

## ABSTRACT

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Title: ***“Synthesis and characterization of new bioactive metal complexes with imine-based pincer ligands: Exploration of potential chemical and biological activities”***

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My thesis work contains the synthesis of new metal complexes using different type of N O S donor imine-based base pincer ligands, and characterization of the complexes by several spectroscopic techniques. Also, we have investigated the catalytic activity of some metal complexes and biological activities of the complexes.

A review of the ligands containing N O S donor site and different complexes of palladium(II), platinum(II), copper(II) and some heavy metal has been described including their several catalytic activities specially towards C-C cross coupling reaction and also interaction with biomolecules with their anti-cancer activities in **Chapter I** along with the purpose of the present investigations.

**Chapter II** deals with the synthesis of Pd(II) and Pt(II) complexes with NNO donor pincer ligand. At the same time the X-ray structure of the complexes and computational study has also been performed. In addition, the cytotoxic activity of the two complexes is investigated against different cancerous cell lines. **Chapter III** is on the synthesis and characterization of two new Pd(II) and Pt(II) complex with ONN donor Schiff base including their X-ray crystallography study and computational study. Furthermore, interaction of the two complexes with BSA protein and *in vitro* anti-cancer activity are performed.

**Chapter IV** deals with the fabrication of thiosemicarbazone ligands and their Pd(II) complexes. Structure of the complexes is confirmed by single crystal X-ray diffraction method. Electronic structure of the complex is interpreted by DFT computations. Catalysis study of the complexes is explored towards Suzuki-Miyaura cross coupling reaction. Additionally, the interaction with the biomolecules (like CT DNA and BSA protein) and antitumor activity against human breast tumor cells is examined.




**Chapter V** describes the synthesis and characterization of an one dimensional copper(II) coordination polymer (CUPM) along with its structural elucidations. Catecholase activity is performed in acetonitrile medium along with its interaction with the DNA and BSA protein molecules. Furthermore, Cytotoxic nature of the complex has also been carried out in cancer cell lines.

**Chapter VI** contains synthesis and spectral characterization of three heavy metal based binuclear luminescent complexes  $[M_2(HL)_2Cl_4]$ ;  $M = Zn, Cd$  and  $Hg$ . The complexes are employed for the selective detection of explosive nitro-aromatic compounds especially 2,4,6-trinitrophenol (TNP) in solution phase as well as in solid phase.

In brief, this thesis accounts the chemistry of different metals with the imine-based pincer ligands of phenol and thiosemicarbazide derivatives. In addition, we have explored the biological activities of the synthesized metal complexes.

  
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