

The Synthesis, Structure and Catalytic Activity of Iron(II) Complex with New N2O2 Donor Schiff Base Ligand

Authors : Neslihan Beyazit, Sahin Bayraktar, Cahit Demetgul

Abstract : Transition metal ions have an important role in biochemistry and biomimetic systems and may provide the basis of models for active sites of biological targets. The presence of copper(II), iron(II) and zinc(II) is crucial in many biological processes. Tetradentate N2O2 donor Schiff base ligands are well known to form stable transition metal complexes and these complexes have also applications in clinical and analytical fields. In this study, we present salient structural features and the details of catecholase activity of Fe(II) complex of a new Schiff Base ligand. A new asymmetrical N2O2 donor Schiff base ligand and its Fe(II) complex were synthesized by condensation of 4-nitro-1,2 phenylenediamine with 6-formyl-7-hydroxy-5-methoxy-2-methylbenzopyran-4-one and by using an appropriate Fe(II) salt, respectively. Schiff base ligand and its metal complex were characterized by using FT-IR, ¹H NMR, ¹³C NMR, UV-Vis, elemental analysis and magnetic susceptibility. In order to determine the kinetics parameters of catechol oxidase-like activity of Schiff base Fe(II) complex, the oxidation of the 3,5-di-tert-butylcatechol (3,5-DTBC) was measured at 25°C by monitoring the increase of the absorption band at 390-400 nm of the product 3,5-di-tert-butylcatequinone (3,5-DTBQ). The compatibility of catalytic reaction with Michaelis-Menten kinetics also investigated by the method of initial rates by monitoring the growth of the 390-400 nm band of 3,5-DTBQ as a function of time. Kinetic studies showed that Fe(II) complex of the new N2O2 donor Schiff base ligand was capable of acting as a model compound for simulating the catecholase properties of type-3 copper proteins.

Keywords : catecholase activity, Michaelis-Menten kinetics, Schiff base, transition metals

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