

Syntheses, structures and magnetic behaviors of 1D and 3D $\mu_{1,5}$ -dicyanamide bridged copper(II) coordination polymers containing a symmetrical 1,2-diamine as a chelator.

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Streszczenie

Two neutral copper(II) coordination polymers, $[\text{Cu}(\text{en})(\text{m}1,5\text{-dca})(\text{dca})]_n(1)$ and $[\text{Cu}_3(\text{en})_2(\text{m}1,5\text{-dca})_6]_n(2)$ [en = 1,2-ethanediamine, dca = dicyanamide], with $\text{m}1,5$ -dicyanamide bridges have been isolated. X-ray structural analysis reveals that each $\text{Cu}(\text{II})$ center in the asymmetric unit of **1** adopts a distorted square pyramidal geometry with a CuN_5 chromophore ligated through two N atoms of the symmetrical 1,2-ethanediamine (en) ligand, one nitrile N atom of a terminal dca ligand and two nitrile N atoms of the $\text{m}1,5$ -bridging dca ligand. **1** is an example of coordination polymer containing both $\text{m}1,5$ - dca and terminal dca . Adjacent copper atoms are connected by dca ligands in the $\text{m}1,5$ -bridging mode affording a 1D chain structure. In the crystalline state, these 1D chains are further associated through weak intermolecular N-H...N hydrogen bonds to form a 2D sheet structure, viewed along the crystallographic b -axis. The asymmetric unit of **2** contains two types of copper(II) centers ($\text{Cu}1$ and $\text{Cu}2$). $\text{Cu}1$ adopts a distorted square pyramidal geometry with a CuN_5 chromophore coordinated through two N atoms of the bidentate ligand (en) and three nitrile N atoms of three different $\text{m}1,5$ -bridged dca ligands, whereas $\text{Cu}2$ is connected to six nitrile atoms of six different $\text{m}1,5$ -bridged dca ligands, resulting in a distorted octahedral geometry with a CuN_6 chromophore. Adjacent copper atoms are connected by $\text{m}1,5$ -bridging dca ligands to form a 3D net-work coordination polymer structure, which contains multiple N-H...N hydrogen bonds in the crystalline state. A variable-temperature magnetic susceptibility study shows very weak antiferromagnetic interactions among the neighboring metal centers through the $\text{m}1,5$ - dca bridges with $J=0.12\text{ cm}^1$ for complex **1** and $J=0.19\text{ cm}^1$ for complex **2**.

Słowa kluczowe

1D and 3D CPs of copper(II), X-ray structure, EPR studies, magnetic properties, Terminal and $\mu_{1,5}$ -bridged dca

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