KD1150 Chemical Equilibria 7.5 credits

Kemisk jämvikt

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

Establishment

Course syllabus for KD1150 valid from Spring 2011

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

Completed upper secondary education including documented proficiency in English corresponding to English A. For students who received/will receive their final school grades after 31 December 2009, there is an additional entry requirement for mathematics as follows: documented proficiency in mathematics corresponding to Mathematics A.

And the specific requirements of mathematics, physics and chemistry corresponding to Mathematics E, Physics B and Chemistry A.

Language of instruction

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

Intended learning outcomes

This course aims at providing the students with sufficient knowledge for them to master equilibrium problems. They should acquire the skill for subjecting these problems to critical analysis as well as assessing the results in terms of reasonableness.

After completed course the student should be able to:

• Identify the unknown variables in the problem

• Find as many equations as there are variables

• Make reasonable approximations for solving the problem without recourse to a computer

• Control the approximations being adequate

• Bring the correct stochiometry to bear on any equilibrium problem

• Utilize correct charge balance whenever ions participate

• Make the correct link between partial pressures and concentrations

• Calculate gaseous equilibria

• Calculate the pH in acidic and basic solutions

• Prepare appropriate buffer solutions and calculate their pH as well as the pH during acid-base titrations

• Calculate the solubility of gases, of ionic solids and the distribution of a given substance between two different solvents

• Calculate the potential of a galvanic cell (i.e: EMF = Electromotive force) as a function of the cells composition

• Calculate equilibrium constants of redox reactions by means of cell potential data and vice versa

• Plan and carry out laboratory exercises aiming at the quantitative separation of metal ions

• Solve complex equilibrium problems aided by an appropriate computer programme

Course contents

Chemical equilibria and the law of mass action as applied to:

• Acid-base equilibria

- Complex formation equilibria
- Solubility equilibria
- Redox equilibria
- Distribution equilibria

The above parts will be mainly dealt with in lectures and class exercises. Knowledge gained in equilibrium theory will be employed when solving practical problems as a project task by means of a computer. Another application of chemical equilibria will be the laboratory exercises dealing with separation of metal ions.

Course literature

Jones & Atkins, Chemistry: Molecules, Matter and Change. 4:e uppl. Freemans. ISBN 0-7167-4257-8

Examination

- KON1 - Examination, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 3.0 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

Written exam, TEN1; 3 credits
Continuous examination, PRO1; 1,5 credits
Laboratory work, LAB1; 3 credits

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.