# Spectrophotometric Iteraction of Eu (III) Metal with substituted Quinoxalie chalcone by Isobestic point method.

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**Abstract**

Isobestic point method was given by Vereilles to study the complex formation between metal and ligand. The observation curves for solution containig metal nitrate $10^{-3}$M. and ligand $10^{-3}$M. idetical I all respect except pH were obtain in DMSO solvant. The colour of solution was light yellow bellow pH 2.5 and pink above pH 6.0 this indicates that the compex formation between metal and ligand. To prevent oxidation of ligand at higher pH during spectrophotometric measurement the spectra were taken immediately after the preparation of solution.

**Keywords**

Spectrophotometer, DMSO.

## Introduction

The basic principle of spectrophotometric technique is the measurement of interaction between radiation energy and electrons of substances. It is the analytical technique used for estimating concentration of metal ion in liquid solution. It is most powerful method for investigation of solution equilibria. Spectrophotometry is differ than pH metric method because it is limited to pH range 2.0 to 11.0 where as spectrophotometric method are not limited.

Substituted Quinoxaline derivatives have been very popular for their biological activity such as antimicrobial[1], Antifungal[2], antitubercular[3-4], anti-inflamatory[5], antiviral[6], antidibetic[7], antihelminthic[8]. So it gained a lot of interest to used such type of compound as ligand with different metal atoms and study their interaction of several metal atoms with organic molecules. M. A. Kassem[9] and et. al. reported a spectrophotometric determination of four fiuroquinolones in pharmaceuticals through ion pair complex formation. Monica A. Valtierra-Alvarado[10] determine a complex formation equilibria of copper(III) metformine and halides in methanol. Abdullah Al-Bablr[11] and co workers reported spectrophotometric determination of Trimipramine in Tablet Dosage from via charge transfer complex formation. L. E. Vidal Salgado[12] and et al determine pka Isobestic point and equation of absorbance vs. pH for a universal pH indicator. Rita K. Hessiey[13] and et al reported a spectrophotometric study of complex formation between cobalt (III) and trans -1, 2- cyclohexanedinitrilotetra acetic acid (CyDTA)[1].

The above literature clearly indicates that metal complexes shows compex formation between metal and ligand.

## Experimental

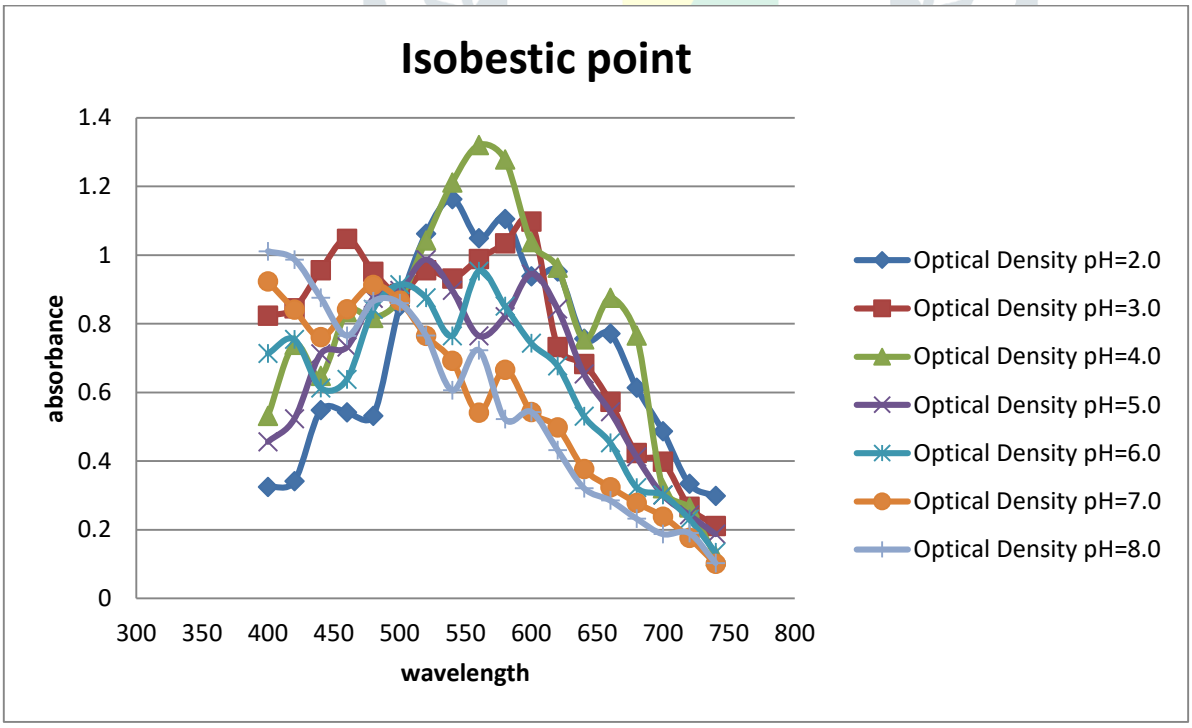
All chemicals used were of AR and LR grade. Ligand (E) -1-(4((3-Chloro-2,3-dihydroquanoxaline-2-yl) amino)phenyl)-3-(4-nitrophenyl)prop-2-en-1-one. Prepared by microwave irradiation method. Absorbance of liquid solution and their metal complexes have been measured by spectrophotometer (Systronic spectrophotometer 106) having spectral range 106 to 1100 nm. The equimolar solution of metal nitrate and

