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Hydrogen-bond-based magnetic exchange between μ-diethylnicotinamide(aqua)bis(X-salicylato)copper(II) polymeric chains.

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Streszczenie

Polymeric salicylatocopper(II) complexes of unusual composition $[Cu(X\text{-}sal)_2(\mu\text{-denia})(H_2O)]_n$ [denia = diethylnicotinamide, and X-sal = 5-methylsalicylate (**1**), 3-methylsalicylate (**2**), 4-methoxysalicylate (**3**), 3,5-dichlorosalicylate (**4**) and 3,5-dibromosalicylate (**5**)] were synthesized and characterized. Magnetic measurements were performed in the temperature range 1.8–300 K. The structural unit of all complexes consists of a Cu^{II} atom, which is monodentately coordinated by the pair of X-salicylate anions in *trans* positions. Water and the diethylnicotinamide ligand occupy the other two basal plane positions of the tetragonal pyramid. The axial positions are occupied by a diethylnicotinamide oxygen atom of neighboring structural units, thus forming a spiral polymeric structure parallel to *b* axis. Magnetic measurements showed that all complexes **1**–**5** exhibit a susceptibility maximum at about 6–8 K. The obtained data fit to Bleaney–Bowers equation gave singlet-triplet energy gaps $2J = -8.60\ cm^{-1}$ for **1**, $2J = -6.57\ cm^{-1}$ for **2**, $2J = -8.57\ cm^{-1}$ for **3**, $2J = -6.82\ cm^{-1}$ for **4**, and $2J = -6.45\ cm^{-1}$ for **5**. The supramolecular structure based on hydrogen bonds [described by supramolecular synthons $R_2^2(10)$ and $R_2^2(12)$] is the pathway for antiferromagnetic interactions of the magnetically coupled pairs of copper atoms of neighboring chains within the 2D supramolecular layers. The results of the magnetic measurements suggest involvement of the COO groups in the magnetic interaction pathway for all five complexes.

Słowa kluczowe

Coordination polymer, copper, hydrogen bonds, magnetic properties, Supramolecular chemistry

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