

Topic: ETHYLENE DICHLORIDE

1.0 SUBSTANCES INCLUDED/SYNONYMS

1.1 SPECIFIC SUBSTANCES

A. SYNONYMS

1. ETHYLENE DICHLORIDE
2. AETHYLENCHLORID (German)
3. 1,2-BICHLOROETHANE
4. BICHLORURE D'ETHYLENE (French)
5. BORER SOL
6. BROCID
7. CHLORURE D'ETHYLENE (French)
8. CLORURO DI ETHENE (Italian)
9. 1,2-DCE
10. DESTRUXOL BORER-SOL
11. 1,2-DICHLOORETHAAN (Dutch)
12. 1,2-DICHLOR-AETHAN (German)
13. DICHLOREMULSION
14. 1,2-DICHLORETHANE
15. DI-CHLOR-MULSION
16. DICHLOR-MULSION
17. DICHLORO-1,2-ETHANE (French)
18. alpha, beta-DICHLOROETHANE
19. sym-DICHLOROETHANE
20. s-DICHLOROETHANE
21. 1,2-DICHLOROETHANE
22. DICHLOROETHYLENE
23. 1,2-DICLOROETANO (Italian)
24. DOWFUME (DOW)
25. DUTCH LIQUID
26. DUTCH OIL
27. EDC
28. ENT 1,656
29. ETHANE DICHLORIDE
30. ETHANE, 1,2-DICHLORO-
31. ETHYLEENDICHLORIDE (Dutch)
32. ETHYLENE CHLORIDE
33. ETHYLENE DICHLORIDE (ACGIH, DOT, OSHA)
34. 1,2-ETHYLENE DICHLORIDE
35. FREON 150
36. GLYCOL DICHLORIDE
37. GRANOSAN
38. NCI-C00511
39. RCRA HAZARDOUS WASTE NUMBER: U077
40. STCC NUMBER: 4909166
41. UN 1184 (DOT)
42. WISWESSER NOTATION: G2G
43. NIOSH/RTECS NUMBER: KI 0525000
44. MOLECULAR FORMULA: C2-H4-Cl2
45. CAS REGISTRY NUMBER: 107-06-2
46. References: RTECS, 1991; HSDB, 1991;
OHM/TADS, 1991

B. DESCRIPTION/USE

1. Ethylene dichloride is a heavy, colorless, oily liquid with a pleasant, chloroform-like odor and a sweet taste (Budavari, 1989; NIOSH, 1990; Sax & Lewis, 1987). It burns with a smokey flame (Budavari, 1989).

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2. USES: Ethylene dichloride is used in the production of vinyl chloride, trichloroethylene, vinylidene chloride, and trichloroethane; as a lead scavenger in antiknock gasoline; in paint, varnish, and finish removers; for metal degreasing, soaps and scouring compounds, wetting and penetrating agents, organic synthesis, and ore flotation; and as a solvent, fumigant, and diluent for pesticides (Sax & Lewis, 1987; HSDB, 1991).

2.0 CLINICAL EFFECTS

2.1 SUMMARY

- A. Initial effects seen after ethylene dichloride ingestion are gastrointestinal; vomiting is common. Cyanosis, dyspnea, and coma may be delayed in onset. Pulmonary edema may develop. Death may be due to cardiovascular, respiratory, or hepatorenal failure. Liver and kidney injury may occur in significant exposures. Neurologic effects have been reported including headache, weakness, tremor, and dizziness.
- B. HEALTH HAZARDS - DOT GUIDE 26
 1. May be poisonous if inhaled or absorbed through skin.
 2. Vapors may cause dizziness or suffocation.
 3. Contact may irritate or burn skin and eyes.
 4. Fire may produce irritating or poisonous gases.
 5. Runoff from fire control or dilution water may cause pollution.
 6. Reference: DOT, 1990.
- C. Vapors may produce irritation of respiratory tract and conjunctiva, corneal clouding, CNS depression, and liver and kidney impairment. Ethylene dichloride may reasonably be anticipated to be a carcinogen (Budavari, 1989).
- D. Ethylene dichloride is an experimental carcinogen, neoplastigen, tumorigen and teratogen. It is an experimental transplacental carcinogen. It is a strong narcotic. It produces experimental reproductive effects. Human mutagenic data exist (Sax & Lewis, 1989).
 1. Animal studies indicate that ethylene dichloride has little ability to adversely affect the reproductive or developmental processes except at maternally toxic levels (Proctor et al, 1988).
- E. Ethylene dichloride is a skin and severe eye irritant, and strong local irritant (Sax & Lewis, 1989).
- F. Odor is not a dependable guide for avoiding dangerous chronic exposures to ethylene dichloride. The odor may be considered pleasant until well above 180 ppm, and may be missed below 100 ppm (HSDB, 1991).
- G. Ethylene dichloride is a pesticide and a priority pollutant (Sax & Lewis, 1989).
- H. Ethylene dichloride clearly belongs in the group of hepatotoxic halogenated hydrocarbons, as opposed to those with primarily narcotic effects (ACGIH, 1986).
- I. Eye contact with either the liquid or with high concentrations of vapor causes immediate discomfort with conjunctival hyperemia and slight corneal injury; corneal burns from splashes recover quickly with no scarring. Prolonged skin exposure, as from contact with soaked

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clothing, produces severe irritation, moderate edema, and necrosis; systemic effects may ensue, as the liquid is readily absorbed through the skin (Proctor et al, 1988).

3.0 TREATMENT

3.1 LIFE SUPPORT

Support respiratory and cardiovascular function.

3.2 SUMMARY

A. FIRST AID - DOT GUIDE 26

1. Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen.
2. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water.
3. Remove and isolate contaminated clothing and shoes at the site.
4. Reference: DOT, 1990.

B. INHALATION EXPOSURE

1. DECONTAMINATION: Move patient to fresh air. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. Administer 100% humidified supplemental oxygen with assisted ventilation as required.

C. DERMAL EXPOSURE

1. DECONTAMINATION: Wash exposed area extremely thoroughly with soap and water. A physician may need to examine the area if irritation or pain persists.

D. EYE EXPOSURE

1. DECONTAMINATION: Exposed eyes should be irrigated with copious amounts of tepid water for at least 15 minutes. If irritation, pain, swelling, lacrimation, or photophobia persist, the patient should be seen in a health care facility.

