

## Chapter 6 Chemical Reactions ▪ Section 1 Summary

## Observing Chemical Change

### Key Concepts

- How can changes in matter be described?
- How can you tell when a chemical reaction occurs?

**Matter** is anything that has mass and takes up space. The study of matter and how matter changes is called **chemistry**. Matter can be described in terms of two kinds of properties—physical properties and chemical properties. **Changes in matter can be described in terms of physical changes and chemical changes.**

A **physical property** is a characteristic of a substance that can be observed without changing the substance into another substance. The temperature at which a solid melts is a physical property. Color, hardness, texture, shine, and flexibility are other physical properties of matter.

A **chemical property** is a characteristic of a substance that describes its ability to change into other substances. To observe the chemical properties of a substance, you must change it into another substance. For example, to observe the chemical reactivity of magnesium, you can let magnesium combine with oxygen to form a new substance called magnesium oxide.

A **physical change** is any change that alters the form or appearance of a substance but that does not make the substance into another substance. Examples of physical changes are bending and cutting. In a physical change, one or more physical properties of the material are altered, but the chemical composition remains the same.

A change in matter that produces one or more new substances is a **chemical change**, or chemical reaction. **Chemical changes occur when bonds break and new bonds form.** As a result, new substances are produced.

One way to detect chemical reactions is to observe changes in the properties of the materials involved. **Chemical reactions involve changes in properties and changes in energy that you can observe.** Changes in properties result when new substances form. A change in color may signal that a new substance has formed. Another indicator might be the formation of a solid when two solutions are mixed. A solid that forms from solution during a chemical reaction is called a **precipitate**. A third indicator is the formation of a gas when solids or liquids react. These and other kinds of observable changes in properties may indicate that a chemical reaction has occurred.

As matter changes in a chemical reaction, it can either absorb or release energy. One indication that energy has been absorbed or released is a change in temperature. An **endothermic reaction** is a reaction in which energy is absorbed. A reaction that releases energy in the form of heat is called an **exothermic reaction**.

**Chemical Reactions** ▪ *Reading/Notetaking Guide***Observing Chemical Change** (pp. 214–221)

*This section describes how a chemical change differs from a physical change. It explains what happens to chemical bonds during a chemical change. It also describes how you can tell when a chemical change in matter has occurred.*

**Use Target Reading Skills**

*Before you read, preview the photographs in Figure 2 in your textbook. Then, complete the graphic organizer by writing two questions about the figure. As you read, answer your questions.*

**Changes in Matter**

Q: What are some examples of physical changes?
A:
Q:
A:

**Introduction** (p. 214)

1. What is matter?

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2. The study of matter and how matter changes is called \_\_\_\_\_.

**Matter and Change** (pp. 215–217)

3. Complete the following table about physical and chemical properties of matter.

Type of Property	How It Can Be Observed	Example
a.	Without changing one substance into another	Color
Chemical	b.	Ability to burn

**Chemical Reactions** ▪ *Reading/Notetaking Guide*

4. Is the following sentence true or false? A physical change never alters the form or appearance of a substance. \_\_\_\_\_
5. Circle the letter of each choice that is a physical change in matter.
  - a. bending a straw
  - b. boiling water
  - c. burning wood
  - d. braiding hair
6. A change in matter that produces one or more new substances is a(n) \_\_\_\_\_.
7. What happens to the bonds between atoms when chemical changes occur?

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**Evidence for Chemical Reactions** (pp. 218–221)

8. List the two main kinds of changes that you can observe when chemical reactions occur.  
\_\_\_\_\_  
\_\_\_\_\_
9. If you detect a change in the color of a material, why does this indicate that a chemical reaction might have occurred?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
10. A solid that forms during a chemical reaction is called a(n) \_\_\_\_\_.
11. Suppose you mix two clear liquids together to form a new substance and bubbles form. What type of reaction might this indicate? Explain your answer.

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**Chemical Reactions** ▪ *Reading/Notetaking Guide***Observing Chemical Change** *(continued)*

12. Is the following sentence true or false? A change in energy occurs during a chemical reaction. \_\_\_\_\_

13. Why does a change in temperature indicate that a chemical reaction may have occurred?

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14. Is the following sentence true or false? Endothermic reactions always result in a decrease in temperature. \_\_\_\_\_

15. Complete the table about changes in energy in chemical reactions.

Type of Reaction	Energy Change	Example
Endothermic	a.	Frying an egg
b.	Energy is released	Burning wood