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Previously it was demonstrated that hydrogen bonds (HBs) can be responsible for observed differences in structural and magnetic dimensionalities in structurally one-dimensional (1D) Cu(II) complexes [1]. The study of magnetic and thermodynamic properties of structurally 1D compound Cu(en)2Ni(CN)4 (en = ethane-1,2-diamine) in the very low temperature region (below 0.5 K) corroborated its magnetically 2D character (square Heisenberg plane); as additional exchange paths to the covalent bonds the present HBsoftheNH⋯N(C)⋯H-N type were suggested [2]. Weak character of the magnetic exchange interactions is in line with long exchange path through the diamagnetic -NC-M-CN-five-atomic bridge. In order to shorten this five-atomic bridge we have undertaken a study of a series copper(II) compounds in which [M(CN)4]2− bridging species with square coordinated diamagnetic M(II) atoms were replaced by [MnCl4]2− anion. The use of [MnCl4]2− anion as a bridging unit enhances the attractiveness of these Cu(II)-Mn(II) bimetallic chain systems from magnetic properties point of view as they represent potential starting blocks in the synthesis of molecular-based ferromagnets.

As the result of our experimental work we have prepared and structurally characterized three novel compounds Cu(men)2MnCl4 (1), Cu(bmen)2MnCl4 (2) and Cu(dmen)2MnCl4 (3) (men = N-methylethane-1,2-diamine; bmen = N,N'-dimethylethane-1,2-diamine; dmen = N,N-dimethylethane-1,2-diamine). Two of them, 1 and 2 exhibit chain-like structures analogous to the already reported Cu(en)2MnCl4 [3] in which the hexa-coordinated Cu(II) atom is surrounded by two chelate bonded blocking ligands and two _2-chlorido ligands placed in the trans positions; these chloride ligands link Cu(II) and Mn(II) atoms. On the other hand, the use of the unsymmetrical dmen ligand leads to a dinuclear compound 3 with molecular structure in which the pentacoordinated Cu(II) and tetrahedrally coordinated Mn(II) atoms are linked by one bridging _2-chlorido ligand. Further details on the syntheses, characterizations and crystal structures will be given. This work was supported by the Slovak grant agency APVV under contract Nos. APVV-0132-11 and by grant agency VEGA (grant 1/0075/13).


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