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Synthesis of methacrylate pendant polyelectrolyte as water-soluble multifunctional cross-linker

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ABSTRACT

A new cationic polyelectrolyte, constituting with quaternary poly(4-vinyl pyridine) (PVPy) backbone and methacrylate pendant groups was prepared by spontaneous polymerization methodology. Thus, action of 2-bromoethyl methacrylate (BEMA) on 4-vinyl pyridine resulted in spontaneous polymerization of vinyl pyridine monomer, without initiator, while methacrylate double bonds remaining unreacted. The resulting water-soluble polymer (QMEP); poly(2-methacryloyloxyethyl 4-vinyl pyridinium bromide) was demonstrated to undergo rapid gelation in concentrated aqueous solutions *via* self-crosslinking of the methacrylate pendant groups by radical polymerization (The abbreviation QMEP stands for quaternary methacrylate functional polymer). Crosslinking densities of QMEP hydrogels estimated by “Phantom Network Model” using equilibrium swelling values, revealed 62.5 % of the residual methacrylate double bonds. QMEP was also employed as multifunctional crosslinker for synthesis of highly swelling hydrogels derived from a set of monomers, such as acrylic acid, acrylamide, N-vinyl formamide and N-vinyl pyrrolidinone.

Key words: Cationic polyelectrolyte, Spontaneous Polymerization, Hydrogels, Crosslinking, Copolymerization.

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