

STYRENE-BASED ORGANIC SUBSTANCES, CHEMISTRY OF POLYMERS AND THEIR TECHNOLOGY

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Abstract: In this article, we discuss the properties of styrene, the organic substances derived from it, and the chemistry and technology of polymers.

Keywords: Styrene, lipid, aerosol, pharynx, inhalation, polymer, monomer, organic substances.

Physical properties: Styrene is a poison of general toxicity. It has irritating, mutagenic and carcinogenic effects. It smells very bad. In case of chronic intoxication, workers disrupt the metabolism of the central and peripheral nervous systems, hematopoietic system, gastrointestinal tract, nitrogen-protein, cholesterol and lipids, and reproductive diseases occur in women. Styrene enters the body mainly through inhalation. If steam and aerosol are sprayed on the mucous membranes of the nose, eyes and pharynx, styrene causes irritation. Urinary metabolites benzene - mandelic acid, phenylglyoxalic acid, ginuric acid and benzoic acid are used as exposure tests. Styrene is easily oxidized, halogens are added, polymerized (forms a solid glass mass - polystyrene) and copolymerized with various

monomers. Polymerization continues at room temperature (sometimes as the temperature rises), so styrene stabilizes antioxidants (e.g., *ter*-butylpirocatecol, hydroquinone). For example, halogenation reacts with bromine to form 1,2-dibromethylbenzene with the vinyl group, not with benzene, unlike aniline. Styrene is used almost exclusively for the production of polymers. Many types of styrene-based polymers include polystyrene, polystyrene (expanded polystyrene), styrene modified polyesters, ABS plastics (acrylonitrile-butadiene-styrene) and SAN (styrene-acrylonitrile). Copolymerization reaction of butadiene and styrene in production and forms styrene butadiene rubbers used in the manufacture of molded and non-molded rubber products. Due to their radiation resistance, styrene-butadiene rubbers are used in the production of gamma radiation resistant rubbers. Styrene is easily oxidized, binds halogens, polymerizes (forms a solid vitreous mass - polystyrene) and is copolymerized with various monomers. Polymerization also occurs at room temperature (sometimes by explosion), so it is stabilized with antioxidants (e.g., *ter*-butylpirocatecol, hydroquinone) during storage. For example, halogenation occurs in the reaction with bromine, unlike aniline, not along the benzene ring, but along the vinyl group with the formation of 1,2-dibromethylbenzene. Styrene was first isolated in 1831. But before World War II, styrene and its polymers were not widely used in industry. Styrene was first obtained on an industrial scale in 1930 in Germany. Styrene production began in the United States in 1933, but the polystyrene synthesized from it was of low quality and cheap. Styrene was used only to produce polystyrene in powder form for injection molding. The availability of large production facilities for the production of monomeric styrene has encouraged the expansion of research on the use of polystyrene in new industries, particularly in the production of consumer goods. The development of research in the field of synthesis of polymers and styrene copolymers has led to the creation of a large group of polymeric materials with different properties. Ethylbenzene is a catalytic reforming product in the C₈ fraction of aromatic hydrocarbons, which can be separated by distillation. However, this is an expensive method. In practice, ethylbenzene is obtained by the classical exothermic reaction by alkylation of benzene with ethylene in the liquid phase as a catalyst for aluminum chloride: possible. Styrene can be obtained by reaction of benzaldehyde with

