

Inorganic Chemistry

Concepts students need to know for lecture

Convert between metric and English units
Predict charges on ions
Classify chemical reactions
Classify compounds as acids or bases
Understand and discuss acid-base theories
Complete and balance chemical equations
Calculate theoretical and percent yields
Discuss the Bohr and Quantum atom
Write electron configurations
Relate atomic structure to properties
Understand ionic bond theory
Understand VSEPR Theory
Understand Valence Bond Theory
Relate bonding, shapes and properties
Describe hybridization and hybrid orbitals
Describe multiple bonds in terms of VBT
Describe resonance, write resonance forms
Understand basics of Molecular Orbital Theory
Relate states of matter to properties
Understand and discuss redox reactions
Understand kinetic theory of reactions
Understand principles of reaction equilibria
Discuss entropy, enthalpy, and free energy
Calculate entropy, enthalpy, and free energy
Discuss electrochemical cells
Calculate cell potentials
Discuss nuclear reactions, nuclear reactors
Discuss reactions of main group elements
Discuss the production of metals from ores
Classify organic functional groups
Classify organic reactions
Understand and apply reaction mechanisms
Describe the stereochemical structure of substances
Draw quasi 3D structures of molecules
Describe the stereochemistry of reactions
Name organic compounds

Concepts students need to know for laboratory

Measure mass and volume
Know basics of chromatographic separations
Quantitatively transfer materials
Carry out distillations
Acquire IR spectra of liquids
Acquire uv-visible absorption spectra
Filter and wash compounds
Recrystallize compounds
Calculate theoretical and percent yields
Use safe laboratory techniques
Properly dispose of laboratory wastes
Use word processing software
Write formal lab reports

Lecture Objectives

Learn Valence Bond Theory in depth
Apply VSEPR Theory
Relate bonding, shape, and properties
Learn use of Molecular Orbital Theory
Understand relationship between atomic structure and properties
Relate thermodynamic properties to reaction equilibrium
Learn properties and reactions of hydrogen
Classify compounds according to different acid-base theories
Balance redox reactions and the use Latimer and Frost diagrams
Learn reactions of main group elements
Learn syntheses of compounds of main group elements
Learn industrial synthetic methods for key industrial compounds
Name and write formulas for inorganic and coordination compounds
Use Group Theory to classify molecules according to point group
Use Group Theory to predict IR spectral characteristics of certain compounds
Learn basics of Ligand Field Theory (LFT) and Crystal Field Theory (CFT)
Use LFT and CFT to explain properties of coordination compounds
Learn basic reactions of transition metals and their compounds
Learn basic methods used in the synthesis of organometallic compounds
Learn the Effective Atomic Number Rule and its applications to predicting formulas of compounds.

Laboratory Objectives

Learn basic inorganic synthetic techniques
Use IR spectra to identify inorganic compounds

Use NMR spectra to identify inorganic compounds

Learn microscale synthetic techniques

Learn basic use of STN ON-LINE

Learn basic glassblowing techniques

Learn the use of an inert gas - vacuum manifold

Learn basic methods for synthesizing air-sensitive compounds