

Physical Chemistry

Concepts students needs to know for lecture

Carry out stoichiometric calculations
Understand the kinetic molecular theory of gases
Carry out calculations involving colligative properties
Carry out gas law calculations
Carry out solution calculations
Understand principles of chemical equilibria
Carry out equilibria calculations
Discuss states of matter and phase changes
Discuss bonding theories (MO and VBT)
Work problems involving calculus and physics

Concepts students need to know for laboratory

Prepare solutions of a given concentration
Use titrimetric methods of quantitative analysis
Use word processing software
Use graphing software
Use spreadsheet software
Carry out error analysis
Use statistical analysis
Write formal laboratory reports
Use safe laboratory techniques
Properly dispose of laboratory wastes

Lecture Objectives

Apply calculus and physics to chemical problems
Discuss the three laws of thermodynamics
Apply laws of thermodynamics to physical changes
Apply laws of thermodynamics to chemical reactions
Apply laws of thermodynamics to phase equilibria
Apply laws of thermodynamics to chemical equilibria
Apply principles of quantum mechanics to simple systems
Apply principles of quantum mechanics to atoms and molecule
Apply principles of quantum mechanics to spectroscopic analysis
Critically analyze reaction mechanisms
Discuss basic postulates of quantum mechanics

Apply kinetics to transport processes such as fluid flow, heat flow, diffusion, and solution conductivity

Determine rate laws, rate constants, and energies of activation from experimental data

Laboratory Objectives

Carry out calorimetric experiments to obtain thermodynamic data

Construct phase diagrams from data

Determine equilibrium constants and activity coefficients from data

Carry out kinetic experiments to determine rate laws, rate constants, and energies of activation

Use molecular modeling software

Use spectroscopic methods to determine molecular constants