

Chemical Kinetics and Reaction Dynamics

Background expected: Basic mathematics and chemistry

- Introduction: Thermodynamics vs Kinetics
 - A brief outcome from thermodynamics and the need for kinetics
- Chemical kinetics
 - Reaction order, molecularity, complex reactions, Enzyme kinetics, activation energy, and Arrhenius law
- Theories on reaction kinetics
 - Arrhenius's theory; collision theory, activated complex theory, transition state theory, Lindeman's theory of uni-molecular reactions
- Collision and diffusion-controlled reactions
 - Gas and Liquid phase reactions, reactions involving ion-ion and ion-dipoles reactions; the influence of solvent, and pressure on the reactions in solution
- Potential energy surfaces
 - Introduction to PES and analysis of reaction dynamics
- Photochemistry and photo-physics
 - Kinetics of photochemical and photophysical process, quantum yield, quenching, excited states, energy transfer processes, Marcus theory of electron transfer process
- Surface reactions and catalysis
 - Introduction to heterogeneous catalysis

Mode Assessment: 50% final exam, 30% short talk, and 20% assignment