

Contents

1. [1. Unit 1: Atomic Structure and Properties](#)
2. [2. Unit 2: Compound Structure & Properties](#)
3. [3. Unit 3: Properties of Substances & Mixtures](#)
4. [4. Unit 4: Chemical Reactions](#)
5. [5. Unit 5: Kinetics](#)
6. [6. Unit 6: Thermochemistry](#)
7. [7. Unit 7: Equilibrium](#)
8. [8. Unit 8: Acids and Bases](#)
9. [9. Unit 9: Thermodynamics & Electrochemistry](#)
10. [10. Frequently Asked Questions](#)
11. [11. Ace Your AP Exams with Save My Exams](#)

The AP Chemistry course is structured as several units, each covering a set of closely related topics. This article will give you an overview of the topics and concepts included in each unit to help you organize your studies.

Unit 1: Atomic Structure and Properties

This unit delves into the structure and properties of atoms. Matter, which makes up everything around us, is anything with mass that takes up space. Atoms are the basic building blocks of matter and the smallest units that still have the properties of an element. When atoms join together, they create molecules, which form the foundation of chemical compounds.

- Moles & Molar Mass
- Mass Spectra of Elements
- Elemental Composition of Pure Substances
- Composition of Mixtures
- Atomic Structure & Electron Configuration
- Photoelectron Spectroscopy
- Periodic Trends
- Valence Electrons & Ionic Compounds

Unit 2: Compound Structure & Properties

In Unit 2, atomic structure at the particulate level is used to explain the macroscopic properties of substances. The chemical and physical characteristics of materials are determined by the structure and arrangement of atoms, ions, or molecules and the forces acting between them.

- Types of Chemical Bonds

- Intramolecular Force & Potential Energy
- Structure of Ionic Solids
- Structure of Metals & Alloys
- Lewis Diagrams
- Resonance & Formal Charge
- VSEPR & Hybridization

Unit 3: Properties of Substances & Mixtures

Unit 3 shows how the properties of solids, liquids, and gases are determined by the relative order of particle arrangement, their freedom of movement, and the nature and strength of interactions between them. There is a direct relationship between the observable properties of solids, liquids, and gases and the structure of their particles at the molecular and atomic levels.

- Intermolecular & Interparticle Forces
- Properties of Solids
- Solids, Liquids, & Gases
- Ideal Gas Law
- Kinetic Molecular Theory
- Deviation from Ideal Gas Law
- Solutions & Mixtures
- Representations of Solutions
- Separation of Solutions & Mixtures
- Solubility
- Spectroscopy & the Electromagnetic Spectrum
- Properties of Photons
- Beer-Lambert Law

Unit 4: Chemical Reactions

This unit explores how matter changes during chemical transformations, expanding on the physical changes covered in Unit 3. Chemical changes occur when bonds between atoms form or break. The strength of these bonds and weaker intermolecular forces helps explain many properties of chemical systems. After a chemical change, the new substances have different properties from the original ones.

- Introduction for Reactions
- Net Ionic Equations
- Representations of Reactions

- Physical & Chemical Changes
- Stoichiometry
- Introduction to Titration
- Types of Chemical Reactions
- Introduction to Acid-Base Reactions
- Oxidation-Reduction (Redox) Reactions

Unit 5: Kinetics

Unit 5 examines how quickly chemical changes happen and what affects these rates. Factors like reactant concentration, temperature, catalysts, and environmental conditions play a role. Chemical changes occur through reactions, and their rates depend on how molecules collide. These reaction rates can be measured and observed, often involving energy changes.

- Reaction Rates
- Introduction to Rate Law
- Concentration Changes Over Time
- Elementary Reactions
- Collision Model
- Reaction Energy Profile
- Introduction to Reaction Mechanisms
- Reaction Mechanism & Rate Law
- Pre-Equilibrium Approximation
- Multistep Reaction Energy Profile
- Catalysis

Unit 6: Thermochemistry

The laws of thermodynamics explain how energy drives changes in matter and predict the direction of these changes. Energy's availability and distribution are vital to most chemical processes. Thermodynamics provides tools to understand energy's role, including the principle of energy conservation, which involves energy transfer through heat and work. Breaking a chemical bond requires energy, while forming a bond releases energy.

