

Table of Contents

AP Chemistry Contents

U1 Unit 1 Preview: Atomic Structure and Properties	3
1.1/Moles and Molar Mass, 1.2/Periodic Trends of Elements, 1.3/Composition of Pure Substances, 1.4/Composition of Mixtures, 1.5/Atomic Structure and Electron Configuration, 1.6/Photoelectron Spectroscopy, 1.7/Periodic Trends, 1.8/Valence Electrons and Ionic Compounds	4
U2 Unit 2 Preview: Compound Structure and Properties	5
2.1/Types of Chemical Bonds, 2.2/Intermolecular Potential Energy, 2.3/Structure of Ionic Solids, 2.4/Structure of Metallic Compositions of Pure Substances, 2.5/Lewis Diagrams, 2.6/Resonance and Formal Charge, 2.7/VSEPR and Hybridization	6
U3 Unit 3 Preview: Properties of Substances and Mixtures	7
3.1/Integrating and Applying Properties of Solids, Liquids, and Gases, 3.4/Ideal Gas Law, 3.5/Kinetic Molecular Theory, 3.6/Deviations from Ideal Gas Law, 3.7/Solutions and Mixtures, 3.8/Representation of Solutions, 3.9/Separation of Solutions and Mixtures	8
U4 Unit 4 Preview: Chemical Reactions	9
4.1/Introduction to Reaction Representations, 4.2/Introduction to Equilibrium Representations of Reactions, 4.4/Physical and Chemical Changes, 4.5/Stoichiometry, 4.6/Introduction to Titration, 4.7/Types of Chemical Reactions, 4.8/Introduction to Oxidation-Reduction (Redox), 4.9/Oxidation-Reduction (Redox) Reactions	10
U5 Unit 5 Preview: Kinetics	11
5.1/Reaction Rates, 5.2/Introduction to Reaction Rate Laws, 5.3/Collision Changes Over Time, 5.4/Elementary Reactions, 5.5/Collision Changes Over Time, 5.4/Elementary Reactions, 5.5/Collision Model, 5.6/Reaction Energy Profile, 5.7/Introduction to Reaction Mechanisms, 5.8/Reaction Mechanism and Rate Law, 5.9/Pre-Equilibrium Approximation, 5.10/Multistep Reaction Energy Profile, 5.11/Catalysis	12
U6 Unit 6 Preview: Thermochemistry	13
6.1/Endothermic and Exothermic Processes, 6.2/Enthalpy Change, 6.3/Heat Transfer and Thermal Equilibrium, 6.4/Heating Curve, 6.5/Calorimetry, 6.6/Introduction to Enthalpy of Reaction, 6.7/Hess's Law, 6.8/Standard Enthalpies of Formation, 6.9/Bond Enthalpies	14
U7 Unit 7 Preview: Equilibrium	15

Table of Contents

7.1/Introduction to Equilibrium, Direct and Reverse Reactions, 7.2/Reaction Quotient and Equilibrium Constant, 7.4/Ca-	
tions, 7.3/Reaction Quotient and Equilibrium Constant, 7.4/Cal-	
culating the Equilibrium Constant, 7.5/Magnitude of the Equi-	
librium Constant, 7.6/Properties of the Equilibrium Constant,	
7.7/Calculating Equilibrium Concentrations, 7.8/Introduction to	
Le Chlier's Principle, 7.9/Le Chlier's Principle, 7.10/Introduction	
to Solubility Equilibria, 7.11/Common Ion Effect, 7.12/pH and	
Solubility	16
U8 Unit 8 Preview: Acids and Bases	17
8.1/Introduction to Acids and Bases and pH and pOH of Strong Bases, 8.3/Weak Acid and Base Equilibria, 8.4/Acid-	
Acids and Bases, 8.3/Weak Acid and Base Equilibria, 8.4/Acid-	
Base Reactions and Buffers, 8.5/Acid-Base Titrations, 8.6/Molec-	
ular Structure of Acids and Bases, 8.7/pH and pKa, 8.8/Properties	
of Buffers, 8.9/Henderson-Hasselbalch Equation, 8.10/Buffer Ca-	
pacity, 8.11/Titration Curves	18
U9 Unit 9 Preview: Thermodynamics and Electrochemistry	19
9.1/Introduction to Thermodynamics, 9.2/Entropy and Entropy Change, 9.3/Gibbs Free Energy and Thermodynamic Favorab-	
ility Change, 9.3/Gibbs Free Energy and Thermodynamic Favorabil-	
ity, 9.4/Thermodynamic and Kinetic Control, 9.5/Free Energy	
and Equilibrium, 9.6/Free Energy of Dissolution, 9.7/Coupled	
Reactions, 9.8/Galvanic (Voltaic) and Electrolytic Cells, 9.9/Cell	
Potential and Free Energy, 9.10/Cell Potential Under Nonstandard	
Conditions, 9.11/Electrolysis and Faraday's Law	20

Unit 1 Preview

Unit Preview

Example

How to use

This preview is your **map**. Use the TOC to jump into any Topic page. Fill each Topic page later — the links already exist.

