

Geochemical Thermodynamics - EAS 6211 – Fall 2013

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| Instructor: | Ellery Ingall Office: EST 2130 Phone 404 894-3883 ingall@eas.gatech.edu |
| Lectures: | TTh 12:05-1:25 pm, EST L1118 |
| Office Hours: | Ellery Ingall T, 10:00am-11:00am, W 10:30-11:30am |
| Grading: | Problem Sets 20% Project(difficulty, paper, presentation) 20% Participation/Preparation 10% Exams 50% |
| Text: | Physical Chemistry for the Chemical and Biological Sciences By Raymond Chang, ISBN 1-891389-06-8 |
| Web Page: | Class materials will be posted on t-square |

Topics

Relevance of Thermodynamics

What is it?
Example Applications

Dealing with High P and T

The Easy Way
The Correct Way

Setting up the Basics

Thermodynamic Terminology
Useful Math

Mineral Equilibria

Equilibrium Constants
Pressure, Temperature Dependence
Chemical Potential Diagrams

Fundamental Relationships

Zeroth Law
First Law
Second Law
Combined First and Second Laws
Third Law
Statistical Interpretation of Entropy
Equations of State

Solid Solutions

Order disorder
Non-ideal Solutions

Real Calculations in Aqueous Systems

Activity-Composition Relations
Debye-Huckel, Davies Equations
Ion pairs

Simple Systems

Free Energy of Formation
Clapeyron Equation
Phase Rule
Phase Diagrams

Redox Systems

Nernst Equation
pe-pH diagrams

Thermodynamics of Solutions and Gases

Raoult's and Henry's Laws
Partial Molar Properties
Gibbs-Duhem Relation
Activity, Fugacity
Standard States
Chemical Potential

Thermodynamic Software

Phreeqc
Application to your work