E. ORAL/PARENTERAL EXPOSURE

1. EMESIS CONTRAINDICATED

- a. Oral ingestion of ethylene dichloride may result in burns of the oropharynx. Emesis is not recommended.
2. DILUTION: Following ingestion and/or prior to gastric evacuation, immediately dilute with 4 to 8 ounces (120 to 240 mL) of milk or water (not to exceed 15 mL/kg in a child).
3. GASTRIC LAVAGE: May be indicated if performed soon after ingestion, or in patients who are comatose or at risk of convulsing. After control of any seizures present, perform gastric lavage. Protect airway by placement in Trendelenburg and left lateral decubitus position or by cuffed endotracheal intubation. Lavage return should approximate fluid given.

4. ACTIVATED CHARCOAL

- a. Activated charcoal has been shown to adsorb ethylene dichloride in animals (Laass, 1975). Activated charcoal may be given following gastric lavage, and as sole decontamination in patients with trivial ingestions or delayed presentations.

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- b. Administer charcoal as slurry. The FDA suggests a minimum of 240 milliliters of diluent per 30 grams charcoal. (Dose: Optimum dose of charcoal is not established; usual dose is 30 to 100 grams in adults and 15 to 30 grams in children; some suggest using 1 to 2 grams per kilogram as a rough guideline, particularly in infants). Charcoal slurry may be aqueous, or mixture of charcoal with saline cathartics or sorbitol.
 - c. Administer one dose of a saline cathartic or sorbitol, mixed with charcoal or administered separately.
 - (1) Magnesium or sodium sulfate (ADULT: 20 to 30 grams per dose; CHILD: 250 milligrams per kilogram per dose) OR magnesium citrate (ADULT AND CHILD: 4 milliliters per kilogram per dose up to 300 milliliters per dose).
 - (2) Sorbitol (ADULT: 1 to 2 grams per kilogram per dose to a maximum of 150 grams per dose; CHILD: (over 1 year of age): 1 to 1.5 grams per kilogram per dose as a 35 percent solution to a maximum of 50 grams per dose). Administer in a health care facility, monitoring fluid and electrolyte status, especially in children.
 - d. The safety of more than one dose of a cathartic has not been established. Hypermagnesemia has been reported after repeated administration of magnesium-containing cathartics in overdose patients with normal renal function. Repeated cathartic dosing should be done with extreme caution, if at all. Administration of cathartics should be stopped when a charcoal stool appears. Cathartics should not be used in patients who have an ileus. Saline cathartics should not be used in patients with impaired renal function.
 - e. TOMES Plus System users may refer to the MEDITEXT ACTIVATED CHARCOAL/TREATMENT management for further information on administration and adverse reactions.
5. CATHARTIC
- a. Cathartics may not be necessary since diarrhea may occur following oral ingestion.
- 4.0 RANGE OF TOXICITY
- 4.1 MINIMUM LETHAL EXPOSURE
- A. ADULTS: Fatalities in adults have been reported after ingestion of 30 to 70 grams (Jacobziner & Raybin, 1961). Death is usually due to circulatory or respiratory collapse.
 - B. ADOLESCENTS: Death resulted from ingestion of 15 milliliters by a 14-year-old boy, secondary to hepatorenal failure (Yodaiken & Babcock, 1973).
 - C. Ingestion of quantities estimated at between 8 and 200 mL have been reported to be lethal, with a toxic response similar to that of cases of inhalation (Proctor et al, 1988).
- 4.2 MAXIMUM TOLERATED EXPOSURE
- A. Inhalation and dermal exposure to 4 to 60 parts per million resulted in symptoms in 90 of 118 workers, including conjunctival congestion and burning sensation, weakness, metallic taste in mouth, headache, dermatographism, nausea, liver pain, tachycardia, dyspnea,

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and bronchial or pharyngeal irritation. Abnormal liver function measurements were found in 40 of 56 workers (ESDB, 1991).

- B. Exposure to 5 to 40 parts per million emitted from aircraft glue was associated with liver and bile duct disease, neurosis, dystonia, asthenia, goiter, and hyperthyroidism (HSDB, 1991).
- C. Symptoms such as nausea, vomiting and dizziness occurred from exposures between 10 and 37 ppm in one of six workers, and physical examinations revealed abnormalities, notably blood changes, in 8 of 16 workers. In another study, workers with exposures generally averaging below 16 ppm, but in a few instances between 30 and 50 ppm, experienced numerous adverse nervous system and liver effects. In a study of 100 Russian workers with exposures up to 5 years at concentrations not exceeding 25 ppm, no changes in blood or internal organs were reported, but various complaints and nervous system effects were noted (ACGIH, 1986).

4.3 WORKPLACE STANDARDS

- A. ACGIH TLV: 10 parts per million TWA (approximately 40 milligrams per cubic meter); no STEL (ACGIH, 1991)
- B. OSHA PEL-TWA Transitional Limit: 50 parts per million; 100 parts per million Ceiling Limit; 200 parts per million maximum peak for 5 minutes in any 3 hours (OSHA, 1989)
 - 1. The PEL-TWA specified in the Transitional Limit shall continue to be achieved by the following methods of compliance through December 30, 1992:
 - a. Administrative or engineering controls must first be determined and implemented whenever possible.
 - b. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section.
 - c. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person.
 - d. Whenever respirators are used, their use shall comply with 29 CFR Section 1910.134.
- C. OSHA PEL Final Rule Limits (OSHA, 1989)
 - 1. PEL-TWA Final Rule Limits: 1 part(s) per million (approximately 4 milligrams per cubic meter)
 - 2. PEL-STEL Final Rule Limit: 2 part(s) per million (approximately 8 milligram(s) per cubic meter); no Ceiling Limit.
 - 3. The effective date for the Final Rule Limits is March 1, 1989.
 - 4. PELs specified in Final Rule Limits shall be achieved by any reasonable combination of engineering controls, work practices and personal protective equipment effective September 1, 1989, through December 30, 1992.
 - 5. Effective December 31, 1992, the following methods of compliance shall be used if no final rule concerning them

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has been published in the Federal Register by December 31, 1991:

