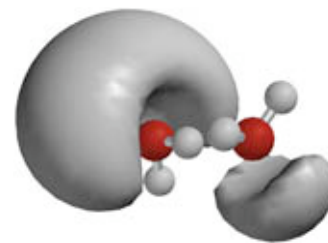


Concepts of Chemistry Advanced Section



From "Principles of Modern Chemistry" by
Oxtoby;Gillis;Nachtrieb, 5th Edition, Thomson, 2002.

THE GASEOUS STATE

Chemistry of Gases
Pressure and Temperature of Gases
The Ideal Gas Law
Mixtures of gases
The Kinetic Theory of Gases

SOLIDS AND LIQUIDS

Bulk Properties of Gases, Liquids, and Solids
Intermolecular Forces: Origins in Molecular Structure
Intermolecular Forces: Forces in Liquids

SOLUTIONS

Composition of Solutions
Introduction to Acid-Base Titrations
Introduction to Oxidation-Reduction Titration

CHEMICAL CHEMICAL EQUILIBRIUM

The Nature of Chemical Equilibrium
The Empirical Law of Mass Action
The Law of Mass Action for Related and Simultaneous Equilibria
Equilibrium Calculations
Direction of Change in Chemical Reactions

ACID-BASE EQUILIBRIA

Classification of acid and Bases
Acid and Base Strength
Equilibria Involving weak Acids and Bases
Buffer Solutions
Acid-Base Titration Curves
Polyprotic Acids

SOLUBILITY AND PRECIPITACION EQUILIBRIA

The Nature of Solubility Equilibria
Ionic Equilibria between Solids and Solutions
Precipitation and the Solubility Product
The effect of pH on Solubility
Complex Ions and Solubility

QUANTUM MECHANICS AND ATOMIC STRUCTURE

Wave Motion and Light
Blackbody Radiation and Photoelectric Effect
Experimental Energy Quantization in Atoms
The Bohr Model
Duality and the Schrödinger Equation
Particle in a Box
The Hydrogen Atom
Many Electron atoms and the Periodic Table
Periodic Properties and Electronic Structure

CHEMICAL BONDING: THE CLASSICAL DESCRIPTION

The Periodic Table
Shell Model of the Atom
Electronegativity
Ionic Bonding
Covalent Chemical Bond
Lewis Diagrams for Molecules
Polar Covalent Bonding
Shapes of Molecules: VSEPR Theory
Oxidation Numbers

QUANTUM MECHANICS AND MOLECULAR STRUCTURE

Quantum Picture of the Chemical Bond
Molecular Orbitals in Diatomic Molecules: LCAO
Molecular Orbitals in Polyatomic Molecules: Valence Bond Model
Bonding and Structure in Organic Molecules

INTERACTION OF MOLECULES WITH LIGHT

General Aspects of Molecular Spectroscopy
Infrared Spectroscopy: Vibrations and Rotations
Electronic spectroscopy of Molecules
Nuclear Magnetic Resonance
Photoelectron Spectroscopy

BONDING IN TRANSITION METALS AND COORDINATION COMPLEXES

Chemistry of the Transition Metals
Formation of Coordination Complexes
Structure of Coordination Complexes
Crystal Field Theory
Ligand Field Theory

PHASE TRANSITIONS

Phase Equilibrium
Phase Transitions
Phase Diagrams

COLLIGATIVE PROPERTIES

Colligative Properties of Solutions
Mixtures and Distillation