unmanned master stream devices or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

>> ERPG-1: 50 ppm – one hour exposure limit: 1 = mild transient health effects or objectionable odor [AIHA]

>> ERPG-2: 200 ppm – one hour exposure limit: 2 = impaired ability to take protective action [AIHA]

>> ERPG-3: 300 ppm – one hour exposure limit: 3 = life threatening health effects [AIHA]

#### **Inhalation Risk:**

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>> A harmful contamination of the air can be reached very quickly on evaporation of this substance at 20 °C.

#### **Effects of Short Term Exposure:**

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>> The vapour is irritating to the eyes, skin and respiratory tract. Inhalation may cause lung oedema. The substance may cause effects on the kidneys and liver. This may result in impaired functions, liver damage and kidney damage. Exposure at high concentrations could cause lowering of consciousness and death. The effects may be delayed.

#### **Effects of Long Term Exposure:**

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>> Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver and kidneys, resulting in impaired functions. This substance is possibly carcinogenic to humans.

#### **Fire Prevention**

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>> NO open flames, NO sparks and NO smoking. Closed system, ventilation, explosion-proof electrical equipment and lighting. Prevent build-up of electrostatic charges (e.g., by grounding). Do NOT use compressed air for filling, discharging,

or handling.

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**Exposure Prevention**

>> AVOID ALL CONTACT! IN ALL CASES CONSULT A DOCTOR!

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**Inhalation Prevention**

>> Use ventilation, local exhaust or breathing protection.

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**Skin Prevention**

>> Protective gloves. Protective clothing.

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**Eye Prevention**

>> Wear safety goggles, face shield or eye protection in combination with breathing protection.

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**Ingestion Prevention**

>> Do not eat, drink, or smoke during work.

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**Exposure Control and Personal Protection**

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**Protective Clothing: ERG 2024, Guide 131 (Ethylene dichloride)**

- >> Wear positive pressure self-contained breathing apparatus (SCBA).
- >> Wear chemical protective clothing that is specifically recommended by the manufacturer when there is NO RISK OF FIRE.
- >> Structural firefighters' protective clothing provides thermal protection but only limited chemical protection.

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## 9. Physical And Chemical Properties

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**Molecular Weight:**

>> 98.96

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**Exact Mass:**

>> 97.9690055

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**Physical Description:**

- >> Ethylene dichloride appears as a clear colorless liquid with a chloroform-like odor. Flash point 56 °F. Denser than water and insoluble in water. Vapors are heavier than air. Density 10.4 lb / gal.
- >> COLOURLESS VISCOUS LIQUID WITH CHARACTERISTIC ODOUR. TURNS DARK ON EXPOSURE TO AIR, MOISTURE AND LIGHT.

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**Color/Form:**

>> Heavy liquid

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**Odor:**

>> Pleasant, chloroform-like

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**Taste:**

The sensation of flavor perceived in the mouth and throat on contact with a substance.

>> Sweet taste

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**Boiling Point:**

>> 182.3 °F at 760 mmHg (NTP, 1992)

>> 83.5 °C

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**Melting Point:**

>> -31.5 °F (NTP, 1992)

>> -35.7 °C

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**Flash Point:**

>> 56 °F (NTP, 1992)

>> 13 °C c.c.

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**Solubility:**

>> 5 to 10 mg/mL at 66 °F (NTP, 1992)

>> Solubility in water, g/100ml: 0.87

**Density:**

>> 1.253 at 68 °F (USCG, 1999) – Denser than water; will sink

>> Relative density (water = 1): 1.2

**Vapor Density:**

>> 3.4 (NTP, 1992) – Heavier than air; will sink (Relative to Air)

>> Relative vapor density (air = 1): 3.42

**Vapor Pressure:**

>> 60 mmHg at 68 °F ; 100 mmHg at 84.9 °F (NTP, 1992)

>> Vapor pressure, kPa at 20 °C: 8.7

**LogP:**

>> 1.48

**LogS:**

The base-10 logarithm of the aqueous solubility of this compound.

