GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Inorganic chemistry, PG_00069032		
Field of study	Chemical Technology		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Rafał Grubba	
	Teachers		

Lesson types

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	40.0	75

Subject objectives

Student gets proper knowlegde 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_K03] Understands the need for continuous learning and knows the opportunities to improve professional, personal and social competences, and is able to think and act in an entrepreneurial manner.	is able to work independently and collaborate in a team, demonstrating responsibility for the tasks assigned and the quality of the work performed.	[SK2] Assessment of progress of work
[K6_U03] Uses chemical knowledge to design compounds, perform physicochemical and analytical measurements, and obtain appropriate sources of information.	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.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
[K6_W02] Possesses the chemical knowledge necessary to synthesize, analyze and evaluate the properties of compounds and processes used in chemical technology.	has basic knowledge 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

Subject contents

Course content – lecture
Lectures.

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 solventsProperties 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.

Course content – exercises
Exercises

The ionic equilibria in aquatic solutions of electrolytes. Weak and strong electrolytes. Broensted theory of acids and bases. The ionizations 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 comlexating reagents on the solubility of ionic precipitates.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Final grade is calculated after passing both elements of the subject	60.0%	60.0%
two partial tests	60.0%	40.0%

Recommended reading

Basic literature

Basic literature
A. Bielański. Podstawy Chemii Nieorganicznej. Wydawnictwo Naukowe PWN, Warszawa 2007

Skrypt Podstawy obliczeń chemicznych wersja internetowa dostępna na stronie Katedry Chemii Nieorganicznej

Supplementary literature

Supplementary literature
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

Example issues/ example questions/ tasks being completed

1. Write the dissociation reaction (Brønsted notation) for $(CH_3)_3N$ 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).

Practical activites within the subject

Not applicable

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