




DESIGN, SYNTHESIS, AND STRUCTURAL STUDY OF MONO- AND POLYNUCLEAR Cu(II) IMINODIACETATE COMPLEXES

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Abstract. The synthesis of three structurally distinct copper(II) coordination compounds was conducted under different pH conditions, employing iminodiacetic acid (IDAH₂) as the ligand. In a neutral medium, compound **1** was obtained as a two-dimensional ionic coordination polymer with the formula $\{(\text{NH}_2(\text{CH}_3)_2)_2[\text{Cu}_3(\text{IDA})_4] \cdot 1.75\text{H}_2\text{O}\}_n$, featuring layered $[\text{Cu}_3(\text{IDA})_4]_n^{2n-}$ anions stabilized by hydrogen bonding networks (pH= 6–6.5). In a basic medium (pH= 8–8.5), compound **2** was isolated as a neutral 2D molecular coordination polymer, $\{[\text{Cu}_3(\text{IDA})_2(\text{IDAH})_2] \cdot 5\text{H}_2\text{O}\}_n$, based on trinuclear copper units bridged by bi- and monodeprotonated ligands. Acidic conditions (pH= 3) led to the formation of compound **3**, $((\text{CH}_3)_2\text{OH})_2[\text{Cu}(\text{IDA})_2] \cdot [\text{Cu}(\text{IDAH})_2]$. The compound exhibits an ionic structure composed of a neutral and anionic mononuclear complexes, charge-balanced by protonated dimethylether cations. The observed structural diversity is attributable to the various deprotonation states of the ligand, in association with the nature of the outer-sphere components. A detailed investigation into the infrared (IR) spectra of the compounds provided substantial evidence supporting the proposed coordination modes and hydrogen-bonding interactions. These interactions have been demonstrated to play a pivotal role in the formation of extended supramolecular architectures in all three compounds.

Keywords: coordination compound, Cu(II), iminodiacetic acid, dioxime, X-ray study.

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