**Stability/Shelf Life:**

>> Stable under recommended storage conditions.

**Autoignition Temperature:**

>> 775 °F (USCG, 1999)

>> 440 °C

**Decomposition:**

>> Hazardous decomposition products formed under fire conditions – Carbon oxides, hydrogen chloride gas.

**Viscosity:**

>> 0.84 cP at 20 °C

**Corrosivity:**

The ability of a chemical to damage or destroy other substances when it comes into contact.

>> Corrodes iron and other metals at elevated temperatures when in contact with water.

**Heat of Combustion:**

>> 12.57 kJ/g

**Heat of Vaporization:**

>> 138 Btu/lb = 76.4 cal/g = 3.2X10+5 J/kg

**Surface Tension:**

>> 32.2 dynes/cm = 0.0322 N/m at 20 °C

**Ionization Potential:**

>> 11.05 eV

**Odor Threshold:**

>> Odor Threshold Low: 6.0 [mmHg]

>> Odor Threshold High: 111.0 [mmHg]

>> Detection odor threshold from AIHA (mean = 26 ppm)

**Refractive Index:**

>> Index of refraction: 1.4422 at 25 °C/D

## 10. Stability And Reactivity

>> Highly flammable. Slightly water soluble.

>> Highly Flammable

## 11. Toxicological Information

### Toxicity Summary:

>> IDENTIFICATION AND USE: 1,2-Dichloroethane is a colorless, oily liquid. It is used in production of vinyl chloride, trichloroethylene, vinylidene chloride, and trichloroethane. It is also used as lead scavenger in antiknock gasoline, paint, varnish, and finish removers, metal degreasing, soaps and scouring compounds, wetting and penetrating agents, ore flotation, and as a solvent. HUMAN STUDIES: Acute incidental exposure to 1,2-dichloroethane by inhalation or ingestion has resulted in a variety of effects in humans, including effects on the central nervous system, liver, kidney, lung and cardiovascular system. The respiratory effects exhibited by individuals who died following acute oral exposure to 1,2-dichloroethane included congestion, pulmonary edema (at 570 mg/kg/day) and bronchitis. Ingestion of  $\geq 570$  mg/kg/day of 1,2-dichloroethane resulted in severe hepatocellular damage and liver atrophy and necrosis. The potential carcinogenicity of 1,2-dichloroethane in exposed human populations has not been extensively investigated. It induced unscheduled DNA synthesis in primary cultures of human cells and gene mutation in several cell lines. Mutation frequency in human cell lines has been correlated with differences in glutathione-S-transferase activity. ANIMAL STUDIES: The acute toxicity of 1,2-dichloroethane is low in experimental animals. The results of short-term and subchronic studies in several species of experimental animals indicate that the liver and kidneys are the target organs. Morphological changes in the liver were observed in several species following subchronic exposure to airborne concentrations. Increases in the relative liver weight have been observed in rats following subchronic oral administration. The carcinogenicity of 1,2-dichloroethane has been investigated in a bioassays on experimental animals and significant increases were not reported in the incidence of any type of tumor in rats or mice exposed by inhalation. There was a non-significant increase in the incidence of mammary gland adenomas and fibroadenomas in female rats exposed by inhalation. In contrast, there was convincing evidence of increases in tumor incidence in two species following ingestion. Significant increases in the incidence of tumors at several sites (including squamous cell carcinomas of the stomach (males), hemangiosarcomas (males and females), fibromas of the subcutaneous tissue (males), adenocarcinomas and fibroadenomas of the mammary gland (females)) were observed in rats administered daily doses by gavage. Similar increases in the incidences of tumors at multiple sites (including alveolar/bronchiolar adenomas (males and females), mammary gland adenocarcinomas (females) and endometrial stromal polyp or endometrial stromal sarcoma combined (females) and hepatocellular carcinomas (males)) occurred in mice administered daily doses by gavage. The incidence of lung tumors (benign papillomas) was significantly increased in female mice following repeated dermal application of 1,2-dichloroethane. Concomitant exposure to inhaled 1,2-dichloroethane and disulfiram in the diet resulted in an increased incidence of intrahepatic bile duct cholangiomas and cysts, subcutaneous fibromas, hepatic neoplastic nodules, interstitial cell tumors in the testes and mammary adenocarcinomas in rats, compared to rats administered either compound alone or untreated controls. No potential to initiate or promote tumor development was evident. In *in vitro* assays, 1,2-dichloroethane has been consistently positive in mutagenicity bioassays in *Salmonella typhimurium*. In cultured mammalian cells, 1,2-dichloroethane forms adducts with DNA. It also induces unscheduled DNA synthesis in primary cultures of rodent cells and gene mutation in several cell lines. There is no evidence that 1,2-dichloroethane is teratogenic in experimental animals. ECOTOXICITY STUDIES: In *Chlorella pyrenoidosa* the content of malondialdehyde (MDA) increased with the increasing concentration of 1,2-dichloroethane. An increase in mutation frequency was reported in barley (*Hordeum vulgare*) when kernels were treated for 24 hrs at 20 °C with 30.3 mM 1,2-dichloroethane.

