COURSE DESCRIPTION CARD - SYLLABUS

Course name

Chemia ogólna i nieorganiczna (General and inorganic chemistry)

Course

Field of study

Technologia chemiczna (Chemical Technology)

Year/Semester

II/3

Area of study (specialization)

-

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

Number of hours

Lecture

0

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

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Faculty of Chemical Technology

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Responsible for the course/lecturer:

Prerequisites

The student has the knowledge, skills and social competences resulting from the completion of the course in the subject General and inorganic chemistry in the first year (1st and 2nd semester) of studies in the field of Chemical Technology, in particular:

Knowledge:

W1. Has solid theoretical knowledge in the field of inorganic and general chemistry and, in particular, describes the structure of matter at the nuclear, atomic and molecular level; identifies the properties of elements and their compounds, explaining them in connection with the place of the element in the periodic table

W2. Knows the principles of health and safety at work in a chemical laboratory and, in particular, the principle of maintaining order in the workplace; knows the basic principles of first aid in the event of accidents and incidents

W3. Lists and characterizes the basic techniques of laboratory work; knows how to plan and carry out a simple chemical experiment and how to analyze, develop and describe its results

W4. Lists reactions involving inorganic compounds of great practical industrial importance. Describes, explains and characterizes their chemistry (course and associated effects)

W5. Lists and describes the most important harmful effects of some elements and inorganic compounds on the environment, and identifies the most important sources from which they are emitted to the environment

Skills:

U1. Has well-established skills in the field of chemical calculations, using the periodic table of elements, notation of summary and structural formulas of chemical compounds as well as writing and balancing of any type of chemical reactions involving inorganic compounds

U2. Is able to analyze and solve typical chemical problems based on knowledge from various sources, including knowledge sought independently; knows how to compare knowledge from different sources

U3. Can organize his own work in a chemical laboratory; correctly applies laboratory work techniques; correctly uses laboratory equipment and correctly interprets the results obtained

U4. Practically implements the principles of safe work in a chemical laboratory

Social competences:

K1. Perceives the relationship between own safety as well as the safety of others working in a chemical laboratory and the compliance with the regulations which apply in a chemical laboratory; develops a habit of maintaining order in the workplace

K2. Is aware of the threat to the natural environment from some commonly used, inorganic chemical compounds; understands the need for action to minimize these harmful effects

Course objective

Strengthening the theoretical knowledge of general and inorganic chemistry and expanding it with knowledge and practical skills related to qualitative inorganic analysis. Strengthening habits related to compliance with the principles of safe work in the laboratory. The developing by students the skills to use their own theoretical knowledge to effectively solve given practical tasks. Strengthening the habit of proper organization of laboratory work.

Course-related learning outcomes

Knowledge

1. The student is thoroughly familiar with the chemical and physicochemical properties of elements and their compounds (K_W03, K_W08)

2. Has solid theoretical and practical knowledge in the field of qualitative analysis of cations, anions and inorganic compounds (K_W03, K_W08)

3. Knows the classical/standard research and observation methods used in the qualitative analysis of cations, anions and simple and complex inorganic compounds/substances (K_W11)

4. Has established knowledge of occupational health and safety in the qualitative analysis laboratory (K_W18)

Skills

1. Student is able to analyze typical problems in the field of inorganic qualitative analysis and find their solutions based on known laws, theorems and methods (K_U01)

2. Properly selects reactions, techniques and analytical methods, necessary for effective performance of qualitative analysis of chemical compounds (K_U21)

3. Is able to prepare and present a well documented elaboration of a problem in the field of inorganic compounds analysis (K_U01)

4. Is able to fully engage in the implementation of assigned laboratory tasks, while ensuring their performance in conditions of full compliance with the principles of occupational health and safety (K_U28)

Social competences

1. The student is aware of the need to constantly improve his knowledge and skills, which is necessary for the effective implementation of the tasks set before him (K_K01)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Laboratory: the teacher regularly controls the theoretical preparation of students to perform planned exercises. The check is carried out by polling and/or in the form of written tests. The teacher observes and assesses the behavior of students in the laboratory, including the ability to organize laboratory work and their manual skills during the performance of the exercises planned. Written reports on performed exercises are subject to evaluation. The final grade is the result of the three components listed above

Programme content

Laboratory:

1. Division of cations and anions into analytical groups (group reagents; separation of individual groups of ions from the mixture)

2. Qualitative analysis of cations (according to the division of Fresenius into five analytical groups):
- qualitative analysis of cations of the analytical groups I and II
- qualitative analysis of cations of the analytical group III
- qualitative analysis of cations of the analytical groups IV and V
- qualitative analysis of cations of the analytical groups I-V

3. Qualitative analysis of anions (according to the division of Alexeyev into three analytical groups):
- qualitative analysis of anions of the analytical group I
- qualitative analysis of anions of the analytical groups II and III

4. Qualitative analysis of simple salts

Teaching methods

Laboratory classes are practical - they involve the students' independent performance of qualitative analysis of samples of unknown chemical composition issued by the teacher. The order of analyzes performed in the laboratory is consistent with the course schedule which is given in this description sheet. The student independently selects/sets the methodology of the approach to solve the problem, using previously acquired knowledge in the subject General and inorganic chemistry (sem. 1 and 2). The lecturer constantly controls the student's behavior in the laboratory and the manner of performing individual activities. The lecturer does not interfere in the methodology chosen by the student for solving the problem, but provides advice and provides assistance when the student reports with a specific substantive question/problem. The lecturer immediately corrects any irregularities that he notices when observing students' work

Bibliography

Basic

1. J. Minczewski, Z. Marczenko, Chemia analityczna t. I, PWN Warszawa 2012

2. B. Chmielewska-Bojarska, Chemia analityczna. Analiza jakościowa kationów i anionów, Wydawnictwo Uniwersytetu Łódzkiego 2012

3. J.A. Szymura, R. Gogolin, J. Lamkiewicz, Analiza jakościowa anionów i kationów w chemii nieorganicznej, Wydawnictwa Uczelniane ATR, Bydgoszcz 2005

4. G. Charlot, Analiza nieorganiczna jakościowa, PWN, Warszawa 1976

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8. K. M. Pazdro, Zbiór zadań z chemii, Oficyna Edukacyjna 2007

9. L. Pajdowski, Chemia ogólna, PWN, Warszawa 1992

Additional

1. A. Ciszewski, M. Baraniak, Aktywność chemiczna i elektrochemiczna pierwiastków w środowisku wody, Wydawnictwo PP, Poznań 2006

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3. K. Radomska, J. Konarski, Chemia nieorganiczna cz. II. Analiza jakościowa, 1987

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5. F.A. Cotton, G. Wilkinson, C. Murillo, M. Bochmann, Chemia nieorganiczna. Podstawy, PWN, Warszawa 1995

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8. W. Ufnalski, Podstawy obliczeń chemicznych z programami komputerowymi, WNT, W-wa 1999

9. G.W. van Loon, S. J. Duffy, Chemia środowiska, PWN, Warszawa 2008

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,0
Classes requiring direct contact with the teacher	45	1,8
Student's own work (literature studies - as preparation for carrying out complex practical laboratory tasks, preparation of laboratory reports, preparation for checking knowledge (oral or written - partial tests) [1]	80	3,2

[1] delete or add other activities as appropriate