



PUB 100-324

Ethylene Dichloride

High-purity ethylene dichloride (EDC) is produced by PPG Industries at Lake Charles, Louisiana. PPG is one of the world's largest producers of ethylene dichloride and ships to customers in tank cars, tank trucks, barges and ocean-going ships. A terminal in Chicago, Illinois, also makes tank car and tank truck shipments.

USES

Almost three-quarters of the ethylene dichloride produced in the U.S. is used as an intermediate for making vinyl chloride. Other important intermediate uses for EDC include making 1, 1, 1-trichloroethane, trichloroethylene, perchlorethylene, ethylene amines and polysulfide elastomers.

Ethylene dichloride is also used as a scavenging agent in tetraethyllead fuel additive compounds to prevent lead salts and lead oxide from depositing on engine cylinder walls.

Ethylene dichloride is an excellent solvent for greases, oils, fats and waxes. Due to the toxicity and flammability of EDC, other chlorinated solvents have displaced it in many applications. However, EDC has certain advantages and is still used for various solvent applications in chemical processing.

GOVERNMENT SPECIFICATIONS

PPG technical-grade ethylene dichloride meets the chemical and physical requirements of Military Specification MIL-E-10662, Ethylene Chloride, Technical, including the requirement that 95% minimum distills between 82.5°C and 84.5°C at 760 mm Hg.

HEALTH HAZARDS

Ethylene dichloride can be taken into the body by ingestion, inhalation or skin absorption. By any of these means it can be highly toxic. Acute poisoning may cause headache, dizziness, feelings of drunkenness, loss of consciousness, internal bleeding and death. Repeated

exposures can bring on nausea, vomiting, stomach pain, irritated mucous membranes, loss of appetite, liver and kidney failure and possible death. Numerous cases of ethylene dichloride poisoning, both fatal and nonfatal, have been documented by the National Institute for Occupational Safety and Health.

When ethylene dichloride is ingested, the predominant characteristic is blood disorder, including clotting problems. With skin absorption or inhalation, the first effects are headache, weakness, eye

irritation, cyanosis (blackening of skin) and nausea. Ethylene dichloride has been found in human milk and in the exhaled breath of nursing mothers who were exposed to the chemical.

Ethylene dichloride in contact with eyes or skin can result in local pain and irritation. Dermatitis may result from removal of natural skin oils and moisture, although permanent eye or skin injury has not been known to occur. If EDC is held close to the skin, as by contaminated clothing, severe irritation and moderate edema and necrosis may result.

TYPICAL PROPERTIES

Chemical Name: Ethylene dichloride; ethylene chloride; 1,2-dichloroethane.

Chemical Formula: CH_2Cl_2

Molecular Weight: 98.97

Description: Ethylene dichloride is clear and colorless, but darkens slowly upon exposure to sunlight. It has an odor like chloroform. The liquid is mobile, volatile and flammable, and its vapor is toxic and flammable.

Boiling Point, °C 82

°F

180

Freezing Point, °C -35.3

°F

-32.6

Flash Point, Tag closed cup, °C 13.3

56

Explosive Limits, volume % in air 6.2 to 15.6

Autoignition Temperature, °C 413

775

Viscosity at 25°C, cps 0.78

Density at 25°C, pounds/gallon 10.3

Refractive Index at 20°C, n_D^{20} 1.444

Vapor Pressure at 25°C, mm Hg 87.0

Vapor Density, air = 1 3.42

Solubility at 25°C, g EDC/100 g water 0.86

at 20°C, g water/100 g EDC 10.16

Solubility: Ethylene dichloride is soluble in most organic solvents.

Reactivity: At moderate temperatures, ethylene dichloride is stable and resistant to oxidation. When heated above its boiling point, it does not corrode metals. But in contact with certain other materials, ethylene dichloride will corrode iron and certain other common materials.

Chronic Exposure

There are reports of two mild cases of human exposure for periods of two to five months which showed symptoms of central nervous system depression and gastrointestinal upset with nausea and vomiting. These persons recovered when removed from exposure. The liver and kidneys may be damaged by prolonged or repeated inhalation of the vapor.

Animal studies conducted by the National Cancer Institute (NCI)⁽¹⁾ suggested that ethylene dichloride can cause cancer in rats and mice by oral administration. However, a later EDC inhalation study of rats and mice by Maltoni, et. al⁽²⁾ failed to confirm the NCI findings.

The current OSHA permissible exposure limits for EDC are 50 ppm (8-hour TWA) 100 ppm (ceiling) and 200 ppm acceptable maximum peak above the ceiling concentration for 5 minutes during a 3-hour period. PPG has established an internal permissible exposure limit for EDC of 5 ppm (8-hour TWA). Although no evidence now exists showing that ethylene dichloride can cause cancer in human beings, PPG strongly suggests that EDC users review their health programs and operations and institute operating and house-keeping practices designed to limit employee exposure as much below currently established exposure limits as practical.

