MH2453 Theory of High Temperature Processes 6.0 credits

Högtemperaturprocessers teori

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

Establishment

Course syllabus for MH2453 valid from Autumn 2007

Grading scale

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

Education cycle

Second cycle

Main field of study

Specific prerequisites

4H1903 Transport phenomena

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 an understanding of the various reactions that form part of materials processes from a fundamental view point. The course consist of two parts: a thermodynamic part and a kinetic part, the latter including even mass and heat transfer. In the first part, the modelling of the thermodynamic of dilute solutions would be given a strong emphasis. Various thermodynamic models for metallic and ionic systems would be discussed. The students are trained in thermodynamic process modelling which will include analog descriptions. The kinetic part begins with a presentaion of thermophysical properties of high temperature systems and their importance in the transport phenomena aspects of materials processes. The chapter on gas-solid reactions would deal with the various reaction mechanisms including diffusion and adsorption. Some of the salient features of multiphase reactions such as dissolution of a solid in a liquid phase and bubble formation in melts would be discussed with illustrations from different materials processes.

Course contents

Thermodynamics: thermodynamic models for metallic melts and dilute solutions. Thermodynamic of ionic solutions. Relationships between slag structure and thermophysical as well as thernochemical properties. Thermodynamic background of electrolysis in liquid phases.

Kinetics: Surface-phenomena and viscosity. Formation of bubbles and drops. Reaction between gas and liquid. Reaction between two liquid phases.Solid-liquid reaction. Gas-solid reaction. Electrode kinetics in molten salt electrolysis.

Course literature

Compendium

Examination

- INL1 - Assignment, 1.5 credits, grading scale: P, F
- TEN1 - Examination, 3.0 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

Exam (TEN1; 3 cr)
Lab work (LAB1; ,5 cr)
Assignment (INL1; 1,5 cr)

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.