- a. Administrative or engineering controls must first be determined and implemented whenever possible.
 - b. When such controls are not feasible to achieve full compliance, protective equipment or any other protective measures shall be used to keep the exposure of employees to air contaminants within the limits prescribed in this section.
 - c. Any equipment and/or technical measures used for this purpose must be approved for each particular use by a competent industrial hygienist or other technically qualified person.
 - d. Whenever respirators are used, their use shall comply with 29 CFR Section 1910.134.
- D. Ethylene dichloride meets criteria for the proposed OSHA Medical Records rule (HSDB, 1991).
- E. ODOR THRESHOLD: 100 parts per million (CHRIS, 1991)
1. Of 20 subjects, 13 could detect ethylene dichloride at 6 ppm (23.2 to 24.9 mg/m(3)), 6 persons could detect it at 4.5 ppm (17.5 mg/m(3)), and 1 person at 3 ppm (12.2 mg/m(3)) (HSDB, 1991).
- F. IDLH value: 1,000 parts per million (NIOSH recommends that this chemical be treated as a potential human carcinogen) (NIOSH, 1990)
- G. ENVIRONMENTAL STANDARDS
1. Ethylene dichloride is on the CERCLA Hazardous Substances List, SARA Title III (EPA, 1990).
 - a. Reportable Quantity: 100 pounds
 2. Ethylene dichloride is NOT on the Extremely Hazardous Substances List, SARA Title III (EPA, 1990).
 3. Ethylene dichloride is specifically listed under Section 313, SARA Title III (EPA, 1990).
- H. OTHER ENVIRONMENTAL STANDARDS
1. Ethylene dichloride is assigned RCRA Hazardous Waste Number U077 (EPA, 1990).
 2. Ethylene dichloride is listed in the TSCA Inventory (RTECS, 1991).
 3. MSHA Standard-air: TWA 50 parts per million (approximately 200 milligrams per cubic meter) (RTECS, 1991)
 4. NIOSH REL-air: 10h TWA 1 part per million; Ceiling Limit: 2 parts per million/15M (RTECS, 1991)
 5. Ethylene dichloride is designated as a hazardous substance under the Federal Water Pollution Control Act and further regulated by the Clean Water Act Amendments of 1977 and 1978. These regulations apply to discharges and effluent limitations of ethylene dichloride (HSDB, 1991).
 6. The Safe Drinking Water Act maximum contaminant level goal for ethylene dichloride is zero (HSDB, 1991).
- I. OTHER
1. STORAGE RECOMMENDATIONS:
 - a. Store in a cool, dry, well-ventilated location. Separate from oxidizing materials, aluminum, and ammonia

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- (NFPA, 1991).
- b. Outside or detached storage is preferred. Small quantities can be stored in brown bottles or opaque containers due to solvent's light sensitivity. Ground and bond metal containers for liquid transfers to prevent static sparks (HSDB, 1991).
- 2. USUAL SHIPPING CONTAINERS: Metal cans, pails, drums; tanks on trucks, rail cars, and barges. Normally packaged under nitrogen gas (NFPA, 1991).
- J. SHIPPING REGULATIONS
 - 1. SURFACE SHIPMENTS
 - a. DOT-HAZARD Classification (RTECS, 1991)
 - (1) DOT-HAZARD: Flammable liquid
 - (2) Label: Flammable liquid
 - b. The United States Department of Transportation has recently revised the Hazardous Materials Transport regulations in order to accommodate both North American and International regulations. Whenever hazardous materials are going to be transported, Title 49 CFR, Transportation, Parts 100 to 180 published by the US Dept of Transportation, contain the regulatory requirements and must be consulted (HSDB, 1991).
 - 2. AIR SHIPMENTS
 - a. INTERNATIONAL (IATA, 1991)
 - (1) UN 1184
 - (2) PROPER SHIPPING NAME: Ethylene dichloride
 - (3) CLASS OR DIVISION NUMBER: 3
 - (4) SUBSIDIARY RISK CLASS OR DIVISION NUMBER: 6.1
 - (5) PRIMARY HAZARD LABEL: Flammable liquid & Poison
 - (6) SUBSIDIARY RISK HAZARD LABEL: Not listed
 - (7) UN PACKING GROUP NUMBER: II
 - (8) PASSENGER AIRCRAFT
 - (a) PACKING INSTRUCTION NUMBER: 306
 - (b) LIMITED QUANTITY PACKAGING INSTRUCTION NUMBER: Y306
 - (c) MAXIMUM NET QUANTITY PER PACKAGE: 1 L
 - (d) LIMITED QUANTITY PACKAGING MAXIMUM NET QUANTITY PER PACKAGE: 1 L
 - (9) CARGO AIRCRAFT
 - (a) PACKING INSTRUCTION NUMBER: 308
 - (b) LIMITED QUANTITY PACKAGING INSTRUCTION NUMBER: Not listed
 - (c) MAXIMUM NET QUANTITY PER PACKAGE: 60 L
 - (d) LIMITED QUANTITY PACKAGING MAXIMUM NET QUANTITY PER PACKAGE: Not listed
 - b. DOMESTIC (HSDB, 1991)
 - (1) Acceptable modes of transportation: air, rail, road, and water (HSDB, 1991).
 - 3. MARITIME SHIPMENTS
 - a. DOT-IMO Classification (RTECS, 1991)
 - (1) DOT-IMO HAZARD: Flammable liquid
 - (2) Label: Flammable liquid, Poison
- K. NFPA HAZARD IDENTIFICATION (NFPA, 1991):
 - 1. Health (Blue): 2
 - 2. Flammability (Red): 3
 - 3. Reactivity (Yellow): 0

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4.4 LD50/LC50

A. PUBLISHED VALUES (RTECS, 1991; Sax & Lewis, 1989)

1. TCLo (INHL) HUMAN: 4,000 ppm/h
2. TDLo (ORAL) HUMAN: 428 mg/kg
3. TCLo (INHL) MAN: 4,000 ppm/1h
4. TDLo (ORAL) MAN: 892 mg/kg
5. TCLo (INHL) RAT: 300 ppm/7h
6. TCLo (INHL) RAT: 5 ppm/7h/78wk
7. TDLo (ORAL) RAT: 5,286 mg/kg/69wk
8. TDLo (ORAL) MOUSE: 3,536 mg/kg/78wk
9. TCLo (INHL) MOUSE: 5 ppm/7H/78wk
10. TDLo (SKIN) MOUSE: 1,120 g/kg/74wk
11. LDLo (ORAL) HUMAN: 286 mg/kg
12. LDLo (ORAL) MAN: 714 mg/kg
13. LDLo (SC) RAT: 99 mg/kg
14. LCLo (INHL) MOUSE: 5 g/m(3)/2h
15. LDLo (SC) MOUSE: 380 mg/kg
16. LCLo (INHL) RABBIT: 3,000 ppm/7h
17. LDLo (SC) RABBIT: 1,200 mg/kg
18. LCLo (INHL) GUINEA PIG: 3,000 ppm/7h
19. LCLo (INHL) GUINEA PIG: 1,500 ppm/7H
20. LDLo (IP) GUINEA PIG: 600 mg/kg
21. LDLo (IV) DOG: 175 mg/kg
22. LDLo (ORAL) DOG: 2,000 mg/kg
23. LD50 (ORAL) RAT: 670 mg/kg
24. LC50 (INHL) RAT: 1,000 ppm/7h
25. LD50 (IP) RAT: 807 mg/kg
26. LD50 (SC) RAT: 1 g/kg
27. LD50 (ORAL) MOUSE: 489 mg/kg
28. LD50 (IP) MOUSE: 470 mg/kg
29. LD50 (ORAL) RABBIT: 860 mg/kg
30. LD50 (SKIN) RABBIT: 2,800 mg/kg
31. LD50 (SKIN) RABBIT: 3,890 mg/kg
32. LD50 (ORAL) DOG: 5,700 mg/kg
33. LC50 (INHL) MONKEY: 3,000 ppm/7h

