



Unique Research Journal of Chemistry

Available online: www.ujconline.net

Research Article

STUDY OF TERNARY COMPLEXES OF Sr (II)

Durrani Ayesha^{1*}, Dengle Shalini² & Nishat Parveen³

¹Dr. Rafiq Zakaria College for Women, Aurangabad, India

²Vivekanand College, Aurangabad, India

³Sir Sayyad College, Aurangabad, India

Received: 24-01-2015; Revised: 22-02-2015; Accepted: 20-03-2015

*Corresponding Author: Ayesha Durrani

Dr. Rafiq Zakaria College for Women, Aurangabad, India

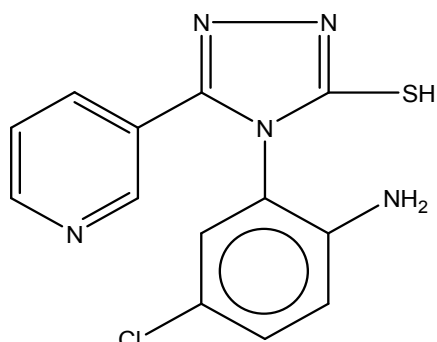
ABSTRACT

Present investigation deals with the study of the ternary complexes of Strontium (II) with heterocyclic compound and amino acid i.e. Hippuric acid and Glycine in aqueous solution using pH-metric titration technique at $25 \pm 0.5^{\circ}\text{C}$ temperature and at an ionic strength of 0.1 M NaClO₄. As pH-metric study used for the simultaneous equilibrium of transition metal using Irving-Rossotti method.

Keywords: pH-metric, Simultaneous equilibrium, Irving-Rossotti method, Ionic Strength and Aqueous Solution

INTRODUCTION

Triazole is an heterocyclic compound. Now a days heterocyclic compound promote the formation of life on earth. Heterocyclic compound¹ contains nitrogen, oxygen and sulphur as hetero atom in the ring system showing the chemotherapeutic and other medicinal uses. Triazoles nucleus is associated with different pharmacological activities such as antimicrobial, antibacterial, antiviral, antifungal effect² and their medicinal values.



Substituted 1, 2, 4-triazole

Mol. Formula C₁₃H₉N₄SCl

Melting Point 88°C

Mol. Weight 270°C

Metal complexes with such types of drugs are found to more effective. The stability of the metal complexes with medicinal

drugs plays a major role in the biological and chemical activity. Isonazide is a antibacterial drug used primarily as a tuberculostatic³.

Hippuric acid and Glycine are the acids and it have -NH₂ and -COOH as a donor atoms are important for biological as well as analytical reactions⁴.

The stability of ternary complexes has been correlated with the Ligands and metal ions. The work of co-ordination chemistry was first begins in the 20th Century. It was related to stepwise formation of complexes⁵.

EXPERIMENTAL

All the chemicals used for pH-metric titrations were of sd-fine chemical ltd. The metal nitrate used for are Sr(NO₃)₂. Similarly Hippuric acid, Sodium hydroxide, perchloric acid are also from sd-fine chemicals. The solutions were prepared in double distilled water and standardized.

RESULTS AND DISCUSSION

The present study deals with pH-metric titration of metal nitrate with Ligands such as 1,2,4-substituted triazole and hippuric acid in 1:1 binary system and 1:1:1 Sr(II) ligand system. This study has great importance in co-ordination chemistry. So many factors are their which play an important role in the formation of complexes such as basicity of ligand, charge, size, ratio etc⁶.

The pH-metric titrations were carried out keeping 1:1:1 metal ligand ratio. The stability constant of mixed ligand complexes were determined by Irving and Rossotti techniques⁷.

