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A heteroleptic copper(II) complex with 6-trifluoromethyluracil and 2,2'-bipyridine: synthesis, spectroscopic characterization and biological activities

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Nucleotide analogues are a class of molecules that presents antimicrobial and antitumor properties. Some examples are the anticancer drug 5-fluorouracil and the antiviral agent acyclovir [1,2]. Due to its well known medicinal applications and its versatility in the viewpoint of coordination chemistry, the nucleotide analogues have also been investigated in the synthesis of metal-based compounds seeking new bioactive agents for treatment of infectious diseases. Here, we present the synthesis of a copper(II) complex with 6-trifluoromethyluracil (L_1) and 2,2'-bipyridine (bpy), and its antibacterial activities. For the synthesis of the complex, a methanolic solution of the precursor Cu-bpy (0.50 mmol in 4.0 mL) was first prepared. Then, the Cu-bpy solution was added to an alkaline solution of L_1 (1.0 mmol in 6.0 mL of a water:methanol solution). The reaction was maintained under stirring and at room temperature for 4 hours, leading to the formation of a blue precipitate. The solid was collected by vacuum filtration, washed with methanol and dried in a desiccator over P_2O_5. The composition found for this complex was CuL_1Bpy plus one water molecule ($CuC_{20}H_{14}F_6N_6O_5{\cdot}H_2O$). Anal. Calc. (%): C 40.31; H 2.37; N 14.10. Found (%): C 40.32; H 1.69; N 13.98. Coordination of the ligand L_1 to Cu(II) was evaluated by the FTIR measurements. The obtained data suggest that L_1 coordinates to the metal by its nitrogen and oxygen atoms. The antibacterial activity of the complex was evaluated by a minimum inhibitory concentration (MIC) assay. The CuL_1Bpy complex was active over Gram-positive *Staphylococcus aureus* and *Bacillus cereus,* and Gram-negative *Escherichia coli* and *Pseudomonas aeruginosa* bacterial strains with MIC values in the range of 0.832 - 3.328 $mmol{\cdot}L^{-1}$. Further studies are envisaged to evaluate its possible biomolecular targets.

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