

ABSTRACT

This work presented in this thesis entitled “**Synthesis , characterization and exploration of properties of some transition metal complexes with N,O –donor ligands**” (**Index no: 253/16/Chem/25 dated 15/12/2016**) has been carried out in the Department of Chemistry, Jadavpur University, from the period 2015 to 2022. Different analytical and spectroscopic techniques have been used during the course of the research like ^1H , ^{13}C NMR, UV-Vis, PXRD, FTIR, and single crystal XRD. In some cases computational studies involving DFT calculations have been utilized. Gas chromatography has been utilized to characterize a few compounds. The thesis contains six chapters. The first chapter is a broad introduction regarding coordination chemistry of transition metals, mainly copper and nickel. Moreover, it contains an elaborate literature survey behind the research work that has been conducted and it also contains a brief overview of the objective of the thesis. The second chapter deals with the synthesis and characterization of a few Schiff base copper(II) complexes and their extensive use as catalysts in alcohol oxidation, yielding the desired products. The products have been identified and quantified by gas chromatography. The third chapter elucidates the synthesis, detailed characterization and study of two heterogeneous catalysts which have been prepared by grafting Ni(II) and Cu(II) on functionalized mesoporous silica. These catalysts have been employed in olefin oxidation reactions thereafter. The fourth chapter contains the description of Cu(II) and Ni(II) complexes, of which the Cu(II) complex resembles a natural enzyme, methane monooxygenase. These have been used to activate C-H bond in alkanes, and of the two, the copper complex was seen to carry this out successfully. The complexes have also been characterized thoroughly. The fifth chapter is an overview of a mononuclear Cu(II) Schiff base complex, which has been effective in interacting with DNA and protein. The DNA and protein binding has been studied by spectroscopy and by biochemical assays. Hence, this complex has relevant biological applications, including cell apoptosis. The sixth chapter is a description of a novel Schiff base copper(II) complex which has been electropolymerized on a simple glassy carbon electrode. The comparison between the two electrodes shows how the modified electrode carries much higher current in a voltammetric set up. It has also been used for catalyzing the oxidation of ascorbic acid. The complex has also been extensively characterized.

Aradhita Bhattacharjee
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Partha Roy
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Professor Partha Roy
Department of Chemistry
Jadavpur University
Kolkata - 700032