

ABSTRACT

The present master thesis deals with the study of the thermal and the dielectric behavior of PNIPAAm and the aqueous solutions of PNIPAAm. PNIPAAm is perhaps one of the most promising thermo-responsive polymers, mainly due to its transition temperature, which is close to the human body temperature.

The aim of the study was the investigation of the glass transition, the thermo-responsive-behavior and how the effect of the polymer's molar weight and the degree of which the addition of water to native samples affect them.

For this purpose, samples were prepared over a wide range of water content. The main experimental techniques employed were Differential Scanning Calorimetry (DSC) and Dielectric Relaxation Spectroscopy (DRS). Finally, measurements of Equilibrium Sorption Isotherm (ESI) took place at room temperature (RT).

Through the analysis of the DSC data, the dependence of the glass transition from the samples' hydration level. The thermo-responsive transition, the crystallization and melting were only observed for the aqueous solution of PNIPAAm.

For the dielectric study, Dielectric Relaxation Spectroscopy measurements were performed where an alternating electric field was applied to the samples. The dielectric function of the sample was measured, which gave us feedback on its relaxation mechanisms.

Finally, the E.S.I. measurements have shown that the hydration level [Hw(wt%)] of PNIPAAm, Mw=19300 g/mol is higher than the hydration level of PNIPAAm, Mw=6000 g/mol.