

BASF Wyandotte Corporation



Wyandotte, Michigan 48192
313 282-3300

June 19, 1975

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meeting, Sept 17
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To:

✓ Dr. Z. Bell, PPG Industries, Inc.
Mr. Milton Freifeld, Manufacturing Chemists Assn.
Mr. W. Ronald Hoopes, Dewey & Almy Div., W.R. Grace & Co.

Subject: Vinylidene Chloride

Gentlemen:

This communication constitutes the recommendations of the Medical Surveillance and Records Subcommittee to the Vinylidene Chloride Technical Panel.

The purpose was to provide a program of Pre-Employment Health Appraisal which will obviate the assignment of individuals with abdominal visceral defects to working in areas of possible contact with vinylidene chloride, and to provide a program of medical surveillance for each employee exposed to vinylidene chloride.

The objective is to avoid allowing an individual with pre-existing abdominal visceral disease the opportunity to develop further health deterioration, and to provide, as early as possible, medical data regarding the possible development of abnormalities in individuals who work with vinylidene chloride.

At the time of the initial consideration for employment in an area where vinylidene chloride contact is possible, the following medical procedures, in addition to those required by routine Pre-Employment Health Appraisal, shall be performed:

1. A general physical examination, with specific attention to detecting enlargement or dysfunction of liver, spleen and kidneys, and for abnormalities in skin, connective tissues and pulmonary system.
2. A medical history, including the elicitation of information regarding the following topics: alcohol intake; liver disease; occupations; exposure to potential hepatotoxic agents, including drugs and chemicals; blood transfusions; hospitalizations.

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3. Laboratory investigations designed to evaluate liver function. The exact testing procedures are at the discretion of the medical administration of each organization. As guidelines, the following are suggested:

Serum levels of total bilirubin, alkaline phosphatase, serum glutamic oxalacetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT), and gamma glutamyl transpeptidase, and technetium sulfa colloid scan of liver and spleen.

The procedures listed in 1, 2, and 3 above, shall be performed every six (6) months in each individual who has been employed in vinylidene chloride manufacturing for ten (10) years or longer, and annually for all other such employees.

Each employee exposed to an emergency shall be afforded appropriate medical surveillance.

A statement of each employee's suitability for continued exposure to vinylidene chloride, including use of protective equipment and respirators, shall be obtained from the examining physician promptly after any examination. A copy of the physician's statement shall be provided each employee.

If any employee's health would be materially impaired by continued exposure, such employee shall be withdrawn from possible contact with vinylidene chloride.

Sincerely,



John J. Ronayne, M.D.
Chairman Medical Surveillance
and Records Subcommittee

/dr

cc: M. M. Johnson, M.D., B. F. Goodrich Co.
J. R. McDonough, M.D., Tennessee Eastman Co.
Harold Lovejoy, M.D., PPG Industries, Inc.

Vinylidene Chloride



Vinylidene chloride monomer (VDC) is a versatile product used with other monomers to make a wide variety of copolymer resins and latices.

Properly inhibited and protected from exposure to air, oxygen, water and light, VDC is stable in shipment and storage at ambient temperatures. Correct handling practices, outlined below, must be followed at all times.

VDC supplied by PPG from its Lake Charles, Louisiana, plant is inhibited with hydroquinone monomethyl ether (HQMMME or MEHQ) to prevent polymerization during shipment and storage. It is shipped under a nitrogen blanket to avoid contact with air and to prevent the formation of a peroxide that can act as a polymerization initiator.

For most applications, the MEHQ inhibitor in PPG vinylidene chloride need not be removed. If uninhibited monomer is required, however, the MEHQ can be removed by distillation or alkali extraction.

PPG Industries operates two pilot reactors — one of 500 gallons capacity, the other of 50 gallons — for polymerization experiments at its Barberton, Ohio, Research Center. PPG researchers use these pilot plants to conduct polymerization studies involving VDC, vinyl chloride, and other monomers as well as PPG's peroxide polymerization initiators.

GRADES

The standard grade of VDC manufactured by PPG is inhibited with hydroquinone monomethyl ether at approximately 200 parts per million. PPG can also supply, on request, a special grade inhibited with phenol at 0.6% to 0.8%.

USES

Vinylidene chloride monomer has been used for many years, primarily as a copolymer with such monomers as vinyl chloride, vinyl acetate, acrylonitrile, and acrylic acid esters. The copolymer resins and latices are formed into films, fibers, coatings and linings.

VDC imparts to finished products qualities of flame retardance, chemical resis-

tance, and impermeability to water vapor and gases.

Data on reactivity ratios of VDC copolymerizations with 36 monomers are presented in a booklet, "Vinylidene Chloride (Inhibited), handling, properties and reactivity ratios" Form A967, available on request from PPG Industries, Chemical Division.

PROPERTIES

Chemical Names: Vinylidene chloride; vinylidene chloride monomer; 1,1-dichloroethylene

Chemical Formula: CH_2Cl_2 ; $\begin{array}{c} \text{H} \quad \text{Cl} \\ \diagdown \quad / \\ \text{C} \\ / \quad \diagdown \\ \text{H} \quad \text{Cl} \end{array}$

Molecular Weight: 96.95. Contains 73.14% chlorine.

Description: At ordinary handling temperatures, below its boiling point of 88.9°F (31.6°C), vinylidene chloride is a liquid. It is clear and colorless and has a sweet odor. Vinylidene chloride is highly volatile and its vapor is toxic and extremely flammable.

