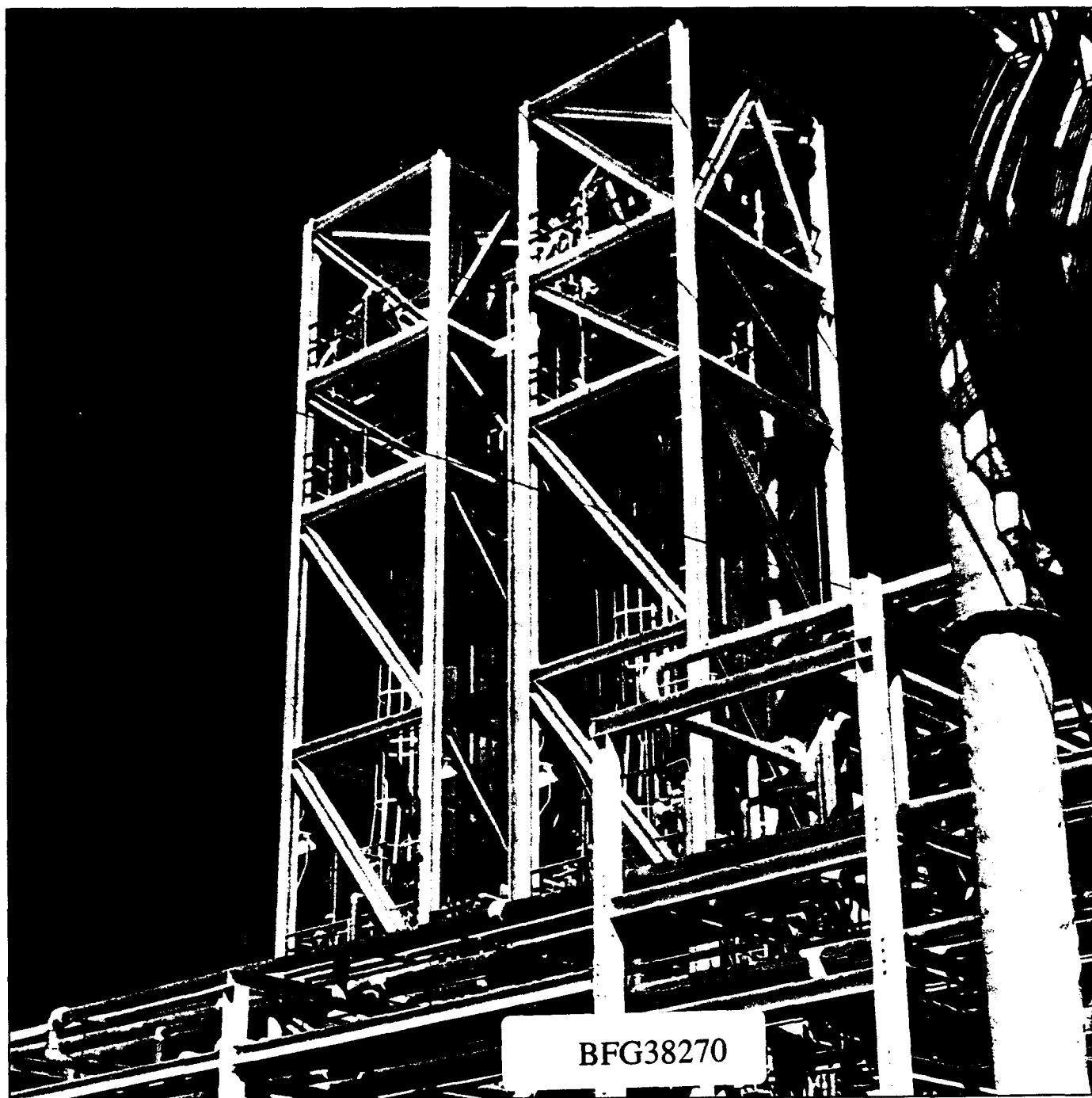


# **Material Safety Data**

## **Geon<sup>®</sup> Vinyl Resins and Compounds**





Material safety data information for Geon vinyl resins and compounds are based on the U.S. Department of Labor Form OSHA-20 modified to facilitate description of our materials. These data are applicable for all Geon vinyl resins and compounds.