flax in the presence of boric acid or zinc chloride at a temperature of 273-283 K and then decarboxylation by heating in the presence of boric acid: Industrial polymers are used in packaging materials, textiles, household items, building materials and others. Used as polymers in fibers, films, coatings, foams and molded products. Polymers have strength, hardness, impact strength, flexibility, elasticity, flexibility, optical transparency, chemical resistance and more. These properties can be modified initially using additives specific to polymers: plasticizers, fillers, dyes, stabilizers. IN assigned to three groups can be polymeric materials depending on these properties: elastomers, plastics, fibers. Elastomers exhibit increasing re-deformation (elasticity), fibers - increasing stiffness, plastic - strength and stiffness. Chain polymerization involves three main stages: excitation, chain growth and fracture, and reaction continuation. Mechanisms through possible free radical, ionic or ionic coordination. Depending on the reaction mechanism, free radical, ionic (cationic or anionic) and ionic coordination polymerization. With stepwise polymerization, monomers are formed as a result of the interaction of functional groups with the construction of the polymer chain. The reaction is carried out using a step-by-step mechanism (i.e., sequential, independent motions) and the chain growth occurs slowly (unlike chain polymerization, where chain growth occurs very rapidly). Phased polymerization continues through the formation of dimers, trimers, tetramers and others. Each of these mediators can remove primary monomers with the same function from the reaction zone and re-enter the reaction zone. Often, stepwise polymerization is accompanied by the release of simple substances of low molecular weight. Polymerization is a simple, low molecular weight compound that is further complicated by high molecular weight. To do this, each molecule of the source must be at least two molecules of the same or different types of compounds, or in other words, source molecules, at least, the functional capacity of the two-way bond depends on the number of reaction groups (-OH, -COOH, -NH₂, etc.), in which the presence or presence is a double or triple bond. Depending on the performance of the resource, the monomer is a linear, branched, or three-dimensional cross-linked polymer. Separate the chain and step polymerization. In the case of destruction according to the law of operation, the breakage of the macromolecule chain occurs at any random place, accompanied by the formation of low

molecular weight parts, but the monomer is almost not formed. It is not necessary if there are active centers in the polymer chain when the law is violated. Decomposition of polymers can occur under the influence of physical factors - heat, light, mechanical stress and chemicals - oxygen, ozone, acids, alkalis. Thermal destruction continues under the influence of temperature, both on the chain mechanism and according to the law of chance. The rate of thermal decomposition determines the thermal stability of the polymer and is determined by the strength of the bonds. Thus, the bond strength for carbocaine polymers depends on the type of CC substituents and their number. Increasing the number of ethylene - propylene - isobutylene in series from left to right reduces the bond strength in the main chain, and therefore the thermal stability of polypropylene is less heat resistant than that of polyethylene and polyisobutylene. If there is an atom, replace the hydrogen in ethylene with a phenyl group; polystyrene polyethylene with relatively less thermal stability. All substitutions do not necessarily reduce thermal stability. In some cases, the process of polymer degradation is not associated with the destruction of the main chains and side groups. Organic compounds, organic substances - substances associated with hydrocarbons or their derivatives, ie almost all chemicals containing carbon [1] is a class of chemical compounds that combine compounds (except carbides, carbonic acid, carbonates, some carbon oxides, etc.). Rhodanides, cyanides). Organic compounds are rare in the earth's crust, but are of great importance because all known life forms are based on organic compounds. Such substances often enter the next life cycle, such as soil organic matter (by the way, the annual production of the biosphere is 380 billion tons) [2]. The main distillates of oil are the building blocks of organic compounds [3]. Organic compounds, in addition to carbon (C), are often hydrogen (H), oxygen (O), nitrogen (N), less - sulfur (S), phosphorus (P), halogens (F, Cl, Br, I) includes , barium (B) and some metals (separately or in various combinations) [4]. The main classes of organic compounds of biological origin - proteins, lipids, carbohydrates, nucleic acids, in addition to carbon, mainly hydrogen, nitrogen, oxygen, sulfur and phosphorus there is. For this reason, "classic" organic compounds mainly contain hydrogen, oxygen, nitrogen, and sulfur, but the elements that make up organic compounds other than carbon can be almost any element. Carbon compounds with other elements form

a special class of organic compounds - organ element compounds. Compounds with the same composition and molecular weight, but with different physicochemical properties. This phenomenon is called isomerism. Polymers are a special type of substance also known as high molecular weight compounds. Their structure usually includes many small segments (compounds). These segments can be similar to each other, then we talk about homopolymer. Polymers belong to macromolecules - a class of substances composed of molecules of very large size and mass. Polymers can be organic (polyethylene, polypropylene, plexiglass, etc.) or inorganic (silicone); synthetic (polyvinyl chloride) or natural (cellulose, starch) .There are currently several methods for characterizing organic compounds: Crystallography (X-ray diffraction) is the most accurate method, but a sufficiently high quality crystal is required to obtain high accuracy.

Therefore, this method is not used very often. Elemental analysis is a destructive method used to determine the composition of elements in a molecule of a substance. Infrared spectroscopy (IR): mainly used to prove the presence (or absence) of functional groups. Mass spectrometry: used to determine the molecular weights of substances and how they are broken down. NMR nuclear magnetic resonance spectroscopy. Ultraviolet Spectroscopy (UV): Used to determine the level of bonding in a system.

References:

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