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Complexation in surfactant solutions: III. complexation of Ni(II), Cu(II), Gd(III), and Fe(III) in mixed solutions of anionic and nonionic surfactants

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Abstract

Complexation of Ni(II), Cu(II), Gd(III), and Fe(III) with chelating agents [iminodiacetic (H₂IDA) and nitrilotriacetic acids (H₃N₃TA)] and salicylic acid (H₂Sal) in mixed solutions of anionic [sodium dodecyl (SDS) and tetradecyl sulfates (STS)] and nonionic surfactants [polyoxyethylene sorbitans Tween (Tw-20, Tw-40, Tw-60, and Tw-80) and Triton X100 (TX) polyoxyethylated adduct of octylphenol) is studied by the nuclear magnetic relaxation and spectrophotometry methods. Association of Cu²⁺, Ni²⁺, Gd³⁺, Fe³⁺, Na⁺, and H⁺ with mixed micelles is treated by computer simulation. It is demonstrated that chelating agents compete with mixed aggregates of surfactants in fixing multicharged metal ions. Salicylic acid forms mixed compounds with Fe(III), containing an alkyl sulfate and an oxyethylated adduct.
