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Studies in Conditional Stability Constants and Confirmation of Complex of Cu (II), Cd (II) and Cr (III) with Substituted Thiocarbamidonaphthols Spectrophotometrically

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ABSTRACT

Present work deals with spectrophotometrically investigation of conditional stability constant and formation constant of metal-ligand complexes of ligands 5-phenyl thiocarbamido-1-naphthol and 5-p-chlorophenyl thiocarbamido-1-naphthol Cu(II), Cd(II) and Cr(III) metal ions with ethanol water systems at different proportions by Jobs method of continuous variation. Complex formation found to be 1:1. This work helps to study solvent –solvent, solute solvent and solute-solute-solvent interaction. This investigation also helps to understand drug effect and drug activity of newly synthesized drugs.

INTRODUCTION

Physical and chemical properties are varied due to complexation. Composition as well as conformation of complex formation can be measured from study of various physicochemical properties by spectrophotometric method. Spectrophotometric technique has a great significance in various sciences and this technique help to study of stability constant and complex formation in solution. Wagh[1] and Deshamukh[2] investigated log K value of chalcones pyridine carboxylic acids and hydroxyl ethyl benzene. Galhan *et al* [3] studied (E)-2-(mercapto-phenylaminoethylene)-3-oxo-N-p-tolylbutamide with some metal ion by spectrophotometrically. Boldescu *et al*[4] spectrophotometrically studied sangurine-b cyclodextrin complex formation. Spectrophotometrically determination of phenylprinehydrochloride and salbutamol sulphate drugs in pharmaceutical preparation using diazotized metacloprine hydrochloride was carried out by Al-Abachi and Abed[5]. Alsamarrai *et al*[6] investigated ephedrine-hydrochloride by spectrophotometrically. Saleha *et al*[7] investigated sulphsalazine antibiotics drugs. Investigation of ion complex formation of anti-hypertensive drug mehtyldopal was studied[8]. Meshram[9] studied complexation by interaction of Dy(III) with lincomycine and lyrodoxin in 70% ethanol-water medium. Spectrophotometric study of diflunisalfebuxostatemetaxalone, fexofenadine methyl ester and linezolide pharmaceutical dosages using tetracynoethelene was carried out by Shrinivas *et al*[10]. Valtierra –Alvardo *et al*[11] investigated formation equilibrium of Cu(II). Solvent effect on dissociation of ammonium and pyridiniumion was studied by Ohataki[12]. Investigation of effect of dielectric constant on Cu(II) –Complexes of phthalic acid in various percentage of dioxane -water mixture was carried by Palaskar[13]. Metal-ligand stability constant and confirmation of complexes formation of 5-phenylthiocarbamido-1-naphthol and 5-p-chlorophenyl -thiocarbamido-1-naphthol with Cu(II), Cd(II) and Cr(III) metal ions been investigated respectively by Spectrophotometric technique at 0.0001 M ionic strength. This work mainly base on Jobs method of continuous variation. This work associated to study of solvent effect, effect of ligands and their substituents as well as effect of metal ions during formation of complexes.

MATERIALS AND METHODS

Experimental

5-phenylthiocarbamido-1-naphthol and 5-p-chlorophenylthiocarbamido-1-naphthol has been synthesized in the laboratory by standard method.The nitrate salts of Copper Cadmium and

Chromium were used & their solutions were prepared in double distilled water. The solutions of potassium nitrate prepared (1M) & used for maintaining ionic strength. Absorption measured by UV Spectrophotometer model 106, (Systronic make) with ± 0.005 accuracy .

RESULTS AND DISCUSSION

Spectrophotometric Measurement

Job's Method

Job's method of continuous variation is reliable method for investigation of complex formation[14]. This method consists of equimolar solutions of metal and ligand varying proportion in such manner that total concentration of metal plus ligand is constant in resulting mixtures[15]. The compositions of metal ions solution (1 $x10^{-4}$M) and ligand (5x 10^{-4}M) were prepared in ten series. Ionic strength was maintained constant (0.1M) by adding an appropriate amount 0f 1M KNO_3 solution in 10 ml volume (λmax) was determined using one of the compositions at which there is maximum absorption. Absorption for all compositions were recorded at a constant wavelength i.e. (λmax). Absorption data and %composition of metal ion and ligand solutions at constant pH can be used to construct the curves. It was observed that 1:1 complex formation occurs in the pH range of 3 to 6. Each solution is diluted up to 15 ml and recorded absorption at same (λ max). Conditional stability constants of metal ligand complexes were calculated for all the systems using following expression.

$$K = \frac{X}{(a1-x)(b1-x)} = \frac{X}{(a2-x)(b2-x)}$$

K = Conditional stability constants of complex.

