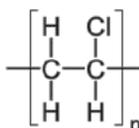


PVC Suspension Resin

CAS Number: 9002-86-2
Synonyms: Chloroethylene Homopolymer; Chloroethylene Polymer; Polyvinyl Chloride Resin; PVC Resin
Chemical Formula: $(C_2H_3Cl)_x$
Molecular Weight: 62.4987
Chemical Structure:



Description: At ordinary temperatures and pressures, PVC Suspension Resin is a solid white powder with no odor.

Refer to the Safety Data Sheet (SDS) for additional information and before handling this material.

Product Overview

PVC Suspension Resin is a polymer manufactured from vinyl chloride monomer. It is used extensively in building and construction, automotive, and medical industries. PVC Suspension Resin is produced at four Westlake Chemical facilities: Aberdeen, Mississippi; Calvert City, Kentucky; Geismar, Louisiana; and Plaquemine, Louisiana. With over 60 years of responsible production and handling experience, Westlake manufactures PVC Suspension Resin with environmental and public safety consideration. Westlake personnel are experienced in handling and shipping PVC Suspension Resin, and our engineers, scientists, and sales personnel can provide technical assistance to users.

Production

Westlake produces PVC Suspension Resin through the polymerization of vinyl chloride monomer. The monomer, water and suspending agents are fed into a polymerization reactor and are agitated at high speeds to form small droplets of vinyl chloride monomer. After an initiator is added, the vinyl chloride monomer droplets are then polymerized into PVC Suspension Resin under controlled pressures and temperatures. After polymerization is complete, the resulting slurry is stripped of unreacted vinyl chloride monomer, the excess water is removed, and the resulting solid is dried to form the final product. The final PVC Suspension Resin contains less than 5 parts per million of residual vinyl chloride monomer.

Uses

Many properties of Polyvinyl Chloride (PVC) make it ideal for a variety of applications. It is biologically and chemically resistant; it is durable and ductile; and it can be made softer and flexible by the addition of plasticizers. With all downstream applications, appropriate registrations and/or approvals may be required. Possible uses for polyvinyl chloride are described below:

- **Pipes** - Roughly half of North America's polyvinyl chloride is used to produce pipes for municipal, construction, and industrial applications. It is particularly well suited for this purpose due to its light weight, high strength, low reactivity, and corrosion and bacterial resistance. Additionally, PVC pipes can be fused together in a variety of ways, including solvent cements, adhesives, and heat-fusion, creating permanent joints that are impervious to leakage. Globally, piping is the single largest use for PVC.
- **Residential and Commercial Siding** - Rigid PVC is used to make vinyl siding. This material comes in a wide range of colors and finishes and is used as a substitute for wood or metal. It is waterproof, weather

resistant, and low maintenance. It is also used in window sills and door frames, gutters and downspouts, and double glazing window frames.

- **Packaging** - PVC is widely used as a protecting film in stretch and shrink wrapping, laminate films with polyethylene, rigid blister packaging, and food and film packaging. It can also be blow molded into bottles and containers. PVC acts as a microbial and water resistant barrier, protecting food, household cleaners, soaps and toiletries.
- **Wiring Insulations** - PVC is used as the insulation and fire retardant on electrical wiring. The wires are coated with the resin and the chlorine acts as a free radical scavenger to insulate and reduce the spread of fire.
- **Medical** - PVC is used to make blood and intravenous bags, kidney dialysis and blood transfusion equipment, cardiac catheters, endotracheal tubes, artificial heart valves, and other medical equipment.
- **Automotive** - PVC is used to make body side moldings, windshield system components, interior upholstery, dashboards, arm rests, floor mats, wire coatings, abrasion coatings, adhesives, and sealants.
- **Consumer Goods** - Both rigid and flexible PVC is used in a wide variety of finished consumer goods, including modern furniture design, air conditioners, refrigerators, phone systems, computers, power tools, electrical cords, garden hoses, clothing, toys, luggage, apparel, vacuums, and credit card stock sheet. PVC can be blended with other plastics to customize the product's properties including color, hardness, abrasion resistance, etc. This method allows producers to determine the customized look and feel of the final product.