### EPA Provisional Peer-Reviewed Toxicity Values:

This section provides the EPA Provisional Peer-Reviewed Toxicity Values (PPRTVs) and links of related assessment documents.

#### Chemical Substance

>> 1,2-Dichloroethane

#### Reference Dose (RfD), Subchronic

>>  $2 \times 10^{-2}$  mg/kg-day

#### Reference Concentration (RfC), Chronic

>>  $7 \times 10^{-3}$  mg/m<sup>3</sup>

#### Reference Concentration (RfC), Subchronic

>>  $7 \times 10^{-2}$  mg/m<sup>3</sup>

#### PPRTV Assessment

>> PDF Document

#### Weight-Of-Evidence (WOE)

>> See the IRIS entry for 1,2-Dichloroethane

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**Last Revision**

>> 2010

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**USGS Health-Based Screening Levels for Evaluating Water-Quality:**

This section provides the USGS Health-Based Screening Levels for Evaluating Water-Quality data.

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**Chemical**

>> 1,2-Dichloroethane

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**USGS Parameter Code**

>> 32103

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**MCL (Maximum Contaminant Levels)[µg/L]**

>> 5

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**Reference**

>> Smith, C.D. and Nowell, L.H., 2024. Health-Based Screening Levels for evaluating water-quality data (3rd ed.). DOI:10.5066/F71C1TWP

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**Evidence for Carcinogenicity:**

Evidence that this chemical does or may cause cancer. The information here is collected from various sources by the Hazardous Substances Data Bank (HSDB).

>> Evaluation: There is inadequate evidence in humans for the carcinogenicity of 1,2-dichloroethane. There is sufficient evidence in experimental animals for the carcinogenicity of 1,2-dichloroethane. Overall evaluation: 1,2-Dichloroethane is possibly carcinogenic to humans (Group 2B).

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**Carcinogen Classification:**

This section provides the International Agency for Research on Cancer (IARC) Carcinogenic Classification and related monograph links. In the IARC Carcinogenic classification, chemicals are categorized into four groups: Group 1 (carcinogenic to humans), Group 2A (probably carcinogenic to humans), Group 2B (possibly carcinogenic to humans), and Group 3 (not classifiable as to its carcinogenicity to humans).

