

Synthesis of a new amino acid/sulfur dioxide copolymer and its use in aqueous two-phase polymer systems

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ABSTRACT

The amine salt N,N-diallyl-N-5-carbomethoxypentylammonium chloride was copolymerized with sulfur dioxide in DMSO with ammonium persulfate or 2,2'-azobisisobutyronitrile and afforded a cationic polyelectrolyte (CPE) with a five-membered cyclic structure on the polymeric backbone. The CPE, upon acidic hydrolysis of the pendent ester groups, gave a corresponding cationic acid salt (CAS) having the equiv. of chloride salt of 6-N,N-diallylammoniohexanoic acid as the monomeric unit. The CAS was converted into an anionic polyelectrolyte (APE) and a polybetaine (PB), having the monomeric unit equiv. of sodium 6-N,N-diallylaminohexanoate and 6-N,N-diallylammoniohexanoate, by treatment with 2 and 1 equiv of base, resp. The soln. properties of APE were investigated by potentiometric and viscometric techniques. The basicity const. of the amine functionality in APE was apparent and as such followed the modified Henderson-Hasselbalch equation; the protonation of the APE became more and more difficult as the degree of protonation of the whole macromol. increased. The compns. and phase diagrams of the aq. two-phase systems of APE and poly(ethylene glycol) were studied. The PB was found to be insol. in water, and this paves the way for the potential use of APE in aq. two-phase polymer systems for protein purifn. and its removal and recycling by conversion into PB.