**About the cover:**

..... A new, continuous stripping process developed by BFGoodrich Chemical Division is achieving new efficiencies in removal of vinyl chloride monomer (VCM) from general purpose (PVC) resins.

Plastics processors and fabricators who use these low-residual VCM resins should not have to establish regulated areas under the federal Occupational Safety and Health Administration standard covering worker exposure to VCM, according to our estimates.

This breakthrough is just one of the many steps we are taking to control VCM — like improved confinement and recovery techniques, automated reactor cleaning and others yet to be announced.

This whole series of engineering improvements is being undertaken in order to assure a continuing supply of vinyl material — a vital, versatile, high-performance product for consumers and industry.

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# MATERIAL SAFETY DATA

## GEON VINYL RESINS AND COMPOUNDS

### SECTION I

**Manufacturer's Name**

BFGoodrich Company, Chemical Division

**Telephone Number**

(AC) 216/524-0200

**Address**

6100 Oak Tree Boulevard  
Cleveland, OH 44131

**Trademark**

Geon Vinyls

**Chemical Name**

Poly (vinyl chloride), PVC

**Formula**

(CH<sub>2</sub> CHCL)<sub>n</sub>

**Chemical Family**

Vinyl Chloride Polymer

**Exceptions:**

Geon 135, 130x24: Copolymer of vinyl chloride/vinyl acetate

Geon 130x17: Carboxy-modified vinyl chloride polymer

### SECTION II — HAZARDOUS INGREDIENTS

PVC resins contain small but detectable amounts of residual vinyl chloride monomer, a cancer-suspect agent (see Table I). PVC compounds also may contain stabilizers, plasticizers, lubricants and other ingredients which will emit vapors during processing. Although use experience has not indicated serious health hazards, prolonged exposure to processing vapors should be avoided. Unusually sensitive employees may experience hoarseness, nausea or labored breathing. Exhaust ventilation should be provided (see Section V) to prevent significant employee exposure.

**Solvents**

No organic solvents are used in the manufacture of Geon vinyl resins. Organic solvents may be used in the manufacture of stabilizers and other ingredients, and therefore, be detectable in small amounts in PVC compound. (See Section V, Ventilation)

vinyl resins. These materials are ubiquitous and trace quantities may be found in the environment.

**B) Compound:** Geon vinyl compounds contain heavy metal stabilizers generally in amounts less than 5%. These may include organometallics such as tin, lead, cadmium, barium and zinc. (See Section V, Ventilation)

**Ubiquitous or  
Carcinogenic Chemicals**

See Table III

**Plasticizer**

Geon vinyl flexible compounds will contain polymeric, monomeric or mixed ester plasticizer in amounts between 20% - 50%. As these materials are volatile when heated, vapors can be released during processing. (See Section V, Ventilation)

**Heavy Metals**

A) *Resin:* No lead, mercury, other heavy metals or heavy metal compounds are used in the manufacture of Geon

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- B) Under abnormal processing conditions, (including equipment malfunctions or plug-up), decomposition of PVC compound may occur in an extruder, injection molding machine, or other processing equipment, resulting in a characteristic whitish smoke which will contain hydrogen chloride and vapors from metallic stabilizers and other ingredients. Inhalation will result in irritation of the respiratory tract, eyes and skin resulting in coughing, pain, and inflammation. Employees involved in removing decomposing materials should be provided with suitable self-contained breathing apparatus. Decomposing compound should be removed to a well-ventilated area and thoroughly soaked in water.
- C) During typical break-down and clean-up of equipment after a processing run, PVC compound may be held at high heat (i.e., processing temperature) for a short period. While this may not result in decomposition, it should be understood that the combined vapors from all ingredients will be present (See Section II). PVC compound cannot be held static in processing equipment under high heat for extended periods of time. Decomposition will occur. During equipment clean-up operations, exhaust ventilation (see Section V) should be provided..