Health Effects

Read and follow all instructions on the product label and review the safety data sheet to understand and avoid the hazards associated with PVC Suspension Resin. Wear appropriate personal protective equipment and avoid direct contact. Eye exposure to dust may cause mechanical irritation; excessive concentrations of nuisance dust in the workplace may reduce visibility and may cause unpleasant deposits in eyes. Skin exposure to dust may cause mechanical irritation. Inhalation exposure to dust may cause irritation; processes such as cutting, grinding, crushing, or impact may result in generation of excessive amounts of airborne dusts in the workplace. Nuisance dust may affect the lungs but reactions are typically reversible. Prolonged and repeated inhalation of respirable dust (particles less than 10 microns in size) may cause damage to lungs. Exposure to PVC respirable dust has been reported to cause lung changes in animals and humans, including decreased respiratory capacity and inflammation. Westlake's PVC Suspension Resin is manufactured by suspension polymerization and the particle size is generally large enough in diameter that it is not considered respirable.

Before handling, it is important that engineering controls are operating and protective equipment requirements and personal hygiene measures are being followed. People working with this chemical should be properly trained regarding its hazards and its safe use and should be given the opportunity to review this document and the safety data sheet.

Environmental Effects

PVC Suspension Resin should be kept out of lakes, streams, ponds or other water sources. Based on the high molecular weight of this polymeric material, transport of this compound across biological membranes is unlikely. Accordingly, the probability of environmental toxicity or bioaccumulation in organisms is remote.

Exposure Potential

Precautions should be taken to minimize potential harm to people, animals, and the environment. Potential for exposure may vary depending upon site-specific conditions. When handling PVC Suspension Resin, always refer

to the safety data sheet and product warning label and follow all instructions and warnings. Based on the expected uses for PVC Suspension Resin, exposure could be through:

- **Workplace exposure** - Exposure can occur in either a PVC Suspension Resin manufacturing facility or in the various industrial facilities that use PVC Suspension Resin. Good industrial hygiene practices and the use of personal protective equipment will, when combined with proper training and environmental, health and safety practices, contribute to a safe work environment.
- **Environmental releases** - In the event of a spill, contain the spill to prevent entry into waterways and sewers. Avoid the generation of dust. The spill area can be washed with water; however, the unusable material should be placed into a closed, properly labeled container compatible with the product. Industrial spills (releases to soil or water) should be controlled by workplace spill programs which include containment around loading and unloading operations and storage tanks and employee training. Many aspects of a spill control program are mandated by federal, state and local requirements. In addition, if a spill occurs, governmental reporting may be required. Refer to the safety data sheet for instructions to contain and clean up a spill to minimize exposure.
- **Consumer exposure** - PVC Suspension Resin is not sold directly to consumers; however it is an ingredient in consumer products. In any case, keep all chemical products out of the reach of children. Westlake cannot and does not make any representation or conclusion about consumer exposure risks associated with its customers' products.

Safe Handling and Storage

Always take precautions to minimize potential harm to people, animals, and the environment. PVC Suspension Resin is stable under normal temperatures and pressures; hazardous polymerization will not occur under normal conditions of storage and use.

Polyvinyl chloride materials should not come into contact with acetal or acetal copolymers in elevated temperature processing equipment. The two materials are not compatible and will react in a violent decomposition when mixed under conditions of heat or pressure. Avoid contact with strong oxidizing agents. Temperatures of 300°F (150°C) or greater over an extended period of time may cause thermal degradation of PVC resin. The formation of hydrogen chloride, HCl, may be generated during this thermal degradation. HCl vapors may cause irritation of the eyes, mucous membrane and respiratory tract.

Keep container closed. Store in a cool, dry, well-ventilated place. Reseal containers immediately after use. To maintain product quality, do not store in heat or direct sunlight, keep only in the original container at a temperature not exceeding 40C.