5.0 HAZARD DATA/MANAGEMENT

5.1 FIRE HAZARD

5.1.1 SUMMARY

A. FIRE OR EXPLOSION HAZARDS - DOT GUIDE 26

1. Flammable/combustible material; may be ignited by heat, sparks or flames.
2. Vapors may travel to a source of ignition and flash back.
3. Container may explode in heat of fire.
4. Vapor explosion hazard indoors, outdoors or in sewers.
5. Runoff to sewer may create fire or explosion hazard.
6. Reference: DOT, 1990.

B. EMERGENCY ACTION - DOT GUIDE 26

1. Keep unnecessary people away; isolate hazard area and deny entry.
2. Stay upwind; keep out of low areas.
3. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.
4. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL

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CAR or TANK TRUCK IS INVOLVED IN FIRE.

3. If water pollution occurs, notify the appropriate authorities.
6. CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available.
7. Reference: DOT, 1990.

S.1.2 FIRE CONTROL

A. SMALL FIRES - DOT GUIDE 26

1. Dry chemical, CO₂, water spray or alcohol-resistant foam.
2. Reference: DOT, 1990.

B. LARGE FIRES - DOT GUIDE 26

1. Water spray, fog or alcohol-resistant foam.
2. Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane.
3. Move container from fire area if you can do it without risk.
4. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks.
5. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
6. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.
7. Reference: DOT, 1990.

S.1.3 COMBUSTION TOXICITY

- A. When heated to decomposition, ethylene dichloride emits highly toxic fumes of chlorides and phosgene (Sax & Lewis, 1989).
- B. Products of combustion include noxious gases: phosgene, hydrogen chloride, acetylene and vinyl chloride (HSDB, 1991).

5.2 EXPLOSION HAZARD

- A. Explosion can result when ethylene dichloride is mixed with liquid ammonia, dimethylaminopropylamine, nitrogen tetroxide, metal powders, organic peroxides reducing agents, and alkali and alkali earth metals. Mixtures with nitric acid are easily detonated by heat, impact, or friction. Mixtures with mercaptans form thioethers and generate heat while mixtures with nitrides generate heat and ammonia forming toxic fumes (HSDB, 1991).
- B. FIRE OR EXPLOSION HAZARDS - DOT GUIDE 26
 1. Flammable/combustible material; may be ignited by heat, sparks or flames.
 2. Vapors may travel to a source of ignition and flash back.
 3. Container may explode in heat of fire.
 4. Vapor explosion hazard indoors, outdoors or in sewers.
 5. Runoff to sewer may create fire or explosion hazard.
 6. Reference: DOT, 1990.
- C. EMERGENCY ACTION - DOT GUIDE 26
 1. Keep unnecessary people away; isolate hazard area and deny entry.

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2. Stay upwind; keep out of low areas.
 3. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.
 4. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR or TANK TRUCK IS INVOLVED IN FIRE.
 5. If water pollution occurs, notify the appropriate authorities.
 6. CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available.
 7. Reference: DOT, 1990.
- 5.3 DUST/VAPOR HAZARD
- A. Ethylene dichloride is moderately explosive in the form of vapor when exposed to flame (Sax & Lewis, 1989).
 - B. EMERGENCY ACTION - DOT GUIDE 26
 1. Keep unnecessary people away; isolate hazard area and deny entry.
 2. Stay upwind; keep out of low areas.
 3. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.
 4. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR or TANK TRUCK IS INVOLVED IN FIRE.
 5. If water pollution occurs, notify the appropriate authorities.
 6. CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available.
 7. Reference: DOT, 1990.
- 5.4 REACTIVITY HAZARD
- A. Ethylene dichloride decomposes to vinyl chloride and HCl above 1,112 degrees F (NIOSH, 1990).
 - B. Ethylene dichloride is incompatible with strong oxidizers and caustics; chemically-active metals such as aluminum or magnesium powder, sodium and potassium; and liquid ammonia (NIOSH, 1990).
 - C. Ethylene dichloride forms violent reactions with Al, N₂O₄, NE₃, and dimethylaminopropylamine (Sax & Lewis, 1989).
- 5.5 ENVIRONMENTAL HAZARD
- 5.5.1 POLLUTION HAZARD
- A. The majority of ethylene dichloride released into the environment will enter the atmosphere mostly from its production and use as a chemical intermediate, solvent, and use as a lead scavenger in gasoline. Major human exposure is from urban air, drinking water from contaminated aquifers and occupational atmospheres (HSDB, 1991).
- 5.5.2 ENVIRONMENTAL TOXICITY
- A. Ecotoxicity Values (HSDB, 1991):
 1. LC50 Daphnia magna, 218,000 mcg/L, 48 hours, conditions of bioassay not specified
- 5.5.3 ENVIRONMENTAL KINETICS
- A. TERRESTRIAL FATE: Releases on land will dissipate by volatilization to air and by percolation into

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groundwater where it is likely to persist for a very long time (HSDB, 1991).

- B. AQUATIC FATE: Releases to water will primarily be removed by evaporation (half-life several hours to 10 days) (HSDB, 1991).
- C. ATMOSPHERIC FATE: Once in the atmosphere, ethylene dichloride may be transported long distances and is primarily removed by photooxidation (half-life approximately 1 month) (HSDB, 1991).
- D. Ethylene dichloride is not expected to bioconcentrate in the food chain; its presence in some food products is probably due to its use as an extractant (HSDB, 1991).

