ABSTRACT

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Title: "Studies on Some Vanadium Chelates with Polydentate Ligands".

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This thesis comprises of work related to the synthesis and characterization of some vanadium complexes incorporating O, N, O coordinating Schiff base ligands and their application towards various catalytic and biological activities.

The thesis is subdivided into five chapters enlarging methods, strategy, experimental findings and analysis of the reaction behavior of some vanadium (IV/V) complexes. **Chapter I** contains summary of the work presented in this thesis with brief description of the physical methods and equipment employed.

Chapter II describes synthesis and characterization of three oxidovanadium (IV/V) complexes coordinated with a tridentate ligand (ONO binding mode) and also two different co-ligands. Experimental analysis of photophysical properties of these complexes along with a detailed DFT and TDDFT calculations are provided in this chapter. One of the complexes shows Catechol oxidase (the reaction mechanism was established by 1H NMR titration) and the bromoperoxidase activity is investigated with the synthesized vanadium complexes.

Chapter III contains synthesis and characterization of three mononuclear oxidovanadium (IV/V) complexes having dibenzofuran based novel Schiff base ligand. The ligand binds with the complex through ONO binding sites. Experimental analysis of photophysical properties of these complexes along with a detailed DFT and TDDFT calculations are provided in this chapter.

Chapter IV contains some catalytic and biological activities of the synthesized complexes described in chapter III. The complexes show bromoperoxidase activity was well interpreted by GC-MS. The synthesized complexes show a noticeable intercalating as well as groove binding interaction with DNA molecule and also show interaction with BSA molecule. The interaction of biomolecules with the synthesized complexes were interpreted by UV-VIS, Fluorescence, CD, Viscometry, FT-IR and also molecular Docking etc.

Chapter V describes synthesis and characterization of two mononuclear oxidovanadium (IV) complexes having coumarin and naphthalene based two different Schiff base ligands. One of the complexes show bromoperoxidase activity (phenol red to bromophenol blue) at a definite pH (pH=5.8). Both the complexes show binding interaction with DNA molecule was established by UV-VIS, Fluorescence and Viscometry method. The interaction of protein molecule (BSA) with the complexes were interpreted by UV-Vis spectroscopy, fluorescence spectroscopy and also FT-IR spectroscopy.

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