KH1123 General Chemistry 1 6.0 credits

Allmän kemi 1

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for KH1123 valid from Spring 2023

Grading scale

A, B, C, D, E, FX, F

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The objective of the course is to consolidate and deepen knowledge in chemistry and provide necessary basis for use in coming courses in chemistry and chemical engineering. The course shall also provide training in use of equipment and several methods that are used in chemical laboratory.

After successfully completed course the student shall be able to:

- Give chemical symbol, Swedish and English name of selected elements and their monoatomic ions and interpret common graphical ways to represent chemical compounds.
- Name/provide chemical formula of inorganic chemical compounds and molecular ions as well as common organic functional groups (systematic names and examples of trivial names).
- Explain basic concepts of chemistry, periodic system, atomic structure and chemical bonding as well as structure of inorganic compounds.
- Connect intermolecular forces to chemical structure and physical properties.
- Apply 1:st-3rd laws of thermodynamics for gases and solutions
- Solve problems of chemistry and physics that are related to phase diagrams, phase transitions and chemical reactions. This includes heat, work, enthalpy, entropy, Gibbs free energy.
- Describe chemical reactions, write net ionic chemical equations, explain and identify selected inorganic reaction types and predict products in inorganic reaction systems.
- Perform chemical laboratory work based on given instructions, with regard to working environment and safety regulations.

Course contents

Chemical principles: aggregation states, element, compound, mixture, chemical formulas, ways to represent chemical compounds.

Nomenclature: atoms, ions, inorganic and organic compounds, common trivial names, short introduction to systematic naming of metal complexes.

Atom structure and properties: orbitals, valence electrons, relation to the properties of elements and to the periodic table, electronegativity.

Chemical bonding: ionic-, metal- and covalent bonds, Lewis structures, sigma and pi-bonds, hybrid orbitals, intermolecular forces. Relation to chemical and physical properties.

Chemical structure: octet rule and most common exceptions to it, VSEPR-formulas and 3D structures, resonance, alternative shapes. Oxidation numbers and formal charge. Relation to reactivity.
Thermodynamics: 1st – 3rd laws, enthalpy, entropy, heat, work, Gibbs free energy.Phase transitions.
Foundations in inorganic reactivity, the concept of mole, stoichiometry and reactions.
Safety risks and chemical risks in the laboratory. Labelling of chemical substances, work environment and safety regulations.
Laboratory equipment.

Examination

- TEN1 - Written examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- UPP1 - Assignments, 1.0 credits, grading scale: P, F
- LAB2 - Laboratory Work, 1.0 credits, grading scale: P, F
- LAB1 - Computer Laboratory Work, 1.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.