#### **Medical Consideration**

Treatment to exposure of PVC combustion or pyrolysis products should be symptomatic. Medical authorities should recognize that carbon monoxide and hydrogen chloride are generated.

#### **Unusual Fire and Explosion Hazards**

PVC resins are not known to represent any potential dust explosion hazard.

#### **Ignition Characteristics**

PVC resin has a flash-ignition temperature of about 391°C (735°F) and a self-ignition temperature of about 454°C (850°F). PVC polymer is characterized as an inherently flame-retarded\* material because of chlorine in the molecule which makes it difficult to ignite and reduces flamespread. The presence of PVC resin or compound, or products fabricated from PVC, have not been associated, by themselves, with creating a fire risk in handling, storage, or use. However, like all organic materials, PVC must be considered combustible and can be forced to burn by continuous application of intense heat. Like all combustible materials, protect from open flame and maintain proper clearance when using portable heat devices, etc. Safely store flammable liquids away from PVC.

\*The descriptive term "flame-retarded" describes a material response to heat and flame under controlled laboratory conditions and should not be considered or used for the description or appraisal of the fire hazard of this material or of products or systems fabricated from this material under actual fire conditions.

### SECTION III — PHYSICAL DATA

**Specific Gravity ( $H_2O = 1.0$ )**

*Resin:* 1.40

*Compound:* See Product  
Data Sheet

**Solubility in Water**

Slight

**Particle Size**

*Resin:* See Table II

*Compound:* Not applicable

**Appearance and Odor**

*Resin:* White powder, practically odorless or bland odor

*Compound:* Pigmented cubical granules or powder, slight odor

### SECTION IV — FIRE AND EXPLOSION HAZARD DATA

**Extinguishing Media**

Water

**Special Fire Fighting Procedure**

Self-contained breathing apparatus should be used for fires in which PVC becomes involved.

**Decomposition Products**

A) When forced to burn, PVC combustion products will mainly be carbon monoxide, carbon dioxide, hydrogen chloride and smoke. Other gases, including aromatics and aliphatics, are present in small amounts. Geon 135 and 130x24 will also contribute minor amounts of acetic acid as gas and smoke.

Inhalation of PVC combustion or pyrolysis products will cause irritation of the respiratory tract, eyes and skin. Depending on severity, physiological response to inhalation will be coughing, pain, inflammation, edema, and desquamation in the upper respiratory tract.

The combustion products of PVC, like those from most other natural and synthetic materials, must be considered toxic. Like most conventional materials including wood, paper and cotton, the major hazard is carbon monoxide.

NOTE: Phosgene and chlorine are not products of PVC combustion.

3. Processing areas such as compound preparation; extruding, curing, or coating operations, and other areas where heat is being applied. Provide suitable ventilation.

VCM at low levels cannot be detected by odor. Suitable test equipment and methods must be used.

#### VCM Monitoring Requirements

OSHA regulations require all facilities where polyvinyl chloride (including blends of PVC with other polymers) is processed or fabricated (with heat sufficient to cause mass melting) shall be monitored to determine concentrations of VCM in the work-place atmosphere. Current OSHA rules require that no employee may be exposed to VCM concentrations greater than 1.0 part per million (ppm) averaged over any eight hour period. The "action level" is 0.5 ppm averaged over an eight hour work day. REFER TO OSHA REGULATIONS (INCLUDING 1910.1017) FOR COMPLETE DETAILS.

Since small quantities of VCM remain in resins and compound, BFGoodrich recommends that periodic personnel monitoring programs be conducted.

