

Ethylene Dichloride

Chemicals



INDUSTRIES

High-purity ethylene dichloride (EDC) is produced by PPG Industries Chemical Division at Lake Charles, Louisiana. Additional capacity is available from the Guayanilla, Puerto Rico plant beginning in 1971. PPG is one of the world's largest producers of ethylene dichloride and ships to customers in tank cars, barges, tank trucks and ocean-going ships.

PPG makes technical-grade ethylene dichloride by direct chlorination of ethylene. EDC made by this process has a higher purity, typically 99.99%, and less than 50 ppm of unsaturated chlorinated compounds. This quality is important to companies processing EDC into vinyl chloride monomer (VCM) because unsaturates yield impurities such as vinylidene chloride, trichlorethylene and other high-boiling compounds. Impurities not only lower VCM yields but also form carbon in EDC cracking furnaces. EDC made by PPG Industries via direct chlorination also has fewer high-boiling and low-boiling chlorinated compounds than EDC made by other methods.

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, trichlorethylene, perchlorethylene, and ethylenediamine.

Plasticizers such as the ethylene glycols, the high-boiling solvent ethylene glycol diacetate, and succinonitrile also use EDC as their base.

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

Ethylene dichloride is an excellent solvent for greases, oils, fats and waxes. Although other chlorinated solvents have displaced it in many applications, ethy-

lene dichloride has certain advantages. These include low cost, superior solvency for certain substances, stability to hydrolysis under special conditions of usage, inertness toward metals and resistance to oxidation. The major solvent applications for ethylene dichloride include:

Industrial extraction solvent in the manufacture of drugs, fish meal and animal feed.

Industrial cleaning solvent for removing contaminants from processing equipment. EDC is used widely as a diluent in blends with other solvents.

Chemical process solvent for processing pesticides, herbicides and other products. Formulation solvent for pesticides and paints, also paint removers. In adhesives based on nitrite and polysulfide rubbers. As an amine carrier for leaching copper.

TYPICAL PROPERTIES

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

Chemical Formula: $\text{CH}_2\text{ClCH}_2\text{Cl}$

Molecular Weight: 98.97

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

Boiling Point, °C	83.5
	182.1
Freezing Point, °C	-35.9
	-32.6
Flash Point, Tag open cup, °C	21
	70
Explosive Limits, volume % in air	6.2 to 15.9
Autoignition Temperature, °C	413
	775
Viscosity at 25°C, cps	0.78
Specific Gravity, 20°/20°C	1.255
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

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.

Specifications

Purity, minimum %	99.7
Color, maximum APHA	10
Appearance	clear, free of suspended matter
Acidity, as HCl, maximum ppm	10
Alkalinity, as NaOH, maximum ppm	10
Water, maximum ppm	200
Free Chlorine	none
Nonvolatile Residue, maximum ppm	100
Total Chlorinated Hydrocarbons, low-boiling, maximum ppm	500
Total Chlorinated Hydrocarbons, high-boiling, maximum ppm	500
Total Oxygenated Compounds, maximum ppm	300
C ₃ and Higher Compounds, maximum ppm	300
Total Soluble Iron, maximum ppm	0.5

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.

TOXICITY

Ethylene dichloride is toxic by inhalation, absorption through the skin and mucous membranes, oral intake and absorption through the gastrointestinal tract. Repeated or prolonged exposures to the liquid or vapor are hazardous. If used in confined spaces, EDC can be fatal.

The threshold limit value (TLV) established in 1969* by the American Conference of Governmental Hygienists is 50 parts per million. Vapor concentrations in work areas should not exceed this TLV as a time-weighted average atmospheric concentration for an 8-hour day.

Concentrations above 100 ppm cause burning of the eyes, tears and irritation of the nose and throat. Acute symptoms such as mental confusion, dizziness, nausea and vomiting are largely related to central nervous system depression or gastrointestinal upset and occur at higher concentrations. Injuries to the liver, kidneys, adrenal glands and lungs also occur at these higher levels. Chronic exposure to lower concentrations may have similar injurious effects.

Repeated or prolonged contact causes reddening or burning of skin by removing the natural oils. If ethylene dichloride is held close to the skin, as by contaminated clothing, severe irritation and moderate edema and necrosis may result. Pain, irritation and tears will follow if it is splashed into the eyes. Any ethylene dichloride splashed into the eyes should be immediately removed by eye irrigation with water for at least 15 minutes. If it is not immediately removed, serious eye damage may result.

More information appears in "Industrial Hygiene and Toxicology," second revised edition, volume II, edited by Irish and Fassett, Interscience Publishers, New York, N.Y., 1963, pages 1280-1284.

* Threshold limit values are reviewed yearly and are revised periodically.

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 at ordinary temperatures, ethylene dichloride is explosive within the limits of 6.2 to 15.9% 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.

Information on the "Safe Handling and Use of Ethylene Dichloride" appears

in Chemical Safety Data Sheet SD-18 published by the Manufacturing Chemists Association, 1825 Connecticut Avenue, N.W., Washington, D.C. 20009. The MCA also publishes Manual Sheet TC-4 on "Unloading Flammable Liquids from Tank Cars."

PACKAGING AND SHIPPING

PPG Industries delivers ethylene dichloride by tank car, barge, tank truck and ship. There are two producing points: Lake Charles, Louisiana and Guayanilla, Puerto Rico. Tank car and tank truck shipments can also be made from a terminal in Chicago, Illinois.

Tank car capacities include 4,000, 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 Chemical Division is available for consulting on handling, storage and use.



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Some of the materials mentioned herein may be hazardous in nature and should be handled with care. Read the label carefully and observe and comply with all the hazard warnings and precautionary directions. Although these materials are not intended for household use, they are all potentially hazardous materials and must be kept out of the reach of children.