

Synthesis and Characterization of a Novel Symmetric Dinuclear Cu(II) Complex

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Keywords: copper complex, symmetric ligand, bioinorganic chemistry

Introduction

Many metalloenzymes have in their active site copper ions. These metals can act cooperatively playing an important role in many biological functions, including dioxygen transport, electron transfer reactions and hydrolytic chemistry¹. In recent years dinuclear copper complexes received special attention due to the increasing interest in the field of biomimetic chemistry, providing insight in the function of the biological sites of metalloenzymes. Herein, a novel Cu(II) complex was proposed with the ligand bpmp-Br, aiming the study of the structural and functional characteristics of these compounds.

Results and discussion

The ligand bpmp-Br was synthesized as described in literature² and the complex was prepared analogously to the literature³.

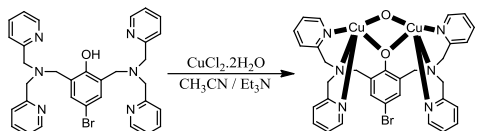


Figure 1. Scheme for the complex synthesis.

The complex was characterized by electrochemistry, infrared and electronic spectroscopy. The IR spectroscopy (KBr) showed the following bands: $\nu(\text{O-H})$ 3426 cm^{-1} , $\nu(\text{C-H}_{\text{ar}}$ e C-H_{alij}) $3246\text{-}2736\text{ cm}^{-1}$, $\nu(\text{C}=\text{C}_{\text{ar}}$ e $\text{C}=\text{N}_{\text{ar}})$ $1479\text{-}1444\text{ cm}^{-1}$, $\nu(\text{C-O}_{\text{phenol}})$ 1376 cm^{-1} , $\nu(\text{C-H}_{\text{ar}})$ 766 cm^{-1} .

The electronic spectra were measured in water and the graphic are displayed in Figure 2.

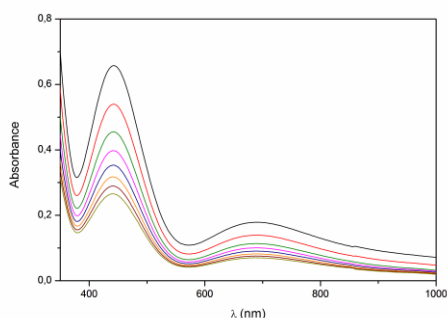


Figure 2. Electronic spectra of the complex with different concentrations.

Two major bands were observed. The first with $\lambda_{\text{max}}=688\text{ nm}$ ($\epsilon=178\text{ L}\cdot\text{mol}^{-1}\cdot\text{cm}^{-1}$), attributed to d-d transition, and the second with $\lambda_{\text{max}}=441\text{ nm}$ ($\epsilon=657\text{ L}\cdot\text{mol}^{-1}\cdot\text{cm}^{-1}$), attributed to a ligand to metal charge transfer transition.

The redox properties of the complex were studied by cyclic voltammetry using water as solvent. The voltammogram is showed in Figure 3 was analyzed at three scan rates: 50, 75 and $100\text{ mV}\cdot\text{s}^{-1}$.

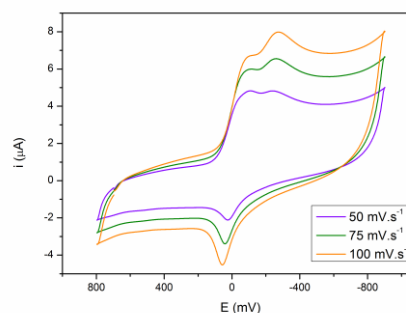


Figure 3. Cyclic voltammogram in water.

There are two reduction waves that can be assigned to the two copper center at $E_{\text{pc}}^{\circ}=-261\text{ mV}$ and $E_{\text{pc}}^{\circ}=-98\text{ mV}$ in a $\text{Cu}^{\text{II}}/\text{Cu}^{\text{I}}$ processes.

Concluding remarks

A dinuclear Cu(II) complex was synthesized using the symmetric ligand bpmp-Br. The complex was characterized using IR, electrochemistry and has a characteristic UV-vis spectrum, however it is still necessary to prove its catalytic efficiency against different substrates.

Acknowledgements

CNPq, CAPES, UFSC, INCT-catalise

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