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DETERMINATION OF STABILITY CONSTANTS OF METAL–LIGAND COMPLEXES SPECTROPHOTOMETRICALLY

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ABSTRACT

: Present work highlight the investigation of conditional stability constant and formation constant of metal-ligand complexes of ligands i.e 2-Hydroxy naphthalene phenyl-N-(3-chloro 4-fluoro) chalconeimine [CFB] and ligands 2-Hydroxy naphthalene 4-dimethyl aniline -N-(3-chloro 4- fluro) chalconeimine [CFN] with Co II metal ion with dioxane-water systems at different proportions by Isobestic Method of continuous variation. The measurement of absorbance was done by spectrophotometer. The stiochiometry of complex formation found to be 1:1and 1:2.This investigation helps to understand drug effect and drug activity of newly synthesized drugs.

Keywords: *Isobestic method , chalconeimine.*

I. 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 measurments of stability constant and confirmation of complex formation in solution Rowland and Meloan[1] investigated cinnamohydroxamic acid chelates spectrophotometrically and reported the composition and the molar extinction coefficients of these chelates. Syed Ahmad Tirmizi, et al [2] have studied The formation of copper(II) complex with famotidine at an absorption maximum of 638 nm at different temperatures spectrophotometrically. p^H-Metric and spectrophotometric studies of rare earth metal complexes with Ramipril studied by Sonar et al.[3] Pawar and Sonar et al[4] also studied spectrophotometric and p^H-metric studies of Ce(III), Dy(III), Gd(III), Yb(III) and Pr(III) metal complexes with Rifampicin. . Nilesh G. Limbachiya1 and [5]have studied the stability constant of 2'-hydroxy-4'-methoxychalcone oxime [HMCO] spectrophotometrically by using Job's method. Raghuwanshi et al[6] have also studied the confirmation of complex formation by Isobestic and Job's method between Cu(II) and substituted isoxazolines spectrophotometrically.

Manimekalai et al[7] have determined the metal-ligand stability constants and composition of 3(2-furanyl)-2-propanehydroxamic acid chelates by Job's method of continuous variation in 30 % ethanol water medium. Narwade et al[8] have investigated the metal-ligand stability constants of UO_2(II) and Cu(II) complexes with some substituted sulphonic acid. investigated sulphsalazine antibiotics drugs. Investigation of ion complex formation of antihypertensive drug mehtyldopal was studied [9]

II. MATERIAL AND METHOD

The halosubstituted chalconeiminein were synthesized by using general method of amination of chalcone . pure and analytical grade solvent and extrapure double distilled water is used for analysis.

In the present study, the equimolar (0.01 M) solutions of metal Co (II), was Prepared in distilled water and ligand (L1 and L2) in dioxane. The measurements for optical density were made at after adjusting the appropriate pH (2 to 3) and appropriate wavelength at 0.1M ionic strength and 30 ± 0.10C. The p^H of each solution was maintained by using the buffer solution. Then each solution was diluted by adding 2 ml of solvent (dioxane) and again optical

densities were measured. Vereille's Isobestic[10] point method was used to study the complex formation, for the systems as Co (II)-L1and Co (II)-L2 at different pH.

III. RESULTS AND DISCUSSION

When the ligand solution are mixed with the metal ions solution then it was observed that the color of solutions was light yellow bellow 2.6 pH and light pink above 6.0 pH for Cu (II)-L1 and Cu (II)-L2 systems. This indicates the complex formation between metal ion and ligand species. To prevent the oxidation of the ligand at higher p^H during spectrophotometric measurements, the optical density measured immediately after the preparation of the solution. The absorption data obtained from table no 1and 2 are used to plot the curves. The curves plotted between wavelength (nm) and optical density (O.D.). From figure 1and 2, the numbers of absorption curves are intersecting at a point (Isobestic point) at 520 nm and 600 nm respectively. This indicates the formation of 1:1 and 1:2 complexes.

