

Prepared by T. Bialke. J. Tanyll
May, 1987



Geon®
Vinyls

MATERIAL SAFETY DATA SHEET

OFF-GRADE VINYL RESIN

ISSUED: MAY, 1987

DOC: 0507j

This bulletin only applies to Geon® Off-Grade Vinyl resin with elevated levels of residual Vinyl Chloride monomer. For information on other BFGoodrich Geon® Vinyl resins see BFGoodrich Geon® Vinyl MSDS G-62, RES January, 1985; available from your BFGoodrich sales representative.

USER'S RESPONSIBILITY

This bulletin cannot cover all possible situations which the user may experience during processing. Each aspect of your operation should be examined to determine if, or where, additional precautions may be necessary. All health and safety information contained in this bulletin should be provided to your employees or customers. It is your responsibility to use this information to develop appropriate work practice guidelines and employee instructional programs for your operation.

SECTION I

Manufacturer's Name

The BFGoodrich Company
Geon® Vinyl Division

Telephone Number

(216) 447-6000

Transportation Emergency

Telephone

CHEMTREC: (800) 424-9300

Address

6100 Oak Tree Blvd.
Cleveland, Ohio 44131

Chemical Family

Ethene, Chloro,
Homopolymer

Trademark

Chemical Name/Synonyms

Polyvinyl Chloride
PVC, Vinyl Homopolymer

CAS Registry No.

9002-86-2

Formula

$(CH_2CHCl)_n$

wp6/0507j

26230001

BFG50213

The BFGoodrich Company, Chemical Group/6100 Oak Tree Blvd., Cleveland, Ohio 44131

BFGoodrich
Chemical Group

The information contained herein is believed to be reliable, but no representations, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications or the results to be obtained therefrom. The information is based on laboratory work with small-scale equipment and does not necessarily indicate end product performance. Because of the variations in methods, conditions and equipment used commercially in processing these materials, no warranties or guarantees are made as to the suitability of the products for the applications disclosed. Full-scale testing and end product performance are the responsibility of

the user. BFGoodrich shall not be liable for and the customer assumes all risk and liability of any use or handling of any material beyond BFGoodrich's direct control. THE SELLER MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Nothing contained herein is to be considered as permission, recommendation, nor as an inducement to practice any patented invention without permission of the patent owner.

SECTION II - HAZARDOUS INGREDIENTS

	<u>CAS Number</u>	<u>Amount in Product*</u>	<u>ACGIH TLV-TWA</u>	<u>OSHA PEL</u>
Vinyl Chloride ¹	75-01-4	> 8.5 ppm	5 ppm Ala	1.0 ppm

*Typical amount - not a specification.

- Notes: • TLV-TWA: Threshold Limit Value - Time Weighted Average for concentration of the chemical substance in the ambient workplace air for a normal 8-hour workday, 40-hour workweek, to which nearly all workers may be repeatedly exposed without adverse effect. American Conference of Governmental Industrial Hygienists, 1985/1986 Edition.
- OSHA PEL: OSHA Permissible Exposure Limit, 8-hour TWA. 29 CFR 1910.1000 and 1910.1017.
 - N.A. means "not applicable"
 - < means "less than"
 - Ala means "human carcinogen" (ACGIH)
 - > means "greater than"

SECTION III - PHYSICAL DATA (Typical data, not specifications)

<u>Boiling Point</u> N.A.	<u>Melt Point</u>	<u>Specific Gravity (H₂O=1)</u> 1.40
<u>Solubility in Water</u> Slight	<u>% Volatile by Weight</u> Not Measured	<u>Vapor Density (Air = 1)</u> N.A.
<u>Vapor Pressure (mm Hg)</u> N.A.	<u>pH</u> 7	<u>Particle Size</u> 1.2 microns
<u>Appearance</u> White, Off-white, pink, Grey free flowing powder or solid lumps		<u>Molecular Weight</u> 95 x 10 ³ number average

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Ignition Characteristics (ASTM D-1929)

Vinyl resin has a flash-ignition temperature of about 391°C (735°F) and a self-ignition temperature of about 454°C (850°F). Vinyl resin by itself will not support combustion because it requires a higher concentration of oxygen for burning than is present in the earth's atmosphere. Vinyl resin can be forced to burn by continuous application of intense heat. Like all combustible material, protect from open flame and maintain proper clearance when using portable heat devices, etc. Store flammable liquids away from vinyl resin.

wp6/0507j

BFG50214

26230002

Flash-Ignition Temperature: The lowest initial temperature of air passing around the specimen at which sufficient combustible gas is evolved to be ignited by a small external pilot flame.

