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RADIATION-INDUCED SYNTHESIS OF THERMOREVERSIBLE HYDROGELS AND THEIR CHARACTERIZATION BY DSC AND ¹H-NMR RELAXOMETRY

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"Intelligent" hydrogels capable of swelling or collapsing in water at low or high temperatures, respectively, were obtained by γ -ray polymerization of acryloyl-L-proline methyl ester (A-ProOMe) in the presence of a crosslinking agent and a hydrophilic or hydrophobic monomer. By cycling the temperature below and above the lower critical solution temperature (LCST) of the corresponding poly(A-ProOMe) homopolymer, the swelling-deswelling behaviour as well as the reversibility of the process were observed. Moreover, it was found that the kind and the amount of comonomer enabled the transition temperature to be easily shifted up and down.

By using the complementary techniques of DSC and ¹H-NMR relaxometry, an investigation on the nature of water in the samples differently swollen was carried out. According to the literature hypotheses, it was possible to distinguish non freezing or bound water from free water and establish that their relative amounts depend on the total water content in the hydrogels. From the curves of fusion of water of the samples at different degree of crosslinking, it was ascertained that with increasing of the latter the amount of freezing water decreases.

By means of ¹H-NMR relaxometry the spin-spin and spin-lattice relaxation curves were obtained. The observed populations of protons were identified with freezing and non freezing water as determined by DSC.