Section 1: The Nature of Chemical Reactions

Preview

Key Ideas

- When do chemical reactions take place?
- What is the role of energy in chemical reactions?

Bellringer

A chemical reaction takes place when a substance changes chemically to produce a new substance.

1. Caitlyn walks out of her front gate, and she notices that there is a little rust on the metal where there is a scratch in the paint. Is the rust an example of a chemical reaction?

2. Juan always crushes the aluminum cans before putting them in the recycling bin. Are the crushed cans examples of chemical reactions?

Bellringer, *continued*

3. Krista notices that the leaves are beginning to change color from green into reds and oranges. Are the colored leaves examples of chemical reactions?

4. The ice cubes in Steven's glass of lemonade are starting to melt. Are the melted ice cubes examples of chemical reactions?

Chemical Reactions

〉When do chemical reactions take place?

〉Chemical reactions occur when substances undergo chemical changes to form new substances.

- Possible signs of a chemical reaction:
  - gas formation
  - solid formation
  - release of energy

Chemical Reactions, *continued*

- Chemical reactions rearrange atoms.
  - **reactant**: a substance or molecule that participates in a chemical reaction
  - **product:** a substance that forms in a chemical reaction
  - Chemical reactions do not create the atoms of the products or destroy the atoms of the reactants.

Visual Concept: Chemical Reaction

Visual Concept: Signs of a Chemical Reactions

Click a thumbnail to learn more.

Energy and Reactions

〉 What is the role of energy in chemical reactions?

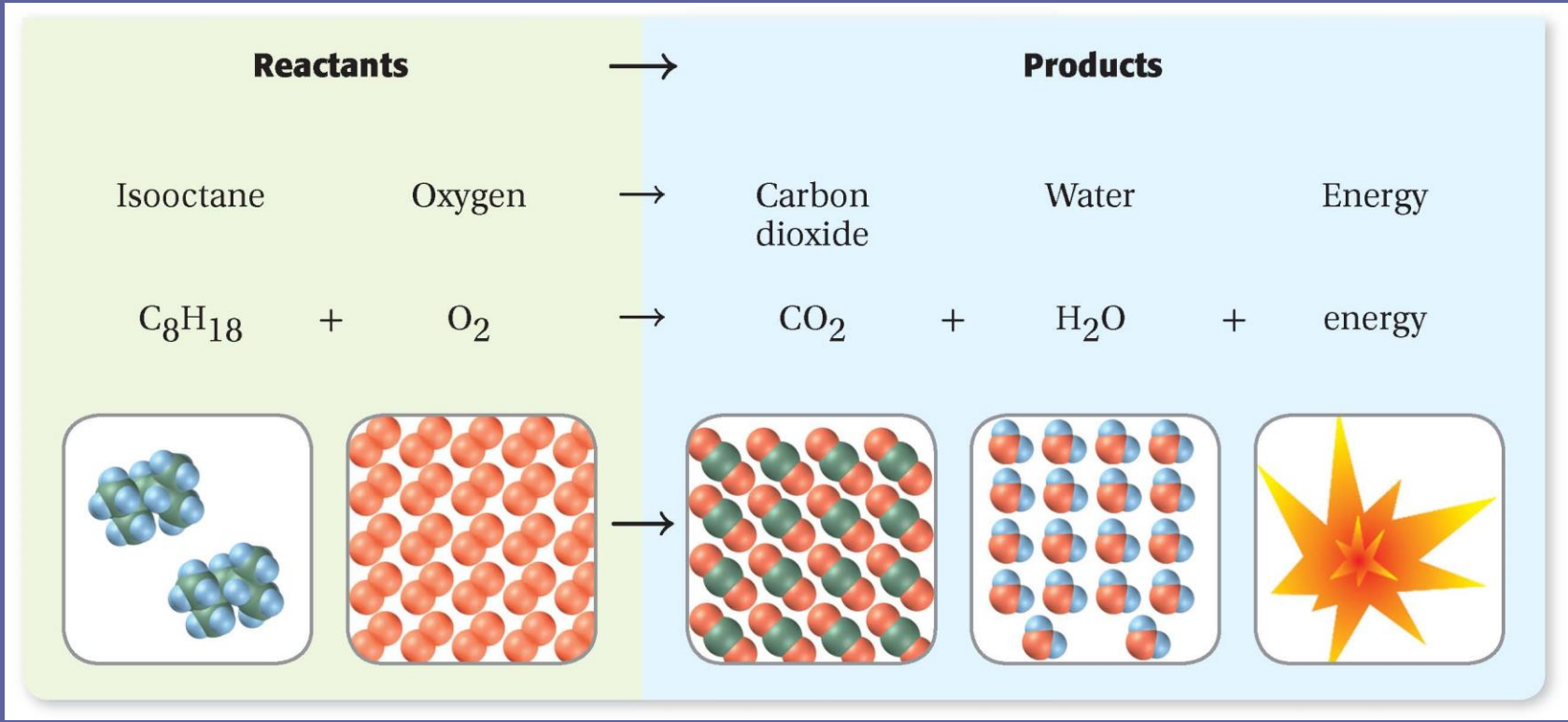
〉 Chemical reactions always involve changes in energy.

- Energy must be added to break bonds.
  - Many forms of energy can be used to break bonds:
    - heat
    - electricity
    - sound
    - light

Energy and Reactions, *continued*

- Forming bonds releases energy.
- Energy is conserved in chemical reactions.
  - **chemical energy:** the energy released when a chemical compound reacts to produce new compounds
  - The total energy that exists before the reaction is equal to the total energy of the products and their surroundings.
  - Energy in a chemical reaction can change form.
    - Energy is never created or destroyed.

Reaction Model



Energy and Reactions, *continued*

- Reactions that release energy are exothermic.
  - The amount of energy released as the products form is greater than the amount of energy absorbed to break the bonds in the reactants.
- Reactions that absorb energy are endothermic.
  - More energy is needed to break the bonds in the reactants than is given off by forming bonds in the products.
- **exothermic reaction:** a chemical reaction in which energy is released to the surroundings as heat
- **endothermic reaction:** a chemical reaction that requires energy input

Energy and Reactions, *continued*