


KAPITAŁ LUDZKI
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez
 Unię Europejską w ramach
 Europejskiego Funduszu
 Społecznego

UNIA EUROPEJSKA
 EUROPEJSKI
 FUNDUSZ SPOŁECZNY


Nazwa przedmiotu		Kod ECTS	
Chemical equilibria and kinetics in aqueous solutions of coordination compounds		13.3.1215	
Nazwa jednostki prowadzącej przedmiot			
Katedra Technologii Środowiska			
Studia			
wydział	kierunek	poziom	drugiego stopnia
Wydział Chemii	Biznes chemiczny	forma	stacjonarne
		moduł specjalnościowy	wszystkie
		specjalizacja	wszystkie
Wydział Chemii	Chemia	poziom	drugiego stopnia
		forma	stacjonarne
		moduł specjalnościowy	wszystkie
Wydział Chemii	Ochrona środowiska	specjalizacja	wszystkie
		poziom	drugiego stopnia
		forma	stacjonarne
Wydział Chemii	Ochrona środowiska	moduł specjalnościowy	wszystkie
		specjalizacja	wszystkie
Nazwisko osoby prowadzącej (osób prowadzących)			
dr hab. Dagmara Jacewicz, profesor uczelni; dr Joanna Drzeżdżon			
Formy zajęć, sposób ich realizacji i przypisana im liczba godzin		Liczba punktów ECTS	
Formy zajęć		4	
Ćw. laboratoryjne		classes - 30 h	
Sposób realizacji zajęć		tutorial classes - 30 h	
zajęcia w sali dydaktycznej		student's own work - 40 h	
Liczba godzin		TOTAL: 100 h - 4 ECTS	
Ćw. laboratoryjne: 30 godz.			
Termin realizacji przedmiotu			
2022/2023 zimowy			
Status przedmiotu		Język wykładowy	
fakultatywny (do wyboru)		angielski	
Metody dydaktyczne		Forma i sposób zaliczenia oraz podstawowe kryteria oceny lub wymagania egzaminacyjne	
Practical laboratory work - chemical experiments, analysis of obtained results and discussion		Sposób zaliczenia	
		Zaliczenie na ocenę	
		Formy zaliczenia	
		short test and report from laboratory	
		Podstawowe kryteria oceny	

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

- passing short test covering the material of the Laboratory classes
- assessment criteria in accordance with the University of Gdańsk Study Regulations

Sposób weryfikacji założonych efektów uczenia się

Chemistry:

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 students 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)

Business Chemistry:

The method of verifying the acquisition of knowledge: Written short tests in the field of chemical kinetics and chemical equilibria. During the laboratory exercises, the student solves problems in writing (tests) or oral (oral answer) in the field of chemical kinetics and chemical equilibria and knows and understands in-depth complex physicochemical processes and is able to analyze their course in connection with other fields of science (K_BChII_W01). The method of verifying the acquisition of skills: Assessment of the student's involvement in discussions on the issues related to this subject. The students is able to independently plan and perform specific research tasks in the field or in the laboratory, interpret their results working individually or in a team, assuming various roles and functions in it (K_BChII_U04). The students is willing to properly assess the acquired knowledge, respect it and disseminate it in order to solve specific cognitive and practical issues (K_BChII_K04)

Environmental Protection:

Written short tests in the field of chemical kinetics and chemical equilibria. During the laboratory exercises, the student solves problems in writing (tests) or oral (oral answer) in the field of chemical kinetics and chemical equilibria and chooses methods, techniques and research tools used in environmental protection (K_OŚII_W04). The method of verifying the acquisition of skills: Assessment of the student's involvement in discussions on the issues related to this subject. The students plans and performs research tasks in the field or laboratory and interprets research results on environmental issues (working individually or in a team assuming various roles, including managerial functions) (K_OŚII_U03) and the students uses advanced measurement and analytical techniques used in environmental protection (K_OŚII_U02). The method of verifying the acquisition of social competences: the students recognizes the importance of knowledge in solving encountered cognitive and practical problems and consults experts in the event of difficulties in solving a problem on her/his own (K_OŚII_K06).

Określenie przedmiotów wprowadzających wraz z wymogami wstępnymi

A. Wymagania formalne

lack

B. Wymagania wstępne

lack

Cele kształcenia

- 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

Treści programowe

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.

Wykaz literatury

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

Kierunkowe efekty uczenia się

Chemical Business:

K_BChII_W01

knows and understands in-depth complex physicochemical processes and is able to analyze their course in connection with other fields of science

K_BChII_U04

is able to independently plan and perform specific research tasks in the field or in the laboratory, interpret their results working individually or in a team, assuming various roles and functions in it

K_BChII_K04

is willing to properly assess the acquired knowledge, respect it and disseminate it in order to solve specific cognitive and practical issues

Chemistry:

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 of the acquired knowledge and skills and the responsibility related to it

Environmental Protection:

K_OŚII_W04

chooses methods, techniques and research tools used in environmental protection

K_OŚII_U03

plans and performs research tasks in the field or laboratory and interprets research results on environmental issues (working individually or in a team assuming various roles, including managerial functions)

K_OŚII_U02

uses advanced measurement and analytical techniques used in environmental protection

K_OŚII_K06

Wiedza

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.

Umiejętności

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
- 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

Kompetencje społeczne (postawy)

Student:

- 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

recognizes the importance of knowledge in solving encountered cognitive and practical problems and consults experts in the event of difficulties in solving a problem on her/his own	
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