5.6 EVACUATION PROCEDURES

5.6.1 SUMMARY

- A. No specific Isolation - Evacuation Distances have been established for this agent.
 - 1. Reference: DOT, 1990.
- B. EMERGENCY ACTION - DOT GUIDE 26
 - 1. Keep unnecessary people away; isolate hazard area and deny entry.
 - 2. Stay upwind; keep out of low areas.
 - 3. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.
 - 4. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR or TANK TRUCK IS INVOLVED IN FIRE.
 - 5. If water pollution occurs, notify the appropriate authorities.
 - 6. CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available.
 - 7. Reference: DOT, 1990.
- C. SPILL OR LEAK, GENERAL - DOT GUIDE 26
 - 1. Shut off ignition sources; no flares, smoking or flames in hazard area.
 - 2. Stop leak if you can do it without risk.
 - 3. Water spray may reduce vapor; but it may not prevent ignition in closed spaces.
 - 4. Reference: DOT, 1990.

5.7 DISPOSAL GUIDELINES

5.7.1 SUMMARY

- A. Eliminate all ignition sources. Use appropriate foam to blanket release and suppress vapors. Absorb in noncombustible material for proper disposal. Report any release in excess of 5,000 pounds (NFPA, 1991).
- B. Cleanup Methods (HSDB, 1991):
 - 1. In/on soil: Construct barriers to contain spill. Remove with pump or vacuum equipment. Absorb residue on sorbent material and shovel into covered metal containers.
 - 2. In/on water: Contain by damming or water diversion. Dredge or vacuum pump to remove contaminant, liquids, and bottom sediment.
 - 3. In/on air: Knock down and disperse vapor with water spray.

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- C. Hycar, an adsorbent material, may be used for vapor suppression and containment (HSDB, 1991).
 - D. After containment, a universal gelling agent may be used to solidify trapped mass. If solubilized, activated carbon (10%) may be applied. Immobilized masses can be removed using dredges or lift (HSDB, 1991).
 - E. Ethylene dichloride-contaminated 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 (HSDB, 1991).
 - F. Ethylene dichloride is a potential candidate for liquid injection incineration, with a temperature range of 650 to 1,600 degrees C and a residence time of 0.1 to 2 seconds. Also, it is a potential candidate for rotary kiln incineration, with a temperature range of 820 to 1,600 degrees C and a residence time of seconds and for fluidized bed incineration, with a temperature range of 450 to 980 degrees C and a residence time of seconds (HSDB, 1991).
 - G. Ethylene dichloride should be susceptible to removal from waste water by air stripping (HSDB, 1991).
- 5.7.2 SMALL SPILL
- A. SMALL SPILLS - DOT GUIDE 26
 1. Take up with sand or other noncombustible absorbent material and place into containers for later disposal.
 2. Reference: DOT, 1990.
- 5.7.3 LARGE SPILL
- A. LARGE SPILLS - DOT GUIDE 26
 1. Dike far ahead of liquid spill for later disposal.
 2. Reference: DOT, 1990.
- 5.8 PERSONNEL PROTECTION
- 5.8.1 SUMMARY
- A. EMERGENCY ACTION - DOT GUIDE 26
 1. Keep unnecessary people away; isolate hazard area and deny entry.
 2. Stay upwind; keep out of low areas.
 3. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.
 4. ISOLATE FOR 1/2 MILE IN ALL DIRECTIONS IF TANK, RAIL CAR or TANK TRUCK IS INVOLVED IN FIRE.
 5. If water pollution occurs, notify the appropriate authorities.
 6. CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available.
 7. Reference: DOT, 1990.
- 5.8.2 RESPIRATORY PROTECTION
- A. EMERGENCY ACTION - DOT GUIDE 26
 1. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.
 2. Reference: DOT, 1990

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3. NIOSH RECOMMENDED RESPIRATOR SELECTION (Maximum Concentration For Use) (NIOSH, 1990)

1. At any detectable concentration
 - a. Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode (Assigned Protection Factor = 10,000).
 - b. Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode (Assigned Protection Factor = 10,000).
2. Escape
 - a. Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister (Assigned Protection Factor = 50).
 - b. Any appropriate escape-type, self-contained breathing apparatus.

5.2.3 PROTECTIVE CLOTHING

1. INTERPRETATION

1. This section consists of a compilation of chemical compatibility recommendations and test data from four reference sources to facilitate protective clothing selection.
2. These recommendations are compiled from published sources and are NOT recommended specifically by Micromedex, Inc. No attempt has been made to verify or professionally review the data presented.
3. There are many critical variables in protective clothing selection that cannot be represented in this summary of the literature. For example, there may be significant differences in the protection offered by the same generic material from one commercial product to another and one lot to another. Refer to "PERSONAL PROTECTIVE EQUIPMENT - OSHA PUB 3077" INFOTEXT document for general information on protective clothing selection.
4. Therefore, these recommendations should not be used as the sole basis for decisions on choice of protective clothing, but rather should be used as a tool by qualified occupational health and safety professionals or other technically qualified persons in conjunction with a review of all mitigating factors.
5. The presence of a specific product within this section does not in any way constitute an endorsement of said product. Material types have been omitted if no test data or recommendations were found in any of the references consulted.

3. FLUOROCARBON RUBBER

1. Synonyms: Viton(R), FPM, VIT
2. General Recommendations:
 - a. RECOMMENDED; Breakthrough time of greater than 8 hours (Forsberg & Mansdorf, 1989)

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- b. GOOD RESISTANCE, based on a small amount of test data or inconsistent test data (ACGIH, 1987)
- c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
- 3. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. NORTH F-091 GLOVE
 - 820 min breakthrough time
 - 0 mg/m(2)/min permeation rate
 - 0.25 mm thickness
 - Performance Index Number 0 (scale of 0 to 5); indicating the highest level of resistance
 - b. NORTH F-091 GLOVE
 - 415 min breakthrough time
 - 49 mg/m(2)/min permeation rate
 - 0.24 mm thickness
 - Performance Index Number 2 (scale of 0 to 5); indicating a low level of permeation rate, more likely to be recommended for protection against frequent splashes than for constant exposure
 - c. NORTH F-091 GLOVE
 - Greater than 480 min breakthrough time
 - 0 mg/m(2)/min permeation rate
 - 0.24 mm thickness
 - Performance Index Number 0 (scale of 0 to 5); indicating the highest level of resistance
- C. TEFLON(TM)
 - 1. Synonyms: PTFE; Polytetrafluoroethylene; TFE
 - 2. General Recommendations:
 - a. RECOMMENDED; Breakthrough time of greater than 8 hours (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a small amount of test data or inconsistent test data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
 - 3. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. CHEMFAB CHALLENGE (miscellaneous garments: suits, coveralls, aprons, etc.)
 - Greater than 340 min breakthrough time
 - 0 mg/m(2)/min permeation rate
 - Thickness not reported
 - Performance Index Number 0 (scale of 0 to 5); indicating the highest level of resistance
 - b. CLEAN ROOM PRODUCTS GLOVE
 - Greater than 1440 min breakthrough time
 - Permeation rate not reported
 - 0.05 mm thickness
 - Performance Index Number 0 (scale of 0 to 5); indicating the highest level of resistance
 - c. CLEAN ROOM PRODUCTS GLOVE
 - 90 min breakthrough time
 - Permeation rate not reported
 - 0.05 mm thickness
 - Performance Index Number not reported

