COURSE DESCRIPTION CARD - SYLLABUS

Course name
Practical applications of inorganic compound reactions [S1TCh2E>PZRZN]

Course

Field of study
Chemical Technology

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
English

Form of study
full-time

Requirements
elective

Number of hours

Lecture
0

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

Lecturers

Prerequisites

Knowledge: Student: has knowledge resulting from passing the subject in general and inorganic chemistry during the 1st and 2nd semester, and in particular: W1. Student has established theoretical knowledge in the field of inorganic and general chemistry, and in particular, is able to describe the structure of matter at the nuclear, atomic and molecular level; can identify properties of elements and their compounds being able, at the same time, to explain these properties in relation to the position of elements in the periodic table W2. Student knows the EHS of chemistry laboratory, especially the rule of keeping the workplace clean; knows First Aid basic principles and is able to apply them in the event of unfortunate accidents and incidents W3. Student can list and characterize basic laboratory techniques W4. Student is able to plan and carry out simple chemical experiment and knows how to analyze, develop and describe its results Skills: Student: has skills resulting from passing the subject in general and inorganic chemistry during the 1st and 2nd semester, and in particular: U1. Student is skilled in chemical calculations: is able to use the periodic table: can write molecular and structural formulas of chemical compounds as well as can write and balance chemical reactions of any type involving inorganic compounds U2. Student is able to analyze and solve typical chemical problems based on knowledge from various sources, including knowledge gained by his/her own; knows how to compare knowledge from different sources U3. Student can organize his/her own work in the chemistry laboratory; can correctly apply different laboratory techniques; can make proper use of laboratory equipment and correctly interpret obtained results Social competences: Student: has knowledge resulting from passing the subject in general and inorganic chemistry during the 1st and 2nd semester, and in particular: K1. Student can see the dependence between his/her own safety and the

safety of other people working in the laboratory in proceeding according to the regulations applied in the laboratory; develops the habit of keeping the workplace clean K2. Student is aware of the adverse effects some commonly used inorganic compounds may have on environment; understands the need to make action required to minimize these harmful effects

Course objective

Broadening of knowledge and improvement of practical skills related to laboratory work. Understanding the importance of being obedient to the EHS laboratory rules and any other restrictions; broadening of knowledge on the novel methods and techniques in use; team orientation for better work performance; transfer of knowledge within the practical application of chemical reactions and the related problem solving techniques; getting familiar with the chemical transformation effects and getting practical knowledge on these effects

Course-related learning outcomes

Knowledge:
1. Student has established theoretical knowledge and laboratory practice in inorganic and general chemistry; can identify the properties of elements and their compounds, and is able to select proper methods and measures necessary for the practical application of chemical reactions and/or operations (K_W03, K_W08)
2. Student can identify the character of various chemical reactions and processes, which allows him/her to recognize specific problems that may occur during their application, especially when he/she is the person in charge when working in team; student is familiar with the laboratory EHS and obeys these rules unconditionally (K_W18)
3. Student can distinguish, characterize and explain the specific character of various techniques applied in laboratory; Student can plan complex chemical experiments and select all the necessary measures and techniques for them to be applied; student knows how to apply the results (K_W15)
4. Naming proper physicochemical properties of elements and their compounds, student can not only explain the simple - one-step -possibility for preparation of some compounds (i.e. by conducting the reaction or chemical operation), but also the necessity of applying multi-stage procedures in other cases (K_W03, K_W08)
5. Student can recognize various applications of inorganic reagents and reactions in which they participate with the use of different technologies and analysis methods available (K_W03, K_W08)

