

Synthesis of copper and nickel complexes using compartmental ligands: X-ray, electrochemical and magnetic studies

J MANONMANI, V NARAYANAN and M KANDASWAMY

Department of Inorganic Chemistry, University of Madras, Guindy Campus,
Chennai 600 025, India

The search for several synthetic routes leading to mononuclear or polynuclear complexes have been stimulated by the potential relevance of these compounds in bioinorganic chemistry. One of them consists of the synthesis of compartmental ligands, which are organic molecules able to bind with one or more metal ions. In the present work, we have synthesized acyclic dicompartmental ligand suitable for the complexation of transition metal ions which can form mononuclear, homo- or heterodinuclear complexes.

Mononuclear complexes ML^1 ($M = Cu, Ni$) where, $L^1 = N,N\text{-bis}[2\text{-hydroxy-3-(morpholino-1-ylmethyl)-5-methylbenzyl}]alkyldiimine$ (alkyl = $(CH_2)_n$, $n = 2, 3$ or 4) and ML^2 where, $L^2 = N,N\text{-bis}[2\text{-hydroxy-3-(morpholino-1-ylmethyl)-5-bromobenzyl}]alkyldiimine$, (alkyl = $(CH_2)_n$, $n = 2, 3$ or 4) have been synthesized and characterized by electronic and ESR spectra. Electrochemical and magnetic studies were carried out. The complexes CuL^{1a} (**1**), CuL^{1c} (**3**), NiL^{1a} (**7**) and NiL^{1d} (**10**) ($a = en, c = bn, d = trien$) have been analysed by X-ray crystallography. Complexes **1** and **3** have square pyramidal geometry. The co-ordination geometry around the metal ion in complex **7** is square planar and that in complex **10** is octahedral. The electrochemical property of the complexes was studied using cyclic voltammetry. A single quasi-reversible electron transfer process occurs at the negative potential region ($E_{p_c} = -80$ to -1.0 V). Copper complexes show a normal magnetic moment ($m_{eff} = 1.68\text{--}1.75$ BM) and are ESR active. Square planar nickel complexes are diamagnetic whereas nickel complex (**10**) has a magnetic moment value of 3.12 BM characteristic of octahedral structures.