Topics in this Unit

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

Unit 1: Atomic Structure and Properties

Main Notes

Definition

Key Idea

Write the core definition/idea here.

Equation

Must-Know Relationship

(equation / proportionality / unit analysis)

Example

Micro Example

(one short worked example or quick check)

Diagram / Figure

Diagram Placeholder

Drop an image later:

```
\includegraphics[width=\linewidth]{diagrams/U1/
1.1/Moles and Molar Mass, 1.2/Mass Spectra of
Elements, 1.3/Elemental Composition of Pure Substances,
1.4/Composition of Mixtures, 1.5/Atomic Structure and
Electron Configuration, 1.6/Photoelectron Spectroscopy,
1.7/Periodic Trends, 1.8/Valence Electrons and Ionic
Compounds .png}
```

Extra Notes

- ★ traps
- ★ quick rules
- ★ units/signs

Unit 2 Preview

Unit Preview

Example

How to use

This preview is your **map**. Use the TOC to jump into any Topic page. Fill each Topic page later — the links already exist.

Topics in this Unit

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

Unit 2: Compound Structure and Properties

Main Notes

Definition

Key Idea

Write the core definition/idea here.

Equation

Must-Know Relationship

(equation / proportionality / unit analysis)

Example

Micro Example

(one short worked example or quick check)

Diagram / Figure

Diagram Placeholder

Drop an image later:

```
\includegraphics[width=\linewidth]{diagrams/U2/2.1/Types of Chemical Bonds, 2.2/Intramolecular Force and Potential Energy, 2.3/Structure of Ionic Solids, 2.4/Structure of Metals and Alloys, 2.5/Lewis Diagrams, 2.6/Resonance and Formal Charge, 2.7/VSEPR and Hybridization .png}
```

Extra Notes

- ★ traps
- ★ quick rules
- ★ units/signs

Unit 3 Preview

Unit Preview

Example

How to use

This preview is your **map**. Use the TOC to jump into any Topic page. Fill each Topic page later — the links already exist.

Topics in this Unit

- 3.1/Intermolecular and Interparticle Forces, 3.2/Properties of Solids, 3.3/Solids, Liquids, and Gases, 3.4/Ideal Gas Law, 3.5/Kinetic Molecular Theory, 3.6/Deviations from Ideal Gas Law, 3.7/Solutions and Mixtures, 3.8/Representation of Solutions, 3.9/Separation of Solutions and Mixtures
3.1/Intermolecular and Interparticle Forces, 3.2/Properties of Solids, 3.3/Solids, Liquids, and Gases, 3.4/Ideal Gas Law, 3.5/Kinetic Molecular Theory, 3.6/Deviations from Ideal Gas Law, 3.7/Solutions and Mixtures, 3.8/Representation of Solutions, 3.9/Separation of Solutions and Mixtures

Unit 3: Properties of Substances and Mixtures

Main Notes

Definition

Key Idea

Write the core definition/idea here.

Equation

Must-Know Relationship

(equation / proportionality / unit analysis)

Example

Micro Example

(one short worked example or quick check)

Diagram / Figure

Diagram Placeholder

Drop an image later:

```
\includegraphics[width=\linewidth]{diagrams/U3/
3.1/Intermolecular      and      Interparticle      Forces,
3.2/Properties of Solids, 3.3/Solids, Liquids, and
Gases, 3.4/Ideal Gas Law, 3.5/Kinetic Molecular Theory,
3.6/Deviations from Ideal Gas Law, 3.7/Solutions and
Mixtures, 3.8/Representation of Solutions, 3.9/Separation
of Solutions and Mixtures .png}
```

Extra Notes

- ★ traps
- ★ quick rules
- ★ units/signs

Unit 4 Preview

Unit Preview

Example

How to use

This preview is your **map**. Use the TOC to jump into any Topic page. Fill each Topic page later — the links already exist.

