

HIGH-TEMPERATURE AQUEOUS GEOCHEMISTRY II

GEOL 458/558

Objectives: 1) To augment knowledge acquired in High-Temperature Aqueous Geochemistry I (GEOL 457/557) via a primarily seminar format using the primary literature; 2) To develop the ability to read and critically evaluate published papers dealing with hydrothermal geochemistry; 3) To develop the ability to present your evaluation and defend it orally.

Topics: The topics to be discussed will be determined on a weekly basis, but will involve some aspect of high-temperature aqueous geochemistry. Most of the papers we discuss will deal with some aspect of ore metal transport or the solubility of minerals in hydrothermal solutions. I will lecture one meeting per week on the following topics:

- I. Structure of water and behavior of electrolytes in water
 - a) Structure of water
 - b) Ion hydration
 - c) The Born Equation
 - d) Measurement of hydration numbers
 - e) The dielectric constant and its relationship to water structure
 - f) Derivation of the Debye-Hückel equation
 - g) Solubility of non-electrolytes and the Setchenow equation
 - h) Ion association
- II. Factors controlling the strength of metal-ligand complexes
 - a) Pearson's Hard-Soft Acid-Base theory
 - b) Ligand-field theory
 - c) Relativistic effects
- III. Experimental methods