Packaging and Shipping

Westlake delivers PVC Suspension Resin by rail car, bulk truck, and bags.

- **Railcar** - Westlake ships PVC by railcar with a typical load of 190,000 lbs.
- **Bulk truck** - Westlake ships PVC in bulk trucks with a typical load of 42,500 lbs.
- **Bagged material** - Westlake ships PVC in 2,205 lb. supersacks or 55 lb. bags for full or less than truckload quantities.

Fire and Explosion Hazards

During a fire, promptly isolate the scene by removing all persons from the vicinity of the incident. No other action shall be taken without suitable training. Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer



or drain. Avoid generating dust. Spill area can be washed with water. The unusable material should be placed into a closed, properly labeled container compatible with the product.

Physical and Chemical Properties

PVC Suspension Resin is a solid white powder with no odor at standard temperatures and pressures. Exposure to temperatures of 300°F or greater for extended periods of time may cause thermal degradation of PVC Suspension Resin. Instantaneous temperatures above 420°F, prolonged heating at processing temperatures, or excessive shear/heat combinations during processing can generate hazardous decomposition products.

| Typical Properties of PVC Suspension Resins | |
|---|-----------------------------------|
| Resin Properties | Typical Value or Range |
| Inherent Viscosity (dl/g) | 0.50 (+/-0.03) to 1.10 (+/- 0.03) |
| Relative Viscosity | 1.55 to 2.50 |
| K Value | 49 to 74 |
| Bulk Density (grams/cm ³) | > 0.480 |
| Specific Gravity | 1.39 |
| Moisture (%) | < 0.35 |
| Residual Vinyl Chloride Monomer (ppm) | < 5.0 |
| HunterLab Color | |
| 'L' | > 94.0 |
| 'a' | < 2.0 |
| 'b' | < 3.5 |
| Particle Size Distribution | Percent Retained On |
| 40 mesh | < 0.1 |
| 60 mesh | < 9 |
| 200 mesh | < 35 |
| Pan | < 10 |

Regulatory Information

The following regulatory information is provided as a supplement to the information already included on the PVC Suspension Resin's safety data sheet.

North American Regulatory Information

- **CONEG Regulation/Model Toxics in Packaging Legislation** - Lead, cadmium, mercury and hexavalent chromium are not intentionally added to PVC Suspension Resin, and based on the formula and Westlake's experience with the product, the sum of the incidental concentration levels of these metals is not expected to exceed 100 parts per million (ppm) by weight.
- **RCRA** - Commercial grade PVC Suspension Resin, as supplied, is not considered a hazardous waste under 40 CFR 261.33. PVC Suspension Resin, if discarded or spilled, does not exhibit one or more



hazardous waste characteristics under 40 CFR 261.24; however, other wastes generated during use of PVC Suspension Resin may exhibit one or more hazardous waste characteristics. (Note: Westlake provides information on U.S. hazardous waste criteria for the product as manufactured. It remains the obligation of the user to evaluate their specific waste and to manage, treat, and dispose of unused material, residues, and containers in accordance with applicable federal, state, and local requirements.)

