



Subject card

Subject name and code	KINETICS AND CALALYSIC, PG_00036530						
Field of study	Chemistry						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2023/2024		
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						
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						
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	The students have fundamental knowledge about chemical kinetics and the reactions occurring with the catalyst, which they can relate to engineering processes. The students know the basic requirements for catalysts.			[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 creating appropriate conditions for conducting chemical reactions and their control. The methods of arranging the catalyst bed and the selection of the shape and size of the elements of this bed are familiarized with. In addition, the main tests diagnosing the possibility of improving the efficiency of the reaction with the participation of a gas-solid catalyst are introduced.			[SU3] Assessment of ability to use knowledge gained from the subject		
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 Steady 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
	test of kinetics calculations	50.0%	50.0%
	presence at lectures	80.0%	10.0%
	lecture test	60.0%	40.0%
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	Adresy na platformie eNauczenie: Kinetyka i kataliza - 2023/2024 - Moodle ID: 28716 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=28716	
Example issues/ example questions/ tasks being completed	<p>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).</p> <p>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?</p>		
Work placement	Not applicable		

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