INFLUENCE OF WATER-SOLUBLE POLYMERS ON THE FORMATION OF MANGANESE(II) COMPLEXONATES IN SOLUTIONS. II. COMPLEXES WITH DTPA

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Abstract

The formation of manganese(II) complexes with diethylenetriaminepentaacetic acid (DTPA, H₅L) in the wide range of pH and reagents’ concentrations in water and aqueous solutions of a number of polymers (poly(diallyldimethylammonium chloride) (PDADMAC), polyvinylpyrrolidone (PVP), sodium polystyrenesulfonate (PSS), polyethyleneimine (PEI)) was studied using NMR-relaxation method. The addition of PDADMAC and PVP had little impact on the equilibrium of the [MnHL]₂⁻ complex formation and on the coefficients of relaxation efficiency (CRE(1,2)). The anionic polymer PSS competed in an acidic medium with the ligand for binding to the manganese ions. The addition of PEI in the pH range of 3–6 led to an increase in the spin-lattice relaxivity of the solutions of the complex as compared to aqueous solution. The observed effects were induced by an interaction of anionic [MnHL]₂⁻ and [MnL]₃³⁻ complexes with the protonated polyethyleneimine due to combination of electrostatic attraction and hydrogen bonding. The images of phantom samples based on manganese complexonates were obtained using medical MRI equipment.

Keywords: manganese(II), diethylenetriaminepentaacetic acid, water-soluble polymers, complex formation, NMR relaxation, MRI scans, contrasting.

References


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