

## ABSTRACT

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**Title: "Studies on some vanadium complexes with polydentate ligands"**

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

This thesis consists of five chapters. **Chapter I** contains a summary of the work presented in this thesis along with a brief description of the physical methods and equipments employed.

**Chapter-II** describes solvent mediated syntheses and characterizations of a four mononuclear and two dinuclear vanadium (V) complexes with hydrazide functionalized Schiff base ligands ( $H_2L^{1-2}$ ). Electro synthesized type II mixed-valence vanadium (V/IV) complexes were reported. The redox properties were supported by theoretical calculations. Catecholase like activity using 3, 5 DTBC was examined.

**Chapter-III** deals with syntheses, X-ray structures of two valproic acid hydrazide based Schiff base ligands ( $H_2L^{3-4}$ ) and their corresponding mono nuclear dioxo vanadium (V) complexes. Constant potential electrolysis (CPE) of the complexes yielded dioxo vanadium (IV) species. The complexes catalytically oxidized pyrogallol to purpurogallin under aerobic condition. The experimental observations including redox properties were well corroborated with the computational results.

**Chapter-IV** discusses solvent dependent syntheses and characterizations of two different sets of mono and dinuclear vanadium (V) complexes using tautomeric form of two valproic acid hydrazide based Schiff base ligands ( $H_2L^{3-4}$ ). Electrochemically synthesized type II vanadium (V/IV) complexes were reported. The catalytic oxidation of 3, 5-DTBC was reported to proceed via semiquinone radical pathway. Peroxidase like activity was monitored following the oxidation of pyrogallol.

**Chapter-V** consists of syntheses of four vanadium (V) complexes with 3-amino-2-naphthol based four Schiff base ligands. ( $H_2L^{5-8}$ ) Detailed characterizations with respect to crystal structures and unique redox properties are reported here. Theoretical calculations were also employed to correlate the experimental findings.

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