- **VOC Information** - PVC Suspension Resin is not listed as a volatile organic compounds (VOC) based on the definition in 40 CFR 51.100; however, it contains a constituent that does qualify as a volatile organic compounds (VOC) at levels less than 5 ppm.
- **HAP Information** - PVC Suspension Resin is not a listed hazardous air pollutant (HAP) as listed in the Clean Air Act Amendments of 1990, 42 USC 7412 (b); however, it contains a hazardous air pollutant at levels less than 5 ppm.
- **Ozone-Depleting Chemicals** - PVC Suspension Resin is not/does not contain ozone depleting chemicals (40 CFR 82, Subpart A, Appendix F).
- **Toxic Pollutants / Priority Pollutants** - PVC Suspension Resin is not a listed toxic pollutants/priority pollutant as listed in 40 CFR 401.15 and/or 40 CFR 423 Appendix A; however, it contains a listed toxic pollutants/priority pollutant at levels less than 5 ppm.
- **CERCLA Hazardous Substance** - PVC Suspension Resin does not appear in the List of Hazardous Substances and Reportable Quantities table (40 CFR 302.4); however, it contains a constituent on the List of Hazardous Substances and Reportable Quantities table at levels less than 5 ppm.
- **TSCA Information** - All of the components of PVC Suspension Resin are listed on the TSCA inventory as active under TSCA Section 8(b). PVC Suspension Resin is not currently subject to any rule or order under TSCA Sections 4, 5(a), 5(e), 6(a), 7, or 12(b).
- **California Proposition 65** - PVC Suspension Resin contains a chemical (at levels less than 5 ppm) known to the State of California to cause cancer.
- **Washington State Children's Safe Product Act (CSPA)** - PVC Suspension Resin contains a component that is listed under the Children's Safe Product Act (CSPA, 70.240) at levels less than 5 ppm.
- **U.S. Food and Drug Administration** - PVC Suspension Resin is not listed as a chemical Generally Recognized as Safe (GRAS) and has not been manufactured under Good Manufacturing Practices (21 CFR 110). However, homopolymers and copolymers of vinyl chloride and polyvinyl chloride are approved for use, in accordance with prescribed conditions and limitations, as components of certain adhesives, coatings, and food contact surfaces used in producing, manufacturing, packing, processing, preparing, treating packaging, transporting or holding food (21 CFR 175.300; 175.320; 177.1010; 177.1200; and 177.1610). A Drug Master File has been submitted and approved by the FDA for the PVC Suspension Resin manufactured at the Plaquemine, Louisiana, facility.
- **Canada DSL/NDL Inventory** - All components of PVC Suspension Resin are listed on the Canadian Domestic Substances List (DSL); no components are listed on the Non-Domestic Substances List.

European Regulatory Information

- **RoHS/WEEE** - PVC Suspension Resin has been reviewed with regard to the EU Directive 2011/65/EU "Restriction on the Use of Certain Hazardous Substances" (RoHS 2). Based on our knowledge of this product and information on the raw material suppliers' safety data sheets, this product does not contain cadmium, hexavalent chromium, lead, mercury, polybrominated biphenyls (PBBs) or polybrominated diphenyl ethers (PBDEs) at levels greater than the tolerated maximum concentration values established by the directive.
- **Europe REACH** - PVC Suspension Resin is considered a substance under REACH and meets the definition of a polymer under REACH EC 1907/2006. PVC Suspension Resin does not contain

Substances of Very High Concern (SVHC) as published in accordance with Article 59(10) of the REACH Regulation as of July 2017, nor does this product contain any substances on Annex XIV (Authorisation List). PVC Suspension Resin falls under the polymer exemption in accordance to the REACH regulations; therefore, Westlake has registered the monomer, vinyl chloride, accordingly. Westlake's customers importing Westlake's PVC Suspension Resin may be covered by agreement under Westlake's REACH registration if requirements and uses are reviewed and approved by Westlake.

- **European Food Additive/Contact** - Compliance to any food additive or contact regulation in Europe for PVC Suspension Resin has not been determined.

Asia-Pacific Regulatory Information

- **Australia Inventory of Chemical Substances (AICS)** - All components of PVC Suspension Resin are listed or compliant with the Australia Inventory of Chemical Substances.
- **China Inventory of Existing Chemical Substances (IECSC)** - All components of PVC Suspension Resin are listed or compliant with the China Inventory of Existing Chemical Substances.
- **Japanese Existing and New Chemicals Inventory (ENCS)** - All components of PVC Suspension Resin are listed or compliant with the Japanese Existing and New Chemicals Inventory.
- **Korean Existing Chemicals Inventory (KECI)** - All components of PVC Suspension Resin are listed or compliant with the Korean Existing Chemicals Inventory.
- **New Zealand Inventory of Chemicals (NZIoC)** - All components of PVC Suspension Resin are listed or compliant with the New Zealand Inventory of Chemicals.
- **Philippine Inventory of Chemicals and Chemical Substances (PICCS)** - All components of PVC Suspension Resin are listed or compliant with the Philippine Inventory of Chemicals and Chemical Substances.
- **Taiwan Existing Chemical Notification List** - All components of PVC Suspension Resin are listed or compliant with the Taiwan Existing Chemical Notification List.
- **Turkey Chemical Inventory** - All components of PVC Suspension Resin are listed or compliant with the Turkey Chemical Inventory.

