

Investigation of translational motion of poly(ethylene glycol) macromolecules in poly(methacrylic acid) hydrogels

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Abstract

The translational mobility of linear macromolecules of poly(ethylene glycol) (PEG) within a weakly cross-linked poly(methacrylic acid) (PMAA) hydrogel was investigated by means of the pulse field gradient (PFG) NMR method in order to reveal the effect of PMAA/PEG complex formation. It was found that inside the collapsed gel a fraction of the PEG molecules has self-diffusion characteristics like those of the network chains. This suggests the formation of an interpolymer complex, as a result of which some linear molecules acquired the dynamic properties of the network chains. Another fraction of the PEG macromolecules inside the collapsed gel enjoyed free diffusion, for they were not included in the complex with PMAA. In contrast, within the swollen gel (at concentrations of PEG higher than 5 wt.-%) the self-diffusion coefficient of all PEG molecules was independent of the diffusion time, which indicates an absence of the interpolymer complex (or at least that its lifetime is negligibly short). © Wiley-VCH Verlag GmbH, 1999.
