IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 2, December 2022
Impact Factor: 6.252

Determination of Stability Constant of Flurosubstituted Chlconemines for its Medicinal Efficiency

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Abstract: *The good activity of drug is depending upon its stability constant i.e. proton ligand stability constant and metal ligand stability constant. If the stability constant is fairly very good then it should use as a good and effective medicine .In content to this in present work the proton ligand stability constant and metal ligand stability constant of fluro substituted chalconeimines L5 = 2-Hydroxy naphthalene 4-dimethyl aniline 4- fluro chalconeimine [FN] are studied with highly reactive transition metal like (Cu (II), Co(II),Cr(II) and Fe(III)). The 70% dioxane water solvent system used in the present investigation. The presence of –OH group confirmed by using of 0.1 M ionic strength. The transition metal (Cu (II),Co (II),Cr(II)and Fe(III)) used and the ligand form 1:1 and 1:2 complex with all values of log k1 and log k2 positive.*

Keywords: Stability Constant, Chalconeimine, Fluro Substitution, Transition metal ion

I. INTRODUCTION

The formation of complex in the liquid state i. e in solution this formation constant help measure the strength of the interaction between the transition metal and active ligand that form complex.As the proton ligand stability constant is an important physicochemical property which play very important role in the field of coordination chemistry for the study of stability of metal complexes. Basically the term stability show that at specific condition how much time we can store it [1]. P.P Chadhari, P. R.Yawale et al. have determine the stability constant of complex of transition metal ion like Fe(III), Mn(II),and Cr(III) with substituted 2-oxo-2H-chromene-3-carbohydrazide derivatives at temperature 42ºCby using the Bjerrum-Calvin titration technique as modified by Irving and Rossotti and they observed that simultaneous complex formation is take place.[2] The stability constant of Atenolol with the copper metal binary and ternary complex by using potentiometric technique at 25 degree temperature in water ethanol solvent system was studied by Amani S. Alturiqi1 , et.al [3] There investigation indicate that the more negative value of log k was due to presence of bulkier group which forming the steric hindrance, The antioxidant activity of ecofriendly synthesized chalconeimine were studied by R.Asaithambi[4] Prithvirajbalu et al.[5] have design the substituted chalconeimine which act as a alpha amylase inhibitor the biological potency was investigated through in vitro which indicate the very significant inhibitor activity the structure was confirmed by using the spectroscopic terms like IR, 1H and ^{13}C-NMR. Hansaraj U. Joshi [6] have studies the stability constant of of seven Schiff bases with trivalent rare earth metal ion Lanthanum using a pH metric titration technique in 80% (v/v) ethanol-water mixture at three different temperatures 298K, 308K & 318K at an ionic strength of 0.1M. Physico – chemical study of Transition metal complexes with Schiff's base at temperature 298 K.was studied by Raman Jee Jha[7]. Mithun Rudrapal and Mullapudi sowmya [8] have synthesized some new chalconeimines and screen for the antioxidant and antibacterial activity by using the reference Gallic acid the standered drug and with ciprofloxacine Patil et.al[9] have synthesized and screen the chalconeimines agained the bacteria and fungus ,and it shows moderate activity. Pradip V. Tekade et.al [10] have determine the stability constant of substituted dihydropyrimidine with transition metal like Ni (II),Cu (II),Co(II) and observe that there is stepwise formation of complex as the ratio of log$K$1/log$K$2 is positive. In present investigation the stability constant of monoprotic ligand i.e Floro substituted chalconeimes 2-Hydroxy naphthalene 4-dimethyl aniline 4- fluro chalconeimine [FN] were determined with few metals of transition series.

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II. MATERIAL AND METHODS

The halosubstituted chalconeimine are synthesized by amination of chalcone with substituted amines (chloro,and fluro substituted) by this chalcone are synthesized by using general claisen Schmidt method . For evaluating the stability constant the very pure and analytical grade solvent and extra pure double distilled water is used. The densities of pure solvent and solutions are determined by using specific gravity bottle.

