

AP Chemistry

I. Enduring Understanding:

Matter can change. (1, 2, 5, 8)

Essential Questions:

What affects the properties of matter?

How can matter change?

What are the effects associated with matter changes?

Student Outcomes: Students will:

- A. Understand that the products of chemical reactions are predictable, if the reaction occurs.
 - 1. *Predict the products of a chemical reaction.*
 - 2. *Balance chemical reactions in terms of atoms and electrons.*

- B. Understand changes in energy and entropy associated with chemical and physical changes.
 - 1. *Calculate changes in entropy and energy using different mathematical models of change.*
 - 2. Describe the 3 step process of solution formation

- C. Understand that every reaction has a specific mechanism in which it is carried out.
 - 1. *Decide whether to use a rate law or integrated rate law to describe a mechanism based on data given.*
 - 2. Calculate the rate law for a reaction.
 - 3. Use the Arrhenius Equation to calculate various unknown variables.

- D. Understand that some chemical reactions produce electron flow (electricity), and vice versa
 - 1. Calculate the potential and free energy of an electrochemical cell.
 - 2. Describe how cell potential and solution concentration are related.

- E. Understand the changes that can happen in a nucleus.
 - 1. *Describe the kinds of nuclear decay, and its associated energy change.*

- F. Understand the naming system for organic chemistry
 - 1. Name organic compounds.

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II. Enduring Understanding:

Matter's structure defines its properties. (1, 2, 5, 8, 9)

Essential Questions:

What defines the properties of matter?

What is the basic structure of matter?

Student Outcomes: Students will:

- A. Understand limits to the ideal gas law
 - 1. Describe what the two constants in the van der Waals equation compensate for.
- B. Understand the nature of the chemical bond
 - 1. *Describe the nature of a chemical bond by calculating percent ionic character and interpreting the bond.*
 - 2. Determine the shape and polarity a molecule will have based on VSEPR and the type of bonds it has.
- C. Understand aqueous equilibria
 - 1. Use ICE tables to calculate different unknowns associated with aqueous equilibria.
 - 2. Use the Henderson-Hasselbach equation to calculate various unknown variables.
- D. Understand the structure of the atom
 - 1. Using Bohr's model, calculate change in energy when electrons change energy levels
 - 2. Using Quantum Mechanical Model, predict the probability of where we will find an electron (electron configurations)
 - 3. Using the Quantum Mechanical Model, understand why the Periodic Table is set up the way it is (different blocks).
 - 4. Using the Quantum Mechanical Model, explain the what trends exist on the Periodic Table and why.

III. Enduring Understanding:

Quantitative reasoning is used to describe matter. (1, 2, 5, 8)

Essential Questions:

How do you describe quantities of matter?

How do you predict the quantities of matter in a chemical reaction?

Student Outcomes: Students will:

- A. This outcome is embedded in the prerequisite chemistry course and is continually practiced in this course.