



# "Studies In Conditional Stability Constants and Confirmation of Complex Formation of Pr(III), Nd(III) & Gd(III) Complexes with Dibromo Chalcone Spectrophotometrically"

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**Abstract:** Spectrophotometric Investigation of Pr(III),Nd(III) & Gd(III) complexes with 1,3-Thiazines,Schiff's Bases & Dibromo Chalcone ligands (L1,L2 & L3) showed 1:1 & 1:2 complex formation between pH range of 2.90 to 6.00.The formation of complexes has been studied by Isobestic Point method & Job's variation method at 0.1M ionic strength and at 27oC spectrophotometrically. The conditional stability constants are determined for 1:1 complexes at about pH = 3.00.

**Keywords :-** Metal Ions(Pr(III), Nd(III) & Gd(III)), substituted Pyrazoles,1,4-dioxane (Solvent)etc.

## I. INTRODUCTION

In view of analytical applications and antibiotic drugs, one of the drugs Dibromo Chalcones which acts as a ligand and is selected in the present investigation.

- The metal chelates of hydrazo-dimedone dyes are-
- Studied by Atefetal conditional stability constants of transition metal ions with some amino acid peptides have been studied by S.N. Dawale & Narwade<sup>2</sup>.
- Sunita and Gupta<sup>3</sup> have worked on spectrophotometric determination of cyanide in biological complex using a new reagent.
- Narwade et al<sup>4</sup> have studied Fe(III) complexes with some substituted Chalcones Spectrophotometrically.
- Raghuwanshi et al<sup>5</sup> have shown 1:1 & 1:2 complex formations of Cu(II),Ni(II) and Co(II) with some substituted chalcones & Isoxazolines Potentiometrically.
- Meshram et al<sup>6-8</sup> have investigates metal ligand stability constants of transition metal ions complexes with some substituted Isoxazolines by Spectrophotometric & Potentiometric techniques.
- A caustical properties of peptides have been studied in 20% methanol-water mixture by sondawale et al<sup>9</sup>.
- The study of the conditional stability constants of transition metal ion complexes with substituted Dibromo Chalcones been undertaken to study the complex formation & their confirmation. The present work been carried out by using Isobestic Point method & Job's method.

## II. EXPERIMENTAL

Schiff's bases and Dibromo Chalcones has been synthesized in the laboratory by standard method. The nitrate salts of Pr,Nd & Gd (BDH) & Potassium Nitrate (BDH) were used & their solutions were prepared in double distilled water (0.01M). The solutions of potassium nitrate was prepared (1M) & used for maintaining ionic strength constants. Absorption are measured by using UV-visible spectrophotometric model-106 (systronics).

## III. RESULTS & DISCUSSION

Spectrophotometric Measurement :-

a) Isobestic Point Method :-

Vareille's method of isobestic point was used to study the confirmation of complex formation between Pr(III),Nd(III) & G(III) with Dibromo Chalcones

The absorption spectra were measured for solution containing metal ion (10 x 10<sup>-4</sup>M) & ligand (50 x 10<sup>-4</sup>M),identical in all respect except pH were obtained. The colour of solution was light yellow below pH 2.50 and light pink above pH 6. The pH of solution was measured by digital pH meter. The data of absorption & wavelength in nm for all the pH solutions were used to construct the curves.

The curves are plotted between wavelength in nm and optical density for Gd(III) L3 systems. As wavelength Varies differences shows for different pH for Gd(III)L3 Systems as given in following Table.

