



## Studies of Stability constant of domperidone with transition metal ions in mixed solvent at 303K.

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### Abstract:-

The interaction of transition metal ion with domperidone drug have been investigated by pH metric titration at 0.1 M ionic strength at room temperature in 50 % dioxane-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 transition metal ions form 1:1, 1:2 complexes with all the systems.

**Key word:** - Stability constant, transition metal.

### Introduction: -

It is used as an antiemetic, gastroprokinetic agent, and galactagogue. 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 papers extensive data base on metal complexes with substituted heterocyclic drugs was presented.

Narwade et.al.<sup>1</sup> studies the Formation and Stability constant of thorium (IV) complex with some substituted pyrazolines. Mathieu W.A. Steenland et.al.<sup>2</sup> 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.<sup>3</sup> has studied the stability constant of Cu (II) and Co (II) complexes with CNBAC in water sample spectrophotometrically. Tuba Sismanoglu<sup>4</sup> 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.<sup>5</sup> have been studied complex formation of Cu (II) and Co (II) metal ion complex with substituted isoxazolines. O.Yamauchi et.al.<sup>6</sup> studied stability constant of metal complexes amino acids with charged side chain by pH-metrically. Hayati Sari et.al.<sup>7</sup> studied the stability constant of glyoxime derivative and their Nickel, Copper, Cobalt and Zinc complexes potentiometric and theoretically.

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 drug under suitable condition with lanthanide by pH metrically.



### Material and Method:-

pH measurement were carried out with equip-tronic EQ-610 pH meter (accuracy  $\pm 0.01$  units) using combine glass electrode at room temperature. Metal nitrate prepared in triply distill water and concentration estimated by standard method.<sup>8</sup> The solution of drugs prepared in solvent. The pH metric reading in 50% 1,4 dioxane - 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

$$I = \frac{1}{2} \sum C_i Z_i^2$$

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  $P^H = 12$ . 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<sup>9</sup>. The  $P^k$  values were determined from formation curves ( $n_A \text{ vs } P^H$ ) by noting the  $P^H$  at which  $n_A = 0.5$ . The accurate values of  $p_k$  were calculated by point wise calculations which are presented in table -1.

**Table-1** - DETERMINATION OF PROTON-LIGAND STABILITY CONSTANT ( $pK$ ) OF DRUG AT 0.1M IONIC STRENGTH.

System	Constant $pK$	
	Half integral	Point wise calculation
Ligand	7.45	$7.275 \pm 0.05$

### METAL -LIGAND STABILITY CONSTANT (Log k):-

Metal-ligand stability constant of transition metal chelate with substituted heterocyclic drug were determined by employing Bjerrum calvin  $P^H$  metric titration method as adopted by Irving and Rossotti. The formation of chelate between metal ions with some substituted heterocyclic drug was indicated by the significant separation starting from  $pH = 2.5$  for all system.



**Table-2 - DETERMINATION OF METAL - LIGAND STABILITY CONSTANT (logK) OF TRANSITION METAL IONS WITH DRUG AT 0.1M IONIC STRENGTH.**

System	Metal ion	Logk <sub>1</sub>	Logk <sub>2</sub>	Logk <sub>1</sub> - Logk <sub>2</sub>	Logk <sub>1</sub> / Logk <sub>2</sub>
Ligand 1	Cu(II)	3.65	6.45	2.80	1.7671
	Zn(II)	4.95	6.50	1.55	1.3131
	Ni(II)	4.85	6.60	1.75	1.3608
	Mg(II)	4.55	5.75	1.20	1.2637
	Fe(II)	5.30	6.75	1.45	1.2736

The result shows the ratio of Logk<sub>1</sub> / Logk<sub>2</sub> 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.

**References: -**

1. M. L. Narwade, V.S. Jamode, and S.K. Gudadhe, Stability constant of Co(II), Ni(II) and Cu(II) chelate with some substituted Pyrazolines, *Acta. Ciencia Indica*, **XIc** : 234 (1985)
2. Mathieu W.A. steenland, Use dirack Gerrit G. turnan, Bart Devreese, Werner Lippens, Jozef Van Beeuman and Andre M. Goeminne, Potentiometric and spectrophotometric study of Cu(II) and Ni(II) complexes of trans -dioxopentaaza macrocycles in aqueous solution, *J.Chem.Soc. Dalton trans.*: 3637-3647(1997)
3. Hong Wen Gao and Jian-Fu-Zhao, Stability constant of Co(II) and Cu(II) complexes with CNBAC and selective determination of Cu(II) by completion coordination, *Croatica Chemica Acta*, CCACAA, Vol. **76(1)** : 1-6(2003)
4. Tuba sismanoglu, Thermodynamic of stability constant of binary complex of Nicotinamide with Mn (II), *Chinese Chemical Letters*, Vol. **14 No. 11** : 1207-1210(2003).
5. P.V. Tekade, K. N. Patil, M.L. Narwade, P.S. Bodake, Y.K. Meshram, Complex formation of Co (II) and Cu (II) metal ion complexes with substitutes isoxazolines. *Asian J. Chem.* **18** (2006) 2657.
6. O. Yamauchi and A. Odani, Stability constant of metal complexes of amino acids with charged side chain, *Pure and Applied chemistry*, Vol.68No.2:469-496(1996).
7. Hayati Sari, Muzaffer Can and Mustafa macit, Potentiometric and theoretical studies of stability constant of glyoxime derivative and their Nickel, Copper, Cobalt and Zinc complexes, *Acta Chim Slov.* Vol.**52** : 317-322(2005)
8. A.I. Vogel, Longmans Green *A Text Book of Quantitative Inorganic Analysis*, London (1975) 589.
9. H.S. Irving and H.S. Rossotti, *J. Chem. Society*: 2904-2913 (1954).