

Geothermodynamics

Objective

The course aims at imparting the prerequisites for - and a first practice in – the use of chemical thermodynamics for solving geochemical, petrologic and materials science related problems.

The course addresses to master's and ph.d.-students with no - or only little - knowledge of geochemical thermodynamics and its application.

Learning objectives

After completion of the course the student is expected to be able to

- *explain* fundamental thermodynamic notions and to *define* them mathematically
- *use* databases of thermochemical data
- *formulate* equilibria in metamorphic, magmatic and sedimentary systems
- *apply* thermodynamic calculations (e.g for the determination of melt-mineral equilibrium conditions, for geobar-/geothermometric reconstructions of P-T conditions)
- *compute* simple binary phase diagrams
- *apply* Schreinemakers' phase theory
- *apply* geothermo-/ geobarometry programmes (f.eks. THERMOCALC, PERPLEX)

Contents

First, the course comprises an introduction to thermodynamic notions and properties. Then, we deal with states and processes of geological systems in terms of their energetics, i.e. thermodynamically. We develop quantitative thermodynamic concepts and use them in order to determine conditions of formation of minerals and rocks and of analogous synthetic materials.

Prerequisites

Petrology, Applied Geochemistry and/or equivalent courses

Teaching period

Summer University, 1. term: July 2nd – 20th, 2012

Types of teaching

Lectures: 8 – 10 hours per week, 22 - 25 hours total

Practical: 8 – 10 hours per week, 22 - 25 hours total

Teaching materials/ textbooks

- (1) digest of chapters from different textbooks (handed out)
- (2) various notes

Course homepage

to follow

Instructor

Hans Dieter Zimmermann

Evaluation

4-hour written exam. Aids (books, notes) are permitted. Evaluation according to the 7-mark scale. External examiner. Admission to the exam requires acceptance of take-home problems (problem sets)

Compulsory programme

10 problem sets

Credits

5 ECTS points

Language

English