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

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Abstract

The amine salt, *N,N*-diallyl-*N*-carboethoxymethylammonium chloride was cyclopolymerized in water using ammonium persulfate as an initiator to afford a cationic polyelectrolyte which on acidic hydrolysis of the pendant ester groups gave the corresponding cationic acid salt (CAS). The CAS was converted into an anionic polyelectrolyte (APE) and polybetaine (PB). The solution properties of the APE having two basic functionalities were investigated in detail by potentiometric and viscometric techniques. Basicity constants of the amine as well as the carboxylate groups in APE are 'apparent' and as such follow the modified Henderson–Hasselbalch equation; as the degree of protonation (α) of the whole macromolecule increases, the protonation of the amine nitrogens and carboxylate groups becomes increasingly more difficult and easier, respectively. While the APE, PB and CAS were found to be soluble in salt-free water, the corresponding PB and CAS of the SO_2 copolymers of the amine salt 1 were found to be insoluble in water.

Keywords: Polyelectrolyte; Polybetaine; Poly(amine salt)