Table 1: Proton Ligand Stability Constant

1,2,4-substituted Triazole			Hippuric acid			Glycine			1,2,4-substituted Triazole			Hippuric acid		
pH	$\bar{\eta}_A$	pK ₁	pH	$\bar{\eta}_A$	pK ₁	pH	$\bar{\eta}_A$	pK ₁	pH	$\bar{\eta}_A$	pK ₂	pH	$\bar{\eta}_A$	pK ₂
5.62	0.70	11.10	4.72	0.61	4.90	10.20	0.66	10.9	9.00	1.63	8.83	8.32	1.60	8.56
5.64	0.65	11.04	4.74	0.58	4.88	10.22	0.63	10.88	9.20	1.50	8.82	8.34	1.59	8.54
5.66	0.59	10.97	4.76	0.55	4.83	10.24	0.56	10.86	9.22	1.0	8.87	8.36	1.55	8.50
5.68	0.55	10.85	4.78	0.52	4.79	10.26	0.53	10.84	9.24	1.03	8.89	8.38	1.55	8.50
6.00	0.54	10.35	5.0	0.51	4.75	10.28	0.50	10.86	9.26	1.08	8.90	9.0	1.53	8.52
6.2	0.51	10.91	5.2	0.49	5.10	11.0	0.48	10.87	9.28	1.23	8.92	9.20	1.50	8.53
6.4	0.50	10.89	5.4	0.48	5.12	11.2	0.46	10.91	10.0	1.29	8.94	9.22	1.48	8.55
6.6	0.48	10.87	5.6	0.46	5.20	-	-	-	10.20	1.40	-	-	-	-

Table 2: Point-wise Calculations of Protonation Constant

Ligands	Half-integral method		Point-wise method	
	pK ₁	pK ₂	pK ₁	pK ₂
Glycine	4.06	-	5.16	-
Hippuric acid	10.09	8.60	09.99	8.35
1,2,4-substituted triazole	10.80	7.96	10.31	8.10

For the present investigation the glycine is used as primary ligand and Hippuric acid and 1,2,4-substituted tirazole as secondary Ligands. During last five decades there has been

tremendous upsurge of interest on the study of stabilities and reactivities of mixed ligand complexes⁸⁻¹⁰.

Stability constant of Mixed-Ligand Complexes

Metal ion	Mixed-Ligand System	log K _{MXY}	$\Delta \log k$
Sr (II)	Glycine + Hippuric acid	4.96	1.68
	Glycine + 1,2,4-substituted triazole	7.21	3.06

The mixed-ligand complexation of Sr (II) with Glycine-Hippuric acid triazole in the ratio of 1:1:1. The results are shown in the above table. The chelates formed in simultaneous equilibrium by taking M:X:Y in the ratio of 1:1:1. For the ternary system $\Delta \log k$ values are positive which shows the complex formation.

The results obtained are analysed by computer programme and the stability constant values are calculated. The ligand titration curves have lower pH-values and acid titration curves¹¹.

The values of $\bar{\eta}_A$ obtained was 0.5 – 1.5 and 1:1 complexes. The Deviation of A + L curve from A + L + M curves indicate formation of complexes.

CONCLUSION

The study of Sr(II) complexes with 1,2,4-Triazole, Glycine and Hippuric acid as described the complex formation equilibria. The effect of ligand properties on the stability of the complexes was investigated. The Ligands and complexes are of great interest in biological activity.

REFERENCES

- Virendra Parmar and et.al, Studies on array of bioactive heterocyclic compounds as a new pharmacophores, ISCB, 2007; 18.
- Narwade S and Karale BK, Synthesis of some biologically important triazole and thiazoles by ultrasound in radiations techniques, ISCB, 2007; 127.
- Thakur SV, Farooqui M, Naikwade SD, Potentiometric study on complexes of Isoniazide Drug with some alkaline earth metal ion in Mixed solvent media, Proceeding of National Conference on upcoming trends in chemical sciences, 2013.
- Sigel A and Sigel H, Marcel-Dekker, Metal ions in biological systems, NY, 1971; 97: 1-34.
- Rob. Janes and Elaine Moore, Metal ligand bonding, published by royal Society of Chemistry-2004,.
- Sangita Sharma, Vora JJ and Joshi JD, Synthesis, Spectroscopic studies and antimicrobial activities of Eu(III), Dy (III) and Tm (III) Heterochelates with 2,2-Bipyridylamine, J. Indian Councio. Chemists, 1997; 12: 55.
- Irving H and Rossotti HS, J. Chem. Soci, (3397), 1953, (2904), 1954.
- Ayesha Durrani, A study of stability constant of coordination compounds, International J. of Chemical Studies, 2014; 1: 5.
- Mohamoud Hassan Moustafa, Studies on the binary and ternary complexes of Hg(II) with Gellcic acid and adrenaline, Ass. Univ. Bull. Environ. Res. 2010; 13(2): 77-90.
- Ayesha Durrani, A solution study of complex formation, Asian J. Research Chem, 2012; 5: 72.
- Nasreen Fatima, Zahida TM, Study of formation constants of Vanadium (III)-Catecholate complexes, J. Saudi. Chem. Soci, 2005; 99(3): 519-525.

Source of support: Nil, Conflict of interest: None Declared