Self-Ignition Temperature: The lowest initial temperature of air passing around the specimen at which, in the absence of an ignition source, ignition occurs of itself, as indicated by an explosion, flame or sustained glow.

Special Firefighting Procedure

Wear positive pressure self-contained breathing apparatus (SCBA). Personnel not having suitable respiratory protection must leave the area to prevent significant exposure to toxic combustion gases from any source. In enclosed or poorly ventilated areas, wear SCBA during cleanup immediately after a fire as well as during the firefighting operations.

Extinguishing Media

Water is most effective. ABC dry chemical, AFFF, and protein type air foams are also effective. Geon® Off-Grade Vinyl resins are "ordinary combustibles" (NFPA defined Class A). Carbon dioxide is not generally recommended for use on Class A fires as a lack of cooling capacity may result in reignition.

Combustion Products

When forced to burn, about 97% of the combustion gases from vinyl resin will be a combination of carbon monoxide, and carbon dioxide and hydrogen chloride. Other gases will include small amounts of benzene and aromatic and aliphatic hydrocarbons.

The combustion products of vinyl resin, like those from other natural and synthetic materials, must be considered toxic. Like wood, paper and cotton, the major hazard is carbon monoxide. Carbon monoxide is an asphyxiant while hydrogen chloride is an irritant. When vinyl resin is burned, it will have a detectable, pungent odor.

Unusual Fire and Explosion Hazards

- Hydrogen chloride has a corrosive effect on many metals. Affected equipment surfaces and unprotected structural elements of buildings should be washed with water based detergent solution to remove corrosive deposits as soon as possible after depositions have occurred.
- Off-Grade Vinyl resin is not considered to be a dust explosion risk. The potential hazard has been evaluated using the Hartmann Vertical Tube Apparatus. Data has also been reported by the National Fire Protection Association (NFPA).
 - (1) In the Hartmann apparatus, vinyl resin representing fine particle size (2 Microns), medium particle size (75 Microns) and large particle size (130 Microns) does not ignite or explode in concentrations up to 2.0 gm/liter.

- (2) The NFPA shows "fine" particle size vinyl resin to have a low order of risk.*

Explosibility index: < < 0.1 (Weak)
Ignition sensitivity: < < 0.1 (Weak)
Explosion severity: < 0.1 (Weak)
Ignition temp., dust cloud: 660°C (1220°F)
*Source: NFPA 654-1975, "Prevention of Dust Explosions in the Plastics Industry." < < 0.1 means that ignition of the dust cloud is not obtained by a spark or flame source.

As a precaution, it is prudent to employ standard safety measures used in handling finely divided organic powders.

SECTION V - HEALTH HAZARD DATA

<u>Threshold Limit Value</u>	<u>Carcinogenic Status</u>
None established	See Appendix I
BPG Recommended	
5mg/M ³ Respirable	

Primary Routes of Entry
Eye, skin, inhalation.

Effects of Overexposure:

Vinyl chloride monomer - Processing of Geon® Off-Grade resin containing high residual vinyl chloride monomer with inadequate ventilation may result in employee workplace exposure to levels of vinyl chloride in excess of the OSHA permissible limits.

Employee exposure to vinyl chloride monomer (CAS Registry Number: 75-01-4), a carcinogen, is regulated by OSHA (29 CFR 1910.1017). The current regulation requires that no employee may be exposed to VCM concentrations greater than 1.0 ppm (parts per million by volume) averaged over an eight-hour period or 5.0 ppm averaged over any period not exceeding 15 minutes. The action level is 0.5 ppm averaged over any eight-hour work day.

The regulation applies to the manufacture, packaging, repackaging, storage, handling or use of vinyl chloride or polyvinyl chloride, but does not apply to the handling or use of fabricated products made of polyvinyl chloride. Purchasers of vinyl resin to be compounded or further processed must comply with the permissible exposure limits set by OSHA. Moreover, the regulation requires a program of initial monitoring in each facility to determine if there is any employee exposure in excess of the action level without the use of respirators. If monitoring does not find VCM above 0.5 ppm, no further action is necessary. Refer to OSHA regulations (including 29 CFR 1910.1017) for complete details.

