

(Table 5.2) Course unit description

Study program: Chemistry
Type and level of studies: Master academic studies of Chemistry – module Research and Development and module Professor of Chemistry
Course unit: Complexes in Medicine
Teacher in charge: Biljana Đ. Glišić
Language of instruction: English
ECTS: 5
Prerequisites: Enrolled in the master academic studies in Chemistry
Semester: summer
<p>Course unit objective</p> <p>The course seeks to transfer knowledge in the field of fundamentals of medical inorganic chemistry, with a particular focus on the application of coordination compounds in medical purposes – from diagnostics to therapy. Special emphasis will be dedicated on the use of transition metal complexes in the therapy of various diseases, as well as on the application of coordination compounds as radiopharmaceuticals and contrast agents.</p>
<p>Learning outcomes of Course unit</p> <p>The students have been introduced to the role of metal ions in biological systems, as well as the potential application of coordination compounds in medicine.</p>
<p>Course unit contents</p> <p><i>Theoretical classes:</i></p> <p>Medicinal inorganic chemistry. Different aspects of medicinal inorganic chemistry. Essential macro- and microelements. Platinum complexes as antitumor agents. Ruthenium complexes as potential antitumor agents. Application of gold complexes in medicine. Application of silver and its complexes in medicine. Bismuth complexes in the treatment of gastrointestinal disorders. The use of mercury, arsenic, antimony, iron, cobalt, and gallium compounds in medicine. Metal complexes as therapeutic and diagnostic radiopharmaceuticals. Metal complexes as contrast agents in diagnostics. Disorders in metal ion metabolism. Chelation therapy. Metal complexes as synthetic metalloproteinases.</p> <p><i>Practical classes:</i></p> <p>Synthesis and structural characterization of antitumor platinum(II) complexes, cisplatin (<i>cis</i>-[PtCl₂(NH₃)₂]) and carboplatin ([Pt(cbdca-O,O')(NH₃)₂], where cbdca is cyclobutane-1,1-dicarboxylate). Synthesis and structural characterization of [Pt(dien)Cl]Cl complex (dien is diethylenetriamine). Investigation of the reactions of [Pt(dien)Cl]Cl complex with biologically important nitrogen- and sulfur-donor ligands (guanosine-5'-monophosphate and L-methionine) using NMR spectroscopy. Correlation of the reaction mechanism of [Pt(dien)Cl]Cl complex with nitrogen- and sulfur-donor ligands to the mechanism of the antitumor and toxic effects of platinum(II) complexes used in medicine for the treatment of tumor. Synthesis and structural characterization of [Au(en)Cl₂]Cl and [Au(dien)Cl]Cl₂ complexes (en is ethylenediamine and dien is diethylenetriamine). Preparation of media for biological evaluation. Sterilization. Laboratory rules in a microbiological laboratory. Evaluation of antibacterial activity of [Au(en)Cl₂]Cl and [Au(dien)Cl]Cl₂ complexes by disc-diffusion and dilution methods.</p>
<p>Literature</p> <p><i>Basic literature</i></p>

1. Enzo Allesio, Bioinorganic Medicinal Chemistry, Wiley-VCH Verlag GmbH & Co. KgaA, Weinheim, 2011.				
<i>Supporting literature</i>				
1. Reviews in the field of medicinal inorganic chemistry				
2. Internal script				
Number of active teaching hours				Other classes:
Lectures: 2	Practice: 2	Other forms of classes:	Independent work:	
Teaching methods				
Lectures, seminars, practical classes				
Examination methods (maximum 100 points)				
Exam prerequisites	No. of points	Final exam	No. of points	
Practical classes	10	Written examination	60	
Tests	20	Oral examination		
Homework		Other		
Seminars	10			
Project				
Grading system				
Grade	No. of points		Description	
10	≥ 91		Excellent	
9	81-90		Exceptionally good	
8	71-80		Very good	
7	61-70		Good	
6	51-60		Passing	
5	≤ 50		Failing	