



## Complexes of transition metals with pyrazole derived ligands: synthesis, physico-chemical characterization and potential application

Željko K. Jaćimović

University of Montenegro, Faculty of Metallurgy and Technology, Cetinski put, 81000 Podgorica,  
Montenegro

Metal complexes with pyrazole and its derivatives have recently attracted the attention of many authors, which is supported by a large number of published scientific papers, as well as by several reviews. However, these compounds are interesting not only from a theoretical, but also practical aspect. Specifically, pyrazoles are the components of many drugs (especially antipyretics and antirheumatics, herbicides and fungicides, and some pyrazole derivatives can be used as extragents of various metal ions. Most recently, the knowledge about biocoordination chemistry of pyrazole and its derivatives has been expanded. Among these, some macrocyclic pyrazole ligands are significant in biochemistry of oxygen transport, as well as those which participate in the formation of three-dimensional structure around the active centre of copper proteins (enzymes). Bearing in mind the considerable interest that exists for complexes with pyrazole derivatives ligands, this paper is aimed to review the newly synthesized complexes (by our research group) of Cu (II), Zn (II), Cd (II), Hg (II), Ni (II), Co (II) with some *di*- and *tri*-substituted pyrazole derivatives, to describe the syntheses and physico-chemical characterization of complex compounds obtained. The potential anticancer activity has been investigated in the selected group of complex compounds (complexes with pyrazolone ligands). The second selected group of compounds was investigated in relation to the potential biological activity (fungicidal activity) on pathogenic fungi *Phomopsis viticola* Sacc, which is the cause of leaf spot disease of grapevine and *Botryosphaeria dothidea* that causes fruit rot of olives.

Kompleksi metala sa pirazolom i njegovim derivatima u novije vrijeme privlače pažnju mnogih autora, o čemu govori veliki broj objavljenih naučnih radova, kao i nekoliko radova preglednog karaktera. Inače, ova jedinjenja su interesantna ne samo sa teorijskog, već i praktičnog aspekta. Naime, pirazoli ulaze u sastav mnogih lijekova (naročito antipiretika i antireumatika), herbicida i fungicida, a neki derivati pirazola se mogu koristiti i kao ekstrageni različitih metalnih jona. U najnovije vrijeme proširena su saznanja i o biokoordinacionoj hemiji pirazola i njegovih derivata. Među ovima značajni su neki makrociklični pirazolski ligandi u biohemiji prenosa kiseonika, kao i oni koji učestvuju u formiranju trodimenzionalne strukture oko aktivnog centra bakar proteina (enzimi).

Imajući u vidu značajan interes koji vlada za komplekse sa ligandima derivatima pirazola, ovaj rad ima za predmet pregled novosintetizovanih kompleksa (od strane naše istraživačke grupe) Cu(II), Zn(II), Cd(II), Hg(II), Ni(II), Co(II) sa nekim *di*- i *tri*-supstituisanim derivatima pirazola opis sinteza i fizičko-hemijsku karakterizaciju dobijenih kompleksih jedinjenja.

Odabranoj grupi kompleksnih jedinjenja(kompleksi sa pirazolonskim ligandima) ispitivana je potencijalna anticancer aktivnost dok je drugoj odabranoj grupi jedinjenja ispitivana potencijalna biološka aktivnost (fungicidna aktivnost) na patogenene gljivice *Phomopsis viticola* Sacc uzročnika bolesti crne pjegavosti vinove loze i *Botryosphaeria dothidea* koja prouzrokuje trulež plodova masline.