

# 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 science practices across units.

## Teach

### SCIENCE PRACTICES

Science practices spiral throughout the course.

- |  |                                |
|--|--------------------------------|
| <b>1</b> Models and Representations      | <b>4</b> Model Analysis        |
| <b>2</b> Question and Method             | <b>5</b> Mathematical Routines |
| <b>3</b> Representing Data and Phenomena | <b>6</b> 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 Progress Checks shows students the areas where they need to focus.

| UNIT 1<br>Atomic Structure and Properties |   | UNIT 2<br>Compound Structure and Properties |   |
|---|---|---|---|
| ~9–10                                     | Class Periods                                   | 7–9%  | AP Exam Weighting                             |
| 5   | 1.1 Moles and Molar Mass                        | 6   | 2.1 Types of Chemical Bonds                   |
| 5   | 1.2 Mass Spectra of Elements                    | 3   | 2.2 Intramolecular Force and Potential Energy |
| 2   | 1.3 Elemental Composition of Pure Substances    | 4   | 2.3 Structure of Ionic Solids                 |
| 5   | 1.4 Composition of Mixtures                     | 4   | 2.4 Structure of Metals and Alloys            |
| 1   | 1.5 Atomic Structure and Electron Configuration | 3   | 2.5 Lewis Diagrams                            |
| 4   | 1.6 Photoelectron Spectroscopy                  | 6   | 2.6 Resonance and Formal Charge               |
| 4   | 1.7 Periodic Trends                             | 6   | 2.7 VSEPR and Hybridization                   |
| 4   | 1.8 Valence Electrons and Ionic Compounds       |   |   |

### Progress Check 1

Multiple-choice: ~20 questions

Free-response: 2 questions

- Short
- Short

### Progress Check 2

Multiple-choice: ~15 questions

Free-response: 1 question

- Long

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UNIT  
3Properties 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  
4Chemical  
Reactions

~14–15

Class  
Periods

7–9%

AP Exam  
Weighting

|   |     |                                       |
|---|-----|---------------------------------------|
| 2 | 4.1 | Introduction for Reactions            |
| 5 | 4.2 | Net Ionic Equations                   |
| 3 | 4.3 | Representations of Reactions          |
| 6 | 4.4 | Physical and Chemical Changes         |
| 5 | 4.5 | Stoichiometry                         |
| 3 | 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                |
| 6 | 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

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## 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

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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                   |
| 6 | 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

- Short
- Long