Boiling Point, °C	+31.6	Critical Pressure, atmospheres	51.3
°F	+88.9	Critical Temperature, °C	222
Freezing Point, °C	-122.5	°F	432
°F	-188.5	Absolute Viscosity at 20°C, cps	0.330
Explosive Limits, volume % in air	7 to 16	Specific Gravity, 20°/20°C	1.213
Flash Point, Cleveland open cup, °C	-15	Density at 20°C, pounds/gallon	10.1
°F	+5	Refractive Index, n_D at 20°C	1.4247
Autoignition Temperature, °C	570.0	Vapor Pressure, mm Hg, at 20°C	475.1
°F	1058	Solubility, water in monomer, weight %	0.035

Solubility: Vinylidene chloride is practically insoluble in water but soluble in most organic solvents.

Reactivity: Uninhibited, or inhibitor-depleted, vinylidene chloride may polymerize very slowly even in the absence of oxygen. To further retard polymerization, the uninhibited monomer should be maintained in darkness below 14°F (-10°C).

Uninhibited, or inhibitor-depleted, vinylidene chloride reacts readily with oxygen or air to form a peroxide at temperatures as low as -40°F (-40°C).

Specification for regular grade:

Appearance	clear, free of suspended matter
Color, maximum APHA	25
Vinylidene Chloride, minimum weight % (excluding inhibitor)	99.6
Acetylene, Acetylides, as C_2H_2 , maximum ppm	25
Other Chlorinated Hydrocarbons, no one to exceed this maximum weight %	0.25
Acidity, as HCl, maximum ppm	10
Peroxide, as H_2O_2 , maximum ppm	10
Water, maximum ppm	50
Inhibitor, HQMME*, ppm	180 to 220

*Hydroquinone monomethyl ether is sometimes referred to as MEHQ (monomethyl ether of hydroquinone).

TOXICITY

Inhibited vinylidene chloride is irritating to the eyes and skin. Upon evaporating, the inhibitor can cause local skin irritations and burns unless washed off thoroughly.

Vinylidene chloride is highly volatile and its vapor is heavy. Its odor-warning properties are not adequate. Overexposure to vapor can lead to anesthesia, irrational behavior and-if continued-to unconsciousness. In all cases of overexposure, medical attention should be obtained. Prolonged or repeated exposures can cause damage to liver and kidneys.

The toxicity of vinylidene chloride vapor is considered to be greater than that of ethylene dichloride but less than that of carbon tetrachloride. Vapor concentrations in work areas should not exceed 25 ppm as a time-weighted average atmospheric concentration for an 8-hour day to avoid adverse effects on workmen. Above a level of 200 ppm, respiratory protection is recommended. Workmen cleaning up spills or stopping leaks should have self-contained or air-supplied breathing apparatus.

More information appears in "Industrial Hygiene and Toxicology," second revised edition, volume II, edited by Irish and Fassett, Interscience Publishers, New York, N.Y., 1967, pages 1305-1307.

HANDLING AND STORAGE

If tank car valves are defective or leaky, do not unload. Telephone the PPG Chem-

icals plant at Lake Charles, Louisiana, 318-882-1200.

Nitrogen used with vinylidene chloride should have a maximum oxygen content of 10 ppm.

Information on unloading tank cars and drums, handling spills and leaks, construction materials, storage tanks and transfer lines is presented in a booklet on "Vinylidene Chloride (inhibited)," Form A967 available on request from PPG Industries Chemical Division.

Fire hazard

Vinylidene chloride vapor is extremely flammable and burns vigorously at concentrations between 7 and 16% by volume in air. Proper ventilation and the elimination of ignition sources are mandatory in areas where vapor concentrations may reach a flammable level due to spills or leaks.

Firemen should be warned that the products of combustion include toxic hydrogen chloride and that vinylidene chloride vapors in high concentrations are toxic. Carbon dioxide or dry chemical agents can extinguish fires effectively, also water spray or foam may be used. Water may also be sprayed to cool equipment. No one without proper protective respiratory equipment should enter an area where there has been a fire until the area has been adequately ventilated.

Explosion hazard

The peroxide compound that forms when uninhibited vinylidene chloride has been

exposed to atmospheric oxygen is potentially dangerous. This peroxide can also form if the inhibitor content has been depleted. Depletion can result from any of several causes including distillation or exposure to oxygen due to improper storage. The presence of peroxide can be detected by sharp, acrid odors or by the precipitation of a white flocculant polymer.

Dried polymer residues may contain adsorbed peroxide which can be exploded by a slight mechanical shock or by heat. These residues should be handled with extreme caution. Adding water that is at room temperature to polymer residues containing peroxide renders them inactive. However, the hazard may return if the water evaporates. The peroxide can be destroyed by several washes with fresh 5% sodium bisulfite solution or with 10% sodium hydroxide solution that is at room temperature. Vinylidene chloride monomer that contains peroxide may be purified by washing in the same manner. Separation and handling of precipitated polymer, and its potentially dangerous adsorbed peroxide, must be done with extreme caution.

Equipment not used continually should be filled with water when shut down.

PACKAGING AND SHIPPING

PPG Industries ships vinylidene chloride (inhibited) in tank cars of 10,000-gallon (105,000-pound) capacity from Lake Charles, Louisiana, and in 55-gallon (500-pound) drums from Bayonne, New Jersey.

SAMPLES AND SERVICE

Samples of Vinylidene Chloride are available, on request in 1 pint and 5 gallon containers. The technical service staff of PPG Industries Chemical Division is available for consulting on handling, storage and use.



PPG INDUSTRIES, Inc.
Chemical Division
One Gateway Center
Pittsburgh, Pa. 15222

Statements and methods presented are based upon the best information and practices known to PPG Industries, Inc. but are not representations or warranties of performance or result nor do they imply any recommendations or infringe any patent or an offer of license under any patent. With respect to its products PPG Industries, Inc. warrants only that they conform to its quality standards.

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.

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