X = Concentration of complex.

a1 & a2 = Concentration of metal ions.

b1 & b2 = Concentration of ligand.

Table – 1: Determination of Conditional Stability of Metal Ligand Complexes

System	Conditional stability constant	Log K
Cu(II) + L2	1.8382×10^{-3}	0.26439×10^{-3}
Cd(II) +L2	2.3809×10^{-3}	0.37668×10^{-3}
Cr(III) +L2	4.4464×10^{-3}	0.64801×10^{-3}
Cu(II) + L3	5×10^{-3}	0.69897×10^{-3}
Cd(II) +L3	1.2010×10^{-3}	0.79540×10^{-3}
Cr(III) +L3	3.8610×10^{-3}	0.58669×10^{-3}

CONCLUSION

From Table 1 it was concluded that resultant values obtained in both techniques are fairly good. There is no appreciable change in log K values. This indicated simultaneously complex formations. Variation in Log K values observed due to direct interfere of dielectric constant, solvent-solvent interaction, solute-solvent interaction and solute-solute-solvent interaction. Table 1 reveals that Log K value of L_2 greater for Cr(III) than Cu(II) and Cd(II). Thus L_2 form more stable complex with Cr(III) than Cd(II) and Cu(II). While Log K value of L_3 greater for Cd(II) than Cu(II) and Cr(III). Thus L_3 form more stable complex with Cd(II) than Cu(III) and Cr(III). This type of investigation helps to study of drug activity and drug effect of newly synthesized drugs.

REFERENCES

1. S.P.Wagh, Ph.D. Thesis Amravati University; 2004.
2. C.N. Deshmukh, Ph.D. Thesis Amravati University; 2004.
3. A.A. Gahlam, A.Y. El-Sayed, M.A. MArouf and M.M.Taufij, Int. J. of advance Research; 2015; 3(1):630-642.
4. VeaceslavBoldescu, Irina Kacso, IoanBratub and Gheorghe Duca, Chemistry J. of Moldova, General industrial and ecological chemistry; 2008; 3(1): 85-88.
5. Mouyed Q, Al-Abachi and Sadeem S. Abed, Baghdad Science J.; 2015: 12(1).
6. KhalafF.,Alsamarrai, Sarmad B. Dikram, Mumin F. Alsamarrai, Int. J. of Sci., Technology and Management; 2015: 4(1): 1738-1746.
7. Magda M. S. Saleha, Elham Y. Hashem,Ahmed K. Youssef and Doaa A. Abdel-Kadir, World J. of pharmacy and pharmaceutical science; 2015: 4(5): 205-226.
8. TehminaFiaz, NasreenFatimal, S.ZafarAbbasZaidi,TanveerAbbasMohib R. Kazimi, American J. Analytical chemistry; 2016;6: 551-558.
9. Y.K. Meshram, Ph.D. thesis in chemistry Amravati University; 2000.

10. B. Shrinivas, P.Yadagoroswami and G.Venketeswarlu, Int. J. of PharmaSci and Research; 2015; 6(6):1002-1010.
11. M. A. Valtierra-Alvarado, M. Pamela Solano-Garcia, Maria del Refigio Gonzalez-Ponce, Jose J.N. Segoviano-Garfis, Int. J. of Scintific and research publication; 2015; 5(6):1-8.
12. H. Ohataki, Bull. Chemical Soc. Japan; 1969; 42:1573.
13. N.G.Palaskar , Ph.D. Thesis Maratvada University, Aurangabad; 1971.
14. M.M.Krunz and L. B. PFendth, Microchemistry Journal; 1983; 28:162.
15. P.B.Raghuvanshi, A.G. Doshi and M.L. Narwade, J. Ind. Chem. Society; 1996; 73: 21.