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**IARC Carcinogenic Agent**

>> 1,2-Dichloroethane

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**IARC Carcinogenic Classes**

>> Group 2B: Possibly carcinogenic to humans

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**IARC Monographs**

>> Volume 20: (1979) Some Halogenated Hydrocarbons

>> Volume Sup 7: Overall Evaluations of Carcinogenicity: An Updating of IARC Monographs Volumes 1 to 42, 1987; 440 pages; ISBN 92-832-1411-0 (out of print)

>> Volume 71: (1999) Re-evaluation of Some Organic Chemicals, Hydrazine and Hydrogen Peroxide (Part 1, Part 2, Part 3)

>> 2B, possibly carcinogenic to humans. (L135)

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**Health Effects:**

>> Breathing or swallowing large amounts of 1,2-dichloroethane can produce nervous system disorders, kidney diseases, or lung effects. This can also lead to heart failure. Skin lesions and benign pulmonary tumors were reported in animals exposed dermally to liquid 1,2-dichloroethane. 1,2-dichloroethane can cause death from cardiac arrhythmia, bronchitis, hemorrhagic gastritis and colitis, hepatocellular damage, renal tubular necrosis and calcification, central nervous system depression, and histological changes in brain tissue after a sufficient single oral dose. (L156)

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**Exposure Routes:**

>> The substance can be absorbed into the body by inhalation of its vapour, through the skin and by ingestion.

>> inhalation, ingestion, skin absorption, skin and/or eye contact

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**Inhalation Exposure**

>> Sore throat. Nausea. Vomiting. Cough. Headache. Dizziness. Drowsiness. Unconsciousness.

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**Skin Exposure**

>> MAY BE ABSORBED! Redness.

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**Eye Exposure**

>> Redness. Pain.

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**Ingestion Exposure**

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>> See Inhalation.

>> irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]

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**Target Organs:**

Organs that are affected by exposure to this chemical. Information in this section reflects human data unless otherwise noted.

>> Cancer, Developmental (effects while organs are developing), Gastrointestinal (Stomach and Intestines, part of the digestive system), Hepatic (Liver), Immunological (Immune System), Neurological (Nervous System), Ocular (Eyes), Renal (Urinary System or Kidneys), Reproductive (Producing Children)

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**Cancer Sites:**

The site in which cancer develops due to exposure to this compound. Cancers are casually referred to based on their primary sites (e.g., skin, lung, breasts, prostate, colon and rectum).

>> [in animals: forestomach, mammary gland & circulatory sys cancer]

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**Adverse Effects:**

An adverse effect is an undesired harmful effect resulting from a medical treatment or other intervention.

>> Neurotoxin – Acute solvent syndrome

>> Occupational hepatotoxin – Primary hepatotoxins: the toxic effect to the liver is the principal adverse effect of the chemical.

>> Nephrotoxin – The chemical is potentially toxic to the kidneys in the occupational setting.

>> Dermatotoxin – Skin burns.

>> IARC Carcinogen – Class 3: Chemicals are not classifiable by the International Agency for Research on Cancer.

>> NTP Carcinogen – Reasonably anticipated to be a human carcinogen.

>> ACGIH Carcinogen – Not Classifiable.

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**Toxicity Data:**

>> LC50 (rat) = 1,000 ppm/7 hr

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**Minimum Risk Level:**

The minimal risk level (MRL) is an estimate of the amount of a chemical a person can eat, drink, or breathe each day without a detectable risk to health

>> Chronic Inhalation: 0.6 ppm (L134) Intermediate Oral: 0.2 mg/kg/day (L134)

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**Treatment:**

Treatment when exposed to toxin

>> Blood gases should be monitored, a good ventilation maintained, and cardiac arrhythmias observed for a minimum of 24 hours. In the event of a ventricular arrhythmia, lidocaine or beta-blockers could be administered. Serum creatinine, hepatic aminotransferase, electrolytes, and fluid balance for signs of hepatic or renal failure should be monitored. Dialysis may be helpful in the event of renal failure. Hepatic failure may be treated with fresh frozen plasma, vitamin K, low protein diet, neomycin, and lactulose. (L156)

