

**KAPITAŁ LUDZKI**
NARODOWA STRATEGIA SPÓJNOŚCIProjekt współfinansowany przez
Unię Europejską w ramach
Europejskiego Funduszu
Społecznego**UNIA EUROPEJSKA**
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Course title		ECTS code	
Chemical equilibria and kinetics in aqueous solutions of coordination compounds		13.3.1227	
Name of unit administrating study			
null			
Studies			
faculty	field of study	type	second tier studies (MA)
Faculty of Chemistry	Chemistry	form	part-time
		specjalty	all
		specialization	all
Teaching staff			
dr hab. Dagmara Jacewicz, profesor uczelni; dr Joanna Drzeżdżon			
Forms of classes, the realization and number of hours		ECTS credits	
Forms of classes		4	
Laboratory classes		classes - 18 h	
The realization of activities		tutorial classes - 30 h	
lectures in the classroom		student's own work - 52 h	
Number of hours		TOTAL: 100 h - 4 ECTS	
Laboratory classes: 18 hours			
TO_TRANSLATE[Termin realizacji przedmiotu]			
2022/2023 winter semester			
Type of course		Language of instruction	
an elective course		english	
Teaching methods		Form and method of assessment and basic criteria for evaluation or examination requirements	
Practical laboratory work - chemical experiments, analysis of obtained results and discussion		Final evaluation	
		Graded credit	
		Assessment methods	
		short test and report from laboratory	
		The basic criteria for evaluation	
		Laboratory classes: positive note from an short test with 3-6 open questions:	
		91-100% 5.0	
		81-90% 4.5	
		71-80% 4.0	
		61-70% 3.5	
		51-60% 3.0	
		< 51% 2.0	
		a. passing short test covering the material of the Laboratory classes	
		b. assessment criteria in accordance with the University of Gdańsk Study Regulations	
TO_TRANSLATE[Sposób weryfikacji założonych efektów uczenia się]			

Written short tests in the field of chemical equilibria and kinetics in aqueous solutions of coordination compounds. During laboratory exercises, the student solves problems in writing (tests) or oral (oral answer) in the field of chemical kinetics and chemical equilibria. (K_W02, K_W05) and demonstrates in-depth knowledge in the field of modern measuring techniques used in chemical analysis in the field of chemical kinetics and chemical equilibria (K_W03). The student plans and implements chemical experiments of extended complexity, critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors (K_U01, K_U02). Method of verifying the acquisition of social competences: undertakes research tasks consciously and responsibly, understanding the social aspects of the practical application of the acquired knowledge and skills and the responsibility related to it (K_K06)

Required courses and introductory requirements

A. Formal requirements

lack

B. Prerequisites

lack

Aims of education

- familiarize students with the main aspects of chemical kinetics and chemical equilibria
- familiarize students with the determining the rate law of a reaction
- presenting the basis of chemical kinetics calculations
- familiarize students with the factors affecting reaction rate
- familiarize students with the factors influencing the chemical equilibria

Course contents [SylabusToPdfv2.23.2](#)

Chemical equilibria and kinetics in aqueous solutions of coordination compounds. The course aims to provide the basic fundamental knowledge of the kinetic principles to students, necessary to describe and understanding the many processes that occur in water solutions. The laboratory includes the synthesis of coordination compounds of zinc(II), cobalt(III), chromium(III) and studies of their physicochemical properties, for example: solution equilibria determined with several methods, complex formation in equilibria in aqueous solutions. The course also include the study of kinetics of reactions in an aqueous solution with the use of selected coordination compounds, determination of the kinetic equation, determination of temperature dependence of the reaction rate constant and proposing mechanisms of the studied reactions.

Bibliography of literature

Literature required to pass the course

1. Viktor Gutmann, Coordination Chemistry in Non-Aqueous Solutions, Springer Nature Switzerland AG
2. , Chemical Equilibria, Volume 4,
3. James House, Principles of Chemical Kinetics, Academic Press

Extracurricular readings

1. Wright Margaret Robson, Introduction to Chemical Kinetics, John Wiley and Sons Ltd
2. Soustelle Michel, An Introduction to Chemical Kinetics, John Wiley and Sons Ltd
3. Marin, Guy B., Kinetics of Chemical Reactions, Wiley-VCH GmbH
4. Turányi, Tamás, Analysis of Kinetic Reaction Mechanisms, Springer-Verlag GmbH

TO_TRANSLATE [Kierunkowe efekty uczenia się]

K_W02

has in-depth knowledge in the field of basic chemistry

K_W03

demonstrates in-depth knowledge in the field of modern measuring techniques used in chemical analysis

K_W05

has extended knowledge in the field of the specialization studied

K_U01

plans and implements chemical experiments of extended complexity

K_U02

critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors

K_K06

undertakes research tasks consciously and responsibly, understanding the social aspects of the practical application

Knowledge

Students: know formulate definition of reaction rate and know examples of chemical reactions that occur at different rates, identify variables used to monitor reaction rates (i.e change per unit of time, Dx/Dt). Examples: pressure, temperature, pH., know the definitions: zero order reactions, first order reactions, second order reactions, are able to determine the sequence of reactions and are able to assess the influence of factors on the rate of chemical reactions, know main techniques of calculations in chemical kinetics, define and know formulate definition of use terms such as reaction intermediate, activation energy, effective collision, rate-determining step and reaction mechanism, interpret energy diagrams related to kinetics, know interpret energy diagrams related to kinetics, to demonstrate an understanding of the fundamental principles of chemical equilibrium, write the equilibrium expression "K" from a balanced equation relate the magnitude of the equilibrium constant "K" to the relative amounts of products and reactants present at equilibrium.

Skills

Students should be able to:

- explain how a change in concentration, change in temperature, change in pH or a change in pressure influences the rate of a reaction.
- to determine the order of reaction
- determine the value of the rate constant

of the acquired knowledge and skills and the responsibility related to it	<ul style="list-style-type: none">- fitting the reaction model to the experimental values- use experimental data to determine the rate law expression and use the data to calculate rate constants and reaction orders- apply Le Chatelier's Principle to describe the qualitative changes caused by various stresses on a system at equilibrium- use data to calculate the value of K and use the value of K to determine quantities present at equilibrium
	Social competence Student: <ul style="list-style-type: none">- is active in extending knowledge and understands the need for continuous education- undertakes to work with a new topic or technique- engages in scientific discussions- understands the need to read scientific and popular science journals in order to expand and deepen knowledge- understands the need for lifelong learning, recognizing self-education as a standard and condition for success on the labor market and achieving professional success
Contact dagmara.jacewicz@ug.edu.pl	