Table No-01 Isobestic method System : CFB (L_1)

	P^H					
Sr.No	wavelength(λ) nm	PH=3	pH=4	PH=5	pH=6	PH=7
1	400	0.093	0.096	0.093	0.094	0.092
2	420	0.122	0.123	0.165	0.195	0.298
3	440	0.212	0.168	0.256	0.308	0.366
4	460	0.255	0.209	0.315	0.365	0.382
5	480	0.31	0.248	0.346	0.384	0.395
6	500	0.353	0.332	0.369	0.396	0.4
7	520	0.387	0.386	0.392	0.397	0.405
8	540	0.432	0.448	0.405	0.403	0.405
9	560	0.464	0.489	0.437	0.411	0.415
10	580	0.498	0.521	0.471	0.428	0.423
11	600	0.521	0.532	0.513	0.515	0.435
12	620	0.553	0.527	0.615	0.563	0.475
13	640	0.576	0.536	0.717	0.686	0.681

Table No-02 Isobestic method System : CFN (L_2)

	P^H					
Sr.No	wavelength(λ) nm	PH=3	pH=4	PH=5	pH=6	PH=7
1	400	0.123	0.124	0.133	0.135	0.122
2	420	0.126	0.133	0.178	0.195	0.289
3	440	0.245	0.188	0.252	0.318	0.376
4	460	0.274	0.219	0.329	0.368	0.399
5	480	0.312	0.272	0.379	0.394	0.409
6	500	0.353	0.323	0.389	0.396	0.414
7	520	0.394	0.396	0.401	0.407	0.406
8	540	0.429	0.466	0.405	0.41	0.408
9	560	0.484	0.526	0.416	0.441	0.405

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10	580	0.518	0.558	0.425	0.466	0.403
11	600	0.549	0.569	0.449	0.485	0.415
12	620	0.572	0.582	0.507	0.529	0.464
13	640	0.586	0.593	0.614	0.656	0.693
14	660	0.598	0.635	0.657	0.678	0.798

ISOBESTIC POINT METHOD

Plots of wavelength (nm) Vs optical density (O.D.)

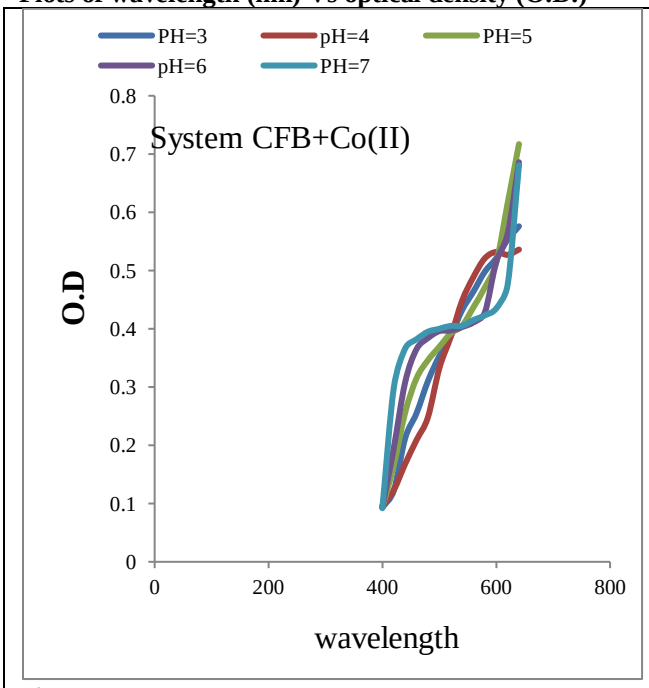

Figure 1

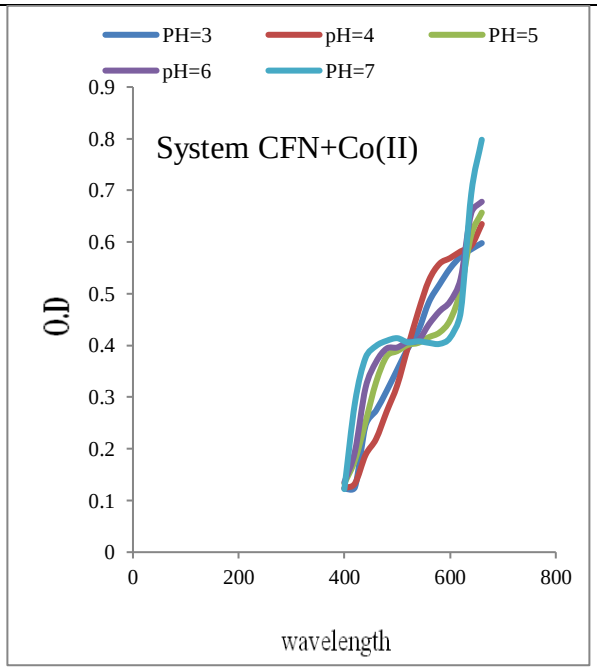

Figure 2

IV. CONCLUSION

On the basis of the above discussion it may be concluded that the figure 1and 2showed that the formation of 1:1 and 1:2 complexes because the numbers of absorption curves are intersecting at a point (Isobestic point) at 520 nm and 600 for L_1 520 nm and 620 for L_2 and nm respectively.

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