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**Interactions:**

>> Our previous investigations demonstrated that 1,2-dichloroethane (DCE) and chronic ethanol treatment separately are able to impair glycoprotein metabolism and secretion, and reduce dolichol concentration in liver membranes. The purpose of this study was to investigate whether chronic ethanol consumption can induce potentiation of rat liver damage due to DCE haloalkane used in several chemical processes and in agriculture. Rats were given 36% of their total energy as ethanol in the Lieber-DeCarli liquid diet for 8 weeks (CH group). The pair-fed control group received an isocaloric amount of dextrine-maltose (PF group). "In vitro" experiments: the DCE (6.5 mM) treatment of isolated hepatocytes from CH rats enhanced glycoprotein retention and further reduced glycoprotein secretion and (14)C-glucosamine incorporation compared to the hepatocytes from CH or from PF and DCE treated rats. "In vivo" experiments: a marked decrease of dolichol concentration in microsomes (in which dolichyl phosphate is rate-limiting for the initial glycosylation of protein) and in Golgi membranes (in which total dolichol is very important for membrane permeability, fluidity and vesicle fusion) was observed in CH rats acutely treated with 628 mg/kg bw of DCE (CH+DCE) compared with CH or PF+DCE treated rats. These data suggest that chronic ethanol consumption increases DCE liver toxicity by affecting protein glycosylation processes and impairing glycolipoprotein secretion, with a concomitant retention at the level of the Golgi apparatus.

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**Antidote and Emergency Treatment:**

>> /SRP:/ Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand-valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR if necessary. Immediately flush contaminated eyes with gently flowing water. Do not induce vomiting. If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention.  
/Halogenated aliphatic hydrocarbons and related compounds/

#### Human Toxicity Excerpts:

>> /SIGNS AND SYMPTOMS/ 1,2-Dichloroethane (DCE) is commonly used as an industrial organic solvent and causes occupational diseases. Toxic encephalopathy is the most common and serious disorder resulting from DCE intoxication. Five patients who worked in shoemaking, pipemaking or a paint factory were identified as suffering from severe encephalopathy due to DCE intoxication. DCE-induced toxic encephalopathy manifests as various neurological deficits, with changes observable by neuroimaging. The main clinical manifestation is headache accompanied by intracranial hypertension. The typical cranial CT/MR scan of DCE toxic encephalopathy shows extensive brain edema and diffuse, symmetric, abnormal signal intensities in the cerebellar dentate nucleus, basal ganglia, and white matter in the bilateral cerebral hemispheres. The diagnosis of DCE toxic encephalopathy can be confirmed by the typical clinical and neuroimaging characteristics together with a history of exposure to substances contaminated with DCE. Dehydrating agents and glucocorticoids are the primary treatments. With early diagnosis and prompt treatment, promising results and recovery can be achieved. Effective prevention is expected to reduce the incidence of DCE toxic encephalopathy.

#### Non-Human Toxicity Excerpts:

>> /LABORATORY ANIMALS: Acute Exposure/ Early biochemical and histological changes in rat lungs were investigated after oral administration of 136 mg/kg 1,2-dichloroethane in oleum solution. The experiment was performed using 80 male Wistar rats. Bronchoalveolar lavage fluid and lung homogenate were examined on posttreatment days 1, 5, 15, and 30. In bronchoalveolar lavage fluid, the activities of lactate dehydrogenase, alkaline phosphatase, and acid phosphatase were elevated on day 1. The activities of superoxide dismutase, catalase, and glutathione peroxidase, and the content of malondialdehyde in lung homogenate, were also increased on day 1. The histological investigation indicated congestion, edema, and lung interstitial inflammatory changes. It was concluded that oral administration of 1,2-dichloroethane causes mild-to-moderate transitory toxic injury of the lung. Lipid peroxidation and the levels of key antioxidant enzymes are increased in the earliest posttreatment period.

