NOVEL IRON(II) AND COPPER(II) COORDINATION COMPOUNDS WITH N,N'-BIPYRIDINE-TYPE LIGANDS: SYNTHESIS AND CHARACTERIZATION

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Abstract. Two new coordination compounds \( \{[\text{Fe}(\text{bpy})_2(\text{H}_2\text{O})_2](\text{SO}_4)_{2n}(\text{bpyH}_2)\cdot2(\text{H}_2\text{O})\} \) \( (1) \) and \( \{[\text{Cu}(\text{bpp})_2(\text{H}_2\text{O})](\text{BF}_4)_2\cdot\text{dmf}\cdot0.75(\text{H}_2\text{O})\} \) \( (2) \), (where bpy= 4,4'-bipyridine and bpp= 1,3-bis(4-pyridyl)propane, dmf= N,N-dimethylformamide) have been synthesized by slow evaporation method rigid and flexible bis(pyridine) ligands. The obtained compounds were characterized by thermal analysis, IR spectroscopy and single crystal X-ray diffraction analysis. The structure of \( 1 \) is a channel-containing open framework constructed through the hydrogen-bonding supported by the criss-cross arrangement of the 1D Fe-bpy anionic chains, in which the surrounding of the metal atom is completed by oxygen atoms belonging to water molecules and \( \text{SO}_4^{2-} \) anions. The structure of \( 2 \) is formed by an one-dimensional polymeric cationic chain, in which the four bpp ligands connect with Cu(II) by four nitrogen atoms and one oxygen atom that belongs to a molecule of water that completes the surrounding of each metal atom. The complexes crystallize in the monoclinic space groups \( C2/c \) and \( P2_1 \) respectively, where Fe(II) and Cu(II) ions present a \( \text{N}_2\text{O}_4 \) octahedral and \( \text{N}_4\text{O} \) square pyramidal environment. The hydrophilic regions absorb \( \text{bpyH}_2^{2+} \) and water molecules in \( 1 \) and \( \text{BF}_4^- \) anions, water and dmf molecules in \( 2 \), which are held in the crystal lattices via hydrogen bonds.

Keywords: crystalline coordination polymer, bridging ligand, supramolecular system, \( \pi-\pi \) stacking interaction.