Topics in this Unit

- **4.1/Introduction for Reactions, 4.2/Net Ionic Equations, 4.3/Representations of Reactions, 4.4/Physical and Chemical Changes, 4.5/Stoichiometry, 4.6/Introduction to Titration, 4.7/Types of Chemical Reactions, 4.8/Introduction to Oxidation-Reduction (Redox), 4.9/Oxidation-Reduction (Redox) Reactions** 4.1/Introduction for Reactions, 4.2/Net Ionic Equations, 4.3/Representations of Reactions, 4.4/Physical and Chemical Changes, 4.5/Stoichiometry, 4.6/Introduction to Titration, 4.7/Types of Chemical Reactions, 4.8/Introduction to Oxidation-Reduction (Redox), 4.9/Oxidation-Reduction (Redox) Reactions

Unit 4: Chemical Reactions

Main Notes

Definition

Key Idea

Write the core definition/idea here.

Equation

Must-Know Relationship

(equation / proportionality / unit analysis)

Example

Micro Example

(one short worked example or quick check)

Diagram / Figure

Diagram Placeholder

Drop an image later:

```
\includegraphics[width=\linewidth]{diagrams/U4/
4.1/Introduction for Reactions, 4.2/Net Ionic Equations,
4.3/Representations of Reactions, 4.4/Physical and
Chemical Changes, 4.5/Stoichiometry, 4.6/Introduction
to Titration, 4.7/Types of Chemical Reactions,
4.8/Introduction to Oxidation-Reduction (Redox),
4.9/Oxidation-Reduction (Redox) Reactions .png}
```

Extra Notes

- ★ traps
- ★ quick rules
- ★ units/signs

Unit 5 Preview

Unit Preview

Example

How to use

This preview is your **map**. Use the TOC to jump into any Topic page. Fill each Topic page later — the links already exist.

Topics in this Unit

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

Unit 5: Kinetics

Main Notes

Definition

Key Idea

Write the core definition/idea here.

Equation

Must-Know Relationship

(equation / proportionality / unit analysis)

Example

Micro Example

(one short worked example or quick check)

Diagram / Figure

Diagram Placeholder

Drop an image later:

```
\includegraphics[width=\linewidth]{diagrams/U5/
5.1/Reaction Rates, 5.2/Introduction to Rate Law,
5.3/Concentration Changes Over Time, 5.4/Elementary
Reactions, 5.5/Collision Model, 5.6/Reaction Energy
Profile, 5.7/Introduction to Reaction Mechanisms,
5.8/Reaction Mechanism and Rate Law, 5.9/Pre-Equilibrium
Approximation, 5.10/Multistep Reaction Energy Profile,
5.11/Catalysis .png}
```

Extra Notes

- * traps
- * quick rules
- * units/signs

Unit 6 Preview

Unit Preview

Example

How to use

This preview is your **map**. Use the TOC to jump into any Topic page. Fill each Topic page later — the links already exist.

Topics in this Unit

- **6.1/Endothermic and Exothermic Processes, 6.2/Energy Diagram, 6.3/Heat Transfer and Thermal Equilibrium, 6.4/Heating Curve, 6.5/Calorimetry, 6.6/Introduction to Enthalpy of Reaction, 6.7/Hess's Law, 6.8/Standard Enthalpies of Formation, 6.9/Bond Enthalpies** 6.1/Endothermic and Exothermic Processes, 6.2/Energy Diagram, 6.3/Heat Transfer and Thermal Equilibrium, 6.4/Heating Curve, 6.5/Calorimetry, 6.6/Introduction to Enthalpy of Reaction, 6.7/Hess's Law, 6.8/Standard Enthalpies of Formation, 6.9/Bond Enthalpies

Unit 6: Thermochemistry

Main Notes

Definition

Key Idea

Write the core definition/idea here.

Equation

Must-Know Relationship

(equation / proportionality / unit analysis)

Example

Micro Example

(one short worked example or quick check)

Diagram / Figure

Diagram Placeholder

Drop an image later:

```
\includegraphics[width=\linewidth]{diagrams/U6/
6.1/Endothermic and Exothermic Processes, 6.2/Energy
Diagram, 6.3/Heat Transfer and Thermal Equilibrium,
6.4/Heating Curve, 6.5/Calorimetry, 6.6/Introduction
to Enthalpy of Reaction, 6.7/Hess's Law, 6.8/Standard
Enthalpies of Formation, 6.9/Bond Enthalpies .png}
```

Extra Notes

- ★ traps
- ★ quick rules
- ★ units/signs

Unit 7 Preview

Unit Preview

Example

How to use

This preview is your **map**. Use the TOC to jump into any Topic page. Fill each Topic page later — the links already exist.

