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 Autumn 2015

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Completion of upper-secondary school before 1 July 2011 and adult education at upper-secondary level before 1 July 2012

Specific entry requirements: mathematics D, physics B and chemistry A. The grade Passed or 3 in each of the subjects is required.

Completion of upper-secondary school from 1 July 2011 and adult education at upper-secondary level from 1 July 2012 (Gy2011)

Specific entry requirements: Physics 2, Chemistry 1 and Mathematics 3C. A pass in each of the subjects is the lowest acceptable grade.

Language of instruction

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

Intended learning outcomes

The aim of the course is to strengthen and deepen the knowledge in chemistry and give required basis in coming courses in physical, organic and analytical chemistry and chemi-technical subjects. The course should also give training in the use of equipment and several of the methods that are utilised in a chemical laboratory.

On completion of the course, the student should be able to:

• Name and understand chemical bonding based on systematic inorganic nomenclature and represent chemical reactions with different descriptors, for example gross formulae, empirical formulae and structural formulae.

• Classify inorganic reactions and predict which products will be formed in the reaction between some important reactants and decide what acts as acid/base, oxidant/reducing agent, ligand/central atom. The student should also be able to describe the coordination chemistry and identify some important ligands and describe the concepts of chelation and complexes involving several nuclea.

• Make relevant observations of chemical reactions and communicate these orally and in writing and write correct balanced reaction formlas and state the degree of oxidation for elements in the reaction products.

• Describe the building of the atom and refer to systematic variations in properties of the relevant elements in the periodic table. The student also should be able to state the electron configuration using the valence electron model and suggest ionic states for the elements and establish main bindning states in reactants.

• Describe and differentiate among different models of chemical bonding (ionic, covalent, complexation, and metallic bondning).

• Establish Lewis structure including resonance - and alternative forms, establish VSEPR-formlas and the spacial structure for chemical compounds and for simple hybridisation.

• Describe the intermolecular forces and discuss which are important for a given chemical reaction. The student should also be able to describe the connection between intermolecular forces and physical properties such as for example boiling point.

• Describe the first and second laws of thermodynamics and thermodynamic components such as enthalpy and entropy, and account for how they depend on temperature and aggregation state.

• Make thermodynamic calculations including enthalpy, entropy, internal energy, heat and work and from these draw conclusions about the heat of reactions/work exchanged with the environment, and calculate Gibb's free energy and decide when chemical reactions will take place.

• Understand and describe the use of wet chemical laboratory equipment, for example burettes, pipettes and volumetric flasks.

Course contents

Course literature

Burdge, J., Chemistry, 3rd Ed., McGraw-Hill, 2013

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.

Other requirements for final grade

To pass in the course, it is required that all parts are passed

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.