

Synthesis and characterization of heteroleptic ruthenium(II) complexes containing 2,6-bis-(1H-imidazol-2-yl)-pyridine ligand

Renan B. Guerra^{1*}, Luis E. S. C. Huamani¹, André L. B. Formiga¹

¹Departament of Inorganic Chemistry, Institute of Chemistry – UNICAMP, P.O. Box 6154, 130783-970 Campinas, SP, Brazil

*e-mail: renanbarrachguerra@gmail.com

Ruthenium complexes with N-heterocyclic ligands have been extensively studied for numerous types of applications such as water-splitting, sensors and biosensors, dye sensitized solar cells, and others. With the experimental investigation on the influence of the ligands on the electrochemical and spectroscopic properties of heteroleptic ruthenium complexes, it is expected to understand how modifications in N-heterocyclic ligands with different σ -donor character influence the electronic density on the metal, including charge transfer and redox processes. To do so, new ruthenium complexes [RuCl(Himpy)(dimpy)] (**2**) and its precursor [Ru(dimpy)Cl₃] (**1**), where dimpy = 2,6-bis-(1H-imidazol-2-yl)-pyridine and Himpy = 2-(1H-imidazol-2-yl)-pyridine, were synthesized by procedures adapted from the literature^{1,2}. The compounds were characterized by UV-vis, ¹H-NMR, ESI-MS, and elemental analysis. The **1** complex, analogous to [Ru(tpy)Cl₃], was obtained in a yield of about 80% whose NMR is shown in Figure 1. The electronic spectra of heteroleptic complex **2** showed a MLCT band at 460 nm, as shown in Figure 2, which demonstrates to be bathochromically shifted compared to [Ru(dimpy)₂]²⁺ (λ = 450 nm) and [Ru(Himpy)₃]²⁺ (λ = 435 nm) from literature^{3,4}.

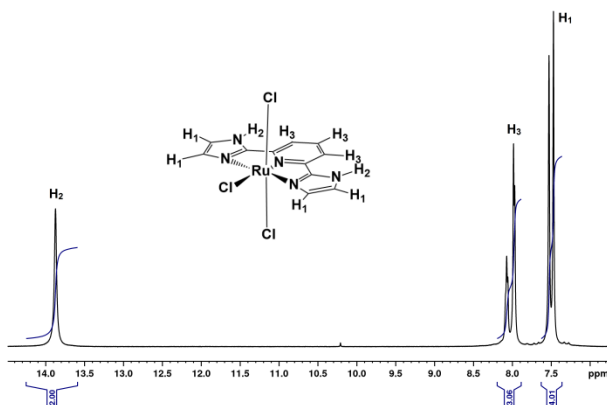


Figure 1. ¹H-NMR spectrum of [Ru(dimpy)Cl₃] with zinc powder in DMSO-d₆.

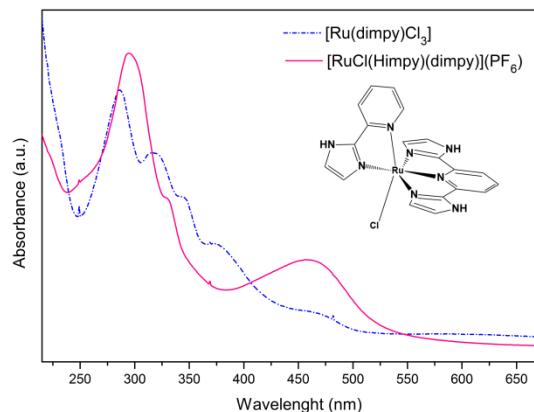


Figure 2. UV-Vis spectra (MeOH) of **1** and **2**.

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