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Stability of interpolyelectrolyte complexes of sulfonate-containing aromatic polyamides in aqueous solutions

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Abstract

Complexation in aqueous solutions of sulfonate-containing aromatic polyamides and a number of polyamines: polyethyleneimine, poly-*N*-(2-aminoethylacrylamide), poly(2-vinyl-2-imidazoline) and poly-*N,N*-dimethyl-*N,N*-diallylammonium chloride has been studied. It has been shown that as a result of macromolecular reactions, interpolyelectrolyte complexes are formed, stabilized mainly by electrostatic forces. It has been found that in the interpolymer system containing sulfonate-containing aromatic polyamide and poly-*N,N*-dimethyl-*N,N*-diallylammonium chloride, complexes of stoichiometric composition the fractional conversion about 0.9 are formed throughout the investigated pH range. Participation in the complexation reaction of polyethyleneimine, poly-*N*-(2-aminoethylacrylamide) and poly(2-vinyl-2-imidazoline) leads to the formation of interpolyelectrolyte complexes stable in neutral and acid environment, where the complexation tends to complete and the amount of salt bonds in the corresponding complex increases. It has been shown that the process of phase separation in the interpolymer systems containing weak polybase can be adjusted by varying their composition. In the case of complexes of non-stoichiometric composition enriched with polyanion, there is a shift of the pH range associated with phase separation systems in more interpolymer acidic region. Based on the studied interpolyelectrolyte complexes, materials with high strength characteristics were obtained. The tensile strength of the film samples is 65-84 MPa with a relative elongation of 20-65%. It has been shown that synthesized materials are characterized by high regulated hydrophilicity that, in combination with good mechanical properties, allows to consider them as promising for use in hydrophilic pervaporation processes.

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