



Subject card

Subject name and code	Inorganic chemistry, PG_00060843						
Field of study	Chemical Technology						
Date of commencement of studies	October 2023	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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Inorganic Chemistry -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Rafał Grubba					
	Teachers	dr inż. Anna Ordyszewska dr hab. inż. Rafał Grubba					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	0.0	0.0	0.0	30
	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	30	5.0		55.0	90	
Subject objectives	Student gets proper knowledge on properties of electrolyte solutions and the main group elements (groups 1,2, 13 and 14)  Student develops skills in stoichiometric calculus based on chemical equilibria.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W02] has knowledge of inorganic, organic, physical and analytical chemistry useful for obtaining selected groups of compounds, determining their physical and chemical properties allowing for their quantitative and qualitative analysis, making measurements and determining the parameters of chemical reactions, phenomena and processes occurring in chemical technology	The student has basic knowledge of inorganic chemistry, knows the basics physical and chemical properties selected groups of compounds inorganic, can describe processes applicable in inorganic technology.	[SW1] Assessment of factual knowledge
	[K6_U03] is able to apply knowledge of inorganic, organic, physical and analytical chemistry and identify appropriate sources of information to design and synthesize simple chemical compounds, carry out basic physicochemical and analytical measurements	The student is able to plan the synthesis of simple inorganic compounds based on the acquired knowledge in the field of chemistry inorganic. The student is able to plan his/her own learning and is able to use information sources.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
	[K6_K03] is aware of the responsibility for his/her own work and is ready to follow the rules of teamwork and take responsibility for the tasks performed jointly	The student is able to work independently and in a group.	[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work [SK2] Assessment of progress of work [SK1] Assessment of group work skills
Subject contents	<p>Lectures.</p> <p>Electrolyte solutions: Electrolytes and nonelectrolytes. Electrolytic dissociation. Balance in electrolyte solutions. Constant and degree of electrolytic dissociation. pH of electrolyte solutions Activity and activity coefficient. Ionic strength. Acids, bases, salts. Theories: Arrhenius, Brønsted and Lewis. Balance. Amphoterism, hydrolysis, buffers, Electrolytic dissociation in non-aqueous solvents Properties of elements belonging to the first four main groups: Group 1: elements, chemical properties of lithium, compounds of lithium, sodium and potassium Group 2: elements, beryllium, magnesium and calcium compounds Group 13: elements, oxides, carbides and halides. Borates and borohydrides Group 14: elements, allotropic forms of coal, inorganic carbon compounds, silicon, germanium, tin and lead compounds.</p> <p>Seminars</p> <p>The ionic equilibria in aquatic solutions of electrolytes. Weak and strong electrolytes. Brønsted theory of acids and bases. The ionization degree and the ionization constants. The calculations of pH values in solutions of acids and bases. The common ion effect. Buffer solutions, hydrolysis. The solubility product. The influence of common ions on the solubility of ionic precipitates. Equilibria in aquatic solutions of complex compounds. The stability constants of complexes. The influence of hydronic ion concentration and the influence of complexing reagents on the solubility of ionic precipitates.</p>		
Prerequisites and co-requisites	It is required to pass the course "Fundamentals of chemistry" (semester I)		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	two partial tests	60.0%	40.0%
	Final grade is calculated after passing both elements of the subject	60.0%	60.0%
	Final grade is calculated after passing both elements of the subject	100.0%	0.0%

Recommended reading	Basic literature	<b>Basic literature</b> A. Bielański. Podstawy Chemii Nieorganicznej. Wydawnictwo Naukowe PWN, Warszawa 2007  Skrypt Podstawy obliczeń chemicznych wersja internetowa dostępna na stronie Katedry Chemii Nieorganicznej
	Supplementary literature	<b>Supplementary literature</b> 1. F.A. Cotton, G. Wilkinson, P. L. Gaus. Chemia Nieorganiczna. Wydawnictwo Naukowe PWN, Warszawa 1995.  2. H. Całus.. Podstawy Obliczeń Chemicznych. Wydawnictwo Naukowe Techniczne. Warszawa 2007.  3. Chemia ogólna i nieorganiczna. Ćwiczenia rachunkowe (po red. Andrzeja Okuniewskiego), Wydawnictwo Politechniki Gdańskiej, Gdańsk 2019
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1. Write the dissociation reaction (Brønsted notation) for $(\text{CH}_3)_3\text{N}$ in aqueous solution. Write the expression for the equilibrium constant of this reaction. Give the reaction of this amine with hydrochloric acid. 2. Explain the structure of electron-deficient compounds on the example of diborane (the number of valence electrons and the number of bonds, types of chemical bonds, shape of the molecule).	
Work placement	Not applicable	

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