

Ph Metric Study Of Substituted Derivative With La(III) Ce(III) And Eu(III) Metal Ions At 0.1 Molar Ionic Strength.

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Abstract-: the interaction of La(III), Ce(III) and Eu(III) with substituted quinoxaline derivative have been studied at 0.1 molar ionic in ethanol solvent. It is observed that La(III), Ce(III) and Eu(III) forms 1:1 complex with substituted quinoxaline derivative. Results obtained are for pK and $\log K$ values are used to see the of substituent which has been studied Ph metrically.

Key words-: pH meter, Ethanol.

Date of Submission: 12-11-2018

Date of acceptance: 26-11-2018

I. Introduction

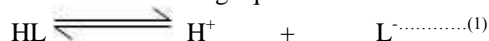
Substituted derivative of quinoxaline shows many biological activities like antifungal, antimicrobial, antitumor, anti-inflammatory, antihelminthic, anti HIV, antialergic, antibacterial. Literature review tells us considerable work has been done on biological activity of such molecule. Coordination chemistry plays a vital role in biological activities. Lanthanide has a property to interact with biomolecules and form a metal complex¹⁻². which is useful to remove unwanted toxins from living beings. The knowledge of stability constant is useful for correct interpretation of complex. This coordination chemistry is applicable for Agricultural, organometalic, biological and pharmaceutical science. Many workers reported the effect of transition metal on stability of complexes Ph metrically.³⁻⁵ Naciya Turkel⁶ and et al reported a complex formation of Nickel(II) and Copper(II) with barbituric acid. M. P. Wadekar⁷ reported determination of stability constant of substituted thiopyrimidine drug. U. A. Pathare⁸ and et al focus on interaction between metal ion and novel chalcones at 0.1 molar ionic strength. Anjali S. Rajbhoj⁹ and co workers study of vitamine E and D complex with transition metal in aceto nitrile water medium.

II. Experimental work

The ligand was synthesized by microwave irradiation method in laboratory. The pH metric titration was carried out with EQ-614-pH meter equipment. AR, and LR grade chemicals are used. The stock solution of ligand were prepared by dissolving require amount of ligand in ethanol solvent. The solution involved in the pH metric titration are

- 1) Perchloric acid ($1 \times 10^{-2}m$) free
- 2) Perchloric acid ($1 \times 10^{-2}m$) free + Ligand ($20 \times 10^{-4}m$).
- 3) Perchloric acid ($1 \times 10^{-2}m$). free + Ligand ($20 \times 10^{-4}m$).+ Metal ion solution ($4 \times 10^{-4}m$)

The readings were recorded for 0.2 ml addition. The graf were plotted between volume of alkali (NaOH) and pH. Ligand involve in this titration is consider as monobasic having only one dissociable H^+ ion and it can be represented as HL. The dissociating equilibrium can be shown as



By the law of mass action we have.....

$$K = [HL]/([H^+][L^-]) \dots\dots\dots(2)$$

III. Result and Discussion

Determination of proton ligand stability constant. (\bar{n}_A) The plot between volume of NaOH and pH of the solution were used to determine proton ligand stability constant. The horizontal difference between titration

curve ($V_2 - V_1$) was measured accurately. It was used to calculate the formation number (\bar{n}_A) of various pH and fixed ionic strength $\mu=0.1$ using Irving and Rossotti's equation.

$$\bar{n}_A = Y - \left\{ \frac{(V_2 - V_1)(N + E^0)}{(V^0 + V_1)T_L^0} \right\} \quad \text{.....(3)}$$

- Where V_0 = initial volume of solution.
- E^0 = initial concentration of free acid.
- T_L^0 = initial concentration of ligand.
- V_1 and V_2 = volume of alkali of normality N .
- Y = replaceable proton from the ligand.

The proton ligand stability constant pK values of ligand were calculated by algebraic method, pointwise calculation and also estimated from formation curve \bar{n}_A vs pH (half integral method) by noting pH at which $\bar{n}_A = 0.5$. shown in table (1)

Table (1) Proton ligand stability constant (pK)

Ligand	pK (half integral method)	pK (pointwise calculation method)
Ligand (L_1)	7.89	8.12

Metal ligand stability constant ($\log k$) were determined by half integral by plotting \bar{n}_A vs pH. The experimental \bar{n}_A values were determined using expression (4).

$$\bar{n}_A = \frac{(V_3 - V_2)(N + E^0)}{(V^0 + V_2) T_M^0} \quad \text{.....(4)}$$

Where N , E_0 , V_0 , and V_2 have same significance as in equation (1) V_3 is the volume of NaOH added in the metal ion titration to attain the given pH reading T_M^0 is the concentration of metal ion in reaction mixture. The stepwise formation constant of La (III), Ce (III) and Eu(III) with ligand in ethanol were determined. The values of $\log k_1$ and $\log k_2$ were calculated from the formation curves \bar{n}_A vs pH using half integral method. The results were calculated by pointwise calculation method shown in table (2).

Table (2) Metal- 1-Ligand stability constant.

System	$\log k_1$	$\log k_2$	$\log k_1 - \log k_2$	$\log k_1 / \log k_2$
$L1 + La(III)$	4.70	3.45	1.25	1.36
$L1 + Ce(III)$	4.11	3.11	1.00	1.32
$L1 + Eu(III)$	3.92	3.05	0.87	1.28

IV. Conclusion

The titration curve shows that departure between (A+L) curve and (A+L+M) curves for all systems started from pH = 2.5. This tells us the complex formation with colour change in the pH range 2.5 to 12 during titration indicates the complex formation between metal and ligand.

In case of quinoxaline derivative (L_1) the difference in the $\log k_1$ and $\log k_2$ values is higher for La(III) than other two metals. This indicates that La forms more stable complex with quinoxaline derivative. The stability order of complex is as follows $La(III) > Ce(III) > Eu(III)$.

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Dr. Y.K. Meshram "Ph Metric Study Of Substituted Derivative With La(III) Ce(III) And Eu(III) Metal Ions At 0.1 Molar Ionic Strength." International Journal of Engineering Science Invention (IJESI), vol. 07, no. 11, 2018, pp 45-46