Abstract

The subject of the presented work is the synthesis and structural characterisation of platinum-alkynyl-complexes. In addition to general spectroscopic properties, their cytotoxic properties towards two human cancer cell lines and their possible interaction with nucleophiles present in the human body were also studied.

The synthesis of a large number of complexes [Pt(cod)(C≡CR)$_2$], [Pt(cod)(Me)(C≡CR)] and [Pt(cod)(R`)(C≡CR)] with various alkynyl ligands (C≡C–R) and different coligands R` such as the strong σ-donating ligands alkynyl, alkyl and aryl as well as halogeno ligands was successfully carried out by using established or modifying methods. The characterisation occurred via NMR, IR, and UV/Vis spectroscopy as well as by cyclic voltammetric analysis. Additionally, some compounds could be structurally established via X-ray diffraction of single crystals. The investigation of the cytotoxic properties of different platinum alkynyl complexes shows a significant anti proliferative effect on the growth of HT-29 breast and MCF-7 colon cancer cells. The complex [Pt(cod)(Me)(C≡C(4Me)Ph)] came out to be even more toxic than *Cisplatin*. In addition, the interactions of selected compounds with chlorine und glutathione as well as the stability towards a decreasing pH value and the solvent dimethylformamide used during the cytotoxicity tests was studied by UV/Vis and NMR spectroscopy.

In a further step the ligand exchange rates of diene chelating agents by the α-diimine 1,4-Diisopropyl-1,4-diazabuta-1,3-dien (*i*PrDAB) in complexes of the type [PtCl$_2$(dien)] with several cyclic and non-cyclic η^4-coordinating dienes were determined. Also, alkynyl platinum complexes of the diene ligand 1,5-dimethylcycloocata-1,5-dien, which is easier to exchange than cod could be synthesized. By comparing the inhibitory concentrations (IC_{50}) towords cancer cell lines no correlation between the exchange rate and the cytotoxicity could be determined. The complex [Pt(cod)(C≡C(4Me)Ph)$_2$] with the stronger cod ligand proved to be more toxic than the analogous compound with the easier exchangeable Me$_2$cod.

The preparation of analogous palladium complexes was impaired by the high tendency of such compounds to undergo reductive elimination and formation of elemental palladium.