

# Synthesis of Some Zinc and Copper Complexes of Benzimidazole

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**Abstract:** Two complexes of Cu(II) and Zn(II) ions with Benzimidazole ligand have been prepared. The ligand and its metal complexes have been characterized by using NMR and FTIR techniques. Ligand L acts as a bidentate ligand. The antibacterial property of the complexes has been verified. The outcome of the antibacterial screening demonstrated that the complexes possess good biological activity against different bacterial strains. The results therefore suggest that all the complexes are better antifungal agents than the free ligand.

**Keywords:** Benzimidazole, Antibacterial, Metal Complexes Zinc Copper

## I. INTRODUCTION

Benzimidazoles are a group of heterocyclic, aromatic and bioactive organic compounds that exhibit a wide range of biological properties [1] and are used as pharmaceutical agents. Benzimidazoles are synthesised by the condensation of o-phenylenediamine and benzoic acids. [2] Several scientists have synthesised and reported various derivatives of benzimidazoles for pharmacological applications, as benzimidazoles and their metal complexes are associated with clinical medicine and new drug development [3]. Benzimidazole derivatives are structural isomers of naturally occurring nucleotides, which allow them to freely interact with biopolymers of living systems [4]. Therefore, benzimidazoles, their derivatives and metal complexes are of great interest in terms of their therapeutic potential. The benzimidazole backbone is a useful structural motif for the representation of chemical functionality in biologically active molecules. Some of its derivatives have potent biological activities as antitumour [5], anti-HIV [6], anti-Parkinson [7] and antimicrobial [8] agents. At the same time, due to the coordination chemistry of azoles acting as ligands in transition metal compounds, the chelating ligands containing benzimidazole groups have been studied in detail in recent years in the context of modelling biological systems [9]. The metal complexes are antimicrobially active and show higher activity than the free ligand. Metal chelation significantly influences the antimicrobial/bioactive behaviour of organic ligands [10]. With this in mind, in this work we aim to investigate the antibacterial activity of benzimidazole-based bases and their metal complexes of Cu (II) and Zn (II) ions. [11]

## II. SYNTHESIS OF COMPLEXES OF BENZIMIDAZOLE WITH ZN BASE

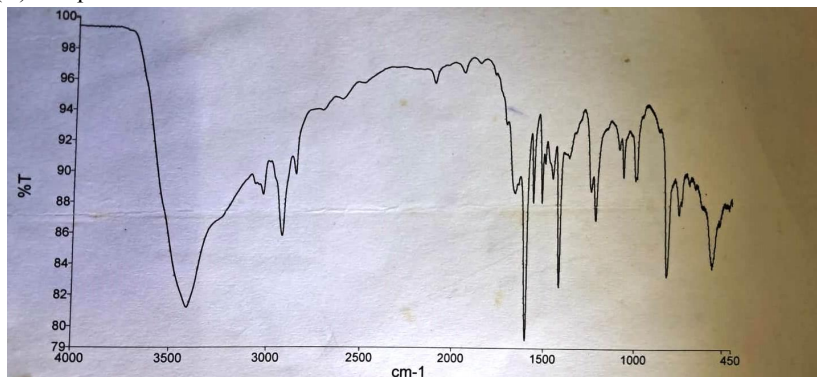
The complexes of zinc with benzimidazole were prepared by the method described in a previous article [13]. Benzimidazole and its derivatives (0.25 mmol) and zinc chloride dihydrates (0.25 mmol) were dissolved in 96% v/v ethanol until homogeneous solutions were obtained. They were mixed with a reflux condenser and a magnetic stirrer for 12 hours. We made the total volume of the reaction mixture to 30 mL. The reaction was carried out at constant room temperature (25 °C) and controlled pH (6-7) until a precipitate of the coordination compounds was formed, which was then washed with 40% EtOH and a mixture of EtOH and H<sub>2</sub>O (volume = 1/1). The reaction products were dried in air at room temperature. The coordination compounds obtained were determined FTIR spectra and NMR technique.

## III. SYNTHESIS OF COPPER-BASED BENZIMIDAZOLE COMPLEXES

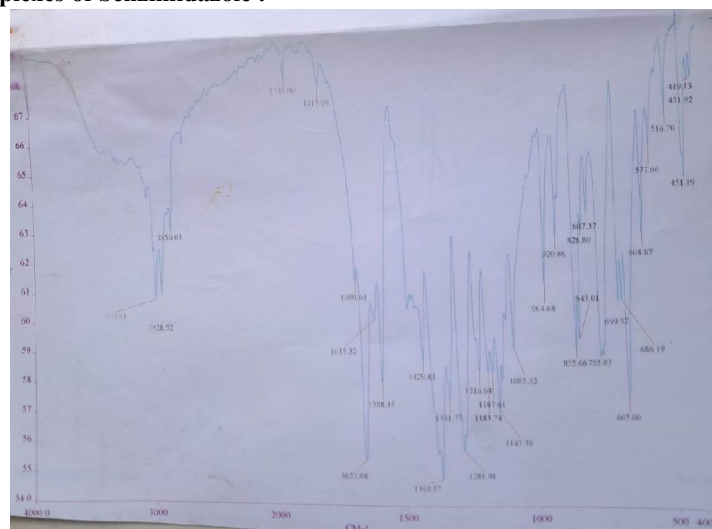
3.1 Preparation of dichlorobis[1,3-bis (benzimidazolyl) benzene] dicopper (II) To a solution of 1,3-bis (benzimidazolyl) benzene (1mM) in ethanol was added 1mM CuCl<sub>2</sub>. The immediately precipitated brown colored compound was allowed to stand at room temperature for 1 hour, then washed with ethanol and dried in vacuum over P<sub>2</sub>O<sub>5</sub> [14].

**IV. RESULT AND DISCUSSION**

In presents the physical characteristics of benzimidazole complexes of zinc (II) and Cu (II) were determined . The ligand & its metal(II) complexes are cream colored.

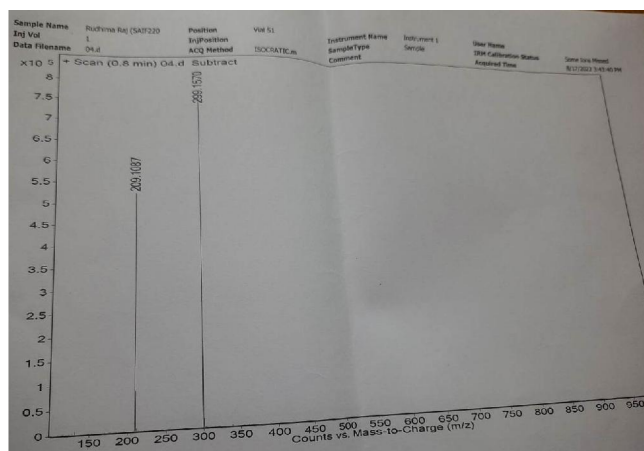


**FTIR of A : Zinc complexes of benzimidazole :**



**B FTIR of Cu complex of Benzimidazole**

b  
FTIR report



**C: NMR report of Zn complexes of Benzimidazole**

### V. CONCLUSION

Spectroscopic techniques such as NMR and IR followed by the preparation of Co(III), Zn(II) and Cu(II) transition metal complexes. The stoichiometric ratio between the transition metal and the ligand of these resulting complexes is 1:2 (M:L) and 1:1 (M:L) and they were structurally elucidated using spectroscopic techniques as well as conductivity measurements. Based on the spectroscopic data obtained, an octahedral environment around the Co(III) and Zn (II) complexes and a square-planar environment around the Cu(II) Were proposed.

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