Product Certifications and Listings

- **Kosher Certification** - PVC Suspension Resin, including the equipment used in its manufacture, does not come into contact with or contain any animal by-products, animal fats, or animal products, nor does it contain chemical additives that are organic in nature. Westlake produces select grades of PVC Suspension Resin that are Kosher certified. Please contact your customer sales representative for additional information.
- **Halal Certification** - PVC Suspension Resin is not Halal certified. However, PVC Suspension Resin does not contain natural L-cysteine extracted from hair or feathers, animal fats and/or extracts, blood of any origin, blood plasma, pork, or other meat byproducts.
- **NSF/PPI PVC Range Composition Approval** - Certain Westlake PVC Suspension Resin products (specifically: PVC1230P, PVC1091 and PVC5385) have been tested and approved as qualified PVC resins in the Plastic Pipe Institute's (PPI) range formulation technical report "TR-2, PPI PVC Range Composition, Listing of Qualified Ingredients" (2016 edition).
- **ISO 9001 Certification** - The following PVC Suspension Resin manufacturing facilities are ISO 9001 certified: Aberdeen, Mississippi; Calvert City, Kentucky; Geismar, Louisiana; and Plaquemine, Louisiana.



Additional Product Information

- **Source** - PVC Suspension Resin is derived from mineral and petroleum sources and has not been derived from plant, animal, synthetic or fermentation sources.
- **Allergenic Materials** - The following are not used in the manufacture of PVC Suspension Resin:

| Potential Allergen | Including |
|--|--|
| Bee Products & Derivatives | honey, pollen, propolis, royal jelly |
| Buckwheat Products & Derivatives | |
| Celery Products & Derivatives | celery seeds |
| Cocoa Products & Derivatives | |
| Coconut Products & Derivatives | |
| Crustacean Products & Derivatives | crab, crayfish, lobster, shrimp/prawn |
| Dairy Products & Derivatives | cow's milk/cream, goat's milk/cream, powdered milk, butter/butter solids, butterfat, buttermilk, milk fat, casein, whey, curds, custard, cheese, yogurt, lactalbumin, lactoglobulin, lactose |
| Egg Products & Derivatives | albumin, egg whites, egg yolks, eggnog, ova albumin, ovomucoid, powdered eggs, mayonnaise, meringue |
| Fish Products & Derivatives | abalone, anchovy, bass, cod, flounder, herring, mackerel, pollock, salmon roe, sardine, tuna, whitefish |
| Fruit Products & Derivatives | apple, apricot, banana, cherry, grapefruit, kiwi, orange, peach, plum, tomato |
| Grain Products & Derivatives | wheat, rice, rye, oats, barley, spelt, kamut |
| Cinnamon Products & Derivatives | |
| Legume Products & Derivatives | alfalfa, beans (green, kidney, lima, navy, wax) |
| Carob | |
| Lentils | |
| licorice | |
| locust bean gum | |
| Peas | |
| Lupin Products & Derivatives | |
| Meat Products & Derivatives | beef, chicken, pork |
| Mollusk Products & Derivatives | abalone, clam, cuttlefish, mussel, octopus, oysters, periwinkle, sassia scallops, snail, squid, whelk |
| Mushroom Products & Derivatives | matsutake |
| Mustard Products & Derivatives | |
| Peanut Products & Derivatives | peanut butter, peanut meal, peanut protein, peanut flour |
| Plant Nuts/Seeds/Oils | safflower, canola |
| Potato Products & Derivatives | |
| Seed Products & Derivatives | cotton, poppy, sesame, sunflower |
| Protein Hydrolysates, Soybean Products & Derivatives | soy, miso, tofu, bean cured, edamame, isolated soy protein, hydrolyzed soy protein, textured soy protein, soy milk, soy sauce, soy nuts, soy flour, soy lecithin |
| Spices | |
| Sulfates/Sulfites & Derivatives | sulfur dioxide, sodium metabisulfites, sodium bisulfite |
| Tree Nut Products & Derivatives | almonds, brazil nut, cashew, chestnut, filberts, hazelnut, hickory, macadamia, pecans, pine nuts, pistachio, queensland nut, walnuts |
| Yam Products & Derivatives | |



