### AP Chemistry Scope & Sequence

<table>
<thead>
<tr>
<th>Days</th>
<th>Unit</th>
<th>Standard(s)/Outcome(s)</th>
<th>Essential/Guiding Questions</th>
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</thead>
</table>
| 7    | Unit 1: Atomic Structure and Properties  
You’ll learn about the composition of atoms and ways scientists measure and categorize these molecular building blocks. | BIG IDEAS:  
- Scale, Proportion, and Quantity  
- Structure and Properties  
SCIENCE PRACTICES:  
- Models and Representations  
- Question and Method  
- Model Analysis  
- Mathematical Routines | Why are eggs sold as a dozen?  
How can the same element be used in nuclear fuel rods and fake diamonds? |
| 9    | Unit 2: Molecular and Ionic Compound Structures and Properties  
You’ll discover the range of chemical bonds and how their structure can affect the properties of the molecules created. | BIG IDEAS:  
- Structure and Properties  
SCIENCE PRACTICES:  
- Representing Data and Phenomena  
- Model Analysis  
- Argumentation | How has the discovery of DNA changed the world?  
How are molecular compounds arranged? |
| 11   | Unit 3: Intermolecular Forces and Properties  
You’ll explore how atoms come together to create solids, liquids, and gases, and how | BIG IDEAS:  
- Scale, Proportion, and Quantity  
- Structure and Properties  
SCIENCE PRACTICES: | How do interactions between particles influence mixtures?  
Why does the smell of |
<table>
<thead>
<tr>
<th>Unit 4: Chemical Reactions</th>
<th><strong>BIG IDEAS:</strong></th>
<th>Why are some reactions faster than other reactions?</th>
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</table>
| You’ll learn how to differentiate physical and chemical processes, and how to measure and express chemical reactions via chemical equations. | **Scale, Proportion, and Quantity**  
**Transformations**  
**Models and Representations**  
**Question and Method**  
**Representing Data and Phenomena**  
**Mathematical Routines**  
**Argumentation** | Why are some reactions faster than other reactions? |

<table>
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<tr>
<th>Unit 5: Kinetics</th>
<th><strong>BIG IDEAS:</strong></th>
<th>Why is the mass of a raw egg different than a boiled egg?</th>
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</table>
| You’ll explore various methods to observe the changes that occur during a chemical reaction. | **Transformations**  
**Energy**  
**Science Practices:** | What are the processes related to changes in a substance? |

**perfume only last a short time?**

Why can you swim in water but you cannot walk through a wall?

How are the properties of gases described?

How can you determine the structure and concentration of a chemical species in a mixture?

What makes fireworks explode?

Why is the mass of a raw egg different than a boiled egg?

What are the processes related to changes in a substance?
| Unit 6: Thermodynamics | **BIG IDEAS:**  
| | ● Energy  
| | **SCIENCE PRACTICES:**  
| | ● Models and Representations  
| | ● Question and Method  
| | ● Representing Data and Phenomena  
| | ● Model Analysis  
| | ● Mathematical Routines  
| | ● Argumentation  
| | **statue last?**  
| | **How can a sports drink cure a headache?**  
| | **Why does bread rise?**  
| 7 | **Why is energy released when water becomes an ice cube?**  
| | **How are chemical transformations that require bonds to break and form influenced by energy?**  
| Unit 7: Equilibrium | **BIG IDEAS:**  
| | ● Transformations  
| | **SCIENCE PRACTICES:**  
| | ● Question and Method  
| | ● Representing Data and Phenomena  
| | ● Model Analysis  
| | ● Mathematical Routines  
| | ● Argumentation  
| | **Why is a waterfall considered a spontaneous reaction?**  
| | **How can reactions occur in more than one direction?**  
| | **How is caffeine removed from coffee?**  
| | **Why is food stored in a refrigerator?**  
| 11 | **Why is food stored in a refrigerator?**  
| | **Why is a waterfall considered a spontaneous reaction?**  
| | **How can reactions occur in more than one direction?**  
| | **How is caffeine removed from coffee?**  
| | **Why is food stored in a refrigerator?**  
| | **Why is energy released when water becomes an ice cube?**  
| | **How are chemical transformations that require bonds to break and form influenced by energy?**  
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| | **How can a sports drink cure a headache?**  
| | **Why does bread rise?**  

reaction and the effects of a series of reactions.

- Models and Representations
- Representing Data and Phenomena
- Mathematical Routines
- Argumentation

You'll learn about energy changes in chemical reactions and how a transfer of energy can change a substance's physical qualities.
| 11 | **Unit 8: Acids and Bases**  
You’ll learn more about pH, the qualities and properties of acids and bases, and how they interact in chemical reactions. | **BIG IDEAS:**  
● Structure and Properties  
**SCIENCE PRACTICES:**  
● Question and Method  
● Mathematical Routines  
● Argumentation | How are reactions involving acids and bases related to pH?  
How does your body maintain pH balance? |
|---|---|---|---|
| 7 | **Unit 9: Applications of Thermodynamics**  
You’ll be introduced to the concept of “thermodynamic favorability” for reactions, meaning how likely they are to occur given energy changes and environmental factors. | **BIG IDEAS:**  
● Scale, Proportion, and Quantity  
● Structure and Properties  
● Energy  
**SCIENCE PRACTICES:**  
● Question and Method  
● Model Analysis  
● Mathematical Routines  
● Argumentation | How does water flow uphill?  
How is the favorability of a chemical or physical transformation determined?  
How is electrical energy generated using chemical reactions? |