

Effects of Axial Ligands on the Redox Properties of Manganese(III) *meso-tetrakis(p-Hydroxyphenyl)* Porphyrin

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In this work, *meso-tetrakis(p-Hydroxyphenyl)* porphyrin [T(*p*-OH)PP] and manganese(III) *meso-tetrakis(p-hydroxyphenyl)* porphyrin Mn[T(*p*-OH)PP] were synthesized and characterized. The UV-visible and cyclic voltammetry were used to evaluate the axial ligand and redox behaviour of Mn[T(*p*-OH)PP]. The addition of ethylamine, diethylamine and tertiary amines to Mn(III) *meso*-porphyrins distinguishes their axial ligand characteristics. The presence of ethylamine causes the octahedral geometry to transform into a square pyramidal structure. Cyclic voltammetry shows that Mn(III) converts to Mn(II) porphyrins. Additionally, the UV-visible spectrophotometry and cyclic voltammetry were also used to investigate the oxidation process.

Keywords: Manganese, *meso*-Porphyrin, Axial effect, Electrochemical properties.

INTRODUCTION

The liver of fish, birds and vertebrates contain porphyrins, many of which are connected to the electron transport of the respiratory chain [1]. Cytochrome P-450 enzymes are found in bacterial chlorophyll and are used to catalyze a variety of reactions. Enzymes that include porphyrin also participate in oxidative reactions, either directly or by an indirect process involving a reaction with hydrogen peroxide [1]. It has been demonstrated that iron porphyrin (TPPBrx)FeCl (TPPBrx) is the dianion of β -brominated-pyrrole tetraphenylporphyrin and $x = 0-8$ is subject to quasi-reversible one-electron oxidations as a result of the conjugated porphyrin ring structure. Two competing effects of the interaction of CO with metalloporphyrin are the propensity of the bromine substituents to remove electrons and the non-planarity of the macrocycle [2].

Axial ligands properties of ruthenium porphyrin have been shifted to longer wavelengths due to the addition of tetrabutylammonium hydroxide. Ruthenium porphyrin has shown two reversible oxidation and one irreversible reduction, which is used to characterize the one electron-transfer reactions [3]. *meso*-Substituted porphyrins have shown the formation of dianion radical due to inclined by the electron donor properties of the porphyrin substituents using tetrabutylammonium hexafluorophosphate as supporting electrolyte and their corresponding diffusion coefficients have been calculated [4]. New ferrocene-functionalized porphyrins and ruthenocene-functionalized porphyrin have exhibited reversible one-electron transfers because the porphyrin ligand has little effect on the ferrocene [5]. Due to the electrical interaction between the porphyrin ring and the peripheral ruthenium complexes *via* the pyridyl bridges, ruthenium porphyrin has generated a peak at

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