Topics in this Unit

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

Unit 7: Equilibrium

Main Notes

Definition

Key Idea

Write the core definition/idea here.

Equation

Must-Know Relationship

(equation / proportionality / unit analysis)

Example

Micro Example

(one short worked example or quick check)

Diagram / Figure

Diagram Placeholder

Drop an image later:

```
\includegraphics[width=\linewidth]{diagrams/U7/
7.1/Introduction to Equilibrium, 7.2/Direction
of Reversible Reactions, 7.3/Reaction Quotient
and Equilibrium Constant, 7.4/Calculating the
Equilibrium Constant, 7.5/Magnitude of the Equilibrium
Constant, 7.6/Properties of the Equilibrium
Constant, 7.7/Calculating Equilibrium Concentrations,
7.8/Introduction to Le Châtelier's Principle, 7.9/Le
Châtelier's Principle, 7.10/Introduction to Solubility
Equilibria, 7.11/Common Ion Effect, 7.12/pH and Solubility
.png}
```

Extra Notes

- ★ traps
- ★ quick rules
- ★ units/signs

Unit 8 Preview

Unit Preview

Example

How to use

This preview is your **map**. Use the TOC to jump into any Topic page. Fill each Topic page later — the links already exist.

Topics in this Unit

- 8.1/Introduction to Acids and Bases, 8.2/pH and pOH of Strong Acids and Bases, 8.3/Weak Acid and Base Equilibria, 8.4/Acid-Base Reactions and Buffers, 8.5/Acid-Base Titrations, 8.6/Molecular Structure of Acids and Bases, 8.7/pH and pKa, 8.8/Properties of Buffers, 8.9/Henderson-Hasselbalch Equation, 8.10/Buffer Capacity, 8.11/Titration Curves 8.1/Introduction to Acids and Bases, 8.2/pH and pOH of Strong Acids and Bases, 8.3/Weak Acid and Base Equilibria, 8.4/Acid-Base Reactions and Buffers, 8.5/Acid-Base Titrations, 8.6/Molecular Structure of Acids and Bases, 8.7/pH and pKa, 8.8/Properties of Buffers, 8.9/Henderson-Hasselbalch Equation, 8.10/Buffer Capacity, 8.11/Titration Curves

Unit 8: Acids and Bases

Main Notes

Definition

Key Idea

Write the core definition/idea here.

Equation

Must-Know Relationship

(equation / proportionality / unit analysis)

Example

Micro Example

(one short worked example or quick check)

Diagram / Figure

Diagram Placeholder

Drop an image later:

```
\includegraphics[width=\linewidth]{diagrams/U8/
8.1/Introduction to Acids and Bases, 8.2/pH and
pOH of Strong Acids and Bases, 8.3/Weak Acid and
Base Equilibria, 8.4/Acid-Base Reactions and Buffers,
8.5/Acid-Base Titrations, 8.6/Molecular Structure of
Acids and Bases, 8.7/pH and pKa, 8.8/Properties of
Buffers, 8.9/Henderson-Hasselbalch Equation, 8.10/Buffer
Capacity, 8.11/Titration Curves .png}
```

Extra Notes

- * traps
- * quick rules
- * units/signs

Unit 9 Preview

Unit Preview

Example

How to use

This preview is your **map**. Use the TOC to jump into any Topic page. Fill each Topic page later — the links already exist.

Topics in this Unit

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

Unit 9: Thermodynamics and Electrochemistry

Main Notes

Definition

Key Idea

Write the core definition/idea here.

Equation

Must-Know Relationship

(equation / proportionality / unit analysis)

Example

Micro Example

(one short worked example or quick check)

Diagram / Figure

Diagram Placeholder

Drop an image later:

```
\includegraphics[width=\linewidth]{diagrams/U9/  
9.1/Introduction to Entropy, 9.2/Absolute Entropy and  
Entropy Change, 9.3/Gibbs Free Energy and Thermodynamic  
Favorability, 9.4/Thermodynamic and Kinetic Control,  
9.5/Free Energy and Equilibrium, 9.6/Free Energy  
of Dissolution, 9.7/Coupled Reactions, 9.8/Galvanic  
(Voltaic) and Electrolytic Cells, 9.9/Cell Potential  
and Free Energy, 9.10/Cell Potential Under Nonstandard  
Conditions, 9.11/Electrolysis and Faraday's Law .png}
```

Extra Notes

- * traps
- * quick rules
- * units/signs