Polyhedron 141 (2018) 60–68

Contents lists available at ScienceDirect

Polyhedron

journal homepage: www.elsevier.com/locate/poly

Halogen/azide bridged box dimer copper(II) complexes of 2-benzoylpyridine-3-methoxybenzhydrazone: Structural and spectral studies

M.M. Fousiamol [a], M. Sithambaresan [b], Victoria A. Smolenski [c], Jerry P. Jasinski [c], M.R. Prathapachandra Kurup [a,d,*]

[a] Department of Applied Chemistry, Cochin University of Science and Technology, Kochi 682 022, Kerala, India
[b] Department of Chemistry, Faculty of Science, Eastern University, Chenkalady, Sri Lanka
[c] Department of Chemistry, Keene State College, 229 Main Street, Keene, NH 03435-2001, USA
[d] Department of Chemistry, School of Physical Sciences, Central University of Kerala, Riverside Transit Campus, Nileshwar, 617314, India

ARTICLE INFO

Article history:
Received 29 August 2017
Accepted 15 November 2017
Available online 24 November 2017

Keywords:
Halogen bridged dimer
Benzhydrazone
Copper(II) complexes
Pseudohalide
Square pyramidal

ABSTRACT

The new proligand 2-benzoylpyridine-3-methoxybenzhydrazone (HL) and its three copper(II) complexes have been synthesized and characterized by different physicochemical techniques, including molar conductivity measurements, magnetic studies, electronic, infrared and EPR spectral studies. The crystal structures of HL and its copper complexes have been resolved using single crystal X-ray studies. The reaction of 2-benzoylpyridine-3-methoxybenzhydrazone with a variety of copper salts yielded a series of copper(II) complexes of the type $[CuLX]_2$ where X = Cl (**1**), Br (**2**) and N_3 (**3**). The crystal structures of all these compounds revealed halogen/azide bridged box dimers having the monoclinic space group symmetry $P2_1/n$. All the complexes have a distorted square pyramidal geometry.

1. Introduction

Hydrazones are an important class of compounds, exhibiting a wide spectrum of activities in the biological, medicinal, catalytic and photoluminescence [1] fields. The biological and medicinal activities include antimicrobial [2], antioxidant [3], anticancer [4,5], antitubercular [6] and DNA binding [7]. They are resourceful compounds which can act as potential multifunctional ligands with interesting coordination modes in either the neutral, monoanionic, dianionic or tetraanionic forms, bearing unusual coordination numbers [8–11]. Among the various transition metals, dinuclear copper(II) complexes are gaining more importance because of their relevance in biological fields [12,13]. Copper complexes exhibit a rich coordination chemistry and copper has its own footprint in both magnetic susceptibility and EPR. Copper(II) complexes of diverse drugs have been the subject of a large number of research studies due to the synergic activity with the drug. The design and synthesis of halide/pseudohalide bridged dinuclear copper(II) complexes of hydrazones have been an attractive area of research [14,15]. The structural and magnetic properties of asymmetric double end-on ($\mu_{2\text{-}1,1}$-N_3) azido-bridged dimeric complexes have been extensively studied [16]. The present paper describes the synthesis and characterization of a new ligand, 2-benzoylpyridine-3-methoxybenzhydrazone, and its three box dimer copper(II) complexes **1**–**3** by IR, UV–Vis, EPR and single crystal X-ray crystallography studies.

2. Experimental

2.1. Materials

All the reagents and solvents employed were commercially available and used as received without further purification. 3-Methoxybenzhydrazide (Alfa Aesar), 2-benzoylpyridine (Sigma Aldrich), copper(II) bromide (Spectrochem), copper(II) chloride dihydrate (Spectrochem) and sodium azide (Merck) were used as supplied.

Caution! Azide complexes of metals with organic ligands are potentially explosive and should be handled with care.

2.2. Synthesis of the ligand (HL) and its copper(II) complexes

2.2.1. Synthesis of 2-benzoylpyridine-3-methoxybenzhydrazone (HL)

HL was synthesized by refluxing 0.183 g (1 mmol) of 2-benzoylpyridine in MeOH with 0.166 g (1 mmol) of 3-methoxybenzhy-

* Corresponding author at: Department of Applied Chemistry, Cochin University of Science and Technology, Kochi 682 022, Kerala, India. Fax: +91 484 2575804.
E-mail address: mrpcusat@gmail.com (M.R.P. Kurup).

https://doi.org/10.1016/j.poly.2017.11.024
0277-5387/