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Copolymers of diallyldimethylammonium chloride and 2-(diallyl(methyl)ammonio)acetate: effect of composition and ionic strength on conformational properties

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Abstract

Copolymerization of diallyldimethylammonium chloride (DADMAC) with 2-(diallyl(methyl)ammonio)acetate (DAMA) was studied. A homologous series of random copolymers (poly(DADMAC-co-DAMA)) with the DADMAC:DAMA ratio equal to 3:7 was investigated by dynamic and static light scattering, viscometry, and flow birefringence in 0.1 M NaOH solutions with the addition of NaCl (up to 1 M). The Mark-Kuhn-Houwink equations were obtained. It was established that decrease in the concentration of low molecular weight salt leads to sharp increase in thermodynamic quality of solvents, and, therefore, in swelling of the macromolecules. Equilibrium rigidity of the studied copolymer was determined as 5 nm. Conformational behavior of poly(DADMAC) (polyelectrolyte), poly(DAMA) (polyzwitterion) and poly(DADMAC-co-DAMA) with the DADMAC:DAMA ratio equal to 3:7 was investigated in solutions at different ionic strength values. It was established that at NaCl concentrations below 0.1 M, copolymer exhibits properties typical of polyelectrolyte, and at higher NaCl concentrations it exhibits properties typical of polyzwitterion. Detailed consideration of contributions of optical effects of micro- and macroform to the observed flow birefringence in copolymer solutions allowed us to estimate optical characteristics of copolymer macromolecules. It was established that in salt-free aqueous so-

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