

Title: Study of temperature-induced phase separation in copolymer solutions

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Abstract: The temperature-induced phase transition of poly(acrylamide/*N*-isopropylmethacrylamide) random copolymers in D<sub>2</sub>O solutions and in mixtures of D<sub>2</sub>O/ethanol and D<sub>2</sub>O/acetone is studied in this work. This phenomenon is on the molecular level analogous with a phase transition (collapse) in hydrogels. Nuclear magnetic resonance (NMR) spectroscopy was used for the study. Results showed that with increasing content of acrylamide in the copolymer the transition temperature is shifted to higher values, the transition is more gradual and smaller fraction of copolymer is phase separated. The same behaviour was found for higher content of ethanol or acetone in the solvent. If this content and the content of acrylamide is very high, the phase transition in dependence on the composition of solvent appears. The relaxation experiments showed that after the phase separation a part of solvent molecules remains bound to globular structures and its mobility is restricted.

Keywords: temperature induced phase separation, poly(acrylamide/*N*-isopropylmethacrylamide) random copolymers, nuclear magnetic resonance