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

Dumitru Ureche [a*], Pavlina Bourosh [b], Ion Bulhac [a]

[a]*Institute of Chemistry of Moldova State University, 3, Academiei str., Chisinau MD 2028, Republic of Moldova*
[b]*Institute of Applied Physics of Moldova State University, 5, Academei str., Chisinau MD 2028, Republic of Moldova*
[*]*e-mail: dumitru.ureche@sti.usm.md, d.ureche@yahoo.com*

Abstract. The synthesis of three structurally distinct copper(II) coordination compounds was conducted under varying pH conditions, with iminodiacetic acid ($IDAH_3$) employed as the ligand. In a neutral medium, compound **1** was obtained as a two-dimensional ionic coordination polymer with the formula $\{[NH_2(CH_3)_2]_2[Cu_3(IDA)_4]\cdot 1.75H_2O\}_n$, featuring layered $[Cu_3(IDA)_4]^{2n-}$ 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, $\{[Cu_3(IDA)_2(IDAH)_2]\cdot 5H_2O\}_n$, based on trinuclear copper units bridged by bi- and monodeprotonated ligands. Acidic conditions (pH= 3) resulted in the formation of compound **3**, $((CH_3)_2OH)_2[Cu(IDA)_2]\cdot[Cu(IDAH)_2]$, an ionic structure composed of a neutral and anionic mononuclear complexes, charge-balanced by protonated dimethylether cations. The structural diversity observed is attributable to the varying deprotonation states of the ligand, in conjunction with the nature of the outer-sphere components. A detailed investigation into the infrared (IR) spectra of the compounds provided substantial evidence in support of the 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.