

Synthesis, characterization, and application of antioxidant activity of bis(2,4-dihydroxyacetophenone)-ethylenediamine Schiff base and its Cu(II) complex

H.M.R.P. Lenadora, M. Sithambaresan*, & S. Premkumar

Department of Chemistry, Eastern University, Sri Lanka

**Corresponding author: sithambaresanm@esn.ac.lk*

Abstract

Schiff bases are condensation products of ketones (or) aldehydes (aldehyde and ketones) with primary amines. Early reported studies show that these Schiff base compounds are successfully synthesized in laboratory conditions and they have remarkable properties. Therefore, the main objective of this study is to synthesize, characterize, and determine the antioxidant activity of the bis(2,4-dihydroxyacetophenone)-ethylenediamine Schiff base ligand and its Cu(II) complex. A Schiff base ligand was synthesized by the condensation reaction of 2,4-dihydroxyacetophenone with ethylenediamine in ethanol. The d-transition symmetric Cu(II) complex was prepared from the reaction of the metal chloride with the newly synthesized bis(2,4-dihydroxyacetophenone)-ethylenediamine as a ligand. The progress of the reaction was monitored by TLC using water-ethanol as a solvent every 20 minutes. The ligand and its metal complex were partially characterized using UV-Visible spectroscopy and FTIR spectroscopic methods. The melting points of the synthesized ligand and its metal complex were determined and the conductivity of the metal complex was also measured. The antioxidant activity of the synthesized compounds was determined by using the standard FRAP assay method. The FTIR spectra showed that the ligand behaved as a dibasic tetradentate ligand with the dioxygen-dinitrogen donor atom system oriented towards the central metal ion. The analytical and spectroscopic data suggest an octahedral geometry for the Cu(II) complex. The antioxidant activity of the ligand and the metal complex were compared with the ascorbic acid as a standard. The values were expressed as FRAP values (mmol Fe²⁺/g). The obtained FRAP value for the Cu(II) complex (0.10103 ± 0.00070) was higher than the value obtained for the ligand (0.05113 ± 0.00085). But when compared to the standard ascorbic acid, all the synthesized compounds (Ligand and Cu(II) complex) have lower antioxidant activity.

Keywords: *Antioxidant activity, 2,4-dihydroxyacetophenone, FRAP assay, FTIR spectra, Tetradentate ligand*