GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Inorganic chemistry, PG_00057549		
Field of study	Green Technologies		
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
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	exam
Conducting unit	Department of Inorganic Chemistry -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Agnieszka Pladzyk	
	Teachers	dr hab. inż. Agnieszka Pladzyk dr hab. Katarzyna Kazimierczuk dr inż. Kinga Kaniewska-Laskowska	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	45.0	0.0	0.0	90
	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	90	10.0	75.0	175

Subject objectives	Through lectures, exercises and laboratories, cause the student to understand and use basic concepts of inorganic chemistry.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_K01] understands the need for learning throughout life, can inspire and organize the learning process of others. Is aware of his/ her own limitations and knows when to ask the experts, can properly identify priorities for implementation, critically evaluate his knowledge	The student understands the need and necessity of continuous improvement of his/her knowledge, is able to plan the sequence of actions enabling the completion of a given task.	[SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work
	[K6_U05] can formulate and solve engineering tasks analytical methods, simulation as well as experimental, able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions	Student is able to use properly selected analytical, simulation and experimental methods and devices enabling basic measurement of quantities characterizing materials and processes occurring in aqueous solutions	[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	[K6_W02] has a basic knowledge of chemistry including general chemistry, inorganic, organic, physical, analytical, including the knowledge necessary to describe and understand the phenomena and chemical processes occurring in the environment; measurement and the determination of the parameters of these processes.	The student has knowledge of general and inorganic chemistry, including knowledge necessary for description and understanding phenomena and chemical processes occurring in aqueous solutions, determining the parameters of these processes. Student gives a short description of noble gases and their compounds. Describes the natural resources, preparation and properties of halogens. Describes the natural resources, preparation and properties of the 16th and 15th groups elements, with a special emphasis on sulfur, nitrogen and phoshorus. Gives a description of 14th group elements - describes the allotropes of carbon and its inorganic compounds, properties of silicon, silica, silicates and silicones. Defines the concept of metal. Describes metals of p, s block. Gives a definition of a coordination compound. Student names the trace and ultratrace elements in living organisms and gives representative examples of biomolecules bearing metalic centers. Student is able to do calculations covering the subject of chemical equilibrium. He can explain the common ion effect, calculate buffer solutions and apply the hydrolysis concept. He also can solve the problems regarding solubility, solubility product and equilibria in aqueous solutions of coordination compounds.	[SW1] Assessment of factual knowledge
	[K6_U01] is able to obtain information from literature, databases and other sources, is able to integrate the information obtained, to make their interpretation, as well as draw conclusions and formulate and justify opinions, take part in the discussion	Student is able to select appropriate data from the literature in order to carry out basic calculations concerning reactions in aqueous solutions, is also able to analyse the obtained calculation results and verify their correctness.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject
Subject contents	LECTURE: Types of inorganic reactions: transfer of electro, transfer of proton, ligand exchange. Noble gases, halogens. Elements of 16 and 15 groups with emphasis on sulfur, nitrogen and phosphorus. The chemistry of group 14 elements - inorganic compounds of carbon; silicon, silica, silicates and silicones. Boron and its compounds. Metals - an introduction. metals of p block. Metals of s block. Coordination compounds. Essential trace and ultratrace elements, biomolecules with metallic centres - selected examples. EXERCISES: Equilibria in the aqueous solutions of electrolytes. Common ion effect. Buffers and hydrolysis of salts. Solubility and solubility product. Equilibria in solutions of complexes. LABORATORY: The program of the laboratory includes 10 exercises concerning qualitative analysis of cations and anions. These exercises are performed individually. Every student must write short entrance test and write the report after each exercise.		

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">1st semester of Inorganic Chemistry passed</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>tutorials</td><td>60.0%</td><td>25.0%</td></tr>
<tr><td>lecture</td><td>60.0%</td><td>50.0%</td></tr>
<tr><td>laboratory</td><td>45.0%</td><td>25.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">Required reading
1. L. Jones, P. W. Atkins "General Chemistry"
2. J. Chojnacki, A. Dołęga, B. Dręczewski "Selected Topics in General and Inorganic Chemistry" Wyd. PG 2013.
3. 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.</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">Recommended reading
1. P. A Cox, "Instant Notes in Inorganic Chemistry" BIOS 2000.
2. MIT Open Courses in Chemistry
3. T. L. Brown, H. LeMay, B. Bursten, "Chemistry. The Central Science" Prentice Hall, 2000.</td></tr>
<tr><td>eResources addresses</td><td colspan="2">Adresy na platformie eNauczanie:
Chemia nieorganiczna - BT i ZT semestr letni 2022/2023 - Moodle ID: 29013
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29013</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">1. Compare the strength of the chlorine oxygen acids
2. Describe the steps in the synthesis of ammonia by the Haber-Bosch method
3. Describe the steps in the synthesis of sulfuric acid (VI)
4. Compare the strength of acids (H2O, H2S, H2Se, H2Te)
5. Compare ammonia combustion products without catalyst and with ruthenium catalyst. Write down the reaction equations.
6. Draw the Lewis formulas of the carbonate anion and the sulfate (IV) ion and compare their spatial structure using the VSEPR method
7. Describe the products of combustion of alkali metals in oxygen. Write down the reaction equations.
8. Describe the steps in the production of aluminum from bauxite - the Bayer process and the Hall-Heroult process</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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