Table

Wave length	System-Gd(III)-L <sub>3</sub>				
	Optical Density				
	pH=3.5	pH=4.5	pH=5.5	pH=6.5	pH=7.5
350	0.140	0.150	0.190	0.255	0.310
400	0.250	0.260	0.310	0.380	0.465
450	0.420	0.420	0.450	0.515	0.490
490	0.540	0.540	0.540	0.540	0.540
500	0.555	0.545	0.480	0.450	0.420
550	0.668	0.630	0.570	0.495	0.355
600	0.750	0.730	0.680	0.610	0.550

It is observed that number of curves are intersecting through isobestic point at 490 for Gd(III) L3 respectively. For above systems the intersecting points shown by dark lines called as Isobestic point. It shows from above table that 1:1 and 1:2 complex formation occurs for given systems.

b) Job's Method :-

Job's variation method was used to know the nature of complexes. Thermo compositions of metal ions solution ( $1 \times 10^{-3}M$ ) & ligand ( $20 \times 10^{-2}M$ ) were prepared in ten series. Ionic strength was maintained constant (0.1M) by adding an appropriate amount of 1M  $KNO_3$  solution in 10 ml volume ( $\lambda_{max}$ ) was determined using one of the compositions at which there is maximum absorption. The absorption for all the compositions were recorded at a constant wave length ( $\lambda_{max}$ ). The data of absorption & %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 2 to 4 & 1:2 complex formation in the pH range of 4 to 5. Each solution is diluted up to 15 ml and recorded absorption at same ( $\lambda_{max}$ ). Conditional stability constants of metal ligand complexes were calculated for all the systems using following expression

$$K = \frac{X}{(a_1 - x)(b_1 - x)} = \frac{X}{(a_2 - x)(b_2 - x)}$$

K = Conditional stability constants of complex.

X = Concentration of complex

$a_1$  &  $a_2$  = Concentration of metal ions

$b_1$  &  $b_2$  = Concentration of ligand.

Conditional stability constants of metal ligand complexes were calculated & presented in Table.

Table Determination of conditional stability of metal ligand complexes

System	Concentration Complex mole <sup>-1</sup>	Conditional Stability Constant (K)
Pr(III)L <sub>3</sub>	$0.1047 \times 10^{-2}$	$3.9431 \times 10^{-2}$
Pr(III)L <sub>4</sub>	$0.1725 \times 10^{-2}$	$0.7968 \times 10^{-2}$
Pr(III)L <sub>5</sub>	$0.1051 \times 10^{-2}$	$3.9165 \times 10^{-2}$
Nd(III)L <sub>4</sub>	$0.0047 \times 10^{-2}$	$0.1053 \times 10^{-2}$
Nd(III)L <sub>5</sub>	$0.1925 \times 10^{-2}$	$0.3270 \times 10^{-2}$
Gd(III)L <sub>3</sub>	$0.1545 \times 10^{-2}$	$0.4750 \times 10^{-2}$
Gd(III)L <sub>5</sub>	$0.1380 \times 10^{-2}$	$0.6516 \times 10^{-2}$

#### IV. CONCLUSION

The conditional stability constants are found to be slightly greater than real stability constants. Therefore it is confirmed from both method that there is simultaneous formation of 1:1 and 1:2 complexes takes place.

#### REFERENCES

- [1] M.A. Ramekar and M.M. Chincholkar, J. Indian Chem.Soc.71.199 (1994).]
- [2] H.S.Patel and N.P.Patel Orient J. Chem.,13,69 (1997).]
- [3] H.I.E1-Subbagh,A.H.Abadi,i.E.Al- Khawad, K.A.A1- Rashood, Arch, Pharm, 332,19 (1999).]
- [4] A.W.Raut and A.G. Doshi,Orient J.Chem,11,205 (1995).]
- [5] D.N. Shelke and D.V. Jahagirdar, J, Indian Chem., Soc.53,613,(1976).]
- [6] M.L. Narwade and P.D. Sawalakhe J.Indian Chem., Soc.70,201,(1993).]
- [7] P.R. Rajput, Ph.D. Thesis, Amravati University (1993).]
- [8] M.S. Deshmukh Ph.D Thesis, Amravati University (1996).]
- [9] A.K. Banerjee and T.V.R.K. rao J. Indian Chem.,Soc.63,480,(1986).]

