

# INTERACTION BETWEEN SMALL ORGANIC ADDITIVES AND THERMOREVERSIBLE POLY(N-ISOPROPYLACRYLAMID)

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## **Abstract**

Thermoresponsive Poly(N-isopropylacrylamide) (PNIPAM), which shows a lower critical solution temperature (LCST) behaviour when dissolved in water, is a promising material in pharmaceuticals. Drug delivery systems as e.g. microgels of PNIPAM are of particular interest.

In this study the interaction of additives, as model substances for drugs, and linear PNIPAM homopolymer is investigated. A variation of simple aromatic compounds with similar structures is chosen as additives. Differential scanning calorimetry (DSC) is used to study the effect of the additive on the LCST. Here a distinct effect on the transition temperature is observed, which is depending on both the concentration and molecular structure of the probe molecule.

The effect of the transition on the molecular dynamics of the additives is investigated by means of liquid state  $^1\text{H-NMR}$ . For all molecules investigated, temperature-dependent NMR measurements show a partial incorporation of the probe molecules into PNIPAM globules above the LCST. By PFG-NMR measurements diffusivities of the probe molecules in polymer solutions are compared to those of pure probe molecule solutions. Relaxation rates of the probe molecules, which monitor their dynamics, turn out to be influenced by the polymer transition. However, this influence is following different rules depending on the molecular structure of the probe.