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New complexes of ruthenium and copper with potential biological activity

Cancer is one of the most frequent cause of death and since decades remains one of the most important target in therapeutic chemistry. Since anticancer activity of platinium complex *i.e. cis*-diaminechloroplatinum(II) (cisplatine) has been proved by Rosenberg in the sixties of the previous century, cytotoxic activity of many other metal complexes have been demonstrated. However, so far only few platinum(II) complexes (*e.g.* cisplatine, carboplatine, nedaplatin, oxaliplatine, heptaplatin and lobaplatine) and two ruthenium(III) complexes [NAMI-A and KP1019] have been applied in clinical trials of anticancer therapies. Although platinum complexes enable to rescue plenty of people's lives, severe side effects connected with application of these compounds cannot been neglected. All this makes the search for new compounds with antitumor activity seems to be one of the most important challenges of the twenty-first century. From other noble metals, copper and ruthenium complexes seem to be perfect candidates to replace platinum. Organometallic ruthenium(II) complexes with selected mono- and bidentate ligands, *e.g.* pyridine derivatives with aromatic azo R-N=N-R group have been recently proposed as new compounds with high antitumour activity. Use of "azo" ligands assures the process of ligand reduction by intracellular biomolecules (*i.e.* glutathione), triggering redox reactions and causing cell death. Studied complexes can be called "intracellular reducers" and studying its mode of action is the innovative approach in the field of anticancer therapies. Furthermore, I investigate copper(I) complexes with potential antitumors as well as biocidal activity. Copper as an element essential to life is less toxic than other noble metals analyzed for medical use, such as platinum or ruthenium. Regardless of the degree of oxidation state of the copper compounds, they cause oxidative stress through the generation of reactive oxygen species (catalytic process). Noteworthy, there are many advantages of the copper(I) compounds application *i.e.* ability to act as chemical nucleases, selective copper(I) ions cell membrane transporters (hCtr), demonstrated cytotoxicity towards many tumour cell lines (even 20 times higher than shown for cisplatine). All new compounds are tested towards tumour cells *in vitro* in Laboratory of Synthesis and Research on Bioactive Compounds and Biomaterials at Faculty of Chemistry UJ, in which I am a responsible person for cells cultures. Results were published in the form of two papers and three are under preparation [1-3]. Within the scope of new metal complexes, I collaborate with professor Małgorzata Jeżowska-Bojczuk group from University of Wrocław.

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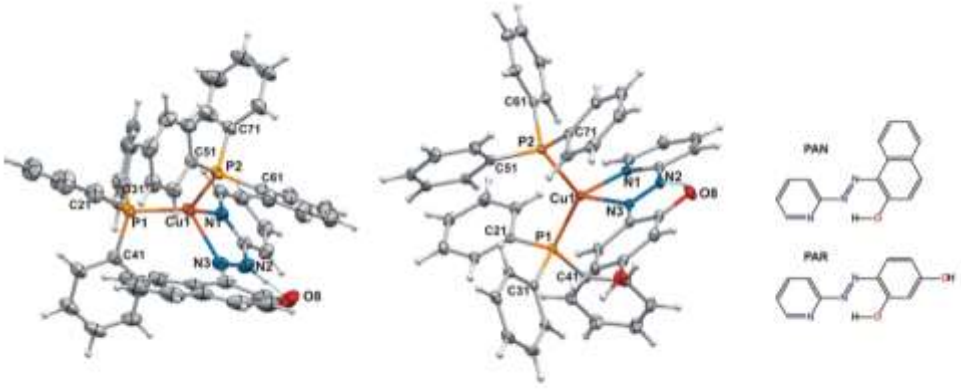

View (25% ellipsoids) of the crystal structure of ion $[Cu(PAN)(PPh_3)_2]^+$ and $[Cu(PAR)(PPh_3)_2]^+$

References:

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