#### Human Toxicity Values:

Quantitative human toxicity values (e.g., lethal dose) for this compound.

>> The lethal oral dose of 1,2-dichloroethane in humans has been estimated to be between 20–50 mL.

#### Non-Human Toxicity Values:

>> LD50 Mouse oral 870–950 mg/kg

#### National Toxicology Program Studies:

Reports from the National Toxicology Program, an interagency program supported by three government agencies (NIH, FDA, and CDC) within the Department of Health and Human Services. This program plays a critical role in generating, interpreting, and sharing toxicological information about chemicals of public health concerns.

>> Thirteen-week studies were conducted to investigate potential differences in rat strain susceptibility to 1,2-dichloroethane toxicity. F344/N rats, Sprague Dawley rats, Osborne-Mendel rats, and B6C3F1 mice (10 animals of each sex) were exposed to 1,2-dichloroethane in drinking water at 0, 500, 1,000, 2,000, 4,000, or 8,000 ppm for 13 weeks. In addition, groups of 10 F344/N rats of each sex were administered 1,2-dichloroethane in corn oil by gavage to compare toxicity resulting from bolus administration with that of continuous exposure in drinking water. Gavage doses of 1,2-dichloroethane were within the range of daily doses resulting from exposure in drinking water. No compound-related deaths occurred in any of the rat strains exposed to 1,2-dichloroethane in drinking water. Weight gain depression was common in each sex of all three rat strains in the 4,000 and 8,000-ppm groups throughout the studies. Water consumption was decreased by 50%–60% with increasing dose for all exposed male and female rats regardless of strain. Kidney and liver weights were increased in dosed rats of all three strains. No chemical-related lesions were observed except for a dose-related incidence of renal tubular regeneration in female F344/N rats. Nine of 10 female mice exposed to 8,000 ppm 1,2-dichloroethane in drinking water died before the end of the study. Mean body weights of males at 500 ppm or more and females at 1,000 ppm or more were lower than those of controls throughout most of the studies. Kidney weights were significantly increased for dosed males and females. Renal tubular cell regeneration was seen in males at 8,000 ppm; at 4,000 ppm, minimal regeneration was present in 8/10 male mice. All male F344/N rats that received 240 or 480 mg/kg and 9/10 females that received 300 mg/kg 1,2-dichloroethane by gavage died before the end of the studies. Mean body weights of the highest dose males and females were lower than those of vehicle controls throughout the studies. Liver and kidney weights were increased for dosed males and females; however, no compound-related lesions were observed. Necrosis of the cerebellum, hyperplasia, inflammation, and mineralization of the forestomach, and necrosis of the thymus were seen in animals that died or were killed in moribund condition. Rat strain differences in susceptibility to 1,2-dichloroethane toxicity were not apparent at the drinking water concentrations

used in these studies; only female F344/N rats exhibited mild chemical related renal lesions. Male B6C3F1 mice appeared to be more susceptible than rats to toxicity of 1,2-dichloroethane administered in drinking water; renal tubule regeneration was observed in male mice in the 4,000- and 8,000-ppm groups. The higher toxicity in mice was likely due to higher water consumption, resulting in up to ten-fold higher doses to mice than to rats. 1,2-Dichloroethane administered in drinking water resulted in less toxicity to F344/N rats than administration of similar doses by gavage.

#### **TSCA Test Submissions:**

Under the Toxic Substances Control Act (TSCA), EPA has broad authority to issue regulations designed to require manufacturers (including importers) or processors to test chemical substances and mixtures for health and environmental effects. This section provides information on test reports submitted for this chemical under TSCA.

>> The ability of 1,2-dichloroethane to induce morphological transformation in the BALB/3T3 mouse cell line (Cell Transformation Assay) was evaluated. Based on preliminary clonal toxicity determinations exposure time=1 day), 1,2-dichloroethane was tested at 0, 4, 20, 100 and 250 ug/ml in one experiment and 5, 10, 25 and 50 ug/ml in a second experiment, with cell survival ranging from 159% to 70% and from 98% to 90% relative to controls, respectively. None of the tested concentrations produced significantly greater transformation frequencies compared to untreated controls.

