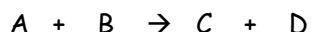


20.1: Chemical Reactions Are Represented by Chemical Equations

When chemical reactions occur, scientists need a quick and easy way to show what's happening.

What is a Chemical Equation?

Label the **products** and **reactants** in the general equation below:



What does the **Law of Conservation of Mass** state?

What are the **Coefficients** in a chemical equation?

When no number is shown, what is the coefficient assumed to be?

- The physical state of each substance is indicated using the symbols in the table below:

Symbol	Meaning
(s)	
(l)	
(g)	
(aq)	

To write a chemical equation, address the following questions: "how much (coefficient)", "of what (chemical formula)", and "in what physical state (s, l, g, aq)"?

Ex 1: Write the following chemical equation from its given word equation:

Two atoms of solid aluminum react with three molecules of aqueous copper (II) chloride to produce three atoms of solid copper and two molecules of aqueous aluminum chloride.

Define a **Balanced Equation**:

How do we balance an equation?

What should you **never** do when you are balancing an equation?!

Examples:

1.) When a piece of solid magnesium ribbon burns in air, a white powder called magnesium oxide is formed.

Write the chemical equation representing this reaction. Then, balance the equation.

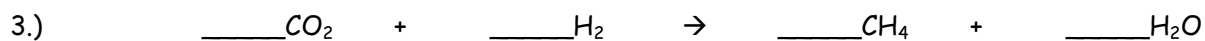
2.) When silver jewelry tarnishes, it develops a thin, dark coating on the surface. Tarnishing is the result of silver combining with sulfur-containing compounds in the air.

Write the chemical equation representing this reaction. Then, balance the equation.

3.) When a silver nitrate solution is mixed with a sodium chloride solution, insoluble silver chloride and sodium nitrate are formed. Write the chemical equation representing this reaction. Then, balance the equation.

Balance the following chemical equations:





20.2: Chemical Reactions Can Be Slow or Fast

What is a **Reaction Rate**?

What are 2 factors that affect the reaction rate? 1. _____ 2. _____

**When molecules react, what must actually occur?*



1. How would *an increase in concentration* **speed up** a reaction?

2. How would *an increase in temperature* **speed up** a reaction?

Define **Activation Energy**:

Draw an energy diagram of a reaction, labeling the activation energy:

20.3: Catalysts Speed Up Chemical Reactions

Define **Catalyst**:

**How is a catalyst different than a chemical reactant?*

Ozone:

Chemical Formula for ozone: _____

What happens as ozone in the Earth's atmosphere is reduced?

What is the group of compounds that destroy ozone molecules? _____ or _____

Where were/are they found?

How do CFCs speed up the rate at which ozone molecules are destroyed (*write out the reaction*)?

20.4: Chemical Reactions Can Be Either Exothermic or Endothermic

Energy changes always accompany chemical reactions. Reactions are either exothermic or endothermic.

○ **Exothermic reactions**:

Ex:

○ **Endothermic reactions:**

Ex:

Define **Net/Overall Energy of Reaction:**

Draw an energy diagram for an **exothermic reaction** in the space below. Label reactants, products, activation energy, and net energy of reaction:

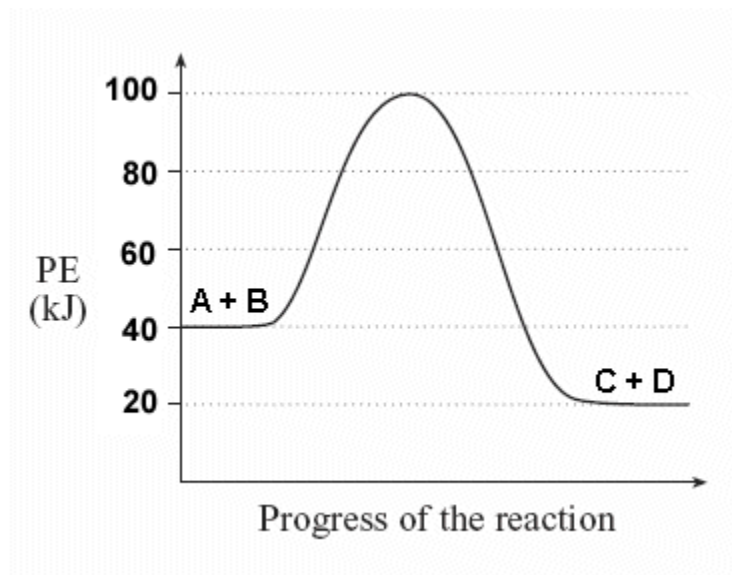
Draw an energy diagram for an **endothermic reaction** in the space below. Label reactants, products, activation energy, and net energy of reaction:

**Then, also show the reaction if a catalyst were present.*

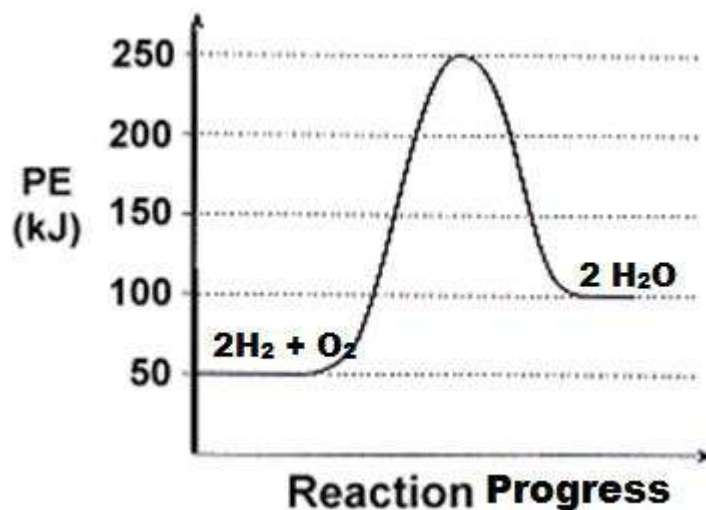
Potential Energy Diagrams

Name: _____

Refer to the following potential energy diagram and answer the questions below:



- 1.) Is the forward reaction endothermic or exothermic?
- 2.) What is the potential energy of the reactants?
- 3.) What is the potential energy of the products?
- 4.) What is the activation energy?
- 5.) What is the net energy of the reaction (ΔE)?



- 1.) Is the forward reaction endothermic or exothermic?
- 2.) What is the potential energy of the reactants?
- 3.) What is the potential energy of the products?
- 4.) What is the activation energy?
- 5.) What is the net energy of the reaction (ΔE)?