Oakwood City School District
AP Chemistry Science Standards

One goal of science education is to help students become scientifically literate citizens able to use science as a way of knowing about the natural and material world. All students should have sufficient understanding of scientific knowledge and scientific processes to enable them to distinguish what is science from what is not science and to make informed decisions about career choices, health maintenance, quality of life, community and other decisions that impact both themselves and others.

The AP Chemistry course provides students with a college-level foundation to support future advanced coursework in chemistry. Students cultivate their understanding of chemistry through inquiry-based investigations, as they explore content such as: atomic structure, intermolecular forces and bonding, chemical reactions, kinetics, thermodynamics, and equilibrium.

AP Chemistry Standards

Atomic Structure and Properties

A. Moles and Molar Mass
B. Mass Spectroscopy of Elements
C. Elemental Composition of Pure Substances
D. Composition of Mixtures
E. Atomic Structure and Electron Configuration
F. Photoelectron Spectroscopy
G. Periodic Trends
H. Valence Electrons and Ionic Compounds

Intermolecular Forces and Properties

A. Intermolecular Forces
B. Properties of Solids
C. Solids, Liquids, and Gasses
D. Ideal Gas Law
E. Kinetic Molecular Theory
F. Deviation from Ideal Gas Law
G. Solutions and Mixtures
H. Representations of Solutions
I. Separation of Solutions and Mixtures Chromatography
J. Solubility
K. Spectroscopy and the Electromagnetic Spectrum
L. Photoelectric Effect
M. Beer-Lambert Law

Chemical Reactions

A. Introduction for Reactions
B. Net Ionic Equations
C. Representations of Reactions
D. Physical and Chemical Changes
E. Stoichiometry

F. Introduction to Titration
G. Types of Chemical Reactions
H. Introduction to Acid-Base Reactions
I. Oxidation-Reduction (Redox) Reactions

Kinetics

A. Reaction Rates
B. Introduction to Rate Law
C. Concentration Changes Over Time
D. Elementary Reactions
E. Collision Model
F. Reaction Energy Profile
G. Introduction to Reaction Mechanisms
H. Reaction Mechanism and Rate Law
I. Steady-State Approximation
J. Multistep Reaction Energy Profile
K. Catalysis

Thermodynamics

A. Endothermic and Exothermic Processes
B. Energy Diagrams
C. Heat Transfer and Thermal Equilibrium
D. Heat Capacity and Calorimetry
E. Energy of Phase Changes
F. Introduction to Enthalpy of Reaction
G. Bond Enthalpies
H. Enthalpy of Formation
I. Hess’s Law

Equilibrium

A. Introduction to Equilibrium
B. Direction of Reversible Reactions
C. Reaction Quotient and Equilibrium Constant
D. Calculating the Equilibrium Constant
E. Magnitude of the Equilibrium Constant
F. Properties of the Equilibrium Constant
G. Calculating Equilibrium Concentrations
H. Representations of Equilibrium

I. Introduction to Le Châtelier's Principle
J. Reaction Quotient and Le Châtelier's Principle
K. Introduction to Solubility Equilibria
L. Common-Ion Effect
M. pH and Solubility
N. Free Energy of Dissolution

Acids and Bases

A. Introduction to Acids and Bases
B. pH and pOH of Strong Acids and Bases
C. Weak Acid and Base Equilibria
D. Acid-Base Reactions and Buffers
E. Acid-Base Titrations
F. Molecular Structure of Acids and Bases
G. H and pK_a
H. Properties of Buffers
I. Henderson-Hasselbalch Equation
J. Buffer Capacity

Applications of Thermodynamics

A. Introduction to Entropy
B. Absolute Entropy and Entropy Change
C. Gibbs Free Energy and Thermodynamic Favorability
D. Thermodynamic and Kinetic Control
E. Free Energy and Equilibrium
F. Coupled Reactions
G. Galvanic (Voltaic) and Electrolytic Cells
H. Cell Potential and Free Energy
I. Cell Potential Under Nonstandard Conditions
J. Electrolysis and Faraday's Law