#### **Populations at Special Risk:**

>> Nursing mothers should not be exposed to 1,2-dichloroethane.

## **12. Ecological Information**

### **Resident Soil (mg/kg)**

>> 4.60e-01

### **Industrial Soil (mg/kg)**

>> 2.00e+00

### **Resident Air (ug/m3)**

>> 1.10e-01

### **Industrial Air (ug/m3)**

>> 4.70e-01

### **Tapwater (ug/L)**

>> 1.70e-01

### **MCL (ug/L)**

>> 5.00e+00

### **Risk-based SSL (mg/kg)**

>> 4.8e-05

### **MCL-based SSL (mg/kg)**

>> 1.40e-03

### **Oral Slope Factor (mg/kg-day)-1**

>> 9.10e-02

### **Inhalation Unit Risk (ug/m3)-1**

>> 2.6e-05

### **Chronic Oral Reference Dose (mg/kg-day)**

>> 6.00e-03

### **Chronic Inhalation Reference Concentration (mg/m3)**

>> 7.00e-03

### **Volatile**

>> Volatile

### **Mutagen**

>> Mutagen

### **Fraction of Contaminant Absorbed in Gastrointestinal Tract**

>> 1

#### Soil Saturation Concentration (mg/kg)

>> 2.98e+03

#### ICSC Environmental Data:

>> The substance is harmful to aquatic organisms.

#### Sediment/Soil Concentrations:

Concentrations of this compound in sediment/soil.

>> SEDIMENT: According to the STORET database, 1,2-dichloroethane was not detected (detection limit 10.0 ng/kg dry weight) in 40 sediment samples(1).

#### Fish/Seafood Concentrations:

Concentrations of this compound in fish or seafood.

>> Results reported in the STORET database are as follows: fish tissue: Lower Mississippi (2 samples) and Western Gulf (3 samples) – not detected; Pacific Northwest (37 samples) 0.05–20 ppm, 0.7 ppm avg; Alaska (6 samples) 0.05 ppm avg and max; data in this report are listed under dichloroethanes, however 1,2-dichloroethane is the most commonly used isomer(1). 1,2-Dichloroethane was not detected in marine invertebrates and fish from Liverpool Bay, England(2).

## 13. Disposal Considerations

### Spillage Disposal

>> Evacuate danger area! Consult an expert! Personal protection: filter respirator for organic gases and vapours adapted to the airborne concentration of the substance. Ventilation. Do NOT let this chemical enter the environment. Do NOT wash away into sewer. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent. Then store and dispose of according to local regulations.

### Disposal Methods

>> Generators of waste (equal to or greater than 100 kg/mo) containing this contaminant, EPA hazardous waste number U077 and D028, must conform with USEPA regulations in storage, transportation, treatment and disposal of waste.

>> Product: Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material; Contaminated packaging: Dispose of as unused product.

>> SRP: Wastewater from contaminant suppression, cleaning of protective clothing/equipment, or contaminated sites should be contained and evaluated for subject chemical or decomposition product concentrations. Concentrations shall be lower than applicable environmental discharge or disposal criteria. Alternatively, pretreatment and/or discharge to a permitted wastewater treatment facility is acceptable only after review by the governing authority and assurance that "pass through" violations will not occur. Due consideration shall be given to remediation worker exposure (inhalation, dermal and ingestion) as well as fate during treatment, transfer and disposal. If it is not practicable to manage the chemical in this fashion, it must be evaluated in accordance with EPA 40 CFR Part 261, specifically Subpart B, in order to determine the appropriate local, state and federal requirements for disposal.

