

Vinyl Chloride

Chemicals



INDUSTRIES

In keeping with its position as a leading producer of vinyl chloride monomer for the merchant market only, PPG Industries expanded its Lake Charles, Louisiana, vinyl chloride plant in 1969. The Guayanilla, Puerto Rico plant, built in 1971, greatly increased PPG's capacity for making vinyl chloride monomer.

A new large tanker, the S.S. Puerto Rican, transports refrigerated vinyl chloride monomer to a newly built terminal at Paulsboro, New Jersey, where it is stored under refrigeration.



At the PPG plant in Guayanilla, Puerto Rico, the company's modern 34,000-ton chemical tanker, S.S. Puerto Rican, receives a load of vinyl chloride monomer.



At the Paulsboro, New Jersey terminal, the S.S. Puerto Rican's load of vinyl chloride monomer is transferred to the refrigerated storage tanks in the background.

PPG produces vinyl chloride monomer by the oxychlorination of ethylene and holds more than 400 domestic and foreign patents on this process.

Uninhibited VCM is quite stable and can be routinely shipped, handled and stored provided proper procedures, outlined below, are followed. To prevent polymerization in transit or storage, it is essential that the monomer be protected at all times from contact with air, oxygen, moisture, catalytic impurities, and light.

PPG normally supplies VCM uninhibited. The use of uninhibited VCM eliminates the need for subsequent processing to remove the inhibitor. If required, suitable inhibitors will be added.

GRADES

PPG Industries produces polymer-grade vinyl chloride monomer.

USES

Most vinyl chloride is polymerized to polyvinyl chloride (PVC) or copolymerized with other monomers such as PPG's vinylidene chloride.

PROPERTIES

Chemical Names:	Vinyl chloride; vinyl chloride monomer; chloroethylene; chloroethene		
Chemical Formula:	CH_2CHCl 		
Molecular Weight:	62.5		
Description:	At ordinary temperatures and pressures, vinyl chloride is a colorless gas with a mild, sweet odor. But as supplied in tank cars and trucks under pressure, it is a liquid. Vinyl chloride is highly volatile and its vapor is extremely flammable.		
Boiling Point, °C	-13.8	Autoignition Temperature, °C	472
°F	+7.0	°F	882
Freezing Point, °C	-153.7	Liquid Density at 60°F	0.9192
°F	-245	Vapor Density, air=1	2.15
Flash Point, open cup, °C	-78	Vapor Pressure, psia at 0°C	25.1
°F	-108.4	20°C	49.2
		40°C	87.6
Explosive Limits, volume %	Solubility, water in monomer,		
in air at 25°C (77°F)	3.6 to 33	at 25°C (77°F), weight %	0.11

Solubility: Vinyl chloride is relatively insoluble in water but soluble in most organic solvents.

Reactivity: Vinyl chloride polymerizes exothermically in the presence of light, air, oxygen or catalysts. Heat alone will not initiate polymerization. Vinyl chloride is thermally stable to quite high temperatures. Although peroxide formation due to air exposure is a slow reaction, certain peroxide products are shock-sensitive. Vinyl chloride is noncorrosive to metals when dry at normal temperatures, but water and elevated temperatures accelerate corrosion. The double bond behaves as in other unsaturated compounds. The chlorine atom is relatively inactive and is more stable than in saturated or allylic compounds.

Specification for polymer grade:

Appearance	clear, free of suspended matter
Color	colorless, water-white
Acidity, as HCl, maximum ppm	5
Iron, as Fe, maximum ppm	0.5
Nonvolatile residue, maximum weight %	0.05
Water, maximum ppm	100
Sulfur, as SO ₂ , maximum ppm	3
Acetaldehyde, maximum ppm	5
Acetylene, maximum* ppm	2

* This maximum is an industry standard; however, the PPG product contains no detectable amount of acetylene.

TOXICITY

Uninhibited monomer is not absorbed through the skin, but the liquid may cause frostbite because it evaporates so fast. If an inhibitor is included, it may cause local skin burns.

