

Platinum(II), palladium(II) and gold(III) complexes with a diacetylmonoxime thiosemicarbazonate ligand of medicinal potential

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Introduction

Pt^{II} complexes such as cisplatin and carboplatin have been extensively used in cancer therapy. Nevertheless, severe side effects, drug resistance and lack of effectiveness against some types of tumors stimulate the synthesis of new drugs. Pd^{II} and Au^{III} are alternatives to replace Pt^{II} in anticancer drugs due to their similar chemical and structural properties. Besides, different mechanisms of action may be achieved with these metal ions.¹

Modifying the ligand structure is as important as changing the metal ion. Therefore, we have selected thiosemicarbazones as chelate agents since they present anti-neoplastic activity by themselves.¹ Additionally, the oxime moiety offers another interesting functionality to our ligand system.

This work presents the synthesis and characterization of new Pt^{II}, Pd^{II} and Au^{III} complexes with an oxime thiosemicarbozonate ligand as preliminary study for the development of new antineoplastic drugs.

Results e Discussion

The oxime thiosemicarbazone (H₂otsc) has been synthesized by refluxing diacetylmonoxime and ethylthiosemicarbazide (1:1). **Figure 1** shows the crystal structure of H₂otsc.

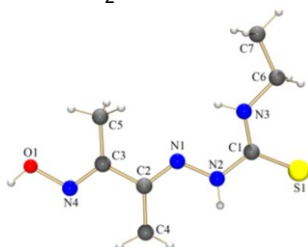
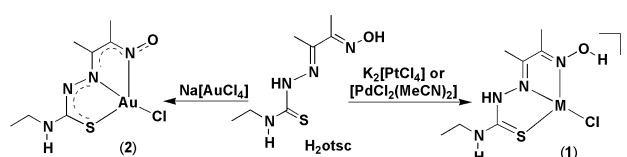


Figure 1 - Molecular structure of H₂otsc.

The complexes were obtained from reactions between H₂otsc and the respective metal precursor in MeOH (Scheme 1). The compounds have been characterized by CHNS analysis, conductimetry, UV-Vis, IR and ¹H-NMR. The conductimetric measurements show that the Pd^{II} and Pt^{II} complexes are cationic, while the Au^{III} complex is neutral. This is

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in accord with the FTIR and ¹H-NMR spectra of the complexes, which showed no deprotonation for the H₂otsc ligand upon coordination to form complexes type **1** but a double deprotonation in **2**.



Scheme 1 – Synthesis of the complexes [MCl(H₂otsc)]Cl (**1a** for M = Pd and **1b** for M = Pt) and [AuCl(otsc)] (**2**).

Complex **1b** was further studied by X-ray diffraction on single crystal and Fig. 2 presents the structure determined. It crystallizes with two complex entities in the asymmetric unit, in the monoclinic crystal system and space group P2₁. As expected from the spectroscopic data, H₂otsc binds the Pt^{II} center as a neutral N,N,S-chelate. A net of intermolecular hydrogen bonds involving the OH and NH groups is observed in the crystal structure.

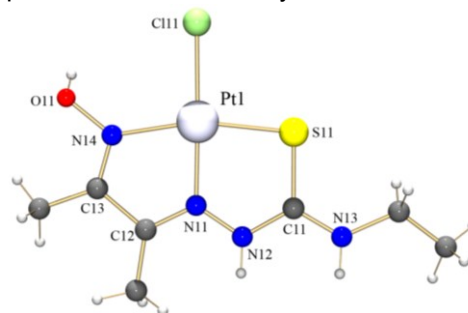


Figure 2 – X-ray structure of the complex ion [PtCl(H₂otsc)]⁺ present in **1b**.

Conclusions

The structural aspects of the complexes presented here are very interesting as well as the exploration of their biological potential, which is now under study.

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