Faculty of Science

KEMB22, Chemistry: Inorganic Chemistry, 7.5 credits

Kemi: Oorganisk kemi, 7,5 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Study programmes board, Faculty of Science on 2017-09-25 to be valid from 2017-09-25, spring semester 2018.

General Information

The course is included in the main field of Chemistry at the Faculty of Science. The course is a compulsory first-cycle course for a degree of Bachelor of Science, main field of subject Chemistry.

Language of instruction: Swedish and English
The course is given in Swedish, but may be given in English if participants who do not have competence in Swedish are expected.

Main field of studies	*Depth of study relative to the degree requirements*
Chemistry	G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Learning outcomes

The aim of the course is to extend and consolidate students' knowledge and skills in inorganic chemistry, especially the chemistry of transition metals.

Knowledge and understanding

Upon completion of the course, the students shall be able to:

- describe, both verbally and graphically, basic solid-state structures (prototypical mineral structures)
- account for allowed spin states (ground states) for octahedral and tetrahedral d-block metal complexes, and the influence of ligands, electron configuration, and the oxidation state of the metal on the spion state of the complex
- describe crystal field splittings (frontier orbitals) for octahedral, tetrahedral, square planar and square pyramidal d-block metal complexes

- rationalize the structures of coordination complexes using molecular obital theory, ligand field theory and VSEPR (the Nyholm-Gillespie rules)

Competence and skills

Upon completion of the course, the students shall be able to:

- derive relatively simple and qualitative molecular orbital diagrams using a symmetry-based approach based on group theory
- describe common reaction mechanisms for ligand exchange on and electron transfer between coordination complexes; derive kinetic rate laws for these mechanisms
- account for and describe bonding modes and reactivities of common ligands in organometallic complexes and describe common (typical) organometallic reactions/reaction mechanisms
- perform electron counting for coordination complexes/organometallic complexes (the effective atomic number rule)
- handle oxygen- and moisture-sensitive metal complexes in the laboratory
- correctly employ chemical nomenclature in the naming of metal complexes

Course content

Lectures: The lectures will focus on the properties of coordination complexes with an emphasis on structures, dynamics and chemical bonding of such complexes. This will include:

- Modern coordination chemistry, especially its interfaces with other subject areas, e.g. catalysis and solid-state chemistry.
- Chemical bonding with an emphasis on application of molecular orbital theory.
- Inorganic reaction mechanisms and kinetics.
- Basic organometallic chemistry and organometallic catalysis.

Laboratory exercises: The students are required to carry out three laboratory exercises that are designed to illustrate some of the important concepts in the course and provide the students with common practical chemical laboratory skills.

Course design

The teaching consists of lectures, instructor-led tutorials in groups, exercises and laboratory work. Compulsory participation is required in laboratory work and associated elements.

Assessment

The course is examined by a written examination at the end of the course. A re-sit examination is offered soon after the examination to students who do not pass.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Subcourses that are part of this course can be found in an appendix at the end of this document.

Grades

Marking scale: Fail, Pass, Pass with distinction.
To be awarded Pass students must pass the examination, pass the laboratory work and participate in all compulsory course elements.

The examination grades are: Fail, Pass or Pass with Distinction. Grades for laboratory work and the compulsory elements included therein are: Fail and Pass.

The final grade for the course is determined by the grade on the final examination.

Entry requirements

To be admitted to the course students must have basic eligibility and knowledge corresponding to:

- KEMA10 General Chemistry, 7.5 credits, KEMA01 Organic Chemistry – Basic Course, 7.5 credits, KEMA12 Inorganic Chemistry – Basic Course 7.5 and KEMA03 Biochemistry – Basic Course, 7.5 credits
- KEMB09 Physical Chemistry – Basic Course, 15 credits
- MATA02 Mathematics for Scientists, 15 credits

Further information

The course cannot be credited as part of a degree programme that also includes KEMB12 Inorganic Chemistry 7.5 credits.

Subcourses in KEMB22, Chemistry: Inorganic Chemistry

Applies from V18

1701 Inorganic Chemistry, 5,5 hp
Grading scale: Fail, Pass, Pass with distinction
1702 Inorganic Chemistry, Laboratory Work, 2,0 hp
Grading scale: Fail, Pass