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D. POLYVINYL ALCOHOL

1. Synonyms: PVAL, PVA, PV Alcohol
2. General Recommendations:
 - a. RECOMMENDED; Breakthrough time of greater than 4 hours, with a permeation rate of less than 10 mg/m(2)/min at 20 to 25 degrees C (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a small amount of test data or inconsistent test data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
3. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. EDMONT 15-552 GLOVE
 - 22 min breakthrough time
 - Permeation rate not reported
 - Thickness not reported
 - Performance Index Number not reported
 - b. EDMONT 15-552 GLOVE
 - Greater than 180 min breakthrough time
 - Less than 90 mg/m(2)/min permeation rate
 - Thickness not reported
 - Performance Index Number 2 (scale of 0 to 5); indicating a low level of permeation rate, more likely to be recommended for protection against frequent splashes than for constant exposure
 - c. EDMONT 25-545 GLOVE
 - 60 min breakthrough time
 - Less than 9 mg/m(2)/min permeation rate
 - Thickness not reported
 - Performance Index Number 1 (scale of 0 to 5); indicating a high level of resistance
 - d. EDMONT 25-950 GLOVE
 - Greater than 480 min breakthrough time
 - 0 mg/m(2)/min permeation rate
 - 0.38 mm thickness
 - Performance Index Number 0 (scale of 0 to 5); indicating the highest level of resistance

E. POLYETHYLENE/ETHYLENE VINYL ALCOHOL

1. Synonyms: PE/EVAL
2. General Recommendations:
 - a. RECOMMENDED; Breakthrough time of greater than 4 hours (Forsberg & Mansdorf, 1989)
 - b. No recommendation (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
3. No specific product recommendations for this material (Forsberg & Keith, 1989).

F. SILVERSHIELD(TM)

1. General Recommendations:
 - a. No recommendation (Forsberg & Mansdorf, 1989)
 - b. GOOD RESISTANCE, based on a small amount of test data or inconsistent test data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material

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2. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. NORTH SILVERSHIELD
 - Greater than 360 min breakthrough time
 - 0 mg/m(2)/min permeation rate
 - 0.08 mm thickness
 - Performance Index Number 0 (scale of 0 to 5); indicating the highest level of resistance
- G. VITON(R)/NEOPRENE
 1. Synonyms: Viton(R) laminated with chlorobutyl
 2. General Recommendations:
 - a. No recommendation (Forsberg & Mansdorf, 1989)
 - b. GOOD RESISTANCE, based on a small amount of qualitative data or inconsistent data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
 3. No specific product recommendations for this material (Forsberg & Keith, 1989).
- III. PE/EVOH/PE
 1. Synonyms: PE laminated with EVOH laminated with PE; Polyethylene/Ethylenevinyl Alcohol/Polyethylene; PE/EVAL/PE
 2. General Recommendations:
 - a. No recommendation (Forsberg & Mansdorf, 1989)
 - b. No recommendation (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
 3. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. SAFETY4 4H GLOVE
 - Greater than 240 min breakthrough time
 - Permeation rate not reported
 - 0.07 mm thickness
 - Performance Index Number 0 (scale of 0 to 5); indicating the highest level of resistance
 - Comments: Measurements taken at 35 degrees C
- II. BUTYL RUBBER
 1. Synonyms: IIR, Butyl
 2. General Recommendations:
 - a. NOT RECOMMENDED; Breakthrough time of less than 1 hour and/or degradation (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a small amount of test data or inconsistent test data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
 3. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. NORTH B-161 GLOVE
 - 140 min breakthrough time
 - Permeation rate not reported
 - 0.56 mm thickness
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material

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- b. NORTH B-161 GLOVE
 - 175 min breakthrough time
 - 3,180 mg/m(2)/min permeation rate
 - 0.43 mm thickness
 - Performance Index Number 4 (scale of 0 to 5);
indicating a high level of permeation rate,
likely to be recommended only in situations
where occasional splashes might occur and should
be removed immediately after exposure
- c. NORTH B-174 GLOVE
 - 180 min breakthrough time
 - 3,204 mg/m(2)/min permeation rate
 - 0.62 mm thickness
 - Performance Index Number 4 (scale of 0 to 5);
indicating a high level of permeation rate,
likely to be recommended only in situations
where occasional splashes might occur and should
be removed immediately after exposure
 - DEGRADATION designation, indicating a noticeable
physical change and/or a significant gain or
loss of weight in the material
- J. NATURAL RUBBER
 - 1. Synonyms: NR
 - 2. General Recommendations:
 - a. NOT RECOMMENDED; Breakthrough time of less than 1 hour
and/or degradation (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a large amount of consistent
test data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
 - 3. Specific product recommendations in alpha order by
manufacturer (Forsberg & Keith, 1989):
 - a. ACKWELL 5-109 GLOVE
 - Less than 1 min breakthrough time
 - 2,100 mg/m(2)/min permeation rate
 - 0.15 mm thickness
 - Performance Index Number 5 (scale of 0 to 5);
indicating a very high level of permeation rate,
and should be considered a dangerous choice
 - DEGRADATION designation, indicating a noticeable
physical change and/or a significant gain or loss
of weight in the material
 - b. EDMONT 36-124 GLOVE
 - Breakthrough time not reported
 - Permeation rate not reported
 - 0.46 mm thickness
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable
physical change and/or a significant gain or
loss of weight in the material
- K. NEOPRENE
 - 1. Synonyms: Chloroprene Rubber, CR, NEO
 - 2. General Recommendations:
 - a. NOT RECOMMENDED; Breakthrough time of less than 1 hour
and/or degradation (Forsberg & Mansdorf, 1989)