For further information, please read BFGoodrich Technical Service Bulletin No. 12, "Vinyl Studies." Good ventilation in those areas where VCM might concentrate - such as where containers are stored and first opened, where materials are mixed and where resin is melted - will further ensure a work environment virtually free of VCM.

Process Upset Conditions:

No adverse health effects are expected from processing Geon® Off-Grade resin when potential exposures are minimized by good industrial hygiene practice and adequate ventilation. Nevertheless, at processing temperatures, the sum total of all ingredients in a vinyl resin-based compound (e.g., vinyl resin, stabilizer, lubricant, modifier, etc.) may emit fumes and vapors that are irritating to the respiratory tract, eyes or skin of some sensitive people. This depends upon processing technique and temperature, volume processed and most importantly, the effectiveness of exhaust ventilation provided to the process area.

Inhalation of decomposition or combustion products, especially hydrogen chloride, will cause irritation of the respiratory tract, eyes and skin. Depending on the severity of exposure, physiological response will be coughing, pain and inflammation.

Medical Conditions Aggravated by Overexposure:

Individuals with bronchial asthma and other types of chronic obstructive respiratory diseases may develop bronchospasm if exposure is prolonged.

SPECIAL NOTE: Hydrogen chloride is detectable by its sharp, pungent odor in concentrations as low as 1-5 ppm. Low concentrations (below 50 ppm) are not harmful in short-term exposures, but do provide excellent warning properties by causing coughing or irritation. Because the protective response is so strong, humans rarely submit to damaging concentrations -- instead, there is an unmistakable urge to leave the area. Repeated or prolonged exposure to high concentrations can cause eye and respiratory damage. In studies sponsored by the Federal Aviation Administration, no incapacitation, no impairment to escape and no significant post-exposure effects occurred in baboons exposed to hydrogen chloride up to 11,400 ppm (1.14%) for fifteen minutes. OSHA has established a ceiling limit of 5 ppm for workplace exposure to hydrogen chloride.

Emergency and First Aid Procedure:

If irritation persists from exposure to processing vapors or decomposition products, remove the affected individual from the area. Call a physician. Provide protection before allowing reentry.

Dust Exposure:

Vinyl resin has little effect on the lungs and is not known to cause any disease when dust exposure is minimized.

While there is no evidence of a substantial risk to health, a British study found a small decrease in breathing capacity for workers who smoked and were exposed to vinyl resin dust. This decrease was about one-seventh of that caused by normal aging and about equal to that expected with a one-pack-a-day cigarette smoker. There was no significant decrease in breathing capacity from inhalation of vinyl resin dust by non-smokers.

The American Conference of Governmental Industrial Hygienists' Threshold Limit Value (1984) for nuisance dust is 10 mg/m³ for total dust and 5 mg/m³ for respirable dust. Respirable dust are those particles in a size range below 10 microns. Typical particle size for vinyl resin is 1.2 - 150 microns .

Routine inhalation of dust of any kind should be avoided. Exercise care when dumping bags, sweeping, mixing or doing other tasks which can create dust. Where large amounts of any dust may occur, wear a respirator approved by NIOSH/MSHA to protect against nuisance dust.

SECTION VI - REACTIVITY DATA

Stability
Stable

Hazardous Polymerization
Will not occur

Hazardous Decomposition Products

Carbon monoxide, carbon dioxide, hydrogen chloride, and small amounts of benzene and aromatic and aliphatic hydrocarbons.

Incompatibility (materials to avoid)

Avoid contact with acetal or acetal copolymers and with amine containing materials during processing. At processing conditions these materials are mutually destructive and involve rapid degradation. Thoroughly purge and mechanically clean processing equipment to avoid even trace quantities of these materials from coming in contact with each other. Prevent cross contamination of feedstocks.

SECTION VII - SPILL OR LEAK PROCEDURE

Steps to be taken in case material is released or spilled

Vacuum or sweep into a closed container for reuse or disposal. Use care to avoid dust generation. Store in a safe location to await disposal. Do not flush chemical into public sewer or water system. Wear protective clothing, monogoggles and dust respirator if cleanup actions will result in the creation of airborne dust.

