

SYNTHESIS OF TERPOLYMERS BASED ON POLYPROPYLENE FUMARATE, ACRYLIC ACID AND DIMETHYLAMINOETHYLMETHACRYLATE

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Unsaturated polyesters are interesting for theoretical and practical studies, because along with the simplicity, cost-effectiveness of production, they contain unsaturated double bonds in their composition, which makes it possible to obtain on their basis polymers of a spatially cross-linked structure. A unique feature of unsaturated polyesters is the ability to copolymerize with various monomers to form valuable products.

At present, there is considerable interest in the synthesis and study of the properties of polymeric materials that are susceptible to changes in the properties of the external environment. A special place among this class of compounds is occupied by polyampholytic polyelectrolytes, which are bipolar molecules of a linear and 3D structure, in the macromolecules of which contain basic acid groups [1]. In this regard, it was interesting to study the terpolymerization of polypropyleneglycolfumarate with acrylic acid and dimethylaminoethylmethacrylate.

Polypropylene glycol fumarate is synthesized by the reaction of polycondensation of propylene glycol and fumaric acid. The compositions of polypropylene glycol fumarate were determined according to elemental analysis, IR spectroscopy. The structural formulas of polypropyleneglycolfumarate were established by NMR spectroscopy.

Polypropyleneglycol fumarates is reacted by radical terpolymerization with acrylic acid and dimethylaminoethyl methacrylate, which forms terpolymers with polyampholytic properties. The found constants for the copolymerization of binary systems are polypropylene glycol fumarate acrylic acid ($r_1=0.82$, $r_2=1.21$), polypropylene glycol fumarate dimethylaminoethyl methacrylate ($r_1=0.43$, $r_2=0.88$) and acrylic acid-dimethylaminoethylmethacrylate less reactivity and prone to heteropolymerization reactions. The calculation of the microstructure of terpolymers showed that, depending on the composition of the initial mixture, statistical polymers are formed, the macromolecules of which are covalently linked to each other. Based on the analysis of the surface structure, it was found that a sample of polypropylene glycol fumarate-acrylic acid-dimethylaminoethyl methacrylate (3.24: 36.64: 60.12 mol%) has a macroporous developed surface with an average pore size of 52 μm . Taken together, the data on the physicochemical properties of the synthesized ternary polymers demonstrate the possibility of their use as matrix-type polymer systems, separators of proteins, dyes, heterogeneous systems, etc.

References

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2. Burkeyev, M.Zh., & Tazhbayev, Ye.M., et al. (16.03.2016). Patent No. 31052 Kazakhstan. Sposob polucheniia nenasyshchennykh poliefirnykh smol na osnove propilenghlikolia, ftalevoho anhidrida i fumarovoi kisloty [Method for the preparation of unsaturated polyester resins based on propylene glycol, phthalic anhydride and fumaric acid] [in Russian].