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- b. POOR RESISTANCE, based on a large amount of consistent test data (ACGIH, 1987)
- c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
- 3. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. EDMONT 19-932 GLOVE
 - 2 min breakthrough time
 - 7,000 mg/m(2)/min permeation rate
 - Thickness not reported
 - Performance Index Number 5 (scale of 0 to 5); indicating a very high level of permeation rate, and should be considered a dangerous choice
 - b. EDMONT 29-840 GLOVE
 - Breakthrough time not reported
 - Permeation rate not reported
 - 0.38 mm thickness
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
 - c. EDMONT 29-870 GLOVE
 - Breakthrough time not reported
 - Permeation rate not reported
 - 0.48 mm thickness
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
 - d. PIONEER N-44 GLOVE
 - 33 min breakthrough time
 - 14,820 mg/m(2)/min permeation rate
 - 0.74 mm thickness
 - Performance Index Number 5 (scale of 0 to 5); indicating a very high level of permeation rate, and should be considered a dangerous choice
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
 - e. PIONEER N-73 GLOVE
 - 8 min breakthrough time
 - 10,000 mg/m(2)/min permeation rate
 - 0.46 mm thickness
 - Performance Index Number 5 (scale of 0 to 5); indicating a very high level of permeation rate, and should be considered a dangerous choice
 - f. Unknown (clothing type unknown)
 - 20 min breakthrough time
 - Permeation rate not reported
 - 0.58 mm thickness
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
- L. NITRILE RUBBER

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1. Synonyms: NBR, Nitrile
2. General Recommendations:
 - a. NOT RECOMMENDED; Breakthrough time of less than 1 hour and/or degradation (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a large amount of consistent test data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
3. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. ANSELL 650 GLOVE
 - Breakthrough time not reported
 - Permeation rate not reported
 - Thickness not reported
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
 - b. ANSELL CHALLENGER GLOVE
 - Breakthrough time not reported
 - Permeation rate not reported
 - Thickness not reported
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
 - c. EDMONT 37-155 GLOVE
 - Breakthrough time not reported
 - Permeation rate not reported
 - 0.40 mm thickness
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
 - d. EDMONT 37-165 GLOVE
 - Breakthrough time not reported
 - Permeation rate not reported
 - 0.60 mm thickness
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
 - e. EDMONT 37-175 GLOVE
 - 7 min breakthrough time
 - 39,000 mg/m(2)/min permeation rate
 - 0.37 mm thickness
 - Performance Index Number 5 (scale of 0 to 5); indicating a very high level of permeation rate, and should be considered a dangerous choice
 - f. NORTH LA-142G GLOVE
 - 8 min breakthrough time
 - 18,660 mg/m(2)/min permeation rate
 - 0.36 mm thickness
 - Performance Index Number 5 (scale of 0 to 5); indicating a very high level of permeation rate,

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- and should be considered a dangerous choice
- g. PIONEER A-14 GLOVE
 - 16 min breakthrough time
 - 17,520 mg/m(2)/min permeation rate
 - 0.54 mm thickness
 - Performance Index Number 5 (scale of 0 to 5); indicating a very high level of permeation rate, and should be considered a dangerous choice
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
 - h. Unknown (clothing type unknown)
 - 2 min breakthrough time
 - Permeation rate not reported
 - 0.20 mm thickness
 - Performance Index Number not reported
 - i. Unknown (clothing type unknown)
 - 2 min breakthrough time
 - Permeation rate not reported
 - 0.30 mm thickness
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
- M. POLYETHYLENE
- 1. Synonyms: PE
 - 2. General Recommendations:
 - a. NOT RECOMMENDED; Breakthrough time of less than 1 hour and/or degradation (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a large amount of consistent test data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
 - 3. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. EDMONT 35-125
 - 1 min breakthrough time
 - 100 mg/m(2)/min permeation rate
 - 0.03 mm thickness
 - Performance Index Number 5 (scale of 0 to 5); indicating a very high level of permeation rate, and should be considered a dangerous choice
 - b. Unknown (clothing type unknown)
 - 2 min breakthrough time
 - Permeation rate not reported
 - 0.05 mm thickness
 - Performance Index Number not reported
- N. POLYVINYL CHLORIDE
- 1. Synonyms: PVC
 - 2. General Recommendations:
 - a. NOT RECOMMENDED; Breakthrough time of less than 1 hour and/or degradation (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a large amount of consistent test data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):

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- No recommendations for this material
- 3. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. EDMONT GLOVE
 - Breakthrough time not reported
 - Permeation rate not reported
 - Thickness not reported
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
 - b. EDMONT 34-100 GLOVE
 - Breakthrough time not reported
 - Permeation rate not reported
 - 0.20 mm thickness
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
 - c. EDMONT V-20 GLOVE
 - 1 min breakthrough time
 - 69,000 mg/m(2)/min permeation rate
 - 0.31 mm thickness
 - Performance Index Number 5 (scale of 0 to 5); indicating a very high level of permeation rate, and should be considered a dangerous choice
- O. NEOPRENE + NATURAL RUBBER
 - 1. Synonyms: Neoprene blended with Natural Rubber
 - 2. General Recommendations:
 - a. No recommendation (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a large amount of consistent test data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
 - 3. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. ANSELL OMNI 276 GLOVE
 - 5 min breakthrough time
 - 13,000 mg/m(2)/min permeation rate
 - 0.45 mm thickness
 - Performance Index Number 5 (scale of 0 to 5); indicating a very high level of permeation rate, and should be considered a dangerous choice
 - b. ANSELL OMNI 276 GLOVE
 - Breakthrough time not reported
 - Permeation rate not reported
 - 0.45 mm thickness
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
- P. NEOPRENE/NATURAL RUBBER
 - 1. General Recommendations:
 - a. No recommendation (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a large amount of consistent

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- test data (ACGIH, 1987)
- c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
- 2. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. ANSELL CHEMI-PRO GLOVE
 - Breakthrough time not reported
 - Permeation rate not reported
 - Thickness not reported
 - Performance Index Number not reported
 - DEGRADATION designation, indicating a noticeable physical change and/or a significant gain or loss of weight in the material
- Q. POLYURETHANE
 - 1. General Recommendations:
 - a. No recommendation (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a small amount of test data or inconsistent test data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
 - 2. No specific product recommendations for this material (Forsberg & Keith, 1989).
- R. CHLORINATED POLYETHYLENE
 - 1. Synonyms: CPE
 - 2. General Recommendations:
 - a. No recommendation (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a small amount of test data or inconsistent test data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
 - 3. Specific product recommendations in alpha order by manufacturer (Forsberg & Keith, 1989):
 - a. Unknown (clothing type unknown)
 - 15 min breakthrough time
 - Permeation rate not reported
 - Thickness not reported
 - Performance Index Number not reported
- S. BUTYL RUBBER/NEOPRENE
 - 1. Synonyms: Butyl rubber laminated with neoprene
 - 2. General Recommendations:
 - a. No recommendation (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a small amount of qualitative data or inconsistent data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):
 - No recommendations for this material
 - 3. No specific product recommendations for this material (Forsberg & Keith, 1989).
- T. NITRILE + PVC
 - 1. Synonyms: Nitrile Rubber blended with polyvinyl chloride
 - 2. General Recommendations:
 - a. No recommendation (Forsberg & Mansdorf, 1989)
 - b. POOR RESISTANCE, based on a small amount of qualitative data or inconsistent data (ACGIH, 1987)
 - c. NFPA Summary (Henry, 1989):

