Inorganic Chemistry

Programme course

6 credits

Oorganisk kemi

NKEB06

Valid from: 2017 Spring semester

Determined by
Board of Studies for Chemistry, Biology and Biotechnology

Date determined
2017-01-25

Main field of study
Chemical Engineering, Chemical Biology, Chemistry

Course level
First cycle

Advancement level
G1X

Course offered for
- Chemistry, Bachelor´s Programme
- Chemical Biology
- Chemical Analysis Engineering, B Sc in Engineering

Entry requirements
Note: Admission requirements for non-programme students usually also include admission requirements for the programme and threshold requirements for progression within the programme, or corresponding.

Prerequisites
General Chemistry

Intended learning outcomes
The aim of the course is to give the basis of inorganic chemistry for further studies in chemistry. After passing the course the student is able to:

- describe the relationship between the electronic structure of atoms/ions and important chemical parameters such as electronegativity, oxidation state, ionic radius, and coordination number
- discuss the acidic and basic properties of metal ions and oxo anions in water solutions
- explain the concept lattice energy and how it can be calculated
- explain the concepts Lewis acid and Lewis base and how they can be applied in the analysis of chemical reactions
- explain how E/pH-diagrams can be used to predict inorganic redox reactions
- discuss the most common coordination geometries of the d-elements and the basis of ligand (crystal) field theory
- apply some important inorganic synthesis methods

Course content

The chemical and physical properties of the elements taking as starting point their positions in the periodic table. The geometry of s-, p-, and d-orbitals and the origin of s, p and d bonds. The difference between ground state and bonding state. Important trends in the periodic table, e.g. acidic and basic properties of cations and anions in water. The relationship between the crystal structure of ionic compounds and their stabilty. The concepts Hard and Soft Acids and Bases (HSAB), Lewis acid and Lewis base. Thermochemical cycles (Born-Haber cycles). Inorganic redox reactions and E/pH-diagrams (Pourbaix diagram). Coordination compounds and Ligand (Crystal) Field Theory. Metal-organic compounds and their chemistry.
The laboratory course includes the synthesis of a few inorganic compounds. Determination of the oxidation states of vanadium by redox titration. Synthesis of cobolt containing coordination compounds and spectroscopic determination of their ligand field splitting.

Teaching and working methods

The course consists of lectures, lessons, and laboratory exercises

Examination

LAB1	Laboratory	1.5 credits	U, G
TEN1	Written examination	4.5 credits	U, 3, 4, 5

Grades

Four-grade scale, LiU, U, 3, 4, 5

Department

Institutionen för fysik, kemi och biologi

Director of Studies or equivalent

Magdalena Svensson

Examiner

Henrik Pedersen

Course website and other links

Education components

Preliminary scheduled hours: 72 h
Recommended self-study hours: 88 h

Course literature

G. Rayner-Canham & T. Overton, “Descriptive Inorganic Chemistry”, 6th ed.

Common rules

Regulations (apply to LiU in its entirety)

The university is a government agency whose operations are regulated by legislation and ordinances, which include the Higher Education Act and the Higher Education Ordinance. In addition to legislation and ordinances, operations are subject to several policy documents. The Linköping University rule book collects currently valid decisions of a regulatory nature taken by the university board, the vice-chancellor and faculty/department boards.

LiU's rule book for education at first-cycle and second-cycle levels is available at http://styrdokument.liu.se/Regelsamling/Innehall/Utbildning_pa_grund-_och_avancerad_niva.