627/E2

Spectroscopic evidence for the pH sensitivity and anion trapping capability of N,N-ethylenebis(acetylacetoneiminato)copper(II) complex

A M K S P Adhikari, M Y Udugala-Ganehenege*
Department of Chemistry, Faculty of Science, University of Peradeniya

A shiny crystalline purple colour N,N-ethylenebis(acetylacetoneiminato)copper(II) complex synthesized by template synthesis shows some interesting acid-base properties and capability of binding anions. Single crystal X-ray crystallographic, XRD, UV, IR and CV data were used to characterize the compound. Interestingly, the complex is purple at $pH > 7$ and colourless in $pH < 2$. Anions like SCN^-, I^- , Br^-, Cl^- binds to this complex when it is in acidic medium turning the colour of the solution to yellow. The intensity of yellow colour varies in the order $Cl^- < Br^- < SCN^- < I^-$. The colour change at $pH < 2$ may be due to the protonation of the ligand environment coordinated to the Cu^{2+} center. The UV-visible spectrum of the complex at $pH > 7$ shows a band at 540 nm. This band disappears and a new band appears around 820 nm giving an isobestic point at 680 nm with the addition of H^+ ions into an ethanolic solution of the compound. Interestingly, the band around 540 nm reappears and the solution colour turns to purple again with the addition of OH^- ions into the same solution. Stepwise addition of SCN^- and Br^- to the solution separately at $pH < 2$ shows an appearance of a new band at 795 nm and 790 nm respectively with the disappearance of the band at 540 nm. This red shift of the d-d band together with the intensity decrease at $pH < 2$ may be due to the protonation of the ligand environment bonded to the Cu^{2+} center by decreasing the crystal field stabilization energy (CFSE) of the complex and increasing the symmetry of the system. The blue shift of the d-d band together with the intensity increase with the addition of various anions to the solution at $pH < 2$ may be due to the CFSE change with the coordination of anions to Cu^{2+} center and decreasing the symmetry of the system.

Financial assistance by the National Science Foundation (grant RG/2006/FR/02) is acknowledged.

*myng@pdn.ac.lk Tel: 081-2394432