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Magnetic Relaxation Probing of the State of Diheptyl Dithiophosphate Ions in Water and Aqueous Triton X-100 Solutions

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Abstract

The nuclear magnetic relaxation was used to study the state of diheptyl dithiophosphoric acid (D7DTP, L7) anions in water and aqueous solutions of the nonionic surfactant, Ttiton X-100, at 298 K in the presence of paramagnetic probes, Mn2+ ions. It was found that increase in the spin-lattice relaxation rate of water protons is caused by formation of simple and mixed (with surfactant) aggregates of D7DTP. Unlike the Mn2+-sodium dodecyl sulfate -Triton X-100 system, studied previously an influence of a probe concentration was found at surfactant concentration close to the CMC. It was suggested that two types of mixed species containing diheptyl dithiophosphate ions, Mn(II), and nonionic surfactant can be formed: micellar aggregates, {Mn(L7)2(TX)}, and polynuclear associates, [Mnx(L7)y(tx)z]. The associates likely contain surfactant in the form of monomers (tx).

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