

ABSTRACT

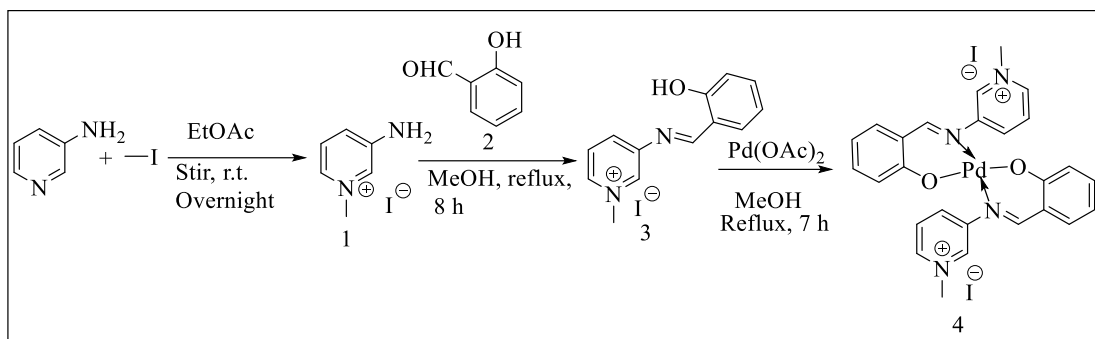
As a state-of-the-art, ionic liquid-supported Schiff base ligand systems offer a new dimension to the common Schiff bases and their transition metal complexes. We all know how important the nature of the ligand systems is when we talk about transition metal complexes. Several transition metal complexes, reported in the literature, are found to be biologically and catalytically active. However, there is still a huge potential to synthesize new transition metal complexes by suitably designing ligand systems. We have been working on such ionic liquid-supported ligand systems and their transition metal complexes to assess their biological and catalytical activities.

The Thesis entitled “**BIOLOGICAL AND CATALYTIC ACTIVITIES OF SOME TRANSITION METAL COMPLEXES OF IONIC LIQUID-SUPPORTED LIGAND SYSTEM**” mainly focuses on the synthesis and characterization of pyridinium-based ionic liquid-supported Schiff bases and their transition metal complexes and their subsequent applications in biological fields and catalysis in organic synthesis. The thesis is divided into five chapters as shown below:

Chapter I is subdivided into two sections, viz. Section A and Section B. **Section A** includes a brief overview of the **Ionic liquids (ILs), Schiff bases, IL-supported Schiff bases, and their transition metal complexes**. Unique features of ionic liquids(ILs), different properties of ILs-supported Schiff bases and their transition metal complexes, the synthesis, and applications in different fields are discussed. A brief **Literature review** highlighting the application of transition metal complexes of ILs-supported Schiff base as catalysts in organic synthesis and active biological compounds is also discussed; followed by the **Objectives of the research work**. On the other hand, **Section B** deals with the experimental part which is subdivided into **Chemicals and solvents used, Instruments used, and Methods of Synthesis of the compounds**.

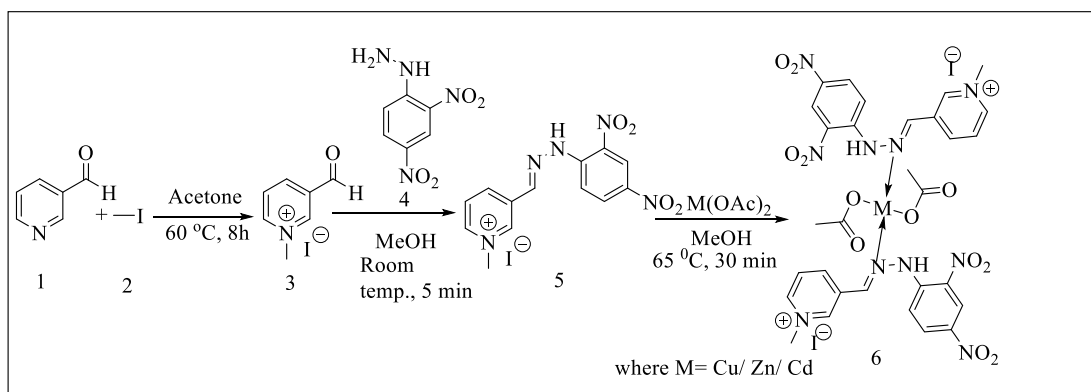
Chapter II comprised of the synthesis and characterization of a pyridinium IL-supported Schiff base Pd(II) complex. It was then used as an efficient heterogeneous catalyst for the Suzuki reaction. The Suzuki reaction was carried out at room temperature under aerobic

conditions and using ethanol as the solvent. Recoverability, recyclability, and short time frame of reaction are the highlights of this research work.



Scheme 1 Synthesis of IL-supported ligand system and the Pd(II) complex

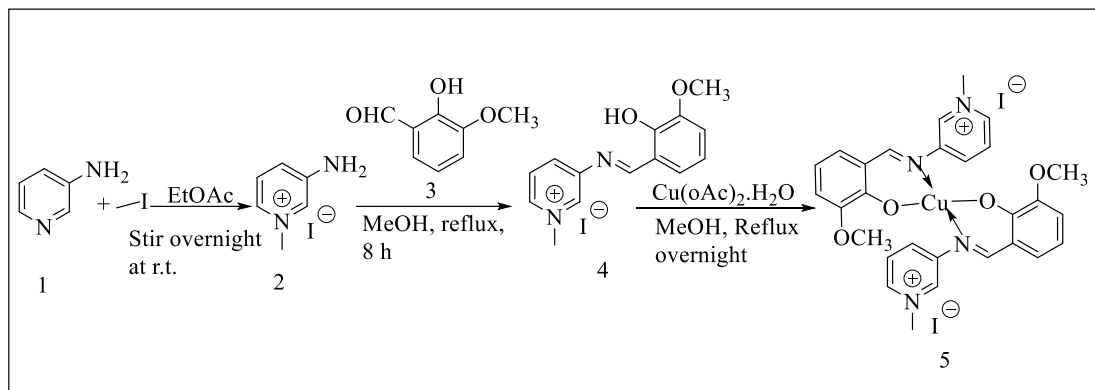
Chapter III discussed the synthesis and characterization of novel Cu(II), Zn(II), and Cd(II) complexes of pyridinium IL-supported Schiff base. They are found to be potent compounds against the ACHN cell line. Cytotoxicity and thus, IC_{50} values were determined against their action toward the ACHN cell line. Their respective ROS production capacity supports their potent cytotoxicity.



Scheme 2 Synthesis of IL-supported Ligand system and the Cu/Zn/Cd(II) complexes

Chapter IV briefly outlines the synthesis and characterization of pyridinium iodide supported Schiff base of Ortho-vanillin and its copper complex. Cytotoxicity activity results show that the copper complex is more potent than the ligand system toward the

ACHN cell line as indicated by their respective IC₅₀ values. Density Functional Theory (DFT) studies calculated the different electronic parameters which show that the Cu complex is fairly stable.



Scheme 3 Synthesis of IL-supported Ligand system and the Cu(II) complex

Chapter V is the penultimate part that encompasses the findings of this research work by stating the concluding remarks.