

Synthesis and solution properties of a new pH-responsive polymer containing amino propanesulfonic acid residues

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Abstract

The reaction of diallyl amine with 1,3-propane sultone led to the synthesis of the zwitterionic monomer 3-(*N,N*-diallylammonio)propanesulfonate. The sulfobetaine was cyclopolymerized in water in the presence of sodium chloride with *t*-butylhydroperoxide as an initiator to afford a polysulfobetaine (PSB) in very good yield. PSB, upon treatment with sodium hydroxide, was converted into an anionic polyelectrolyte (APE). Although APE was readily soluble in salt-free water, PSB needed the presence of low-molecular-weight salts (e.g., NaCl, KI, etc., in the range of 0.135-1.04 N) for its dissolution. The solution properties of PSB and APE were investigated with potentiometric and viscometric techniques. The basicity constant of the amine was apparent and followed the modified Henderson-Hasselbalch equation; as the degree of protonation (α) of the whole macromolecule increases, the protonation of the amine nitrogens becomes increasingly more difficult. The composition and phase diagram of the aqueous two-phase systems of APE/PSB and poly(ethylene glycol) were also explored. © 2002 Wiley Periodicals, Inc. *J Polym Sci Part A: Polym Chem* 41: 172-184, 2003

Keywords

phase diagrams • polyelectrolytes • polysulfobetaines • polyzwitterions • viscosity

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