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Catalytic Activation of Dioxygen by Redox Active Cobalt(II) and Copper(II) Complexes for Oxidation of Triphenylphosphine

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The open-chain *tris*(amidate) ligand, *N,N'*-(2,2'-azanediyl-*bis*(2,1-phenylene))-*bis*(4-methoxybenzamide) has been prepared and characterized by ^{1}H NMR, ^{13}C NMR, COSY, HMQC and FT-IR techniques. Co(II) and Cu(II) complexes of the fully characterized a redox active ligand have been synthesized. The characterization of Co(II) and Cu(II) complex was accomplished by spectroscopic ^{1}H NMR and FT-IR techniques. The Cu(II) complex has been also characterized by single crystal X-ray diffraction (Figure 1a), ^{1}H NMR and FT-IR techniques. Molecule formula of Cu(II) complex, $C_{68}H_{72}Cu_2K_2N_{10}O_{12}$; Monoclinic, Space group P21/c (No. 14), a = 20.929(5) Å, b = 14.029(3) Å, c = 22.454(5) Å, β = 100.716(4)°, V = 6477(3) Å^3, 52740 reflections measured, 17372 unique (R_{int} = 0.0298) which were used in all calculations. The electron transfer mechanism of the prepared complexes are investigated by the aid of cyclic voltammetry (Figure 1b) and the conversion rate of triphenylphosphine to triphenylphosphine oxide in the presence of excess dioxygen was monitored using gas chromatography. As a result, only Co(II) complex, after six hours, 27% of the PPh_3 was converted to $OPPh_3$, and after thirty hours, 86% of the PPh_3 had been converted to $OPPh_3$.

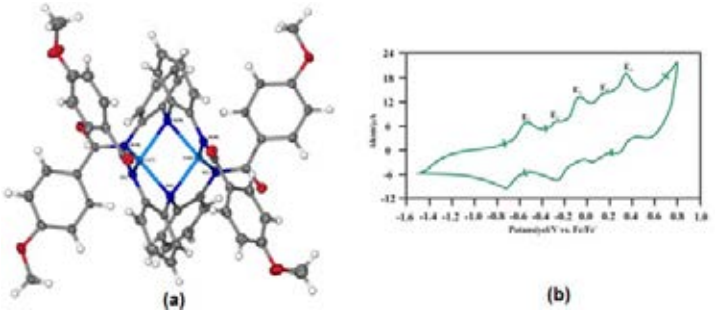

Figure 1. Molecular structure of $K[Cu(HL^{OCH3})_2]$ **(a)** and Cyclic voltammogram of $[Et_4N][Co(HL^{OCH3})_2]$ **(b)**.

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Keywords: Redox-active ligand, Metal complexes, Homogeneous catalyst, Dioxygen, X-ray single crystal diffraction.