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STUDIES OF STABILITY CONSTANT OF 2-(THIAZOL-4'-YL)-*1H*-BENZIMIDAZOLE-1-ACETIC ACID WITH TRANSION METAL IONS IN % ETHYL ALCOHOL AT 303.15K.

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ABSTRACT

The interaction of transion metal ion with 2-(Thiazol-4'-yl)-*1H*-benzimidazole-1-acetic acid have been investigated by pH metric titration at 0.1 M ionic strength at 303.15k 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 (logK). It is observed that lanthanide ion form 1:1, 1: 2 complexes with all the systems.

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 f metal ion in the biological kingdom.

In the earlier papers extensive 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 Gaoet.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. AH Naggar et al studied the stability constant of binary and ternary complexes of sulphamethoxazole and glycine with metal ions by potentiometry and conductometry.[8]

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 substituted heterocyclic compound under suitable condition with lanthanide by pH metrically.

MATERIAL AND METHOD

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 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% ethyl alcohol – 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,

$$C_i Z_i^2$$

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.

$$HL \longrightarrow H^+ + L^-$$

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 substituted drugs.
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 $_V{}^s$ 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 Some Substituted Heterocyclic Drugs at 0.1m Ionic Strerngth.

System	Constant pK	
	Half integral	Point wise calculation
Ligand	6.45	6.495. ± 0.05

Metal -Ligand Stability Constant (Log K)
Metal-ligand stability constant of transition metal ions chelate with some substituted heterocyclic compound were determined by employing Bjerrum calvin P^H metric titration method as adopted by Irving and Rossotti. The formation of chelate between transition metal ions with some substituted heterocyclic compound were indicated by the significant separation starting from pH =2.5 for transition metal ions with ligand. The change of colour from colourless to faint yellow to orange colour complex form.

Table 2: Determination of Metal - Ligand Stability Constant (Logk) of Yb(Iii), Pr(Iii) And Ce(Iii) With Some Substituted Heterocyclic Drugs At 0.1m Ionic Strerngth.

System	Metal ion	$Logk_1$	$Logk_2$	$Logk_1$ - $Logk_2$	$Logk_1$ / $Logk_2$
Ligand	Fe(II)	4.70	5.45	0.75	1.1596
	Cu(II)	4.95	5.50	0.55	1.1111
	Co(II)	4.85	5.60	0.75	0.9573
	Ni(II)	4.55	5.75	1.20	1.2637
	Zn(II)	5.30	5.95	0.65	1.1226

The result shows the ratio of $Logk_2$ /$Logk_1$ 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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