



INDUSTRIES

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Date: December 31, 1968
From: Commercial Development
Location: G.O. - 20 South
Subject: Vinylidene Chloride

In the event you do not have one on file, you may find the attached technical bulletin on vinylidene chloride by Ethyl Corporation to be of some interest.

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JFD/pjh

Attachment

cc: E. D. Witman

c.c.

Graybill
Lynette
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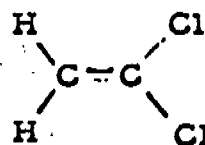
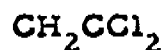
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VINYLDENE CHLORIDE

CHEMICAL NAMES

Vinylidene Chloride
1,1-Dichloroethylene
uns-Dichloroethylene

FORMULA



APPLICATION

Manufacture of Polymers

PROPERTIES OF PURE VINYLDENE CHLORIDE

Physical State	Clear liquid
Odor	Sweet, pleasant
Molecular Weight	96.95
Boiling Point at 760 mm Hg, °C	31.7
Freezing Point, °C	-122.5
Density at 20°C	
g/ml	1.2132
lb/gal.	10.12
Flash Point (open cup), °C	-10
Explosive Limits (vol % in air at 25°C)	7-16
Index of Refraction, n_D^{20}	1.4271
Vapor Pressure, mm Hg	
at 0°C	215.9
25°C	599.0
Absolute Viscosity, cp	
at 0°C	0.422
20°C	0.358
50°C	0.292

The information presented herein is believed to be accurate and reliable, but is presented without guarantee or responsibility on the part of Ethyl Corporation. Further, nothing contained herein shall be taken as an inducement or recommendation to manufacture or use any of the herein described materials or processes in violation of existing or future patents.

TYPICAL ANALYSIS OF ETHYL'S VINYLIDENE CHLORIDE

The outstanding quality of Ethyl's product is shown in the following typical analysis:

% Vinylidene Chloride (excluding inhibitor). . .	99.9 min
Specific Gravity, 25°C/25°C.	1.2022-1.2122
Cottrell Boiling Range	
50% Boiling Point, °C	31.7-32.2
Mid-80% Boiling Range, °C	0.5 max
Water, ppm	100 max
Chloroacetylene (as C ₂ H ₂), ppm	1 max
Other Chlorinated Hydrocarbons, ppm	500 max
Inhibitor	As required

HANDLING

Vinylidene Chloride is an extremely flammable liquid. In addition to the risk of fire or explosion, it is irritating to the skin and eyes and may cause burns. Work areas where vinylidene chloride is handled or stored should be well ventilated in order to keep the concentration below the safe lower explosive limit at all times. Over-exposure can lead to anesthesia. It is recommended that concentrations of vinylidene chloride in air be monitored and maintained at levels below 100 ppm.

Vinylidene chloride vapors burn strongly but not violently. Recommended fire extinguishers are foam, carbon dioxide, and dry chemicals, using a water spray for cooling as required.

Employees working in areas where vinylidene chloride is handled or stored should be thoroughly familiar with the hazards associated with its use. Emphasis in training should be placed on the use of personal protective equipment, fire-fighting equipment, location of safety equipment, and first-aid measures.

SHIPPING

Vinylidene chloride, inhibited as required, is shipped in the following containers:

Container	ICC Specification	Pounds, Net (approximate)
Tank Cars	105 A 100 W	105,000
	105 A 200 W	105,000
Tank Trailers	MC-330	25,000
55-gal drums (non-returnable)	17C	500
5-gal drums (non-returnable)	17C	45

All shipments are made in accordance with ICC regulations. The vapor space in all containers is filled with nitrogen. Each container bears the ICC red label for FLAMMABLE liquids, and the following warning label:

DANGER!

