

P7: Effect of systems buffer solutions and temperature on the formation of Co(II), Ni(II) and Fe(III) complexes in aqueous solutions

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Abstract:

In the last years, the formation of the complexes of the 4-(2-pyridylazo) resorcinol "PAR" with transitions metals has been extensively studied in various anhydrous and aqueous media.¹⁻² S. G. Nagarkar and M. C. Eshwar have realized a spectrophotometric determination of Zirconium (IV) with the 4-(2-Pyridylazo)-resorcinol in aqueous solution.³ Chiyo Matsubara and col used Ti(IV)-PAR complex for the determination of trace amounts of hydrogen peroxide and sulfite as food additive. Also, an extraction of Pd(II)-PAR complex into molten naphthalene at 90°C has been realized by Yanjie Dong and Ke Gai.⁴⁻⁵ A new ternary complex of V(V) with 4-(2-pyridylazo)-resorcinol (PAR) has been obtained by using an extraction-spectrophotometric method.⁶ H.Bendjeffal et al have studied the immobilization of Co(II)-PAR and Ni(II)-PAR on Algerian hydrothermal clay from aqueous solution.⁷

In the present work, we have studied the effect of temperature and buffer–water systems on the formation and the stability of complexes species of Co(II), Ni(II) and Fe(III) with the salt of 4-(2-pyridylazo)-resorcinol "PAR". The absorption spectra of the complexes of Co(II), Ni(II) and Fe(III) with the salt of 4-(2-pyridylazo)-resorcinol "PAR" in various buffer–water systems solutions {HPW (HCl/KCl/Water), ASW (H₃COOH/CH₃COONa/Water) and AAW (NH₄OH/NH₄Cl/Water)} have been investigated in the wavelength range 400–800 nm in the temperature interval from 20 to 90°C. The modification of the solution pH (1 to 9) caused a pronounced shift of the absorption maximum towards lower energies and a significant increase of absorption intensity, indicating a change in coordination geometry. The absorbance decreased with the augmentation of the temperature, and this was attributed to a distraction and/or a modification of complexes structures. The stability constant 'k', molar absorption coefficient 'ε', stoichiometry "n" and thermodynamics parameters (ΔG° , ΔH° and ΔS°) of the formation of these complexes have been determined.

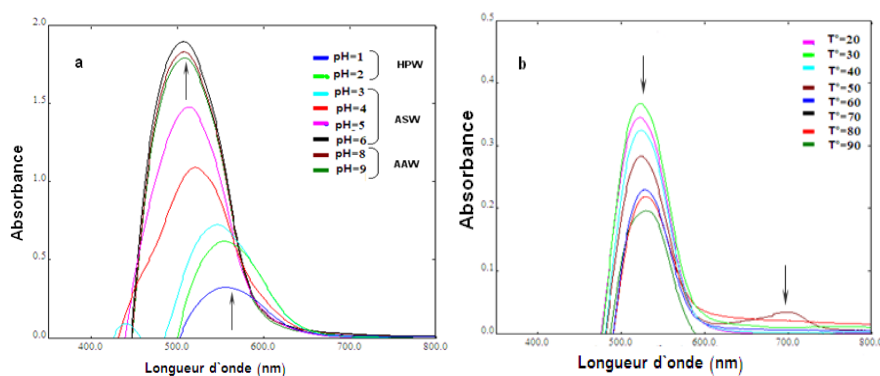


Fig 1 : Absorption spectra of Ni(II)-PAR

Références :

- 1) A. V. Rossi¹, M. Tubino¹ Ecl. Quím., São Paulo 2003, 28(1), 55-62.
- 2) P.-G. Su, S.-D. Huang, Analytica Chimica Acta 1998, 376, 305-311.
- 3) S.G. Nagarkar and M. C. Eshwar, Mikrochimica Acta [Wien] 1974, 797-800.
- 4) Chiyo Matsubara et al, Yakgaku Zasshi 1985, 105(6), 569-573.
- 5) Yanjie Dong and Ke Gai, Bull. Korean. Chem. Soc 2005, 26 (6), 943-946.
- 6) Kiril Gavazova, Vanya Lekova, Georgi Patrnov, Acta Chim. Slov 2006, 53, 506-511.
- 7) H. Bendjeffal, K. Guerfi, Y. Bouhedja, Physics Procedia 2009, 2, 889-897.