



STUDIES OF STABILITY CONSTANT OF 4-(4-BENZHYDRYLOXY-1-PIPERIDYL)-1-(4-TERT-BUTYLPHENYL) BUTAN-1-ONE WITH TRANSITION METAL IONS AT 303K.

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ABSTRACT

The interaction of transition metal ion with 4-(4-benzhydryloxy-1-piperidyl)-1-(4-tert-butylphenyl) butan-1-one drug have been investigated by pH metric titration at 0.1 M ionic strength at room temperature in 70 % Ethanol-Water mixture. The data obtained use to estimate the values of proton-ligand stability constant (P^k) and Metal - ligand stability constant ($\log K$). It is observed that lanthanide ion form 1:1, 1: 2 complexes with all the systems.

KEYWORDS: 4-(4-benzhydryloxy-1-piperidyl)-1-(4-tert-butylphenyl).

INTRODUCTION

The studies of metal-ligand complexes in solution of a number of metal ions with carboxylic acids, oximes, phenols etc. would be interesting which throw light on the mode of storage and transport of metal ion in the biological kingdom. In the earlier number of investigators shows the data base on metal complexes with substituted heterocyclic drugs was presented. Narwade et. al.^[1] studies the Formation and Stability constant of thorium (IV) complex with some substituted pyrazolines. Mathieu W.A. Steenland et.al.^[2] studies stability constant of Cu(II) and Ni(II) complexes of trans-dioxopentaaza macrocycles in aqueous solution by different technique. Hong-Wen Gao et.al.^[3] has studied the stability constant of Cu (II) and Co (II) complexes with CNBAC in water sample spectrophotometrically. Tuba Sismanoglu^[4] have studied the stability constant of binary complexes of Nicotinamide with Mn (II) by pH metrically. He also determines change in free energy, change in enthalpy and change in entropy from stability constant at different temperature. Tekade et.al.^[5] have been studied complex formation of Cu (II) and Co (II) metal ion complex with substituted isoxazolines. O.Yamauchi et.al.^[6] studied stability constant of metal complexes amino acids with charged side chain by pH-metrically. Hayati Sari et.al.^[7] studied the stability constant of glyoxime derivative and their Nickel, Copper, Cobalt and Zinc complexes potentiometric and theoretically. Talele^[8] et. al have been studied the stability constant of Schiff base metal complexes at ionic strength.

After review of literature survey the detail study of complex under identical set of experimental condition is

still lacking. It was thought of interest to study the chelating properties of drug under suitable condition with lanthanide by pH metrically.

Experimental

pH measurement were carried out with equip-tronic EQ-610 pH meter (accuracy ± 0.01 units) using combine glass electrode at room temperature. Metal ions solutions prepared in triply distill water and concentration estimated by standard method.^[9] The solution of drugs prepared in solvent. The pH metric reading in 70% Ethanol – water mixture were converted to $[H^+]$ value by applying the correction proposed by Van Uitert Haas.

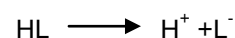
The overall ionic strength of solution was constant and calculated by the equation

$$\mu = 1/2 \sum C_i Z_i^2$$

The concentration of other ion in addition to Na^+ and ClO_4^- were also taken into consideration.

RESULT AND DISCUSSION

Substituted heterocyclic drugs may be ionized as acid having replaceable H^+ ion from -OH group. Therefore it is represented as HL i.e.



The titration data used to construct the curves between volume of NaOH and P^H . They are called acid-ligand titration curves.

It is observed from titration curves for all systems ligand start deviating from the free acid curves at P^H 2.5 and

deviating continuously up to $P^H = 11$. The deviation shows that dissociation of proton in drug.

The average number of proton associated with the ligand (n_A) was determined from free acid and acid – ligand titration curves employing the equation of Irving and Rossotti.^[10] The P^k values were determined from formation curves (n_A vs P^H) by noting the P^H at which $n_A = 0.5$. The accurate values of pK were calculated by point wise calculations which are presented in table -1.

Table 1: Determination of proton-ligand stability constant(pK) of 4-(4-benzhydryloxy-1-piperidyl)-1-(4-tert-butylphenyl) butan-1-one AT 0.1M ionic strength.

System	Constant pK	
	Half integral	Point wise calculation
Ligand-1	6.42	6.396. $\pm$ 0.05

Table 2: Determination of metal –ligand stability constant ($\log K$) of transition metal ions with some 4-(4-benzhydryloxy-1-piperidyl)-1-(4-tert-butylphenyl) butan-1-one at 0.1M ionic strength.

Ligand	System	$\log k_1$	$\log k_2$	$\log k_2 - \log k_1$	$\log k_2 / \log k_1$
Ligand	Cu (II)	3.65	5.45	1.80	1.4932
	Zn (II)	3.85	5.50	1.65	1.4286
	Ni (II)	3.55	5.60	2.05	1.5775
	Mg (II)	3.65	4.75	1.10	1.3014
	Fe (II)	4.75	5.45	0.70	1.1474

The result shows the ratio of $\log k_1 / \log k_2$ is positive in all cases. This implies that there is little or no steric hindrance to the addition of secondary ligand molecule. The smaller difference may be due to trans structure.

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METAL -LIGAND STABILITY CONSTANT ($\log k$)

Metal-ligand stability constant of transition metal chelate with some 4-(4-benzhydryloxy-1-piperidyl)-1-(4-tert-butylphenyl) butan-1-one drug were determined by employing Bjerrum calvin P^H metric titration method as adopted by Irving and Rossotti. The formation of complexes between transition metal ions with drug were indicated by the significant separation starting from $pH = 2.5$ for all systems.

The change of colour from colourless to faint yellow colour complex form.