GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Inorganic Chemistry, PG_00049194		
Field of study	Chemistry		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2022/2023
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	7.0
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. Łukasz Ponikiewski	
	Teachers	dr hab. inż. Łukasz Ponikiewski dr inż. Damian Rosiak dr hab. inż. Rafał Grubba dr inż. Anna Ordyszewska	

Lesson type and method of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	60.0	0.0	0.0	105
	E-learning hours included: 0.0						
	2022/2023 Chemia Nieorganiczna dla kierunku Chemia - Moodle ID: 28767 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28767						

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	105	5.0	65.0	175

Subject objectives	Types of chemical reactions - electron transfer, electron transfer, proton transfer reactions and ligand transfer reactions.Introduction of the students to the basic concepts of inorganic chemistry - properties of the elements and chemical compounds, their occurence in nature, processing and use. Part I. p-block elements

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U02] can work individually and in a team; he/she can assess the necessary task time and plan and organize individual work and in a small team in a way that ensures the execution of the task within a set deadline	The student knows how to plan and carry out simple laboratory activities.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[K6_K04] is aware of the importance of ethical behaviour in accordance with the principles of safety and health at work	The student learns how to plan and carry out simple chemical experiments in a safe way.	[SK3] Assessment of ability to organize work
[K6_K01] understands the need for lifelong learning, can inspire and organize the process of teaching other people	The student compiles the knowledge obtained in the various modules of classes to solve problems.	[SK4] Assessment of communication skills, including language correctness [SK2] Assessment of progress of work
K6_W02	The student understands the connection between general chemistry rules and properties of simple chemical compounds.	[SW1] Assessment of factual knowledge
[K6_W09] has knowledge on chemical management and the concept of sustainable development necessary to conduct the management of chemicals (including dangerous substances) in the industrial plant, knows health and safety issues and ergonomics.	The student knows the chemical properties of p-block elements elements and their simple compounds	[SW1] Assessment of factual knowledge

Subject contents

LECTURE: Redox- reactions. Acids and bases. The chemistry of nonmetals. Noble gases and their compounds. Halogens. The elements of groups 15 and 16 and their compounds with special emphasis on sulfur, nitrogen and phosphorus. The chemistry of group 14 elements - allotropes of carbon, inorganic compounds of carbon, silicon, silicates, silicones, germanium, tin and lead. Boron, boranes and oxoboranes. LABORATORY: Every student has to do a two-semester course of classic qualitative analysis. During the running semester it consists of 7 practical exercises covering the qualitative analysis of selected cations. EXERCISES: Solutions - solubility, concentrations percent, molar, normal, mol fraction, stoichiometry of the reactions in solutions. The concept of chemical equilibrium - basic calculations. Equilibria in the electrolyte solutions. Dissociation. Strong and weak electrolytes. The ion product of water. pH scale. Solutions of acids and bases. Solutions of salts. Buffer solutions. Precipitation equilibria and equilibria in solutions of complex compounds.

Prerequisites and co-requisites

None

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory - short tests and detailed reports	45.0%	25.0%
Lecture tests	60.0%	50.0%
Exercises - Two written tests during semester	60.0%	25.0%

Recommended reading

Basic literature	A. Bielański Chemia nieorganiczna, PWN recent editions; P.A. Cox Krótkie wykłady, chemia nieorganiczna, PWN 2003; F.A. Cotton, G. Wilkinson, P.L. Gaus Chemia nieorganiczna, podstawy, PWN 1995. University scripts: J. Prejzner: Inorganic Chemistry. Laboratory exercises. Issued by Gdansk University of Technology, Gdansk 2004. J. Chojnacki, A. Dołęga, S. Konieczny, A. Konitz, A. Okuniewski (red.), J. Pikies, A. Pladzyk, Ł. Ponikiewski, M. Walewski, A. Wiśniewska: Chemia ogólna i nieorganiczna. Ćwiczenia rachunkowe. *Wydawnictwo Politechniki Gdańskiej*, Gdańsk 2019. ISBN:978-83-7348-795-6.
Supplementary literature	N.N. Greenwood, A. Earnshaw Chemistry of the elements Pergamon, 2nd Ed. (2005); C.E. Housecroft, A.G. Sharpe Inorganic chemistry, Pearson, Prentice Hall; 1st (2001), 2nd (2005) or 3rd (2008) editions; A.F. Wells Strukturalna chemia nieorganiczna WNT, 1993. M. Łaniecki Basics Inorganic Qualitative Analysis, Issued by UAM, Poznań; Calculations in General Chemistry, collective work, issued by University of Gdansk, Gdańsk.
eResources addresses	

Example issues/ example questions/ tasks being completed	1) Why does the nitric oxide molecule have a permanent magnetic moment? Explain using the molecular orbitals diagram. Calculate the bond order in the nitric oxide molecule. 2) Why does iodine poorly dissolve in water and dissolve well in a solution of potassium iodide? Explain and write down the equation for the appropriate reaction. 3) List at least two carbon oxides, write down their names, draw Lewis formulas. Describe briefly the physical properties of these compounds (physical state, color, odor, solubility in water). 4) Write down the equations for the reactions of sodium chloride and sodium iodide with sulfuric acid (VI). 5) Describe the bonds found in the B2H6 molecule 6) How sodium hydroxide is obtained on a technical scale. Write down the reaction equations. 7) Use the energy diagram to illustrate the molecular orbitals of oxygen in the ground state (triplet oxygen) and in the excited state (singlet oxygen). How can an oxygen molecule be excited from a triplet state to a singlet state? 8) Write down the reactions that occur in the production of nitric acid from ammonia. In which reaction is the use of a catalyst necessary? What kind of catalyst is used? 9) How is nitrogen obtained on a technical scale and how on a laboratory scale? 10) What type of binding occurs in alkali metal hydrides? Write the equation of reaction of lithium hydride with water.
Work placement	Not applicable