COURSE DESCRIPTION CARD - SYLLABUS

Course name

Kinetyka chemiczna i elektrochemia (Chemical kinetics and electrochemistry)

Course

Field of study	Year/Semester
Technologia chemiczna (Chemical Technology)	3/6
Area of study (specialization)	Profile of study
-	general academic
Level of study	Course offered in
First-cycle studies	Polish
Form of study	Requirements
part-time	elective

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
0	15	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Agnieszka Świderska-Mocek

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Wydział Technologii Chemicznej

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Responsible for the course/lecturer:

Prerequisites

Students:

have knowledge in general chemistry (writing chemical reactions, converting concentrations, knowledge of laboratory glassware and basic laboratory equipment).

have knowledge in mathematics and physics enabling the introduction of problems in physical chemistry (basic laws of physics, differential calculus).

are able to prepare solutions of specific concentrations.

are aware of further development of their competences.

Course objective

To familiarise students with the practical application of advanced problems in physical chemistry and electrochemistry at the academic level in the field of: chemical kinetics (simple and complex reactions in simple laboratory experiments), catalysis, corrosion and the theory of strong and weak electrolytes.

Course-related learning outcomes

Knowledge

Students will be able to characterise, list and identify simple and complex reactions, define hommo- and heterogeneous catalysis and conductivity. K_W03, K_W10

Students will be able to define and explain selected problems in electrochemistry: mechanism and types of corrosion. K_W03, K_W10

Students will be able to define and explain problems in kinetics of complex reactions (oscillatory and catalytic reactions). K_W03, K_W10

Skills

Students will be able to obtain information from literature, databases and other sources; interpret it as well as draw conclusions and formulate and substantiate opinions. K_U01

Students will be able to work individually and as part of a team; estimate the time needed to complete the assigned task. K_U2

Students will be able to apply the principles of thermodynamics in the implementation of chemical processes. K_U23

Students will have the self-study skills in the subject. K_U05

Students will be able to elaborate, describe and present results of an experiment or theoretical calculations. K_U09

Students will be able to distinguish between types of chemical reactions and to select them for specific chemical processes. K_U18

Social competences

Students will understand the need for further training and developing their professional competences. K_K01

Students will be able to properly prioritise the task. K_K04

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Laboratory classes: The course passing is based on points received for the individual exercise description. Passing exercises from 56% .

Programme content

Laboratory classes:

Rate of chemical reaction. Rate constant. Order of the Chemical Reaction. Molecularity of the Chemical Reaction. Zero, first, second, and third-order rate equations.

Complex Reactions: reversible, parallel, competitive, consecutive. Inductive. Oscillatory Reactions.

Catalysis. Heterogeneous and Homogenous Catalysis. Mechanism of catalyst operation. Types of homogeneous catalysts in liquid solution. The dependence of rate of catalysis on the amount of catalyst. Acid-base catalysis. The principle of operation of heterogeneous solid catalysts. Catalyst supports (powder and monolithic).

Chemical and electrochemical corrosion (examples). Mechanism of electrochemical corrosion processes. Protecting from Corrosion. Chemical and electrochemical depositions of metal coating. Standard Electrochemical potentials series. Electrolysis

Theory of the strong and weak electrolytes. Conductometry. Conductivity. Specific conductivity. Methods of conductivity measurements. Law of independent migration of ions – Kohlrausch's law. Limiting molar conductivity determination for weak and strong electrolytes. Conductivity in non-aqueous electrolytes

Teaching methods

Laboratory classes- practical method - laboratory exercises. Planning, execution and analysis of the results of physicochemical experiment.

Bibliography

Basic

1. K. Pigoń, Z. Ruziewicz, Chemia Fizyczna, PWN Warszawa 2013
2. P. Atkins, Chemia Fizyczna, PWN Warszawa 2019
3. A. Molski, Wprowadzenie do kinetyki chemicznej, WNT Warszawa 2000
4. L. Sobczyk, Eksperymentalna Chemia Fizyczna, PWN Warszawa 1982

Additional

1. P. Atkins, Podstawy Chemii Fizycznej, PWN Warszawa 1999
2. L. Sobczyk, A. Kisza, Chemia fizyczna dla przyrodników, PWN Warszawa 1977
3. H. Buchnowski, W. Ufnalski Wykłady z chemii fizycznej, WNT Warszawa 1998

4. Instrukcje do ćwiczeń laboratoryjnych z chemii fizycznej

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2
Classes requiring direct contact with the teacher	17	0,5
Student's own work (preparation for laboratory classes, preparation of the report.) [1]	33	1,5

[1] delete or add other activities as appropriate