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- No recommendations for this material

3. No specific product recommendations for this material (Forsberg & Keith, 1989).

6.0 PHYSICOCHEMICAL

6.1 PHYSICAL PARAMETERS

6.1.1 PHYSICAL STATE

- A. Ethylene dichloride is a heavy, colorless, oily liquid with a pleasant, chloroform-like odor and a sweet taste (Budavari, 1989; NIOSH, 1990; Sax & Lewis, 1987). It burns with a smokey flame (Budavari, 1989).

6.1.2 MOLECULAR WEIGHT

- A. 98.96 (Budavari, 1989; RTECS, 1991)

6.1.3 SPECIFIC GRAVITY

- A. 1.2569 at 20 degrees C/4 degrees C (Budavari, 1989)

6.1.4 DENSITY

- A. 1.2569 at 20 degrees C/4 degrees C (Budavari, 1989)

6.1.5 OTHER

- A. MELTING POINT: approximately minus 40 degrees C (Budavari, 1989)
- B. BOILING POINT: 83 to 84 degrees C (Budavari, 1989)
- C. VAPOR PRESSURE: 100 mmHg at 29.4 degrees C (Sax & Lewis, 1989)
- D. FLASH POINT:
 1. 56 degrees F (13 degrees C) (CC) (Budavari, 1989)
 2. 65 degrees F (18 degrees C) (OC) (Budavari, 1989)
- E. EXPLOSIVE LIMITS:
 1. Upper Explosive Limit: 15.9% (Sax & Lewis, 1989; NFPA, 1991)
 2. Lower Explosive Limit: 6.2% (Sax & Lewis, 1989; NFPA, 1991)
- F. AUTOIGNITION TEMPERATURE: 775 degrees F (Sax & Lewis, 1989)

6.2 CHEMICAL PARAMETERS

6.2.1 CHARACTERISTIC ODOR/TASTE/COLOR

- A. Ethylene dichloride is a heavy, colorless, oily liquid with a pleasant, chloroform-like odor and a sweet taste (Budavari, 1989; NIOSH, 1990; Sax & Lewis, 1987).

6.2.2 PH

- A. No information on the pH of ethylene dichloride was found in available references at the time of this review.

6.2.3 REACTIVITY

- A. Ethylene dichloride decomposes slowly, becomes acidic and darkens in color (NIOSH, 1990).
- B. Ethylene dichloride is stable to water, alkalies, acids, or active chemicals; resistant to oxidation; and will not corrode metals (Sax & Lewis, 1987).
- C. Ethylene dichloride corrodes iron and other metals at elevated temperatures in contact with water (HSDB, 1991).

6.2.4 SOLUBILITY

- A. Ethylene dichloride is soluble in about 120 parts water. It is miscible with alcohol, chloroform, and ether (Budavari, 1989).
- B. Solubility in water: 0.869 g/100 mL water at 20 degrees

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C (HSDB, 1991).

6.2.5 OTHER

A. SAMPLING METHODS

1. Ethylene dichloride can be collected from air on silica gel and extracted with isopropyl alcohol (HSDB, 1991).

B. ANALYTICAL METHODS

1. Photodetection with halide meters, infrared spectrometry and gas chromatography have been used to quantify ethylene dichloride samples (HSDB, 1991).
2. Ethylene dichloride can be detected in water using gas chromatography and flame ionization or chemiluminescence detectors (HSDB, 1991).
3. Liquid-liquid extraction (EPA Method No. 501.2) can be used for water samples, where a small volume of sample is extracted and then injected into a gas chromatograph with an electron capture detector. Detection limit is 20 mcg/L (HSDB, 1991).
4. EPA Method 601 is a purge-and-trap gas chromatographic method with electrolytic conductivity detection for the analysis of ethylene dichloride in municipal and industrial discharges. The detection limit is 0.03 mcg/L (HSDB, 1991).
5. EPA Method 624 is a purge-and-trap gas chromatographic/mass spectrometry method for the analysis of ethylene dichloride in municipal and industrial discharges. The detection limit is 2.8 mcg/L (HSDB, 1991).
6. For analysis of ethylene dichloride in solid wastes, EPA Method 8010 for Halogenated Volatile Organics can be used. Samples are analyzed by direct injection or purge-and-trap using gas chromatography, with detection achieved with a halogen-specific detector. The detection limit for ethylene dichloride is 0.03 mcg/L (HSDB, 1991).
7. EPA Method 8240, Gas Chromatography/Mass Spectrometry for Volatile Organics, can be used to quantify most volatile organic compounds that have boiling points below 200 degrees C and that are insoluble or slightly soluble in water, including ethylene dichloride. The practical quantitation limit for an individual compound is approximately 5 mcg/kg (wet weight) for wastes and 5 mcg/L for groundwater (HSDB, 1991).

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7.1 GENERAL REFERENCES

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7.2 CONSULTANTS

A. CHEMTREC

1. The above information is initial response data. For further information, consult manufacturer and/or Chemtrec (1-800-424-9300).

B. EPA ENVIRONMENTAL RESPONSE TEAM

1. In case of a large spill or release, notify appropriate local pollution, fire, and emergency response authorities. Seek 24-hour professional environmental engineering assistance through the EPA's Environmental Response Team (ERT), Edison, New Jersey (201) 321-6660.

C. NATIONAL PESTICIDE TELECOMMUNICATIONS NETWORK

1. Provides 24-hour consultation to poison centers and other health professionals for the management of pesticide poisoning. Call toll-free 800-858-7378, or if outside the U.S., the non-toll-free number is 806-743-3091.

8.0 AUTHOR INFORMATION

- A. Written by: POISINDEX(R) system staff, 05/87
B. Revised by: Patricia M Bill, BA, 06/91
C. Reviewed by: Betty J Dabney, PhD, 08/91
D. In addition to standard revisions of this management certain portions were updated with recent literature: 11/92
E. Specialty Board: Hazard
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