>> Waste must never be discharged into sewers or surface waters. Contaminated porous surfaces (sand, vermiculite, etc) should be disposed of at a waste management facility. Recovered liquids may be reprocessed, incinerated, or treated at a waste management facility.

>> For more Disposal Methods (Complete) data for 1,2-Dichloroethane (20 total), please visit the HSDB record page.

>> SRP: Recycle any unused portion of the material for its approved use or return it to the manufacturer or supplier. Ultimate disposal of the chemical must consider: the material's impact on air quality; potential migration in air, soil or water; effects on animal, aquatic and plant life; and conformance with environmental and public health regulations. If it is possible or reasonable use an alternative chemical product with less inherent propensity for occupational harm/injury/toxicity or environmental contamination.

## 14. Transport Information

### DOT

Ethylene dichloride

3

UN Pack Group: II

Reportable Quantity of 100 lb or 45

### IATA

Ethylene dichloride

3, 6.1

UN Pack Group: II

## 15. Regulatory Information

### Federal Drinking Water Standards:

Federal drinking water standards (e.g. maximum containment level (MCL)) for this chemical. These standards are legally enforceable.

- >> Maximum contaminant levels (MCL) for organic contaminants apply to community and non-transient, non-community water systems: 1,2-Dichloroethane, MCL 0.005 mg/L.

### Federal Drinking Water Guidelines:

Federal drinking water guidelines (e.g. maximum containment level (MCL)) for this chemical. In general, these guidelines are recommendations and not legally enforceable.

- >> The maximum contaminant level goal (MCLG) for the following organic contaminant is zero mg/L: 1,2-dichloroethane.

### State Drinking Water Standards:

State drinking water standards (e.g. maximum containment level (MCL)) for this chemical. These standards are legally enforceable.

- >> (CA) CALIFORNIA 0.5 ug/L

### Clean Water Act Requirements:

The Clean Water Act (CWA) of 1972 establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under CWA, the U.S. Environmental Protection Agency (EPA) developed the Toxic Pollutant List (40 CFR Part 401.15) and the Priority Pollutant List (40 CFR Part 423, Appendix A). These lists are to be used by EPA and States to develop the Effluent Guidelines regulations and ensure water quality criteria and standards.

- >> Ethylene dichloride is designated as a hazardous substance under section 311(b)(2)(A) of the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing this substance.

### TSCA Requirements:

This section provides information on requirements concerning this chemical under the Toxic Substances Control Act (TSCA) of 1976. TSCA provides EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. Certain substances are generally excluded from TSCA, including, among others, food, drugs, cosmetics and pesticides.

- >> Section 8(a) of TSCA requires manufacturers of this chemical substance to report preliminary assessment information concerned with production, exposure, and use to EPA as cited in the preamble in 51 FR 41329. Effective date: 8/4/95; Reporting date: 10/3/95.

### Regulatory Information

#### The Australian Inventory of Industrial Chemicals

>> Chemical: Ethane, 1,2-dichloro-

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**REACH Registered Substance**

>> Status: Active Update: 22-03-2023 <https://echa.europa.eu/registration-dossier/-/registered-dossier/15430>

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**REACH Substances of Very High Concern (SVHC)**

>> Substance: 1,2-dichloroethane

>> EC: 203-458-1

>> Date of inclusion: >19-Dec-2011

>> Reason for inclusion: Carcinogenic (Article 57a)

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**New Zealand EPA Inventory of Chemical Status**

>> Ethane, 1,2-dichloro-: HSNO Approval: HSR001152 Approved with controls

## 16. Other Information

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**Toxic Combustion Products:**

Toxic products (e.g., gases and vapors) produced from the combustion of this chemical.

>> Combustion by-products may include hydrogen chloride and phosgene.

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**Other Safety Information**

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**Chemical Assessment**

>> IMAP assessments - Ethane, 1,2-dichloro-: Human health tier II assessment

>> IMAP assessments - Ethane, 1,2-dichloro-: Environment tier II assessment

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