Interfacial reactions on rocks and soils

Schedule:

Components of soil/rock-solution systems. Characteristic properties of bulk phases and interfaces, thermodynamic characterization. Typical chemical species under geological conditions. Phase transition processes. Structure of the interface: Gibbs separation surface.

Characteristic processes of external and internal surfaces. Surface complex formation models. Thermodynamic and kinetic description of adsorption, ion exchange, surface precipitation, crystal growth, and coprecipitation. Properties of extremely diluted solutions. Material transport in the geological environment. Catalytic effects of rocks: humus formation and green chemistry.

Fundamental study of interfacial processes using montmorillonite as a model material. External and internal sphere complex formation. Surface acid-base properties. Redox processes. Effect of complex formation on ion balance. Binding and transformation of organic substances. Chemical modification possibilities, utilization of the resulting substances (waste treatment, catalysis).

Interfacial processes in real systems. Relationship between interfacial properties and geological origin. Sorption and migration of environmental pollutants. Storage of radioactive waste in geological environments. Surface acid-base properties of soils. Interactions of phosphate ions with soils, their effect on plant nutrient uptake.

Methods for investigating interfacial processes in rocks and soils.