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Production Of Vinyl Chloride Based Polymer

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Abstract: Viniplast is characterized by mechanical prochnostyu, v 5 times legche chuguna, v 8 raz legche svintsa, nizkoy teploprovodnostyu.Iz nego izgotovlyayut pokrytiya əlektroliznyx vann, ventilyatsionnyx ustroystv, pogloshchayushchix parы acid, bakov dlya acid i shchelochey

Keywords: polymer, monomer, thermoplastic, vinyl chloride, phosgene, pyrolysis, polyvinyl chloride.

Polymerization is the process by which the same monomers combine at high temperatures and pressures to form a high molecular weight compound without an intermediate product.

Polyvinyl chloride (PVC) is a thermoplastic material obtained by polymerization of vinyl chloride. Polyvinyl chloride is the most important polymer product in the world. More than 3,000 products are produced from this polymer.

In 1912, a patent was granted for the industrial polymerization of vinyl halide. In 1935, vinyl chloride was obtained by treating vinyl chloride dichloroethane with an alcoholic solution of alkali. Polyvinyl chloride has been a commodity since 1935.

When stored, it is exposed to heat, light, moisture, oxygen, ozone, aggressive agents, mechanical forces.

Insulation materials for cables and electric wires, artificial leather, hoses, wrapping materials, linoleum are obtained from polyvinyl chloride. Polyvinyl chloride is used as a shield against tanks, reservoirs, chemical equipment, pipes from chlorine, chloride and sulfuric acid.

The main raw material for obtaining polyvinyl chloride is vinyl chloride (VX).

It is second only to ethylene in demand. At room temperature it is a colorless gas with an ethereal odor, boiling point - 13.9^0 C, density 970 kg / m^3.

Vinyl chloride is soluble in acetone, ethyl alcohol, insoluble in water. It is prone to combustion, and its mixture with air has explosive properties. Combustion releases corrosive substances and toxic phosgene. Vinyl chloride has a strong negative effect on the human body.

Damages the central nervous system, bone system, connective tissue, brain and heart. Causes immune changes in tumors. Injures the liver. Observations show that it causes cancer in various tissues and organs, including the liver, brain and lungs.

Chlorvinyl is obtained in various ways. Acetylene is obtained by hydrochlorination in the presence of a catalyst, dehydrochlorination with a solution of alkali in alcohol, by chlorination of ethylene at high temperature.

$$\underset{\text{ethylene}}{CH_2=CH_2} + CI_2 \rightarrow \underset{\text{dichloroethane}}{CH_2CI-CH_2CI}$$

The resulting dichloethane is pyrolyzed to form chlorovinyl and hydrogen chloride. The released hydrogen chloride is sent to chlorinate ethylene and vinyl chloride is formed:

$$CH_2=CH_2 + \tfrac{1}{2}O_2 + HCI \xrightarrow{CuCI} CH_2=CHCI + H_2O$$

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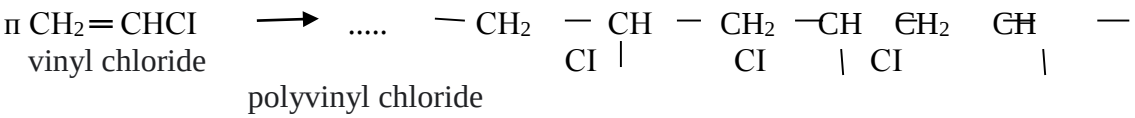
If oxygen and initiator are not used, thermal polymerization of vinyl chloride does not occur, it is rapid in the presence of oxygen.

Experiments show that the polymer is not formed without oxygen in the presence of oxygen, even if the temperature is carried out at 20-110^0 C for 50-100 hours:



polyvinyl chloride

Its molecular mass is 30,000-400,000. In the industry, polyvinyl chloride plasticizers are produced with and without additives. Polyvinyl chloride without plasticizer is called viniplast.Viniplast is obtained by heating by mixing 2-3% stabilizer with polyvinyl chloride, ie lead acetate or calcium stearinate.

Viniplast is characterized by mechanical strength and chemical stability, it is 5 times lighter than cast iron, 8 times lighter than lead, and conducts less heat.

It is used to make coatings for electrolysis baths, ventilation devices that absorb acid vapors, tanks for acids and alkalis, details of batteries.

It is used to make coatings for electrolysis baths, ventilation devices that absorb acid vapors, tanks for acids and alkalis, details of batteries.

The polymerization reaction is very sensitive to various compounds. If acetylene, methyl and ethyl alcohol, hydrochloric acid are added, the polymerization is very slow, if styrene, hydroquinone, aniline, phenol, bromine, potassium permanganate are mixed, the polymerization process stops.

Vinyl chloride should be stored away from heat and fire, so it is buried deep in the ground and stored for 14 hours at a temperature of 22^0 in special containers with the addition of a stabilizer. Equipped with a pressure control device and a spark arrester.

Equipped with a pressure control device and a spark arrester. The container in which the substances are stored is stored at a temperature below 50^0 C, in conditions of air exchange with the external environment. Exposure to copper, flame, heat, oxidizers, caustic soda and active metals should be avoided.

Stabilized vinyl chloride is transported in liquid form in refrigerated steel tanks. The steel tank should be well dried and filled with nitrogen.

In industry, polyvinyl chloride is obtained by the following methods:

1. The suspension is polymerized on the basis of a periodic scheme. In an aqueous solution containing 0.02 - 0.05% protective colloid is mixed in an aqueous solution of vinyl chloride in the presence of 0.02 - 0.05 % diazobic compound initiator. The mixture is heated to 45 - 65 ^{0} C. It is kept until homogeneous.

Polyvinyl chloride granules with a size of 100-300 microns are formed. It is packed through a sieve. Polymerization is carried out in a reactor with a capacity of 200 m^3. In the second method, polymerization is carried out in two stages.

In the first stage, vinyl chloride containing 0.02-0.05% of the initiator by mass is polymerized to 10%. . When maintained at the desired temperature, polyvinyl chloride particles grow in the second stage and porous polychlorinated vinyl granules with a size of 100–300 μm are formed.

Vinyl chloride, which did not take part in the reaction, is extracted and re-fed. The resulting polymer is friable and easy to process. The second method of polymerization is preferable to the first method because energy consumption, service charge and capital costs are reduced.

During the second method of obtaining polychlorinated vinyl, the heat resistance of non-homogeneous polychlorinated vinyl on the hardware wall is much lower than that of the first polymerization method.

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In the third method, polymerization is carried out by emulsification. The process is carried out in the presence of water-soluble initiator (H_2O_2) PAV emulsifier.

In the aqueous solution, 0.5% by mass passes through the aqueous phase and vinyl chloride. With weak stirring, the polymerization continues at 45-600 C. Polyvinyl chloride with a particle size of 40-50%, 03 - 0.5 μm, is removed from the bottom of the reactor. 90-95% of the vinyl chloride obtained for the reaction is converted into polyvinyl chloride.

When the unvaccinated vinyl chloride is returned to the reactor, the polyvinyl chloride is dried and sifted in a dusting chamber.

Emulsion polyvinyl chloride is contaminated with secondary substances, which are used in the preparation of pastes and plastisols. Polyvinyl chloride is an important polymer.If vinyl chloride, which is not involved in the process, is re-fed to the reactor, production efficiency will increase.

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