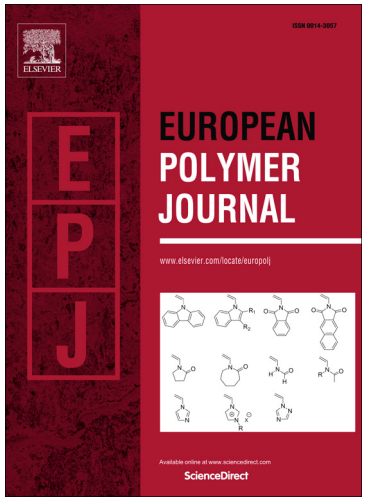
Accepted Manuscript



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

N.V. Tsvetkov, A.A. Lezov, P.S. Vlasov, A.A. Lezova, S.A. Samokhvalova, E.V. Lebedeva, G.E. Polushina

PII: S0014-3057(16)30819-9
DOI: http://dx.doi.org/10.1016/j.eurpolymj.2016.09.026
Reference: EPJ 7497

To appear in: *European Polymer Journal*

Received Date: 27 July 2016
Revised Date: 7 September 2016
Accepted Date: 13 September 2016

Please cite this article as: Tsvetkov, N.V., Lezov, A.A., Vlasov, P.S., Lezova, A.A., Samokhvalova, S.A., Lebedeva, E.V., Polushina, G.E., Copolymers of diallyldimethylammonium chloride and 2-(diallyl(methyl)ammonio)acetate: effect of composition and ionic strength on conformational properties, *European Polymer Journal* (2016), doi: http://dx.doi.org/10.1016/j.eurpolymj.2016.09.026

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

N.V. Tsvetkov[a,*], A.A. Lezov[a], P.S. Vlasov[a], A.A. Lezova[a], S.A. Samokhvalova[a], E.V. Lebedeva[a], G.E. Polushina[a]

[a] *St. Petersburg State University, 7/9 Universitetskaya nab., St. Petersburg 199034, Russia*

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-

*Corresponding author

Email address: n.tsvetkov@spbu.ru (N.V. Tsvetkov)