

Synthesis, spectral and magnetic properties, and crystal structures of copper(II) pyridinecarboxylate adducts with N-heterocyclic ligands.

Autorzy

Peter Segl'a

M. Palicová

D. Mikloš

Marian Koman

Milan Melnik

Maria Korabik

Jerzy Mroziński

Tadeusz Głowiak

M. R. Sundberg

P. Lönnecke

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Kolekcja

Naukowa

Synthesis and characterization of seven new complexes $[\text{Cu}(\text{2-MeSnic})_2(\text{CH}_3\text{OH})]_2$ (where 2-MeSnic is 2-methylthionicotinate), $[\text{Cu}(\text{2-MeSnic})_2\text{L}_2]_2$ (where L is pyridine — py, ethylnicotinate — Etnic and butylnicotinate — Bunic), $[\text{Cu}(\text{2-MeSnic})_2\text{L}_2(\text{H}_2\text{O})_2]$ (where L is py and nicotinamide — nia) and $[\text{Cu}(\text{2-MeSnic})_2(\text{N-Menia})_2(\text{H}_2\text{O})_2] \cdot 2\text{H}_2\text{O}$ (where N-Menia is N-methylnicotinamide) are reported. The characterization were based on elemental analysis, infrared, electronic and EPR spectra, and magnetic susceptibility measurements over a temperature range of 1.8 — 300 K or 70 — 300 K. Three complexes of different type were studied by X-ray analysis. The molecule of $[\text{Cu}(\text{2-MeSnic})_2(\text{CH}_3\text{OH})]_2$ has dimeric paddle-wheel cage structure with a tetragonal pyramidal arrangement around Cu^{II} . The dimer results from the fact that carboxyl groups of four 2-MeSnic anions function as bridging in a *syn-syn* arrangement. On the other hand $[\text{Cu}(\text{2-MeSnic})_2(\text{py})_2]_2$ forms dimers with hexacoordinated Cu^{I} atoms in highly distorted coordination octahedra, each with two oxygen atoms of bridging carboxyl groups in an *anti-anti* arrangement of two 2-MeSnic anions, with two oxygen atoms of one asymmetrically chelating 2-MeSnic anion and with two nitrogen atoms of two pyridine ligands. The temperature independent EPR spectrum for this complex exhibits an axial signal which corresponds to almost isolated $S = 1/2$ magnetic ions. Magnetic data for the dimer show a weak antiferromagnetic interaction between the two metal ions with $J = -0.65 \text{ cm}^{-1}$. The Cu^{I} atom in complex $[\text{Cu}(\text{2-MeSnic})_2(\text{py})_2(\text{H}_2\text{O})_2]$ is hexacoordinated in an elongated centrosymmetrical tetragonal-bipyramidal arrangement (4 + 2). Based on the molecular structure the electronic, infrared, electron paramagnetic resonance spectra and magnetic properties are discussed and stereochemistry as well as the mode of ligand coordination in new solid complexes under study have been determined.

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