

Coordination chemistry of 2-hydroxymethylbenzimidazole complexes with copper(II) and cadmium(II) ions: similarities and differences.

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The new Cu(II) and Cd(II) complexes of the biologically relevant ligand 2-hydroxymethylbenzimidazole: $[\text{CdL}_2(\text{NO}_3)_2]$ **1**, $[\text{CuL}_2(\text{NO}_3)](\text{NO}_3)(\text{H}_2\text{O})$ **2**, $[\text{CdL}_3](\text{NO}_3)_2\text{L}(\text{EtOH})_{0.25}$ **3**, *mer*- $[\text{CuL}_3](\text{NO}_3)_2(\text{H}_2\text{O})(i\text{-PrOH})$ **4** have been synthesized and characterized by elemental analyses, UV–Vis, IR, Raman, EPR, NMR, X-ray diffraction and magnetic measurements. X-ray studies have confirmed a bidentate fashion of coordination of the 2-CH₂OHBIm to the Cd(II) as well to Cu(II) ions. This results in the formulation of a five-membered chelate ring in which both N(imidazole) and O(hydroxymethyl) donors of ligand are involved. A comparison of Cu(II) **4** and Cd(II) **3** model complexes shows that both metals may form complexes which exhibit identical structures (distorted octahedral) forming chromophores of the MN₃O₃ type. On the contrary, the polyhedra of metal complexes containing two ligands are different. The copper complex **2** is a five-coordinated with tetragonal pyramid as coordination polyhedron (CuN₂O₃) but cadmium forms an eight-coordinated (CdN₂O₆) complex **1**. Weak C–H⋯π type interactions which were extracted from X-ray data of **1** were confirmed by the ¹³C NMR method. The IR data indicated that Cd(II) is a considerably better acceptor (Lewis acid) than Cu(II) ion for the N, O-donor ligand. The similarities and differences revealed in the coordination behaviour of Cu(II) and Cd(II) towards N, O-donor ligand should be treated as a test on possibility of the copper(II) ions to be displaced by cadmium(II), for example, in the intracellular sites.

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