- EXTREMELY FLAMMABLE LIQUID.
- MAY CAUSE BURNS.
- Keep container closed and away from heat, sparks, and open flame.
- Use with adequate ventilation.
- Avoid prolonged breathing of vapor.
- Avoid contact with skin, eyes, and clothing.
- In case of contact, immediately remove all contaminated clothing and flush skin and eyes with plenty of water; for eyes, get medical attention.

UNLOADING TANK CARS

Applicable instructions for unloading tank cars containing flammable liquids are set forth in 'Manufacturing Chemists' Association Manual Sheet TC-4. Also see ICC Regulations, Sec. 74.560 to 74.563 inclusive, for unloading tank cars.

Under no circumstances should air be permitted to enter vinylidene chloride tank cars, for this can lead to the formation of hazardous peroxides. Accordingly, 5-10 pounds positive nitrogen pressure should always be left in empty cars.

If tank cars are found to be leaking, or to have defective valves, immediately notify Ethyl Corporation, 100 Park Avenue, New York, N. Y., 10017 (Phone area code 212, ORegon 9-2000).

STORAGE

Vinylidene chloride must be stored away from light or air. It is recommended that positive nitrogen pressure be maintained in the vapor space.

Storage areas should be selected in accordance with local codes or authorities having jurisdiction. Assistance is available from such organizations as National Board of Fire Underwriters and Factory Insurance Association.

Tanks, valves, pipes and fittings coming into contact with vinylidene chloride liquid or vapor should be constructed of steel or nickel. Copper and copper containing alloys, such as brass and monel, should not be used because of the possible presence of acetylenic compounds.

Storage tanks should be constructed according to ASME Code, Section VIII, for at least 30 psi maximum design working pressure and full vacuum. Frangible safety discs are recommended instead of relief valves, for corrosion and polymer may render relief valves ineffective.

All liquid inlet lines should enter or extend to the bottom of the vessel. This guards against the accumulation of static electricity. All equipment should be properly grounded. Adequate diking should be provided under the tank area to confine liquid in case of tank rupture.

HAZARDOUS PEROXIDES

When vinylidene chloride is stored in the presence of air or oxygen, a peroxide compound of undetermined structure is formed. Even when an inhibitor is present, oxygen exposure should be avoided, for the inhibitor may be used up and the peroxide compound can still form. Formation of these peroxides is often accompanied by the precipitation of a flocculent vinylidene chloride polymer. The peroxide can be explosive, and since it is absorbed on the precipitated polymer, this polymer must be regarded as explosive when separated by filtration, evaporation or drying. If dry and containing more than about 15% of the peroxide, this material can detonate from a slight mechanical shock or from heat. Polyvinylidene chloride, free of peroxides, is not explosive.

Probable exposure to oxygen, and consequently the possible presence of peroxides, is indicated in two ways: (1) Peroxides decompose to form phosgene, hydrochloric acid and formaldehyde, all of which give off a sharp odor even at low concentrations; (2) the appearance of polymer is another indication of possible oxygen exposure.

Confirmation of the presence of peroxide can be determined by the liberation of iodine from a slightly acidified dilute potassium iodide solution.

Upon evaporation of vinylidene chloride, residues may remain. These residues, as sometimes found in pipes, lines, laboratory equipment and storage vessels, should be handled with caution for they may contain peroxides. The residues can be rendered inactive by immediately flushing them with water. It is recommended that large scale equipment, used on an intermittent basis, be filled with water when not in use.

SPILLS AND LEAKS

Spills and leaks should be attended to immediately. Ignition sources should be eliminated from the area. It is recommended that spilled vinylidene chloride be covered with an absorbing medium, such as sand. After the absorbent has soaked up the vinylidene chloride, it can be removed to a safe area.

The volatility of vinylidene chloride is great enough to allow concentrations exceeding 2% to be present in the air in the immediate area of a spill. Consequently, gas masks or air masks should be worn.

SERVICE

Ethyl Corporation maintains a technical staff as a service to assure vinylidene chloride customers of a reliable supply of high quality product.

Requests for samples, further information, or the assistance of a technical representative are welcomed.

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