

Subject card

Subject name and code	General chemistry, PG_00053435						
Field of study	Environmental Protection						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2026/2027		
Education level	Bachelor's 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	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		3.0		
Learning profile	academic		Assessment form		exam		
Conducting unit	Laboratory of Biological Inorganic Chemistry -> Department of General and Inorganic Chemistry -> Faculty of Chemistry -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Joanna Makowska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0		58.0	75
Subject objectives	- familiarizing students with the basic types of inorganic compounds and methods of balancing chemical reaction equations, - introducing students to the basics of chemical calculations. - familiarizing students with all issues mentioned in the lecture program content,						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[OŚL3_W01] Discusses the basic concepts of mathematics, physics, chemistry and biology. Describes physical, chemical and biological phenomena occurring in nature as well as geological, geomorphological and climatic conditions of the functioning of nature.	Students verbally and in writing correctly argue their conclusions in the field of chemistry, interpret and analyze related information with basic chemical and gas laws, stoichiometry and concentrations of solutions, and factors determining the functioning of nature	[SW2] presentation/project/paper/report
	[OŚL3_K08] Is responsible for and takes care of the specialist equipment entrusted to her/him for research and laboratory or field work.	- Student exercises due caution when using laboratory equipment and working with chemical reagents; - Student performs basic chemical calculations, taking into account the basic chemical and gas laws, stoichiometry and concentrations of solutions, and is able to apply them to conduct experiments and prepare a laboratory experiment	[SK8] observation of student's independent or team work
	[OŚL3_U04] Uses specialist language in the discussion and properly uses the nomenclature in the field of environmental protection and individual disciplines related to it.	- student identifies and recognizes the basic types of chemical bonds, - student explains selected elements of kinetics and chemical equilibrium, - student knows how to determine the structure of chemical particles, - student understands and describes the structure of atoms of individual elements, - student explains and explains the basic theories of acids and bases, - student applies basic chemical rules and concepts, - student recognizes and names the basic types of chemical reactions along with oxidation and reduction reactions, - student knows why acid-base indicators change their color depending on the pH of the solution, - student defines the basic laws of electrochemistry, - student illustrates and describes the properties of elements and their compounds using chemical equations, - student knows the basic computational techniques in chemistry, - student knows how to distinguish solutions of non-electrolytes and electrolytes from each other.	[SU4] test/exam - oral or written
	[OŚL3_K05] Identifies the level of her/his knowledge and skills, demonstrates the need to update knowledge about the environment and its protection, demonstrates the need for continuous professional training and personal development.	- Student is aware of the need to critically analyze his or her own work - Student understands the need to independently search for information in scientific literature; can formulate appropriate questions	[SK1] oral statement/conversation/discussion
Subject contents	Basic concepts in radiochemistry (Hydrogen isotopes. Types of radioactive transformations.); Molecule (Chemical bonds. Binding energy. Electronegativity. Hybridization and molecular geometry. VSEPR method.); Kinetics and chemical equilibrium (Rate of chemical reactions. Factors influencing the rate of chemical reactions. Types of kinetic equations. Multi-stage reactions. Law of mass action and equilibrium constant. Influence of external factors on chemical equilibrium.); Solutions (Non-electrolyte solutions (colligative properties). Electrolyte solutions - strong electrolyte theory (dissociation and dissociation degree).); pH of aqueous solutions (Acids and bases - theories of acids and bases. Neutralization. Ionic product of water. pH scale. pH indicators. pH of aqueous solutions of strong acids and bases.); Fundamentals of electrochemistry (Basic issues of electrochemistry (half-cell, cell, electrode, Nernst equation, hydrogen electrode). Electrochemical series of metals. Possibility of metal reacting with water, non-oxidizing and oxidizing acids depending on its position in the periodic table. Electrolysis. Electrode reactions of simple inorganic compounds. The balance of the electrolysis process - Faraday's laws.)		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	positive grade in the written exam consisting of: 12-20 open questions covering issues mentioned in the lecture program content	50.0%	100.0%

Recommended reading	Basic literature	1. Calculations in general chemistry - UG script 2. A. Bielański - General and inorganic chemistry 3. J. D. Lee - Concise Inorganic Chemistry L. Jones 4. P. Atkins General chemistry
	Supplementary literature	1. J. Amiel - General chemistry 2. L. Sobczyk, A. Kiszka - Physical chemistry for naturalists, 3. FA. Cotton, G. Wilkinson, P.L. Gaus - "Inorganic Chemistry"
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Define: mole, molar mass, atom, catalyst, homogeneous mixture 2. Mark the valence electrons and state which element the following electron configuration corresponds to: $1s^2 2s^2 2p^6 3s^2 3p^2$ 3. Prove using the VSEPR method that the CH_4 molecule has a tetrahedral structure (sp^3 hybridization) 4. 100 cm^3 of NaOH solution with $d=1.4\text{ g/cm}^3$ contains 51.2g of NaOH 5. Calculate the percentage, molar and normal concentrations of this solution 6. State what type of bond occurs in the molecules: I_2, HCl, NaCl and briefly justify your answer.	
Work placement	Not applicable	

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