GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	KINETICS AND CALALYSIC, PG_00036530		
Field of study	Chemistry		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	3	Language of instruction	Polish
Semester of study	5	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Physical Chemistry -> Faculty of Chemistry -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Joanna Krakowiak	
	Teachers	dr hab. inż. Joanna Krakowiak	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	0.0	0.0	0.0	45

E-learning hours included: 0.0

eNauczanie source addresses:

Moodle ID: 988 Kinetyka i Kataliza (2025/26)
https://enauczanie.pg.edu.pl/2025/course/view.php?id=988

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	45	5.0	25.0	75

Subject objectives

The students have to learn a fundamental concepts of chemical kinetics and catalysis. These topics are colligated with the chosen subjects studied during the Physical Chemistry course. The presented processes deal with the phenomena running in homogeneous, heterogeneous and microheterogeneous (i.e. with enzymes) environments.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W03	Understands the fundamental mechanisms of chemical reactions and is able to model them using chemical kinetics equations. Recognizes the role and functioning of catalysts in both homogeneous and heterogeneous systems, as well as their compatibility with the electronic structure and molecular architecture of the reactants involved in a given chemical reaction.	[SW1] Assessment of factual knowledge
[K6_U06] can analyze the functioning of equipment, apparatus and technology lines used in laboratories and chemical industry, and can recognize and propose methods to solve the simple engineering tasks which he can meet as an Engineer and select and use routine methods, chemical apparatus and tools to solve practical engineering tasks, including also technological processes; can himself/herself read and make technical drawings using CAD software	The student is aware of the importance of ensuring appropriate conditions for carrying out and controlling chemical reactions. They become familiar with key laboratory methods used to monitor chemical reaction kinetics. The course introduces examples of catalyst bed arrangements and criteria for selecting the shape and size of catalyst particles. Additionally, the student learns about fundamental diagnostic tests used to evaluate the potential for improving the efficiency of gas–solid catalytic reactions. They are also aware of the essential steps required to implement a new catalyst in an industrial production line.	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information

Subject contents

Basic knowledge of chemical kinetics: rate of reaction, dependence of rate on concentration, rate constant, chemical reaction order. The influence of the temperature on the rate Arrhenius equation and activation energy. Chemical kinetics of the simple and complex processes. The basic and the using of the Stady State Assumption. Reactions in a gas phase and in a solution. The Collision Theory and the Transition State Theory for description of a chemical reaction. Homogeneous, heterogeneous and enzymatic catalysis. Adsorption. Contact processes. The structure and features of catalysts. Autocatalysis. The elements of: electrode reactions, chain reaction, oscillating reactions, photochemistry and polymerisation.

Prerequisites and co-requisites

Basic knowledge of general, inorganic and organic chemistry and mathematics (basic types of functions and their plots, basic of differential calculus, the calculation of simple integral).

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
lecture test	60.0%	40.0%
presence at lectures	80.0%	10.0%
test of kinetics calculations	50.0%	50.0%

Recommended reading

Basic literature	P. Atkins, J. De Paula, Atkins Physical Chemistry, Oxford Henry Eyring, Edward Eyring Modern chemical kinetics, Reinhold,
Supplementary literature	M. R. Wright, An Introduction to Chemical Kinetics, John Wiley & Sons Ltd.,
eResources addresses	

Example issues/ example questions/ tasks being completed

1. The reaction between A + B is first order in A and second order in B. Give the rate expression, and then find the units of k (assume time in minutes).

2. Trichloroethanoic acid is readily decarboxylated in aqueous solution. Why is it possible in this case that the actual concentrations of the acid are not needed for the first order plot?

Work placement

Not applicable

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