CollegeBoard AP

AP® Chemistry

Your Course at a Glance

Plan

The Course at a Glance provides a useful visual organization of the AP Chemistry curricular components, including:

- Sequence of units, along with approximate weighting and suggested pacing. Please note, pacing is based on 45-minute class periods, meeting five days each week for a full academic year.
- Progression of topics within each unit.
- Spiraling of the big ideas and science practices across units.

Teach

SCIENCE PRACTICES

Science practices spiral throughout the course.

1 Models and Representations
2 Question and Method
3 Representing Data and Phenomena
4 Model Analysis
5 Mathematical Routines
6 Argumentation

Required Course Content

Each topic contains required Learning Objective and Essential Knowledge Statements that form the basis of the assessment on the AP Exam.

Assess

Assign the Progress Checks—either as homework or in class—for each unit. Each Progress Check contains formative multiple-choice and free-response questions. The feedback from the Personal Progress Checks shows students the areas where they need to focus.

UNIT 1

Atomic Structure and Properties

~9–10 Class Periods | 7–9% AP Exam Weighting

- 5 1.1 Moles and Molar Mass
- 5 1.2 Mass Spectra of Elements
- 7 1.3 Elemental Composition of Pure Substances
- 5 1.4 Composition of Mixtures
- 1 1.5 Atomic Structure and Electron Configuration
- 4 1.6 Photoelectron Spectroscopy
- 4 1.7 Periodic Trends
- 4 1.8 Valence Electrons and Ionic Compounds

Progress Check 1
Multiple-choice: ~20 questions
Free-response: 2 questions
- Short
- Short

UNIT 2

Compound Structure and Properties

~12–13 Class Periods | 7–9% AP Exam Weighting

- 6 2.1 Types of Chemical Bonds
- 3 2.2 Intramolecular Force and Potential Energy
- 4 2.3 Structure of Ionic Solids
- 4 2.4 Structure of Metals and Alloys
- 3 2.5 Lewis Diagrams
- 6 2.6 Resonance and Formal Charge
- 6 2.7 VSEPR and Hybridization

Progress Check 2
Multiple-choice: ~15 questions
Free-response: 1 question
- Long

UNIT 3

Properties of Substances and Mixtures

~14–15 Class Periods | 18–22% AP Exam Weighting

- 4 3.1 Intermolecular and Interparticle Forces
- 4 3.2 Properties of Solids
- 3 3.3 Solids, Liquids, and Gases
- 5 3.4 Ideal Gas Law
- 4 3.5 Kinetic Molecular Theory
- 6 3.6 Deviation from Ideal Gas Law
- 5 3.7 Solutions and Mixtures
- 3 3.8 Representations of Solutions
- 2 3.9 Separation of Solutions and Mixtures
- 4 3.10 Solubility
- 4 3.11 Spectroscopy and the Electromagnetic Spectrum
- 5 3.12 Properties of Photons
- 2 3.13 Beer-Lambert Law

Progress Check 3
Multiple-choice: ~30 questions
Free-response: 2 questions
- Short
- Short

UNIT 4

Chemical Reactions

~14–15 Class Periods | 7–9% AP Exam Weighting

- 2 4.1 Introduction for Reactions
- 5 4.2 Net Ionic Equations
- 2 4.3 Representations of Reactions
- 6 4.4 Physical and Chemical Changes
- 5 4.5 Stoichiometry
- 2 4.6 Introduction to Titration
- 1 4.7 Types of Chemical Reactions
- 1 4.8 Introduction to Acid-Base Reactions
- 5 4.9 Oxidation-Reduction (Redox) Reactions

Progress Check 4
Multiple-choice: ~20 questions
Free-response: 1 question
- Long

UNIT 5

Kinetics

~13–14 Class Periods | 7–9% AP Exam Weighting

- 6 5.1 Reaction Rates
- 5 5.2 Introduction to Rate Law
- 5 5.3 Concentration Changes Over Time
- 5 5.4 Elementary Reactions
- 4 5.5 Collision Model
- 3 5.6 Reaction Energy Profile
- 1 5.7 Introduction to Reaction Mechanisms
- 5 5.8 Reaction Mechanism and Rate Law
- 5 5.9 Pre-Equilibrium Approximation
- 3 5.10 Multistep Reaction Energy Profile
- 6 5.11 Catalysis

Progress Check 5
Multiple-choice: ~25 questions
Free-response: 2 questions
- Short
- Long

UNIT 6

Thermochemistry

~10–11 Class Periods | 7–9% AP Exam Weighting

- 6 6.1 Endothermic and Exothermic Processes
- 3 6.2 Energy Diagrams
- 6 6.3 Heat Transfer and Thermal Equilibrium
- 2 6.4 Heat Capacity and Calorimetry
- 1 6.5 Energy of Phase Changes
- 4 6.6 Introduction to Enthalpy of Reaction
- 5 6.7 Bond Enthalpies
- 5 6.8 Enthalpy of Formation
- 5 6.9 Hess's Law

Progress Check 6
Multiple-choice: ~20 questions
Free-response: 2 questions
- Short
- Short

UNIT 7

Equilibrium

~13–15 Class Periods | 7–9% AP Exam Weighting

- 6 7.1 Introduction to Equilibrium
- 4 7.2 Direction of Reversible Reactions
- 3 7.3 Reaction Quotient and Equilibrium Constant
- 5 7.4 Calculating the Equilibrium Constant
- 6 7.5 Magnitude of the Equilibrium Constant
- 5 7.6 Properties of the Equilibrium Constant
- 3 7.7 Calculating Equilibrium Concentrations
- 3 7.8 Representations of Equilibrium
- 6 7.9 Introduction to Le Châtelier's Principle
- 5 7.10 Reaction Quotient and Le Châtelier's Principle
- 5 7.11 Introduction to Solubility Equilibria
- 2 7.12 Common-Ion Effect

Progress Check 7
Multiple-choice: ~30 questions
Free-response: 2 questions
- Short
- Long

UNIT 8

Acids and Bases

~14–16 Class Periods | 11–15% AP Exam Weighting

- 5 8.1 Introduction to Acids and Bases
- 5 8.2 pH and pOH of Strong Acids and Bases
- 5 8.3 Weak Acid and Base Equilibria
- 5 8.4 Acid-Base Reactions and Buffers
- 5 8.5 Acid-Base Titrations
- 6 8.6 Molecular Structure of Acids and Bases
- 2 8.7 pH and pK_a
- 6 8.8 Properties of Buffers
- 5 8.9 Henderson-Hasselbalch Equation
- 6 8.10 Buffer Capacity
- 2 8.11 pH and Solubility

Progress Check 8
Multiple-choice: ~30 questions
Free-response: 1 question
- Long

UNIT 9

Thermodynamics and Electrochemistry

~10–13 Class Periods | 7–9% AP Exam Weighting

- 6 9.1 Introduction to Entropy
- 5 9.2 Absolute Entropy and Entropy Change
- 6 9.3 Gibbs Free Energy and Thermodynamic Favorability
- 6 9.4 Thermodynamic and Kinetic Control
- 6 9.5 Free Energy and Equilibrium
- 4 9.6 Free Energy of Dissolution
- 4 9.7 Coupled Reactions
- 2 9.8 Galvanic (Voltaic) and Electrolytic Cells
- 5 9.9 Cell Potential and Free Energy
- 9 9.10 Cell Potential Under Nonstandard Conditions
- 5 9.11 Electrolysis and Faraday's Law

Progress Check 9
Multiple-choice: ~30 questions
Free-response: 2 questions
- Long
- Short