Vapor concentrations in work areas should not exceed 200 ppm as a time-weighted average atmospheric concentration for an 8-hour day to avoid adverse effects on workmen. High vapor concentrations can cause dizziness and anesthesia. More information appears in Chemical Safety Data Sheet SD-56, "Vinyl Chloride," published by the Manufacturing Chemists Association, 1825 Connecticut Avenue, N.W., Washington, D.C. 20009.

HANDLING AND STORAGE

Aluminum and its alloys must not be used in equipment to store or handle vinyl chloride because explosive aluminum chloroalkyls can be formed. PPG's vinyl chloride is made from ethylene and contains no detectable amount of acetylene. Vinyl chloride made from acetylene by an older process contains traces of acetylene that could react explosively with copper or its alloys to form copper acetylides. It is not safe to use such vinyl chloride in processing equipment containing copper or brass.

Exposure of vinyl chloride to oxygen and air results, after a time, in polymer formation. This can cause problems in equipment used for storage and transfer of monomer. Vinyl chloride should be stored under a blanket of nitrogen with a maximum oxygen content of 10 ppm.

Fire hazard

Vinyl chloride vapor is extremely flammable. Its explosive limits are between 3.6 and 33% by volume in air. Proper ventilation and the elimination of ignition sources are mandatory in areas where vapor concentrations may reach a flammable level. When a tank car is unloaded, both the car tank and the unloading pump should be electrically grounded.

The major products of combustion include toxic and corrosive hydrogen chloride as well as carbon monoxide, and less than 10 ppm of phosgene. Only in the very near vicinity of a vinyl chloride monomer fire could detectable amounts of phosgene be present.

Carbon dioxide or dry chemical agents extinguish small fires effectively, but no extinguisher is known for large fires. Streams of water cannot extinguish a liquid vinyl chloride fire because the monomer does not mix with water and will float on top. Water may be sprayed to cool equipment. If the source of the vinyl chloride monomer leak has not been closed off, do not attempt to extinguish a large fire because hot metal can re-ignite an unburned vapor cloud. No one without proper protective respiratory equipment should enter an area where there has been a fire until the area has been adequately ventilated.

Unloading tank cars

If tank car valves are defective or leaky, do not unload. Telephone the PPG Chemicals plant at Lake Charles, Louisiana, 318-882-1200. Information on un-

loading tank cars and trucks appears in the PPG manual, "Vinyl Chloride Monomer Handling and Properties, form A-994."

Warning: Air should never be permitted to enter vinyl chloride tank cars or other containers during or after unloading. Close and seal all openings. Leave at least 10 psig of vinyl chloride vapor pressure in empty tank car being returned.

PACKAGING AND SHIPPING

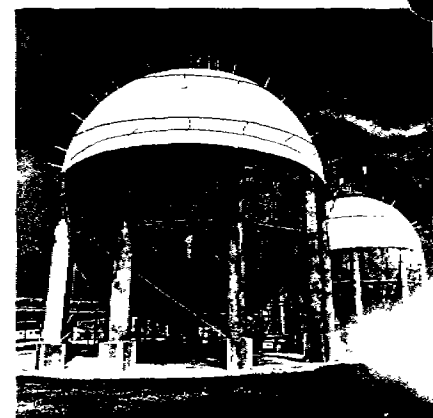
PPG Industries delivers vinyl chloride by ship, barge, tank car and tank. There are 3 shipping points: Lake Charles, Louisiana; Guayanilla, Puerto Rico; and Paulsboro, New Jersey.

PPG maintains a fleet of tank cars for vinyl chloride service. All cars are equipped for top unloading. There are three car sizes, 100,000-pound, 180,000-pound and 220,000-pound net weight. Tank trucks hold up to 40,000 pounds. Ships and barges hold up to several million pounds.

SAMPLES AND SERVICE

Samples of vinyl chloride are available on special request in returnable laboratory-size steel cylinders holding 5 pounds or in cylinders holding 200 pounds.

The technical service staff of PPG Industries Chemical Division is available for consulting on handling, storage and use.



Storage spheres at PPG's Lake Charles, Louisiana plant hold thousands of gallons each of liquid vinyl chloride monomer under pressure. Horizontal storage tanks at right serve as day tanks.



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