#### Major Types of PVC Resin and Compound

| TYPE<br>COMPOUND<br>USED IN | AVERAGE AMOUNT OF RVCM<br>(PPM) PRIME GOODS |                | AVERAGE AMOUNT<br>OF RVCM (PPM)<br>OFF-GRADE RESIN* |
|-----------------------------|---------------------------------------------|----------------|-----------------------------------------------------|
|                             | IN RESIN<br>PRIOR TO<br>COMPOUNDING         | IN COMPOUND    | RVCM TAILINGS<br>(B, C & E-GRADES)                  |
| Rigid                       | <5                                          | <5             | <50                                                 |
| { Rigid &                   | <5                                          | <5             | <50                                                 |
| { Flexible                  | <5                                          | <5             | <50                                                 |
| Flexible                    | <5                                          | <1             | <5                                                  |
| Rigid                       | <5                                          | <5             | <5                                                  |
|                             | <20                                         |                | <20                                                 |
|                             |                                             |                | GROUND RESIN<br>(B-GRADE ONLY)                      |
| Rigid                       | <10                                         | <5             | <50                                                 |
| None                        | <10                                         | Not Applicable | <50                                                 |
| None                        | <10                                         | Not Applicable | <50                                                 |
| None                        | <10                                         | Not Applicable | <50                                                 |

\*Downgraded resin  
(B & C grade)  
Same as prime

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## SECTION V — HEALTH HAZARD DATA

### Vinyl Chloride Monomer (VCM)

As PVC is manufactured today, small but detectable quantities of VCM, a cancer-suspect agent, remain in resins and compounds. While this may not result in detectable quantities in PVC processing or fabricating plants, there are conditions under which residual VCM may accumulate to measurable amounts. Since VCM is volatile, it is released from the resin gradually in storage and more rapidly under heat and further processing. Open, handle, and use PVC resin and compound under well-ventilated conditions to avoid significant employee exposure.

Areas where VCM might concentrate above the OSHA "action level" are:

1. Enclosed containers such as bulk railcars, bulk trucks, storage tanks, and drums. Vent the air space above the resin or compound and monitor for VCM; or, provide suitable respiratory protection prior to exposure of personnel (See OSHA 1910.1017)
2. Storage areas for bagged PVC and places where incoming resins and compounds are unloaded, where packages are first opened, and where material is first melted. Provide suitable ventilation.

**TABLE I**

**Residual Vinyl Chloride (RVCM) in**

| <u>DESCRIPTION</u>             | <u>BFGCD<br/>DESIGNATION</u> | <u>INHERENT<br/>VISCOSITY<br/>ASTM D 1243</u> | <u>CLOSEST<br/>CLASSIFICATION<br/>ASTM D 1755</u> |
|--------------------------------|------------------------------|-----------------------------------------------|---------------------------------------------------|
| <b>Suspension Resins</b>       |                              |                                               |                                                   |
| Homopolymers                   |                              |                                               |                                                   |
| 1. High Molecular Weight ..... | 102EP F-5                    | 1.13                                          | GP6-15443                                         |
| 2. Med. Molecular Weight ....  | 103EP                        | 1.00                                          | GP5-15443 }                                       |
|                                | 103EP F-76                   | 0.92                                          | GP4-16043 }                                       |
|                                | 92                           | 1.00                                          | GP5-15543                                         |
| 3. Low Molecular Weight .....  | 110x334                      | 0.68                                          | GP1-16243                                         |
| <b>Emulsion Resins</b>         |                              |                                               |                                                   |
| Dispersion .....               | 121, 128                     | 1.20                                          | Not Applicable                                    |
| <b>Mass Resins</b>             |                              |                                               |                                                   |
| Low Molecular Weight .....     | 80x5                         | 0.76                                          | GP2-16243                                         |
|                                | 140x30                       | 0.76                                          | GP2-46043                                         |
|                                | 140x31                       | 0.84                                          | GP3-46343                                         |
|                                | 140x32                       | 0.76                                          | GP4-46243                                         |

