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Potentiometric and spectroscopic studies of sulfonamide azo-dye complexes with some transition metal ions and uranium

(2009) *Portugaliae Electrochimica Acta*, 27 (2), pp. 143-152.

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Abstract

Molecular structure of the azo-dye derived from sulfonamide was synthesized. The elucidation of ligand and complex structures were studied by electronic, infrared and ¹H NMR spectroscopies. Proton-ligand constants of sulphonamid azo-derivatives and the stability constant of Mo (III), VO (II), UO₂ (II) and Co (II) metal ions with sulfonamide azodye derivatives have been determined potentiometrically in 0.1 M KCl and 30% (v/v) ethanol-water mixture. The data are discussed in terms of the electronic character of the substituents and of the change in temperature. The pK₁-H values have been found to increase with increasing electron donating nature of the substituents. The evaluated dissociation processes are non spontaneous, endothermic and entropically unfavourable. The order of the stability constants of the formed complexes was found to be Mo³⁺>VO²⁺>UO₂²⁺>Co²⁺. The influence of substituents on the stability of the complexes was examined on the basis of an electron repelling property of the substituent. The effect of temperature on the stability of the formed complexes was studied and the corresponding thermodynamic parameters (ΔG , ΔH and ΔS) were evaluated and discussed. The stoichiometries of these complexes were determined conductometrically and indicated the formation of 1:1 and 1:2 (metal:ligand) complexes.

Author Keywords

Complexation and Thermodynamics; Conductometric; Potentiometric; Sulfonamide azo-dyes

ISSN: 08721904