

UNITS

The course content is organized into commonly taught units. The units have been arranged in a logical sequence frequently found in many college courses and textbooks.

The nine units in AP Chemistry, and their weighting on the multiple-choice section of the AP Exam, are listed below.

Pacing recommendations at the unit level and on the Course at a Glance provide suggestions for how to teach the required course content and administer the Personal Progress Checks. The suggested class periods are based on a schedule in which the class meets five days a week for 45 minutes each day.

While these recommendations have been made to aid planning, teachers should of course adjust the pacing based on the needs of their students, alternate schedules (e.g., block scheduling), or their school's academic calendar.

TOPICS

Each unit is broken down into teachable segments called topics. The topic pages (starting on p. 36) contain the required content for each topic. Although most topics can be taught in one or two class periods, teachers should pace the course to suit the needs of their students and school.

Units	Exam Weighting
Unit 1: Atomic Structure and Properties	7–9%
Unit 2: Molecular and Ionic Compound Structure and Properties	7–9%
Unit 3: Intermolecular Forces and Properties	18–22%
Unit 4: Chemical Reactions	7–9%
Unit 5: Kinetics	7–9%
Unit 6: Thermodynamics	7–9%
Unit 7: Equilibrium	7–9%
Unit 8: Acids and Bases	11–15%
Unit 9: Applications of Thermodynamics	7–9%

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

BIG IDEAS

Big ideas spiral across topics and units.

- | | |
|--|---|
| SPQ Scale, Proportion, and Quantity | TRA Transformations and Quantity |
| SAP Structure and Properties | ENE Energy |

Assess

Assign the Personal Progress Checks—either as homework or in class—for each unit. Each Personal 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
SPQ	5	1.1 Moles and Molar Mass
SPQ	5	1.2 Mass Spectroscopy of Elements
SPQ	2	1.3 Elemental Composition of Pure Substances
SPQ	5	1.4 Composition of Mixtures
SAP	1	1.5 Atomic Structure and Electron Configuration
SAP	4	1.6 Photoelectron Spectroscopy
SAP	4	1.7 Periodic Trends
SAP	4	1.8 Valence Electrons and Ionic Compounds

Personal Progress Check 1

- Multiple-choice:** ~20 questions
Free-response: 2 questions
- Short-answer
 - Short-answer

UNIT 2		Molecular and Ionic Compound Structure and Properties
~12–13	Class Periods	7–9% AP Exam Weighting
SAP	6	2.1 Types of Chemical Bonds
SAP	3	2.2 Intramolecular Force and Potential Energy
SAP	4	2.3 Structure of Ionic Solids
SAP	4	2.4 Structure of Metals and Alloys
SAP	3	2.5 Lewis Diagrams
SAP	6	2.6 Resonance and Formal Charge
SAP	6	2.7 VSEPR and Bond Hybridization

Personal Progress Check 2

- Multiple-choice:** ~15 questions
Free-response: 1 question
- Long-answer

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UNIT 3

Intermolecular Forces and Properties

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

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

Personal Progress Check 3

Multiple-choice: ~30 questions
Free-response: 2 questions

- Short-answer
- Short-answer

UNIT 4

Chemical Reactions

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

TRA 2	4.1 Introduction for Reactions
TRA 5	4.2 Net Ionic Equations
TRA 3	4.3 Representations of Reactions
TRA 6	4.4 Physical and Chemical Changes
SPQ 5	4.5 Stoichiometry
SPQ 3	4.6 Introduction to Titration
TRA 1	4.7 Types of Chemical Reactions
TRA 1	4.8 Introduction to Acid-Base Reactions
TRA 5	4.9 Oxidation-Reduction (Redox) Reactions

Personal Progress Check 4

Multiple-choice: ~20 questions
Free-response: 1 question

- Long-answer

UNIT 5

Kinetics

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

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

Personal Progress Check 5

Multiple-choice: ~25 questions
Free-response: 2 questions

- Short-answer
- Long-answer

continued on next page

UNIT 6

Thermodynamics

~10–11

Class
Periods

7–9%

AP Exam
Weighting

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

Personal Progress Check 6

Multiple-choice: ~20 questions

Free-response: 2 questions

- Short-answer
- Short-answer

UNIT 7

Equilibrium

~14–16

Class
Periods

7–9%

AP Exam
Weighting

TRA 6	7.1 Introduction to Equilibrium
TRA 4	7.2 Direction of Reversible Reactions
TRA 3	7.3 Reaction Quotient and Equilibrium Constant
TRA 5	7.4 Calculating the Equilibrium Constant
TRA 6	7.5 Magnitude of the Equilibrium Constant
TRA 5	7.6 Properties of the Equilibrium Constant
TRA 3	7.7 Calculating Equilibrium Concentrations
TRA 3	7.8 Representations of Equilibrium
TRA 6	7.9 Introduction to Le Châtelier's Principle
TRA 5	7.10 Reaction Quotient and Le Châtelier's Principle
SPQ 5	7.11 Introduction to Solubility Equilibria
SPQ 2	7.12 Common-Ion Effect
SPQ 2	7.13 pH and Solubility
SPQ 4	7.14 Free Energy of Dissolution

Personal Progress Check 7

Multiple-choice: ~30 questions

Free-response: 2 questions

- Short-answer
- Long-answer

UNIT 8

Acids and Bases

~14–15

Class
Periods

11–15%

AP Exam
Weighting

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

Personal Progress Check 8

Multiple-choice: ~30 questions

Free-response: 1 question

- Long-answer

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UNIT
9Applications of
Thermodynamics

~10–13

Class
Periods

7–9%

AP Exam
Weighting

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

Personal Progress Check 9**Multiple-choice: ~30 questions****Free-response: 2 questions**

- Short-answer
- Long-answer