ABSTRACT

Metal ions play a major role in a number of biochemical reactions, analytical chemistry and in catalysis. In biological systems metal ions also play an important role in replication, transcriptions and translation reactions. Metal ions and most of the ligands do not exist in free and isolated form in biological systems, but do not exist mostly in the form of multi-ligand and multi-metal ion equilibria with mixed ligand complexes. Many of ligands are likely to complete for metal ions such as Cu, Co, Zn, Fe, Ca, Mg, K etc. in biological fluids resulting in mixed ligand chelation.

Mixed ligand complexes where a metal ion coordinates with two or more different ligands are predominantly formed. Hence, quantitative study of mixed ligand complexes, especially ternary complexes, is being extensively investigated. Ternary complexes also provide models for the metal mediated reactions in case where the metal ion acts as bridge between two ligands and catalyse their reaction by low energy pathway involving an unimolecular reaction.

β-diketones are versatile synthons used in synthetic organic chemistry. They are also good chelating agents and form stable metal ligand complexes. They are found to be associated with various biological activities. It has been reported that the biological activity of β-diketones enhances in coordination with transition metal ions.

The complexing properties of β-diketones with various metals has resulted in formation of various complexes. Transition metal complexes of β-diketones with various metals has resulted in formation of various complexes. Transition metal
complexes of β -diketones and amino acids have been studied thoroughly by many as a part of their research work. A special emphasis has been laid on study of complexes involving biomolecules for the last few decades.

Taking into considerations all these aspects studies on transition metal complexes of β -diketones and substituted amino acids in solutions have been reported from our laboratory. As a part of metal ligand interactions efforts are made to concentrate on the stability factors of the binary and ternary complexes. Also, the factors those are responsible for the stabilization of these complexes in solutions are given due attention.

Present study is in continuation with research work on the stability of binary and ternary complexes of various Schiff bases, wherein it was planned to synthesize new analogues of β -diketones and to study their chelating properties towards different metal ions.

Thus present research work was carried out with following objectives:

1. Preparation and characterization of β -diketones
2. Study of coordination behaviour of β -diketones towards transition metal ions.
3. Study mixed ligand complexes of transition metals with these ligands as primary and some other biological ligands as a secondary in solution.
4. Biological activities of ligands and the effect of substituents in the ligand on the behaviour of complexes.
The present work entitled “EQUILIBRIUM STUDY OF MIXED LIGAND COMPLEXES OF TRANSITION METALS WITH β-DIKETONES AND AMINO ACIDS” is presented in three chapters.

**Chapter I**: This chapter consists of introduction, theoretical principles and mathematics involved in the potentiometric technique and for the determination of stability constants.

**Chapter II**: This chapter is divided into three sections.

First section describe the preparation of ligands and characterization of these ligands. The ligands used in the present work are listed below:

1. 1-(3,4,5-triethoxyphenyl)-3-(2-hydroxyphenyl)propane-1,3-dione
2. 1-(5-bromo 2-hydroxy phenyl)3-3(3,4,5-triethoxyphenyl)propane 1,3-dione
3. 1-(5-chloro 2-hydroxy phenyl)3-3(3,4,5-triethoxyphenyl)propane 1,3-dione
4. 1-(3,4,5-triethoxyphenyl)-3-(2-hydroxy 5-methyl phenyl) propane-1,3-dione
5. 1-(5-chloro 2-hydroxy 4-methyl phenyl)-3(3,4,5-triethoxyphenyl)propane 1,3-dione

Second section details with the pH metric study of binary complexes of ligands with transition metals like Cu(II), Ni(II), Co(II), Mn(II), and Zn(II). The observed values of stability constants of these complexes have been explained on the basis of ionic size of metals and basicity of ligands.
Third section: In this section the antifungal activity of all the ligands against *Aspergilles Niger*, *Trichoderma* and anti bacterial activity against species *E-coli*, *Pseudomonas Acronosa* are studied.

**Chapter III**: This chapter consists of introduction, theoretical principles involved in mixed ligand formation process. Five β-diketones used as primary ligands and eight amino acids as secondary ligands with Cu(II) and Ni(II) metal ions. By using “SCOGS” computer program the process is explained on the basis of species distribution.

**ORIGINAL WORK**

The present work is carried out to understand the complexation of β-diketones with transition metals by potentiometry. These ligands are synthesized from substituent ortho hydroxyl acetophenon and substituted benzoic acid by BVT synthesis and have been used for the first time for potentiometric study to determine their pK values and stability constants of binary and ternary complexes in solution state. They are also used first time for the study of antifungal and anti bacterial activity.

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