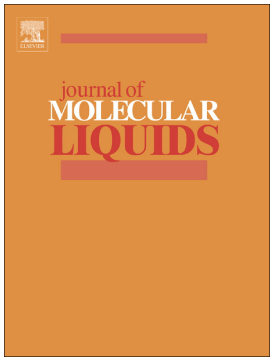

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Spectroscopic and conductometric study of interaction of anionic surfactants with $[Co(phen)_3]F_2.2H_2O$ complex

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ABSTRACT

A new complex $[Co(phen)_3]F_2.2H_2O$ has been synthesized and characterized by elemental analysis, FTIR studies, magnetic measurements, electronic absorption measurements and single crystal X-ray diffraction analysis. The crystals are triclinic in the *P-1* space group, with *a* = 11.9520(8), *b* = 12.8152(9), *c* = 15.1013(11)Å, *α* = 98.175(2)˚, β= 91.601(2)˚, γ = 114.8700(10)˚. The crystal structure displays O–H…F and O–H…O hydrogen-bond interactions. Solubilization of $[Co(phen)_3]F_2.2H_2O$ by anionic surfactants sodium dodecyl sulphate (SDS) and sodium stearate (SS), in aqueous solutions in the premicellar and micellar concentration ranges has been investigated by using UV-visible spectroscopy and electrical conductivity measurements. The equilibrium model was used to evaluate thermodynamic parameters of complex-surfactant interaction like standard entropy (ΔS_m), free energy (ΔG_m) and enthalpy (ΔH_m) of micelle formation. The disruption of structured water in the near environment of hydrophobic groups of surfactants is responsible for the increase in critical micelle concentration (CMC) with the rise in temperature. The negative value of ΔG_m and ΔH_m indicate that solubilisation of complex in micelles of both surfactants was spontaneous, in addition to enthalpy and entropy driven. UV/Visible spectroscopy uncovers the quantitative measure of interaction of complex with surfactant in terms of partition constant (K_x), binding coefficient (K_b), binding free energy (ΔG_b) and free energy of partition (ΔG_p). The results obtained suggested that the critical micelle concentration of both surfactants is increased due to the presence of complex in micellar