Waste Disposal Method

Landfill or incineration in accordance with federal, state and local regulations. This product is not defined or designated as hazardous by current provisions of the Federal Resource Conservation and Recovery Act (RCRA). 40 CFR 261.

If incinerated, be aware that hydrogen chloride is generated.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation

Provide effective exhaust ventilation to draw dust and/or fumes away from workers to prevent routine inhalation. Compounding, hot melt processing (extruding, molding, etc.), cutting or sawing, machining, regrinding, thermoforming, heat welding and other processing or post-processing operations involving heat sufficient to result in polymer breakdown should be examined to ensure adequate ventilation.

Some degassing of Vinyl Chloride will occur during shipment and storage. Precautions should be taken during container opening and prior to trailer entry. Containers or trailers should be opened under ventilated conditions and allowed to ventilate to the atmosphere for at least 30 minutes or time sufficient for the accumulation of Vinyl Chloride monomer to dissipate prior to handling or entry.

Store in ventilated area to prevent build-up of Vinyl Chloride monomer.

Respiratory Protection

If monitoring shows employee exposures above OSHA PEL, utilize appropriate respiratory protection until engineering controls have been installed to lower ambient VCM levels to below the OSHA PEL. See OSHA Vinyl Chloride Standard 29 CFR 1910.1017 for respirator selection guide. If excessive dust conditions are encountered wear a respirator approved by NIOSH/MSHA to protect against nuisance dust.

Abnormal conditions such as equipment malfunction, use of improper equipment or procedures, or hangup or stagnation of vinyl resin-based compound during processing may cause decomposition. Employees involved in removing decomposing material should be provided with suitable air-supplied respirators, such as NIOSH/MSHA-approved positive pressure, self-contained breathing apparatus.

- Wear protective gloves when handling hot material during processing.
- Wear monogoggles suitable for keeping dust out of the eyes.
- Avoid breathing dust.
- Do not get in eyes, on skin or on clothing.

SECTION IX - SPECIAL PRECAUTIONS

Normal Melt Processing. Virtually all thermoplastic materials will emit fumes and/or vapors when heated to processing temperatures. The concentration and composition of these vapors will depend upon variables such as specific compound formulation and processing method and temperature. Vinyl chloride monomer may be present due to high residual concentration in Geon® off-grade vinyl resin. Always use vinyl resin under well-ventilated conditions and avoid continued or prolonged breathing of process vapors. For personal hygiene, wash thoroughly after handling resin, especially before eating, smoking or using toilet facilities. Do not store or consume food in processing areas. Do not use processing equipment to heat food.

Cleanup following normal melt processing should be performed under well-ventilated conditions. Vinyl chloride monomer may be given off due to high residual monomer in off-grade vinyl resin. If airborne concentrations of vinyl chloride exceed the PEL, airline respirators need to be worn. Compound based upon vinyl resin may be held at process temperatures for a short time without significant thermal degradation. However, it should be recognized that exposure to either elevated temperature or excessive heat history (time) will result in decomposition.* Equipment should not be shut down for extended time periods with vinyl compound in it, or decomposition and possible corrosion of unprotected metal may result. If dies and screws are not to be cleaned manually, then compound should be purged from processing equipment prior to shutdown using special vinyl purge compound or a compatible thermoplastic such as general purpose ABS (do not use flame-retarded or halogen-containing grades for this purpose).

* Time and temperature required to initiate degradation will vary depending upon processing technique, degree of compound stabilization and other factors. As a rule-of-thumb, degradation begins to occur after about one hour at 177°C (350°F), about ten minutes at 204°C (400°F) and within five minutes at 232°C (450°F).

In case of power loss or other mishap, shut off the machine and dismantle the die assembly as soon as possible before degradation or decomposition begins. If decomposition begins (with gassing and "popping" sounds) before the die can be disassembled, dangerously high pressure may occur in the die system. In this event, shut off the machine, clear the area of personnel and wait until decomposition stops. Thoroughly ventilate the area. Remove and disassemble the die system. Before entry into unknown concentrations of gases, don self-contained breathing apparatus. These are guidelines only. Refer to technical service reports and equipment manufacturer's recommendations for specific procedures.

Regrinding scrap normally generates substantial heat. Cool regrind before placing it in containers. The excellent insulating quality of vinyl will prevent heat in the center of a container from escaping, potentially resulting in slow thermal decomposition of the material. This may not only render the product unsatisfactory for further processing, but also result in fumes and vapors being released into the workplace atmosphere.

