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Área: INO

Ruthenium(II) Complex with 1-Hyhdroxy-9,10-anthraquinone Inhibits Cell Cycle Progression at G0/G1 and Induces Apoptosis in Melanoma Cells

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Palavras Chave: *1-Hydroxy-9,10-anthraquinone, Ruthenium complexes, Melanoma, Antiproliferative activity.*

Highlights

New ruthenium complexes containing 1-hydroxy-9,10-anthraquinone were obtained. Interactions with DNA was performed. Ru(II) complex revealed a greater cytotoxic activity in melanoma cell line (CHL-1).

Abstract

Melanoma is the most aggressive and lethal skin cancer that affects thousands of people worldwide. Ruthenium complexes have shown promising results as cancer chemotherapeutics, offering several advantages over platinum drugs, such as potent efficacy, low toxicity, and less drug resistance. Additionally, anthraquinone derivatives have broad therapeutic applications, including melanoma. Thus, two new ruthenium complexes with 1-hydroxy-9,10-anthraquinone were obtained: *trans*-[Ru(HQ)(PPh_3)$_2$(bipy)]PF_6 (**1**) and *cis*-[$RuCl_2$(HQ)(dppb)] (**2**), where HQ = 1-hydroxy-9,10-anthraquinone, PPh_3 = triphenylphospine, bipy = 2,2′-bipyridine, PF_6 = hexafluorophosphate, and dppb = 1,4-bis(diphenylphosphine)butane (Figure 1). The complexes were characterized by infrared (IR), UV–vis, ^{1}H, ^{13}C{^{1}H}, and ^{31}P{^{1}H} NMR spectroscopies, molar conductivity, cyclic voltammetry, and elemental analysis. Furthermore, density functional theory (DFT) calculations were performed. Compound (**2**) was determined by single-crystal X-ray diffraction, which confirms the bidentate coordination mode of HQ through the carbonyl and phenolate oxygens (Figure 2). Additionally, DNA-binding experiments yielded constants of 10^5 M^{-1} (Kb = 6.93 × 10^5 for (**1**) and 1.60 × 10^5 for (**2**)) and demonstrate that both complexes can interact with DNA through intercalation, electrostatic attraction, or hydrogen bonding. The cytotoxicity profiles of the compounds were evaluated in human melanoma cell lines (SK-MEL-147, CHL-1, and WM1366), revealing greater cytotoxic activity for (**1**) on the CHL-1 cell line with an IC_{50} of 14.50 ± 1.09 μM. Subsequent studies showed that (**1**) inhibits the proliferation of CHL-1 cells and induces apoptosis, associated at least in part with the pro-oxidant effect and cell cycle arrest at the G1/S transition.

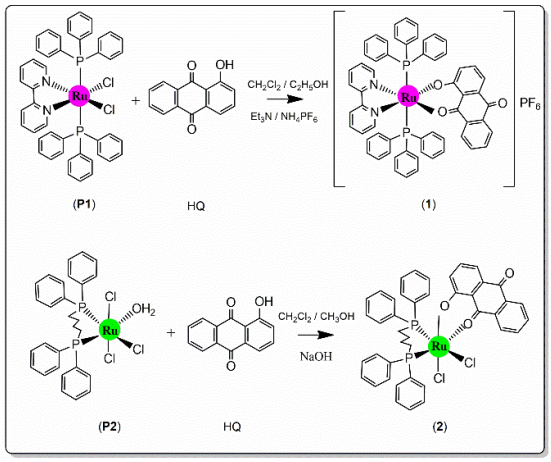

Figure 1. Synthetic route of complexes (**1**) and (**2**).

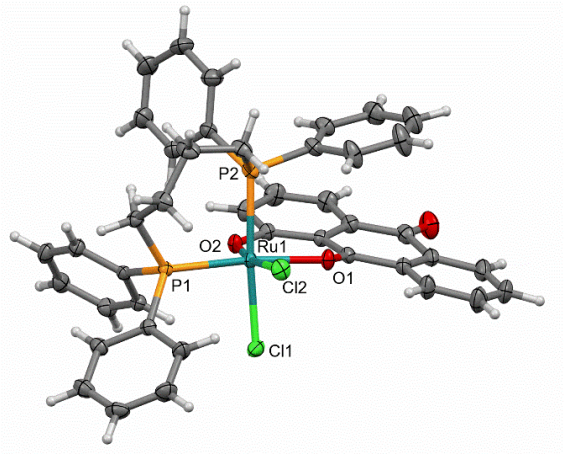

Figure 2. Ellipsoid representation (25% probability) of (**2**).

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