**Note:** < means "less than."

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## SECTION VI — REACTIVITY DATA

Stability  
Stable

Decomposition Products  
See Section IV

Hazardous Polymerization  
Will Not Occur

## SECTION VII — SPILL OR LEAK PROCEDURES

**Steps to be taken in case material is released or spilled**

Apply normal clean-up procedures. Waste PVC material should be stored in containers for re-use or disposal. If conditions occur where excessive dust is possible, employees should be supplied with respiratory protective devices. (See Section V)

**Waste Disposal Method**

Sanitary landfill or incineration in accordance with federal, state, or local regulations. If incineration is used, recognition should be made that hydrogen chloride is generated. Hydrogen chloride is corrosive to unprotected metal.

## SECTION VIII — SPECIAL PROTECTION INFORMATION

Safety glasses are recommended for all industrial workplaces. Protective gloves and clothing are not required when handling Geon vinyl resins or compounds. Protective gloves should be used when handling hot PVC during processing.

As a resin purchaser, certain ingredients you select for use in compounding may dictate the need for special consideration. As we cannot be responsible for materials or operations outside of our direct control, we recommend you contact your additive supplier for necessary information regarding the specific compounding ingredients you select.

## SECTION IX — SPECIAL PRECAUTIONS

This bulletin has been written as a guide to provide relevant product information on the safe use of PVC resin and compound. A publication of this type cannot be expected to cover all possible individual situations.

The user of PVC resin and compound has the responsibility for providing a safe and healthful operation and has the obligation to thoroughly examine all aspects of his operation to determine if or where additional precautions are required. BFGoodrich relies on the user of PVC resin and compound to utilize the information we have supplied to help make the workplace as safe as possible.

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#### **Low VCM Content of Geon Vinyls**

BFGoodrich has implemented continuing technical efforts to reduce the level of VCM in the work atmosphere, the environment, and in PVC resin. Extensive product and process improvements have resulted in General Purpose, EP-type, Dispersion and Mass Polymerized Blending resins with extremely low levels of residual VCM. Residual VCM in major types of Geon vinyl resins are presented in Table I. (See pages 4 & 5).

Studies in PVC processing and fabricating plants using low VCM resins have shown all monitored exposures to be below the action level. Such low levels should make it possible for a typical processing plant to have all areas non-regulated, i.e., exposure less than 0.5ppm. Ventilation and work practice programs should be implemented to assure worker exposure levels will be below the action level. Compliance with OSHA rules requires that a program of initial monitoring be implemented. BFGoodrich recommends that periodic personnel monitoring be conducted thereafter.

Progress has also been made in reducing residual VCM in suspension grade Blending resins. Because of the unique characteristics of Blending resins, there is greater technical difficulty in stripping residual VCM without damaging the polymer.

Although low, residual VCM in suspension grade Blending resins may result in detectable quantities above the action level in storage and processing areas of the resin users plant. The processor should monitor personnel periodically and implement ventilation and work practice programs to prevent significant employee exposure.

Equipment and technology are being developed and implemented to reduce residual VCM in suspension grade Blending resins to very low levels. We shall keep you informed.

#### **Respiratory Protection — Dust**

Operations involving possible exposure to airborne PVC particles should be evaluated as the individual situation exists. OSHA 1910.1000 states that if airborne concentrations of dust particles are found to exceed a total mass of 15 mg/m<sup>3</sup>, or 5 mg/m<sup>3</sup> respirable particles, appropriate engineering controls or NIOSH approved respiratory protection is recommended.

#### **Ventilation**

Exhaust ventilation designed to pull vapors away from workers should be installed at all mixing operations, the hot end and feed area of processing equipment and at cut-off equipment. We recommend environmental monitoring to determine the need for exhaust ventilation in other areas; and exhaust ventilation provided as needed. Other areas to consider include thermoforming, heat sealing, soldering or other operations involving heat.