Remove vinyl resin from walkways and floors to prevent slippery footing.

wp6/0507j

26230008

BFG50220

Sprinklered warehouse areas are recommended. Although vinyl resin by itself will not support combustion, materials such as wooden pallets, cardboard boxes and other combustibles can provide sufficient fuel to force vinyl resin to burn.

Compounding vinyl resin. Many of the common compounding ingredients which are mixed with vinyl resin may require special handling, especially respiratory protection. It is your responsibility to obtain and follow the recommended precautions of the individual additive supplier.

SPECIAL NOTE: Vinyl compound at or above normal processing temperature must never be allowed to accumulate in thick masses, or it will begin to thermally decompose and to swell due to internal gassing. Gassing may cause a thick mass to explode if its outside surface is hardened. Molten waste should be collected as strands or flattened to 2-inches or less, and quenched in a drum of cold water provided for this purpose. Decomposing material should be removed to a well-ventilated area, preferably outdoors.

SECTION X - TRANSPORTATION

For domestic transportation purposes, this product is not defined or designated as a hazardous material by the U.S. Department of Transportation under Title 49 of the Code of Federal Regulations, 1983 Edition.

- DOT Proper Shipping Name: Not applicable
- DOT Hazard Class: Not applicable
- DOT Label: Not applicable
- UN/NA Hazard No.: Not applicable

SECTION XI - HAZARD CODES

NEFPA 704 (*)

Health: 2
Flammability: 1
Reactivity: 0
Special: None

HMIS (**)

Health: 2
Flammability: 1
Reactivity: 0
Personal Protection: *

* See OSHA Standard 29 CFR 1910.1017

Hazard Code Key: 0 = Insignificant; 1 = Slight; 2 = Moderate;
3 = High; 4 = Extreme.

(*) National Fire Protection Association (NFPA) rating identifies the severity of hazards of material during a fire emergency (i.e., "on fire").

(**) Hazardous Materials Identification System, National Paint and Coatings Association (HMIS) rating applies to product "as packaged" (i.e., ambient temperature).

wp6/0507j

26230009

BFG50221

XII - CONTAINER LABELS

Caution: Contains Vinyl Chloride. Vinyl Chloride is a cancer suspect agent. Breathing of excessive amounts of dust over a long period of time may cause a slight reduction in breathing capacity. Off-gassing of Vinyl Chloride during storage or processing may result in airborne concentrations of Vinyl Chloride above the OSHA permissible limit. Exposure to Vinyl Chloride has been associated with cancer. Overheating or degradation may emit fumes containing hydrogen chloride (HCl), may cause eye, respiratory tract or skin irritation.

Precautions: Store in well ventilated areas. Process to prevent release of dust. Process with adequate ventilation. In case of overheating or degradation, wear positive pressure, self-contained breathing apparatus (SCBA). In case of fire, extinguish with water.

DISCLAIMER OF LIABILITY

As the conditions or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for any use of this material. Information contained herein is believed to be true and accurate, but all statements or suggestions are made without warranty, express or implied, regarding accuracy of the information, the hazards connected with the use of the material or the results to be obtained from the use thereof. Compliance with all applicable federal, state and local laws and regulations remains the responsibility of the user.

APPENDIX I

The OSHA hazard communication standard requires that manufacturers of products state in the MSDS whether or not the material is listed as a carcinogen. The lists to be consulted include OSHA Health Standards, The International Agency for Research on Cancer (IARC) and the National Institute for Occupational Safety and Health's Registry of Toxic Effects of Chemical Substances (RTECS)

NIOSH in RTECS has listed Polyvinyl Chloride (PVC) as a carcinogen. NIOSH has misinterpreted the IARC monograph 19.377.76 (Summary of Data Reported and Evaluation). The monograph states that "studies (about)... the possibility of cancer on workers involved in the fabrication of plastics, including Polyvinyl Chloride, are insufficient to evaluate carcinogenicity."

IARC monograph 19.419.79 correctly identifies Vinyl Chloride monomer as a carcinogen. NIOSH's inexplicable expansion to include all the polymers listed (including Tygon which is used in medical tubing) is in error.

The Vinyl Institute, a trade organization representing the PVC industries, is working with the RTECS review board to correct the misinterpretation of the IARC monographs.

26230010

wp6/0507j

BFG50222