

LCST type phase transition of acrylamide-derivative Linear and Crosslinked polymers in mixed solvents

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Switching the LCST(Lower critical solution temperature)s of thermo-sensitive linear and crosslinked polymer has been detected in the mixed solvent system. Three kinds of polymer are prepared by a precipitation polymerization, which are composed of poly(N-isopropylacrylamide)(PNIPAm), poly(N-vinylcaprolactam)(PNVCL), poly(N-diethylacrylamide)(PNDEAm). The prepared polymers exhibit similar LCST, adjacent to human body temperature, transition in pure water solution. However, with adding organic solvent(Dimethylformamide(DMF) and Dimethyl sulfoxide(DMSO)), LCST and volume phase transition temperature(VPTT) of linear and crosslinked polymers are varied considerably due to the characteristic of chemical group. We use a thermo optical analysis(TOA) and a photon correlation spectroscopy(PCS) technique to measure the switched LCSTs and VPTTs. A molecular thermodynamic framework, combined mixing and elastic contributions, is utilized to describe liquid liquid equilibria (LLE) and the thermosensitive swelling behavior of both type of polymer solutions.