HANDLING AND STORAGE

Ethylene dichloride is a flammable liquid. It introduces a fire hazard wherever it is handled, stored or used. At high temperatures, such as occur in open flames, it decomposes to give off toxic and corrosive gases. Mixed with air

Specification and typical analysis:

	Specification	Typical Analysis
Purity, minimum %	99.7	99.5
Color, maximum APHA	10	8
Appearance	clear, free of suspended matter	clear, free of suspended matter
Acidity, as HCl, maximum ppm	10	< 1
Alkalinity, as NaOH, maximum ppm	10	
Water, maximum ppm	200	50
Free Chlorine	none	0
Nonvolatile Residue, maximum ppm	100	1
Total Chlorinated Hydrocarbons, low-boiling, maximum ppm	500	75
Total Chlorinated Hydrocarbons, high-boiling, maximum ppm	500	100
Total Oxygenated Compounds, maximum ppm	300	10
C ₁ and Higher Compounds, maximum ppm	300	10
Total Soluble Iron, maximum ppm	0.5	0.5
Specific Gravity, 60°/60°F	1.261-1.264	1.262

at ordinary temperatures, ethylene dichloride is explosive within the limits of 6.2 to 15.6% by volume. Fire and explosion hazards can be minimized by adequate ventilation, the proper types and arrangement of equipment, and reasonable precautions and care in handling.

PACKAGING AND SHIPPING

PPG Industries delivers ethylene dichloride by tank car, barge, tank truck, drums and ship from the Lake Charles, Louisiana, plant. Tank car and tank truck shipments can also be made from a terminal in Chicago, Illinois.

Tank car capacities include 8,000, 10,000 and 20,000 gallons. Tank truck capacity is generally 4,000 gallons.

SAMPLES AND SERVICE

Samples of ethylene dichloride are available in various sizes to meet customer requirements.

The technical service staff of PPG Industries' Chemicals Group is available for consulting on handling, storage and use.

⁽¹⁾NCI, "Bioassay of 1,2-Dichloroethane for Possible Carcinogenicity", DEHW Publ. No. (NIH) 78-1361 (1976).

⁽²⁾C. Maltoni, et. al, "Cold Spring Harbor Symposium", Nov. 15-19, 1979.



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Ethylene Dichloride

Chemicals



INDUSTRIES

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TYPICAL PROPERTIES

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Chemical formula:	$\text{CH}_2\text{ClCH}_2\text{Cl}$
Molecular Weight:	98.97
Description:	Ethylene dichloride is clear and colorless, but darkens slowly upon exposure to sunlight. It has an odor like chloroform. The liquid is mobile, volatile and flammable, and its vapor is toxic and flammable.
Boiling Point, °C	83
Boiling Point, °F	181
Freezing Point, °C	-35.9
Freezing Point, °F	-32.6
Flash Point, Tag open cup, °C	18
Flash Point, Tag open cup, °F	65
Explosive Limits, volume % in air	6.2 to 15.9
Autoignition Temperature, °C	413
Autoignition Temperature, °F	775
Viscosity at 25°C, cps	0.78
Density at 20°C, pounds/gallon	10.5
Refractive Index at 20°C, n_D	1.444
Vapor Pressure at 20°C, mm Hg	62.0
Vapor Density, air = 1	3.42
Solubility at 25°C, g EDC/100 g water	0.84
at 20°C, g water/100 g EDC	0.16

Solubility: Ethylene dichloride is soluble in most organic solvents.

Reactivity: At moderate temperatures, ethylene dichloride is stable and resistant to oxidation. When moisture-free at ordinary temperatures, it does not corrode metals. But in contact with water at elevated temperatures, ethylene dichloride will corrode iron and certain other common metals.

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Recent animal studies conducted by the National Cancer Institute (NCI) have shown that ethylene dichloride can cause cancer in rats and mice by oral administration. However, in other studies of rats and mice exposed to EDC by inhalation, the results—although preliminary—did not confirm the NCI findings.

The National Institute for Occupational Safety and Health (NIOSH) has recommended that the current OSHA permissible exposure limit be reduced from 50 ppm to 5 ppm (8-hour TWA) with a ceiling of 15 ppm. Although no evidence now exists showing that ethylene dichloride can cause cancer in human beings, PPG strongly suggests that EDC users review their health programs and operations and institute operating and housekeeping practices designed to limit employee exposure as much below currently established exposure limits as practical.

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