- Endothermic & Exothermic Processes
- Energy Diagrams
- Heat Transfer & Thermal Equilibrium
- Heat Capacity & Calorimetry
- Energy of Phase Changes

- Introduction to Enthalpy of Reaction
- Bond Enthalpies
- Enthalpy of Formation
- Hess's Law

Unit 7: Equilibrium

In this unit, any bond or intermolecular attraction can form or break, and these processes constantly compete. Initial conditions and external changes, like adding a substance, changing temperature, or adjusting volume, can upset the balance between forward and reverse reaction rates. Le Châtelier's principle predicts how an equilibrium system will shift under stress. The equilibrium constant (K) represents the reaction's state at equilibrium, while the reaction quotient (Q) describes the reaction at any moment, allowing comparison to equilibrium.

- Introduction to Equilibrium
- Direction of Reversible Reactions
- Reaction Quotient & Equilibrium Constant
- Calculating the Equilibrium Constant
- Magnitude of the Equilibrium Constant
- Properties of the Equilibrium Constant
- Calculating Equilibrium Concentrations
- Representations of Equilibrium
- Introduction to Le Châtelier's Principle
- Reaction Quotient & Le Châtelier's Principle
- Introduction to Solubility Equilibria
- Common-Ion Effect

Unit 8: Acids and Bases

This unit explores acid-base chemistry and solubility. Acid-base reactions, which involve proton exchange, are reversible and quickly reach equilibrium. These reactions can be analyzed using the principles of chemical equilibrium. The values of K for most acid-base reactions are either very large or very small, making it possible to draw conclusions about equilibrium without complex calculations.

- Introduction to Acids & Bases
- pH & pOH of Strong Acids & Bases
- Weak Acid & Base Equilibria
- Acid-Base Reactions & Buffers
- Acid-Base Titrations

- Molecular Structure of Acids & Bases
- pH & pKa
- Properties of Buffers
- Henderson-Hasselbalch Equation
- Buffer Capacity
- pH & Solubility

Unit 9: Thermodynamics & Electrochemistry

The thermodynamics of a chemical reaction connects its molecular structure to its observable outcomes. Every change in matter involves an energy change, often due to shifts in electrostatic forces that affect potential energy. Chemical systems undergo three main energy-altering processes: heating or cooling, phase changes, and chemical reactions. By understanding the laws of thermodynamics, students can explain energy's role and predict how matter changes.

- Introduction to Entropy
- Absolute Entropy & Entropy Change
- Gibbs Free Energy & Thermodynamic Favorability
- Thermodynamic & Kinetic Control
- Free Energy & Equilibrium
- Free Energy of Dissolution
- Coupled Reactions
- Galvanic (Voltaic) & Electrolytic Cells
- Cell Potential & Free Energy
- Cell Potential Under Nonstandard Conditions
- Electrolysis & Faraday's Law

Frequently Asked Questions

How Many Units are in AP Chemistry?

There are nine units in AP Chemistry.

What are the Hardest AP Chemistry Units?

Most teachers and students think thermodynamics, equilibrium and acids and bases are the hardest topics in AP chemistry. This is because these topics involve both conceptual understanding and mathematical calculations in various contexts.

What Units are Most Common on the AP Chemistry Exam?

Each unit for Chemistry has predefined weightings in the exam paper. These weightings are summarized in the table below.

Unit	Exam Weighting
Unit 1: Atomic Structure & Properties	7-9%
Unit 2: Compound Structure & Properties	7-9%
Unit 3: Properties of Substances & Mixtures	18-22%
Unit 4: Chemical Reactions	7-9%
Unit 5: Kinetics	7-9%
Unit 6: Thermochemistry	7-9%
Unit 7: Principles of Equilibrium	7-9%
Unit 8: Acids & Bases	11-15%
Unit 9: Thermodynamics & Electrochemistry	7-9%