

The effects of protonated heterocyclic cations on the structural and magnetic properties of tetrachlorocuprate(II) anions : X-ray, magnetochemical and EPR studies.

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Streszczenie

The crystal and molecular structures and magnetic properties of two new complexes (HMepy)₂[CuCl₄]·2H₂O, **2**, and (H₂Me₂ppz)[CuCl₄], **3**, formed by tetrachlorocuprate(II) anions and organic heterocyclic cations, bis(3-amino-2-chloro-5-methylpyridinium) (HMepy) and *trans*-2,5-dimethylpiperazinium (H₂Me₂ppz), respectively, have been determined by the analysis of their X-ray diffraction data, magnetic susceptibility behaviour and EPR spectral parameters. These characteristics differentiate the [CuCl₄]²⁻ anions in **2** and **3** as well as that previously reported in (H₂bipip)[CuCl₄]·H₂O, **1**, (bipip = 4,4'-bipiperidine) (Tuikka *et al.*, *CrystEngComm*, 2013, **15**, 6177; Wikaira *et al.*, *J. Coord. Chem.*, 2016, **69**(1), 57). The present study reveals a significant effect of the organic cations on the geometry and magnetic properties of the [CuCl₄]²⁻ anions caused evidently by the changes in the crystal packing structure. A characteristic relationship was observed between the average *cis*-angles around the Cu(II) ions in [CuCl₄]²⁻ for **1–3**, affected by the Cu(II) coordination geometry, and *g*-tensor components derived from the EPR spectra, a measure of interaction of copper(II) unpaired electrons in the [CuCl₄]²⁻ anions with an external magnetic field. The magneto-structural correlations revealed weak antiferromagnetic exchange interactions between the [CuCl₄]²⁻ anions transmitted by different pathways.

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