



REGULAR ARTICLE

Structural and spectral characterization of Cu(II) complexes of N(4)-substituted thiosemicarbazones derived from 2-hydroxyacetophenone: Crystal structure of a dinuclear Cu(II) complex

E B SEENA^{a,b}, M SITHAMBARESAN^c, SUNI VASUDEVAN^d and
M R PRATHAPACHANDRA KURUP^{a,e,*}

^aDepartment of Applied Chemistry, Cochin University of Science and Technology, Kochi 682 022, Kerala, India

^bPost Graduate and Research Department of Chemistry, Maharaja's College, Ernakulam, India

^cDepartment of Chemistry, Eastern University, Chenkaladi, Sri Lanka

^dDepartment of Chemistry, National Institute of Technology Calicut, Calicut 673 601, Kerala, India

^eDepartment of Chemistry, School of Physical Science, Central University of Kerala, Tejaswini Hills, Periyar, Kasaragod 671 320, Kerala, India

E-mail: mrpcusat@gmail.com; mrp@cukerala.ac.in

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Abstract. Copper(II) complexes of 2-hydroxyacetophenone-N(4)-cyclohexylthiosemicarbazone (H_2L^1) and 2-hydroxyacetophenone-N(4)-phenylthiosemicarbazone (H_2L^2) have been synthesized and characterized by different physicochemical techniques like magnetic studies and electronic, infrared and EPR spectral studies. $[(CuL^1)_2]$ (**1**) is a dinuclear complex having four coordination around copper(II) with distorted square planar geometry. The two individual dinuclear complexes are interconnected through two bifurcated classical hydrogen bond interactions producing a sheet-like structure along b axis. $[(CuL^2)_2] \cdot \frac{1}{2}H_2O$ (**2**) also has a dimeric structure. The thiosemicarbazones bind to the metal as dianionic ONS donor ligand in all the complexes, except in the complexes $[Cu(HL^1)Cl] \cdot 2H_2O$ (**3**), $[Cu(HL^1)Br] \cdot 4H_2O$ (**4**) and $[Cu(HL^1)NO_3] \cdot C_2H_5OH(H_2O)$ (**5**), where the ligand moieties are coordinated as monoanionic (HL) ones. Complexes $[CuL^1 \cdot dmbipy]$ (**6**), $[CuL^2 \cdot dmbipy] \cdot 3H_2O$ (**7**), $[CuL^2 \cdot bipy] \cdot H_2O$ (**8**) and $[CuL^2 \cdot phen] \cdot 2C_2H_5OH$ (**9**) are heterocyclic base adducts.

Keywords. 2-Hydroxyacetophenone; thiosemicarbazone; X-ray crystallography; copper(II) complex; EPR spectrum.

1. Introduction

Thiosemicarbazones form a class of versatile nitrogen and sulfur (NS) donor chelating ligands and are known to exhibit diverse biological activities.¹ The biological activities are dependent upon the chemical nature of the moiety attached to the C=S carbon atom. They can act as tridentate ligands if additional donor atoms are present near the thiosemicarbazone moiety.² Thiosemicarbazones derived from 2-hydroxyacetophenone can act as a dianionic tridentate ligand by deprotonation of both phenol and thiol functions.²

They can also behave as monoanionic tridentate ligands coordinating with a metal centre through the deprotonated phenolic oxygen, thione sulfur and the azomethine nitrogen.² Thiosemicarbazones form complexes with copper(II) exhibiting interesting structures.³

Thiosemicarbazones and their copper complexes are of considerable interest because of their chemical and promising biological properties.^{4,5} They can easily be modified by varying the parent aldehyde or ketone used for the synthesis, particularly with compounds having additional potential coordinating sites or by

*For correspondence

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