Skills:
1. Student is skilled in writing and balancing chemical reactions of any type involving inorganic compounds and their thermodynamic conditions; student can use his/her in practice while conducting reactions and complex experiments involving inorganic reagents (K_U01, K_U18)
2. Student is able to analyze and solve typical chemical problems based on knowledge from various sources, including knowledge gained by his/her own; knows how to compare knowledge from different sources; has team-oriented attitude when complex chemical issues are developed and planned (K_U01, K_U02, K_U16)
3. Student can organize his/her own work in the chemistry laboratory; can correctly apply different laboratory techniques; can make proper use of laboratory equipment and correctly interpret obtained results (K_U01, K_U07, K_U20)
4. Students implements and follows the EHS rules of chemistry laboratory (K_U10, K_U28)

Social competences:
1. Student can see the dependence between his/her own safety and the safety of other people working in the laboratory in proceeding according to the regulations applied in the laboratory; develops the habit of keeping the workplace clean (K_K03, K_K04)
2. Student is aware of specific risks and responsibilities he/she must take for implementation of entrusted tasks while working in a team (K_K01, K_K03, K_K05)

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 for the implementation of the laboratory exercise plan. The check is carried out by oral questioning 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 manual skills during the performance of the exercises planned. Written reports on performed exercises are subject to evaluation. The final grade from laboratory classes is the outcome of the above three components - it is evaluated according to the scale of grades in force at Poznan University of Technology. If the classes are conducted remotely, then as part of the report, the tutor gives students additional problems for solving, relating to the issues of laboratory practice, assessing the manner of their description and interpretation.

Programme content

Issue retaled to practical applications of inorganic compound reactions.

Course topics

1. Applications of paper chromatography. Separation of halide anions
2. Applications of ion exchangers. Ion exchange chromatography. Water hardness removal
3. Mineral binders. Cement quality testing
4. Unconventional separation techniques. Purification of iodine by sublimation
5. Characteristics of water quality. Determination of oxidizability in potassium manganate (VII) reaction potassium manganate (VII)
6. Corrosion of metallic elements. Corrosion prevention

Teaching methods

Classes are practical, they consist in the students themselves doing exercises included in the course plan. Exercises are performed in accordance with the attached instructions. The teacher personally shows and explains how to perform the activities and operations that students meet for the first time. The teacher constantly controls the student's behavior in the laboratory and the way of performing his work themselves. He immediately notices and corrects irregularities. In the case of conducting laboratory classes remotely, it is of particular importance to present students' videos on the issues of laboratory practice and discuss them in detail.

Bibliography

Basic:
1. J. Minczewski, Z. Marczenko, Chemia analityczna. Tom 3: Analiza instrumentalna, PWN, Warszawa 1997
2. B. Tremillon, Jonity w procesach rozdzielczych, PWN, Warszawa 1970
3. L. Czarnecki, T. Broniewski, O. Henning, Chemia w budownictwie, Wydawnictwo Arkady, Warszawa 1996
4. W. Żenczykowski: Budownictwo ogólne. Tom 1: Materiały i wyroby budowlane, Wydawnictwo Arkady, Warszawa 1976
5. B. i E. Gomułkowie, Ćwiczenia laboratoryjne z chemii wody, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 1998
6. L. A. Dobrzański, Podstawy nauki o materiałach i metaloznawstwo, WNT, Warszawa, 2002
3. A. Bielański, Podstawy chemii nieorganicznej, t.1-3, PWN, Warszawa 2005
4. L. Jones, P. Atkins, Chemia ogólna. Cząsteczki, materia, reakcje, tom 1 i 2, PWN, Warszawa 2009

Additional:
1. A. Ciszewski, M. Baraniak, Aktywność chemiczna i elektrochemiczna pierwiastków w środowisku wody, Wydawnictwo PP, Poznań 2006
2. L. Kolditz, Chemia nieorganiczna, PWN, Warszawa 1994
3. F. Domka, J. Jasiczak, Analiza jakościowa, Wydawnictwo AE, Poznań 2004
4. K. M. Pazdro, Zbiór zadań z chemii, Oficyna Edukacyjna 2007
5. M.J. Sienko, R.A. Plane, Chemia. Podstawy i zastosowania, WNT, Warszawa 2002

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00