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 is

1) Perchloric acid (1× 10-2m) free
2) Perchloric acid (1× 10-2m) free + Ligand (20×10-4m).
3) Perchloric acid (1× 10-2m) free + Ligand (20×10-4m).+ Metal ion solution(4×10-4m)

The titration was carried out in 70% dioxane-water mixture

The readings were recorded for 0.1 ml addition. The graph 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

HL H+ + L-…… (1)

By the law of mass action we have……

K= [HL]/ ([H+][L-])……(2)

P^H- metric studies pH-metric titrations were performed between rare earth (III) metal ions and biprotic ligands at constant ionic strength maintained by $NaClO_4$ (μ=0.01, 0.05 and 0.1 mol/L). Titrations were performed with the under mentioned solutions (Table 1) using carbonate free 0.01 mol/L standard NaOH solution, which was prepared by Gran method [11] Calculation of dissociation constant Irving and Rossoti [12,13] modified the method proposed by Bjerrum. They reported an alternative method to calculate dissociation constants of acidic ligands and formation function for metal-ligand chelates from direct pH meter readings obtained during a titration. Equations (1), (2) were employed to evaluate dissociation constant of biprotic ligand

The plots between volumes of NaOH and pH of the solutions were used to determine the proton ligand formation numbers (representing the replacement of H^+ from functional group of ligand with respect to pH value) and evaluate the proton-ligand stability constants of the ligands. The horizontal difference ($V_2 - V_1$) was measured accurately between the titration curves of acids and acids + ligands. It was used to calculate the formation proton ligand formation number $\bar{n}_A$ at various pH values and fixed ionic strength μ = 0.1 M using Irving and Rossetti's equation.

$$\bar{n}_A = \gamma - \frac{(V_2 - V_1)\,(N + E^0)}{(V^0 + V_1)(T_L^0)} \qquad \ldots\ldots\ldots (2)$$

Where V^o is the initial volume of the solution, E^0, T_L^0 are the total concentrations of the mineral acid and ligand respectively. V_1 and V_2 are the volumes of alkali of a normality N during the acid and ligand titration at a given pH, γ is the number of replaceable proton from the ligand.

The metal-ligand formation number ($\bar{n}$) is estimated by Irving-Rossotti's equation.

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

$$\log\left[\frac{\bar{n}}{1-\bar{n}}\right] = \log K_1 - pL$$

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III. RESULT AND DISCUSSION

The stability constant for the ligands with different transition metal ions are given below

Sr. No	System	Logk1 LogK2	Half integral method	Point wise calculation Method
1	FN-Cu(II)	Logk1 LogK2	3.7824 0.1693	3.8918 0.3627
2	FN-Co(II)	Logk1 LogK2	3.6738 2.1086	3.8830 2.1960
3	FN-Fe(III)	Logk1 LogK2	4.3120 1.7859	4.6090 1.8613
4	FN-Cr (II)	Logk1 LogK2	3.6848 1.6784	3.7617 1.6821

For ligand FN with different transition metal ions follow the order

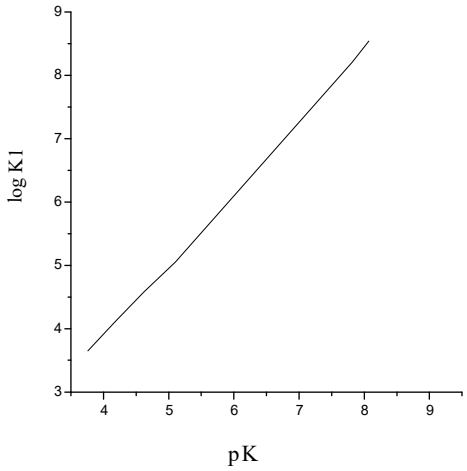
Fe(III) > Cu(II) > Cr(II)> Co(II)

IV. CONCLUSION

- The difference between log K_1 and log K_2 values is smaller, indicate the simultaneously complex formation.
- The difference between log K_1 and log K_2 values is greater, indicate the formation of stepwise complex formation.
- The difference between log K_1 and log K_2 values greater than 2.5 indicating 1:1 and 1:2 complex formation.

So the compound under investigation for stability constant indicates that there is simultaneous and stepwise formation of complex with metal ion take place, from result data it is also clear that the metal complexes formation is depend upon the ability of metal and ligand interaction

The pattern of curve was shown below which is observe by plotting the log k1 /logk2 vs pK which shows the straight line graph this conclude that log value is directly proportional to increase in value in pk



V. ACKNOWLEDGMENT

The Author is thankful to department of chemistry, RDIK and NY KD College Bandera for providing the necessary research

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