Name Date

Section 3.3 Summary

Physical and Chemical Changes

Textbook pages 96–105

Before You Read

Cooking an egg is a chemical change. Boiling water is a physical change. What do you think is the difference between a chemical change and a physical change?

_____

_____

Mark the Text

Reinforce Your Understanding

As you read this section, highlight the main point of each paragraph. Use a different colour to highlight an example that helps explain the main point, or write your own.

Reading Check

1. What is formed in a chemical change?

_____

_____

_____

What is a physical change?

During a **physical change**, a substance changes in form but not in its chemical composition. No new substances are formed. Ice melting is an example of a physical change. Some of the properties of liquid water are different from the properties of solid water. But the chemical composition of the water has not changed and no new substances have been produced.

All changes of state are physical changes. Other physical changes include cutting, grinding, and tearing substances. Dissolving salt in water is also a physical change. The individual salt ions and water molecules do not change when salt is dissolved in water.

What is a chemical change?

A **chemical change** causes one or more new substances to be formed.

Burning paper is an example of a chemical change. The smoke that escapes and the grey-black solid that is left behind (ash) are new substances. Each new substance has properties and chemical compositions that are different from the original paper.

In any chemical change, the starting substances that react are called reactants, and the substances that result are called products.

In a chemical change, new chemical bonds are formed while other chemical bonds are broken.

How can you tell if a change is chemical?

Some chemical changes are easy to observe. When fireworks explode, energy is released in the form of heat, light, and sound. Other chemical changes may be more difficult to observe.

If you can make two or more of the following observations, then a chemical change probably has taken place.

- Heat is produced or absorbed.
- One or both reactants are used up.
- There is a change in colour.
- Gas bubbles form in a liquid.
- A solid forms in a liquid.

How is energy involved with physical and chemical changes?

All changes in matter involve changes in energy. Energy is either released or absorbed. The energy is often in the form of heat, but it also may be in the form of sound or light.

If energy is released, the process is described as **exothermic**. Water freezing, iron rusting, and natural gas burning are examples of exothermic changes. If energy is absorbed, the process is described as **endothermic**. Cooking an egg, baking bread, and melting ice are examples of endothermic changes.

Reading Check

2. In what kind of process is energy absorbed?

Name Date

Cloze Activity
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Use with textbook pages 96–100.

Evidence of chemical change

Vocabulary	
changes of state	light
chemical	liquid
endothermic	physical
energy	product
exothermic	reactant
gas bubbles	solid
heat	sound

Use the terms in the vocabulary box to fill in the blanks. Each term may be used more than once. You will not need to use every term.

1. A(n) _____ change produces new substances with new properties. An example of this would be rust forming on an iron nail.

2. In a(n) _____ change, the appearances of substances change, but no new substances are produced. An example of this would be the melting of a chocolate bar.

3. All _____ (for example, boiling, freezing, and melting) are physical changes because they do not produce new substances.

4. Dissolving salt in water is an example of a(n) _____ change. Burning paper is an example of a(n) _____ change.

5. When baking soda is added to vinegar, a gas is formed. In this example, baking soda is a(n) _____ and the gas formed is called the _____.

6. In a chemical reaction, _____ or a(n) _____ might form in a liquid.

7. An explosion is an example of a(n) _____ process. The energy released in this type of reaction is usually in the form of _____, _____, or _____.

8. In a(n) _____ process, energy is absorbed from the surrounding environment.

Use with textbook pages 96–100.

Chemical change and physical change

1. Define the following terms.

(a) chemical change _____

_____

(b) physical change _____

_____

2. Identify whether the example is a physical change or a chemical change.

(a) ice cream melting _____

(b) rust forming on a car _____

(c) a tire inflating with air _____

(d) food digesting in the stomach _____

(e) cutting a piece of paper into two pieces _____

(f) acid on limestone producing carbon dioxide gas _____

3. For a slice of bread and a piece of wood, draw an example of each of the following changes.

(a) A slice of bread—physical change	**(b)** A slice of bread—chemical change
(c) A piece of wood—physical change	**(d)** A piece of wood—chemical change

Use with textbook pages 96–100.

Endothermic or exothermic?

1. Define the following terms.

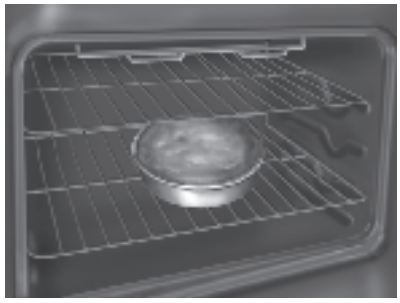
(a) exothermic _____

_____

(b) endothermic _____

_____

2. What type of process—exothermic or endothermic—is shown in each illustration?



(a) _____ **(b)** _____

3. Identify each of the following changes as exothermic or endothermic by placing a checkmark in the correct box.

	Description	Exothermic	Endothermic
(a)	ice melting		
(b)	water boiling		
(c)	water freezing		
(d)	dynamite exploding		
(e)	fireworks lighting up the sky		
(f)	trees burning during a forest fire		
(g)	cold pack used for an injury		
(h)	gasoline burning in an engine		
(i)	match burning after it is rubbed on a rough surface		

Use with textbook pages 96–100.

Physical and chemical changes

Match each Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.	
Term	**Descriptor**
1. _____ physical change **2.** _____ chemical change **3.** _____ exothermic **4.** _____ endothermic	**A.** heat is given off **B.** heat is absorbed **C.** does not involve heat **D.** new products are formed **E.** appearance of substance changes

Circle the letter of the best answer.

5. Which of the following is an example of a physical change?

A. a glacier melting

B. a campfire burning

C. an antacid tablet fizzing after it is placed in water

D. carbon dioxide being produced in the engine of a running car

6. Which of the following is an example of a chemical change?

A. a lake freezing over

B. grinding rocks into gravel

C. sugar dissolving in a cup of tea

D. a candle burning

7. When an iron nail is left out in the rain, the iron combines with oxygen in the air to form iron (III) oxide, which is commonly known as rust. What do the iron and oxygen represent?

A. the products

B. the reactants

C. the physical change

D. the chemical change

8. A student adds a white powder to a clear liquid and the mixture begins to bubble. The student notices that the side of the container feels warm. What is this an example of?

I.	a physical change
II.	a chemical change
III.	an exothermic reaction
IV.	an endothermic reaction

A. I and III only

B. I and IV only

C. II and III only

D. II and IV only

9. Which of the following are evidence that a chemical change has occurred?

I.	a colour change
II.	a solid forms
III.	bubbles of gas form

A. I and II only

B. I and III only

C. II and III only

D. I, II, and III