ligand are prepared in DMSO solvent thus ratio of metal : ligand is 1:50. The pH of the solution should be in the range of 2.0 to 9.0 increment of 1.0 pH. The adjustment of pH be done by addition of few drops of HCl or NaOH and record the absorbance of each solution in the range of 400 to 700 nanometer.

## Observation table:

| Wavelenth ƛ | Optical Density | | | | | | |
|---|---|---|---|---|---|---|---|
| | pH=2.0 | pH=3.0 | pH=4.0 | pH=5.0 | pH=6.0 | pH=7.0 | pH=8.0 |
| 400 | 0.325 | 0.823 | 0.532 | 0.456 | 0.713 | 0.923 | 1.011 |
| 420 | 0.341 | 0.845 | 0.739 | 0.523 | 0.754 | 0.841 | 0.987 |
| 440 | 0.548 | 0.956 | 0.648 | 0.712 | 0.613 | 0.761 | 0.876 |
| 460 | 0.542 | 1.047 | 0.834 | 0.732 | 0.638 | 0.842 | 0.765 |
| 480 | 0.532 | 0.951 | 0.817 | 0.874 | 0.842 | 0.913 | 0.865 |
| 500 | 0.851 | 0.887 | 0.871 | 0.897 | 0.914 | 0.867 | 0.86 |
| 520 | 1.062 | 0.956 | 1.043 | 0.987 | 0.876 | 0.765 | 0.766 |
| 540 | 1.163 | 0.932 | 1.211 | 0.897 | 0.765 | 0.692 | 0.606 |
| 560 | 1.049 | 0.988 | 1.32 | 0.765 | 0.953 | 0.541 | 0.723 |
| 580 | 1.105 | 1.034 | 1.278 | 0.821 | 0.851 | 0.666 | 0.522 |
| 600 | 0.938 | 1.098 | 1.038 | 0.945 | 0.743 | 0.543 | 0.543 |
| 620 | 0.952 | 0.732 | 0.963 | 0.843 | 0.677 | 0.498 | 0.432 |
| 640 | 0.756 | 0.683 | 0.754 | 0.654 | 0.531 | 0.377 | 0.321 |
| 660 | 0.771 | 0.573 | 0.876 | 0.544 | 0.453 | 0.324 | 0.285 |
| 680 | 0.614 | 0.423 | 0.766 | 0.412 | 0.323 | 0.278 | 0.232 |
| 700 | 0.487 | 0.398 | 0.321 | 0.301 | 0.301 | 0.238 | 0.187 |
| 720 | 0.334 | 0.267 | 0.265 | 0.243 | 0.231 | 0.176 | 0.19 |
| 740 | 0.298 | 0.211 | 0.122 | 0.187 | 0.134 | 0.101 | 0.103 |

## Result and conclusion:



Method of Isobestic point will be carried out for conformation of complexes by Vareilles modified by Vosburges and Gold. Few metal ions forms more than two complexes with which given ligand and composition of complexes change with change in pH higher complexes are form at higher pH if solution containing ligand almost 50-40 time more concentrated than the metal ion that prepared and their pH are adjusted to cover the entire range of complexions.

The knowledge of Isobestic point can be used to calculate the stability constant of complexe. It complex and stability constant for all systems is calculated by using following expression.

$$PL = -\log [L]$$

$$PL = -\log \frac{\frac{[H^+]}{K_1} + \frac{[H^+]}{K_1 K_2}}{TL^0 - \overline{n}\, T^0 m}$$

Where $[H^+]$ = hydrogen ion concentration.

$K_1$ $K_2$ =first and second dissociation of ligand.

$TL^0$ = Concentration of ligand.

$T^0m$ =Concentration of metal.

$\overline{n}$ = Metal ligand formation no.

The values of stability constant in both methods are found as follows

| System | Spectrophotometry log K | pHmetry log K |
|---|---|---|
| Eu (III) | 4.00 | 3.70 |
| La (III) | 5.23 | 4.70 |
| Ce (III) | 5.30 | 4.11 |

## Conclution:

It could be conclude that the agreement between values obtained by both technique is fairly good there is no appreciable change in the log k values.

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