

The effects of charge densities on the associative properties of a pH-responsive hydrophobically modified sulfobetaine/sulfur dioxide terpolymer

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ABSTRACT

Sulfur dioxide, zwitterionic monomer, 3-(N,N-diallylammonio)propanesulfonate and a hydrophobic monomer N,N-diallyl-N-octadecylammonium chloride were cycloterpolymd. in DMSO using azobisisobutyronitrile (AIBN) as the initiator to afford water-insol. polysulfobetaines (PSB) in excellent yields. The PSBs were converted into the corresponding anionic polyelectrolyte (APE) by treatment with 1 equiv. of sodium hydroxide. Treating the pH-responsive PSB polymers with different equiv. of NaOH varied the zwitterionic and anionic charge densities in the polymer chain. The polymer chains with zwitterionic fraction greater than 0.5 were found to be insol. in water. The soln. properties of the APE and PSB/APE systems contg. varying amt. of the hydrophobic monomers in the range 0-10 mol% were investigated by viscometric techniques. It was found that PSB/APE polymer with a ratio of 33:67 for the zwitterionic and anionic fractions in the polymer chains, resp., gave the highest viscosity value. The polymer concn. (C^*_{HA}) of around 1 g/dL was required for the manifestation of significant hydrophobic assocns. The polymer solns. exhibited sharp increase in viscosity with increasing polymer concns. in salt (NaCl)-free as well as salt-added solns. The presence of sodium chloride is shown to enhance intermol. assocns. in polymers having hydrophobes in the lower mol% range, whereas, intramol. assocns. were manifested in polymers contg. higher proportions of the hydrophobes.