KD2070 Technical Surface Colloid Chemistry 6.0 credits

Teknisk yt- och kolloidkemi

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

Establishment

Course syllabus for KD2070 valid from Autumn 2007

Grading scale

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

Education cycle

Second cycle

Main field of study

Chemistry and Chemical Engineering

Specific prerequisites

1. Three years of study at the School of Chemistry and Chemical Engineering, KTH, or corresponding knowledge.

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 provide a broad, fundamental basis in surface and colloid chemistry and its applications.

After completing the course, a student should be able to:

• Identify the various types of colloidal systems and classify them according to their thermodynamic stability.

• Identify, describe and predict the phase behaviour of multicomponent systems in terms of molecular properties and self-assembly.

• Understand and describe the nature of surface active agents and the driving forces for their adsorption to various types of interfaces. Calculate the interfacial concentration from surface tension and/or bulk concentration data.

• Explain interfacial charging mechanisms

• Account for the stability or otherwise of a colloidal system in terms of the surface forces acting between the constituent particles and predict behaviour in response to changes in composition.

• Calculate the magnitude of the surface forces acting between arbitrary surfaces/particles in a given medium.

• Understand and apply quantitatively the basic principles of surface thermodynamics to explain and calculate the effect of surface tenson, contact angles, wetting behaviour and related phenomena.

• Explain quantitatively the relationship between adhesion, surface energy and adsorption.

• Identify and describe the surface chemical principles involved in industrial processes such as froth flotation, paper making and detergency.

Course contents

Fundamental principles of colloid and surface chemistry. Capillarity. Thermodynamics of surface tension, adsorption and interacting surfaces and related experimental methods.

Surface films and Langmuir-Blodgett films.

Electrostatics at interfaces

Electrokinetic phenomena

Surface forces, double layer forces, van der Waals forces, steric forces, stability of colloids.

Stabilization of dispersions. Dewatering of slurries and fiber suspensions.

Adhesion, wetting, flotation and detergency.

Gas adsorption and adsorption from solution.

Properties and aggregation of surfactants, micelles, vesicles, liquid crystals and biomembranes.

Emulsions, microemulsions and foam.

Course literature

1. K. Holmberg et al. Surfactants and Polymers in Aqueous Solution John Wiley & Sons, 2002

2. Handouts

Examination

- TEN1 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.5 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, 4,5 credits.
2. Completed laboratory course, 1,5 credit.
Textbook

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.