Synthesis and characterisation of coordination polymers of Cu^{II} and Zn^{II} with 1,3-bis(1,2,3,4-tetrazol-2-yl)propane - rotational freedom of the donor group favours structural diversification.

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The novel bidentate ligand 1,3-bis(1,2,3,4-tetrazol-2-yl)propane (pbtz), which possesses a flexible spacer, was synthesised in order to investigate the influence of the flexibility of ligand molecules on the architecture of coordination polymers. For that purpose the reactions between pbtz and $M(ClO_4)_2·6H_2O$ salts (M = Cu^{II} and Zn^{II}) were performed. The complexes $[\{Cu(pbtz)_3\}(ClO_4)_2]_\infty$ and $[\{Zn(pbtz)_3\}(ClO_4)_2·2EtOH]_\infty$ were characterised by IR and UV/Vis spectroscopy and their crystal structures were determined by single-crystal X-ray diffraction measurements. In both compounds the pbtz ligand molecules act as N4,N4′ connectors bridging the central atoms, and the 2-substituted tetrazole rings coordinate in a monodentate fashion to the central atoms forming $M(tetrazole)_6$ cores. $[\{Cu(pbtz)_3\}(ClO_4)_2]_\infty$ was isolated as a 1D coordination polymer. The copper(II) ions are triply bridged by ligand molecules, leading to the formation of infinite 1D chains. A highly unusual manner of bridging, with the tethering of two neighbouring central atoms by the same kind of ligand molecules, although possessing different conformations, is observed. In $[\{Zn(pbtz)_3\}(ClO_4)_2·2EtOH]_\infty$ the six-coordinate zinc(II) ions, which are bridged by single ligand molecules, serve as topological nodes, leading to the formation of a 3D α-polonium-type network. The crystal structure of the Zn^{II} complex contains only one such net solvated by ethanol molecules. A conformational analysis of the ligand molecules in both compounds demonstrates that the flexibility of the pbtz and the ability of the tetrazole rings in particular to adopt various, relative orientations is responsible for the diversity of the architectures of the obtained complexes.

Adres publiczny

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