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Catalytic Activation of Dioxygen by Redox Active Cobalt(II) and Zinc(II) Complex for Oxidation of Triphenylphosphine

HAKAN ARSLAN [1], İLKAY GÜMÜŞ [1], ÜMMÜHAN SOLMAZ [1], CORA MACBETH [2], GÜN BİNZET[3], ERSAN TURUNÇ [4]

[1] DEPARTMENT OF CHEMISTRY, FACULTY OF ARTS AND SCIENCE, MERSIN UNIVERSITY, CIFTLIKKOY CAMPUS, MERSIN, 33343, TURKEY

[2] DEPARTMENT OF CHEMISTRY, EMORY UNIVERSITY, 1515 DICKEY DRIVE, ATLANTA, GA 30322, USA

[3] DEPARTMENT OF ELEMENTARY SCIENCE EDUCATION, FACULTY OF EDUCATION, MERSIN UNIVERSITY, YENISEHIR CAMPUS, 33160, MERSIN, TURKEY

[4] ADVANCED TECHNOLOGY RESEARCH AND APPLICATION CENTER, MERSIN UNIVERSITY, CIFTLIKKOY CAMPUS, MERSIN, 33343, TURKEY

The NNN pincer ligands are of the form NH(*o*-PhNHC(O)CH_3)$_2$ has been synthesized and characterized by ^{1}H NMR, ^{13}C NMR, COSY, HMQC, LC-MS and FT-IR techniques. Monomeric Co(II) and Zn(II) complexes of the prepared ligand have been obtained with a ligand:metal ration (2:1). While Co(II) complex has been characterized by spectroscopic ^{1}H NMR and FT-IR, suitable crystalline structure of Zn(II) complex has been clarified by single crystal X-ray diffraction technique (Figure 1a). Molecule formula of the Zn(II) complex, $C_{43}H_{57}N_8O_5Zn$; Triclinic, Space group *P-1* (No. 2), a = 11.6020(18) Å, b = 12.7900(19) Å, c = 19.934(3) Å, α = 95.479(2)°, β = 98.439(2)°, γ = 107.911(2)°, V = 2752.9(7) Å^3, Z = 2, 15514 reflections measured, 12335 unique (R_{int} = 0.0795) which were used in all calculations. In addition, the redox behavior of the complexes was investigated by using cyclic voltammetry (Figure 1b). Furthermore, the ability oxidize of complexes to triphenylphosphine to triphenylphosphine oxide in the presence of dioxygen were monitored by the aid of gas chromatography. After six hours, we found that only Co(II) complex converted to 93% of the triphenylphosphine to triphenylphosphine oxide.

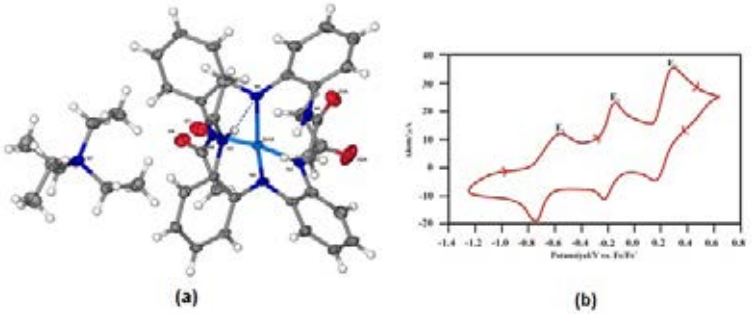

Figure 1. Molecular structure of [Et_4N][$Zn(HL^{acetyl})_2$] **(a)** and cyclic voltammogram of [Et_4N][$Co(HL^{acetyl})_2$] **(b)**.

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