- **Additives/Preservatives/Flavorings** - The following are not used by Westlake facilities in the manufacture of PVC Suspension Resin:

| | | |
|-----------------------------------|----------------|-------------------|
| Adipate | Ethylene Oxide | Parabens |
| Artificial Colors/Color Additives | Free Glutamate | PAH |
| Benzopyrene | Gelatin | Phosphates |
| BPA (Bisphenol A) Caramel Color | Hormones | Phthalates |
| Chloramphenicol | Iodine | Potassium Bromate |
| DEHP | Jatropha Plant | Psyllium |
| Diacetyl | Lactose | Sodium Benzoate |
| Diethylene Glycol | Latex | Sorbic Acid |
| Dioxin | Maleic Acid | Starch |
| Diphenylamine | Melamine | Sudan Red |
| DMAA | MSG | Titanium Dioxide |
| Dyes/Food Dyes | Palm Oil | 4-Methylimidazole |

- **Bovine Spongiform Encephalopathy** - PVC Suspension Resin is not of animal origin, and, to Westlake's knowledge, does not contribute to Transmissible Spongiform Encephalopathy (TSE)/Bovine Spongiform Encephalopathy (BSE).
- **Genetically Modified Organisms (GMOs)** - PVC Suspension Resin is not manufactured with and does not contain genetically modified organisms.
- **Natural Latex Rubber** - PVC Suspension Resin is not manufactured with and does not contain natural latex rubber as defined in 21 CFR 801.437(b)(1).
- **Nutritional Value** - PVC Suspension Resin does not have nutritional value.
- **Partially Hydrogenated Oils (PHOs)** - PVC Suspension Resin is not manufactured with and does not contain Partially Hydrogenated Oils (PHOs).

Product Stewardship

Westlake Chemical is committed to managing PVC Suspension Resin so that it can be safely used by its employees and customers. Westlake's relationships with its customers encourage communication about safety and environmental stewardship.

Additional Information

For more information regarding Westlake's PVC Suspension Resin, contact us by calling (713) 960-9111.

References

- Westlake Chemical website: www.westlake.com

Notice

Prior to its use, the user is responsible for determining the suitability of the product or products covered by this Product Stewardship Summary and for complying with all federal, state, and local laws and regulations in connection with its use. Neither Westlake Chemical nor any of its affiliates shall be responsible for any damages of any kind whatsoever resulting from the use of or reliance on this Product Stewardship Summary or product or products to which it refers.

This Product Stewardship Summary is intended only to provide a general summary of the potential hazards associated with the product or products described herein. It is not intended to provide detailed information about potential health effects and safe use and handling information and, although Westlake Chemical believes this information is correct, Westlake Chemical makes no warranties as to its completeness or accuracy. Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling the Westlake Chemical product(s) mentioned in this document. Before working with any of these products, users must read and become familiar with the available information on product hazards, proper use, and handling. Information is available in several forms, such as safety data sheets and product labels. A copy of Westlake's safety data sheet for PVC Suspension Resin can be obtained by going to the company's website www.westlake.com.

This information is subject to change without notice.

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