




# Chemical Reactions

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Observing Chemical Change  
Describing Chemical Reactions  
Controlling Chemical Reactions  
Fire and Fire Safety



# Observing Chemical Change

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How can matter and changes in matter be described?

- Matter can be described in terms of physical properties
  - Physical property: a characteristic of a substance that can be observed without changing the substance into another substance
  - Matter: anything that has mass and takes up space
  - Chemistry: the study of the properties of matter and how matter changes

# Observing Chemical Change

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How can matter and changes in matter be described?

- Matter can be described in terms of chemical properties
  - Chemical property: a characteristic of a substance that describes its ability to change into different substances

# Observing Chemical Change

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How can matter and changes in matter be described?

- Matter can be described in terms of physical changes
  - Physical change: a change that alters the form or appearance of a material but does not make the material into another substance

# Observing Chemical Change

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How can matter and changes in matter be described?

- Matter can be described in terms of chemical changes
  - Chemical reaction: the process in which substances undergo chemical changes that result in the formation of new substances

# Observing Chemical Change

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Chemical changes occur when bonds break and new bonds form.

# Observing Chemical Change

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How can you tell when a chemical reaction occurs?

- Chemical reactions involve two main kinds of changes that you can observe--formation of new substances and changes in energy.
  - Precipitate: a solid that forms from a solution during a chemical reaction
  - Endothermic reaction: a reaction that absorbs energy in the form of heat
  - Exothermic reaction: a reaction that releases energy in the form of heat

# Describing Chemical Reactions

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What information does a chemical equation contain?

- Chemical equations use chemical formulas and other symbols instead of words to summarize a reaction.
  - Chemical equation: a short, easy way to show a chemical reaction, using symbols
  - Reactant: a substance that enters into a chemical reaction
  - Product: a substance formed as a result of a chemical reaction



# Describing Chemical Reactions

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What does the principle of conservation of mass state?

- The principle of conservation of mass states that in a chemical reaction, the total mass of the reactants must equal the total mass of the products.
- The law of conservation of mass states that mass can neither be created nor destroyed only rearranged.
  - Open system: a system in which matter can enter from or escape to the surroundings
  - Closed system: a system in which no matter is allowed to enter or leave

# Describing Chemical Reactions

What much a balanced chemical equation show?

- To describe a reaction accurately, a chemical equation must show the same number of each type of atom on both sides of the equation.
  1. Write the equation
  2. Count the atoms
  3. Use coefficients
    - a. Coefficients: a number in front of a chemical formula in an equation that indicates how many molecules or atoms of each reactant and product are involved in a reaction
  4. Look back and check

# Describing Chemical Reactions

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What are three categories of chemical reactions?

- Many chemical reactions can be classified in one of three categories
  - Synthesis: a chemical reaction in which two or more simple substances combine to form a new, more complex substance
  - Decomposition: a chemical reaction that breaks down compounds into simpler products
  - Replacement: a reaction in which one element replaces another in a compound or when two elements in different compounds trade places

# Controlling Chemical Reactions

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How is activation energy related to chemical reactions?

- All chemical reactions need a certain amount of activation energy to get started.
  - Activation energy: the minimum amount of energy needed to get a chemical reaction started

# Controlling Chemical Reactions

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What factors affect the rate of a chemical reaction?

- Chemists can control rates of reactions by changing factors such as surface area, temperature, and concentration, and by using substances called catalysts and inhibitors.
  - Concentration: the amount of one material in a certain volume of another material
  - Catalyst: a material that increases the rate of a reaction by lowering the activation energy
  - Inhibitor: a material that decreases the rate of a reaction

# Fire and Fire Safety

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What are the three things necessary to maintain a fire?

- Fuel: a material that releases energy when it burns
- Oxygen
- Heat
  - Combustion: a rapid reaction between oxygen and fuel that results in fire

# Fire and Fire Safety

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Why should you know about the causes of fire and how to prevent a fire?

- If you know how to prevent fires in your home and what to do if a fire starts, you are better prepared to take action.

\*\*\*\*Make a class comment as to how many fire alarms are in the house you live in!\*\*\*\*