XXI Brazilian Meeting on Inorganic Chemistry
X Brazilian Meeting on Rare Earths
III Workshop on Theoretical Bioinorganic Chemistry
Belo Horizonte, September 12 - 15th 2024

A new dimeric copper(II) complex containing a furan-derived *N*-acylhydrazone: Synthesis, characterization, solution studies and interaction with HSA.

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Thematic Area: Biological Inorganic Chemistry

Keywords: copper(II) complexes, *N*-acylhydrazone, HSA

According to the WHO, cancer is the second leading cause of death worldwide. In this context, many efforts have been made to develop more efficient therapies, presenting less side effects than current treatments. Our group pioneered in proposing the use of dinuclear copper(II) complexes derived from *N*-acylhydrazonic ligands as promising antiproliferative agents [1]. This work describes a dimeric copper(II) complex derived from a hydrazone containing a furan ring (**1**), which was synthesized from copper(II) nitrate trihydrate and H_2L2 ligand, obtained, in turn, from the condensation between 5-methylsalicylaldehyde and furan-2-carbohydrazide in methanol. Complex **1** was characterized by spectroscopic and electrochemical techniques, as well as studies in solution and interaction with the blood protein HSA. The IR spectrum of **1** shows characteristic bands present in the ligand spectrum, but shifted to lower wavenumber values, being indicative of complexation. Coordinated nitrate ion bands were also observed, which are in agreement with the structure obtained by X-ray diffraction. The UV-Vis spectrum in DMF displays 5 bands, some of which related to the *N*-acylhydrazone, and others to charge transfer from the phenolate ion to the cupric center and to the typical metal *d-d* transition. A complexation study of H_2L2 was carried out in methanol and the concentrations of the ligand and copper(II) nitrate trihydrate solutions were 2×10^{-5} mol L^{-1} and 3×10^{-4} mol L^{-1}, respectively. The curve obtained shows a saturation tendency close to 1 equivalent of Cu^{2+} ion, suggesting that the stoichiometry of the complex formed in solution is of the 1:1 type. The assays with the HSA protein were carried out using a 2×10^{-5} mol L^{-1} solution of complex **1**; the profile observed shows a bathochromic shift from the band initially centered at around 388 nm to 404 nm as the concentration of protein increases. Isosbestic points can be easily identified at around 330, 345 and 400 nm during the first HSA additions, indicating that only two absorbing species (free and bound forms of the complex) are initially in equilibrium. Plotting the absorbance at 430 nm as a function of HSA equivalents provides a sigmoidal curve that stabilizes at around [HSA]/[**1**] = 0.50, indicating that HSA can host up to two units of the dimeric complex, or four of the resulting monomeric compounds, in case of dissociation. The conductivity study indicates that complex **1** is a 1:2 type electrolyte [3], because of the nitrate ions in the structure, that are replaced by solvent molecules when in solution.

Acknowledgments: CNPq, FAPERJ, CAPES, Central Analítica (PUC-Rio).

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