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Synthesis and characterization of Co(III) complexes containing hydroxyurea and 1,10-phenanthroline with biological activities

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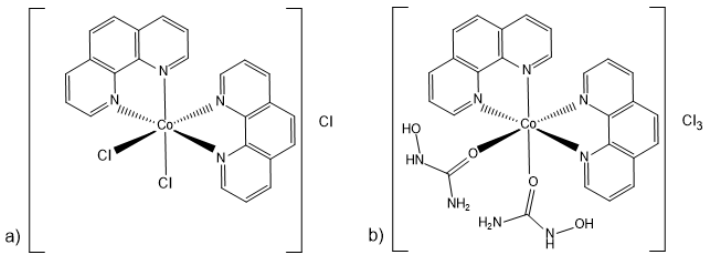
It's undeniable that society has made significant advances in developing products and technologies for various diseases, but some neglected diseases have few treatment options, as noted by the World Health Organization[3]. Therefore, it's relevant to conduct studies to develop treatment options for these mentioned groups. Following the theme of the versatile properties of coordination compounds[1,2], this study focuses on creating a cobalt(III)-based coordination compound using hydroxyurea (HU) and *o*-phenanthroline (phen) as ligands. From *cis*-$[CoCl_2(phen)_2]Cl.3H_2O$ (Figure 1a), was synthesized the compound *cis*-$[Co(HU)_2(phen)_2]Cl_3.2H_2O$ (Figure 1b), and both were characterized using various analytical techniques. The ^{13}C NMR spectrum confirmed that hydroxyurea is part of the complex composition. Based in the vibrational spectrum (FTIR), HU coordinates to Co(III) through the oxygen atom (carbonyl). Additionally, elemental and thermal analyses supported the proposed compositions, and the X-ray diffraction data indicated a strong similarity in crystal structures between both compounds. Once well-characterized, the compounds were evaluated against *T. cruzi*, bacterial and fungal strains. As a result, *cis*-$[CoCl_2(phen)_2]Cl.3H_2O$ exhibited trypanocidal activity, in a similar way of benznidazole, against trypomastigotes and amastigotes forms of *T. cruzi* in non-toxic concentrations to cardiomyocytes. Furthermore, *cis*-$[Co(HU)_2(phen)_2]Cl_3.2H_2O$ showed antimicrobial activity against two bacterial strains (*Staphylococcus aureus and Bacillus subtilis*). Since the compounds exhibit expected characteristics and demonstrate multiple types of biological activity, it is important to continue studying them to elucidate their mechanisms of action and identify other potential activities.

Figure 1. Proposed structures for *cis*-$[CoCl_2(phen)_2]Cl.3H_2O$ (a) and *cis*-$[Co(HU)_2(phen)_2]Cl_3.2H_2O$ (b)



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