

## CHAPTER 3

## STUDY GUIDE

# Matter—Properties and Changes

## Section 3.1 Properties of Matter

In your textbook, read about physical properties and chemical properties of matter.

Use each of the terms below just once to complete the passage.

chemical	mass	physical
density	properties	substance

Matter is anything with (1) \_\_\_\_\_ and volume. A (2) \_\_\_\_\_ is a form of matter with a uniform and unchanging composition. Substances have specific, unchanging (3) \_\_\_\_\_ that can be observed. Substances have both physical and chemical properties. (4) \_\_\_\_\_ properties can be observed without changing a substance's chemical composition. Color, hardness, and (5) \_\_\_\_\_ are examples. Other properties cannot be observed without changing the composition of a substance. These are called (6) \_\_\_\_\_ properties. An example is the tendency of iron to form rust when exposed to air.

Label each property as either *physical* or *chemical*.

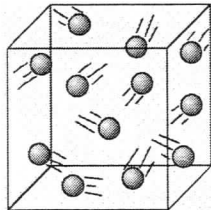
- \_\_\_\_\_ 7. Chemical formula H<sub>2</sub>O
- \_\_\_\_\_ 8. Forms green carbonate when exposed to moist air
- \_\_\_\_\_ 9. Remains unchanged when in the presence of nitrogen
- \_\_\_\_\_ 10. Colorless
- \_\_\_\_\_ 11. Solid at normal temperatures and pressures
- \_\_\_\_\_ 12. Ability to combine with another substance
- \_\_\_\_\_ 13. Melting point
- \_\_\_\_\_ 14. Liquid at normal temperatures and pressures
- \_\_\_\_\_ 15. Boiling point is 100°C
- \_\_\_\_\_ 16. Conducts electricity
- \_\_\_\_\_ 17. Density is  $\frac{1\text{g}}{\text{cm}^3}$

**Section 3.1** *continued*

In your textbook, read about states of matter.

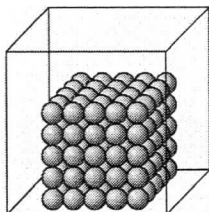
Label each drawing with one of these words: **solid, liquid, gas.**

18.



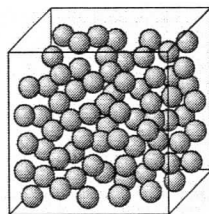
\_\_\_\_\_

19.



\_\_\_\_\_

20.



\_\_\_\_\_

For each statement below, write *true* or *false*.

- \_\_\_\_\_ 21. All matter that we encounter in everyday life exists in one of three physical forms.
- \_\_\_\_\_ 22. A solid has definite shape and volume.
- \_\_\_\_\_ 23. A liquid has a definite shape and takes on the volume of its container.
- \_\_\_\_\_ 24. A gas has both the shape and the volume of its container.
- \_\_\_\_\_ 25. The particles in a gas cannot be compressed into a smaller volume.
- \_\_\_\_\_ 26. Liquids tend to contract when heated.
- \_\_\_\_\_ 27. The particles in a solid are spaced far apart.
- \_\_\_\_\_ 28. The words *gas* and *vapor* can be used interchangeably.

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continued

**Section 3.2 Changes in Matter***In your textbook, read about physical change and chemical change.***What kinds of changes do these words indicate? Write each word under the correct heading. Use each word only once.**

boil	crumple	crush	explode
burn	ferment	freeze	grind
condense	melt	oxidize	rot
corrode	rust	tarnish	vaporize

**Physical Change****Chemical Change**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_

9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_
14. \_\_\_\_\_
15. \_\_\_\_\_
16. \_\_\_\_\_

**For each item in Column A, write the letter of the matching item in Column B.****Column A**

- \_\_\_\_\_ 17. The new substances that are formed in a chemical reaction
- \_\_\_\_\_ 18. A chemical reaction that involves one or more substances changing into new substances
- \_\_\_\_\_ 19. Shows the relationship between the reactants and products in a chemical reaction
- \_\_\_\_\_ 20. States that mass is neither created nor destroyed in any process
- \_\_\_\_\_ 21. The starting substances in a chemical reaction

**Column B**

- a. chemical change
- b. reactants
- c. products
- d. chemical equation
- e. law of conservation of mass

**Answer the following question. Write an equation showing conservation of mass of reactants and products.**

22. In a laboratory, 178.8 g of water is separated into hydrogen gas and oxygen gas. The hydrogen gas has a mass of 20.0 g. What is the mass of the oxygen gas produced?

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## PHYSICAL VS. CHEMICAL CHANGES

In a physical change, the original substance still exists, it has only changed in form. In a chemical change, a new substance is produced. Energy changes always accompany chemical changes.

Classify the following as being a physical or chemical change.

1. Sodium hydroxide dissolves in water. \_\_\_\_\_
2. Hydrochloric acid reacts with potassium hydroxide to produce a salt, water and heat. \_\_\_\_\_
3. A pellet of sodium is sliced in two. \_\_\_\_\_
4. Water is heated and changed to steam. \_\_\_\_\_
5. Potassium chlorate decomposes to potassium chloride and oxygen gas.  
\_\_\_\_\_
6. Iron rusts. \_\_\_\_\_
7. When placed in  $H_2O$ , a sodium pellet catches on fire as hydrogen gas is liberated and sodium hydroxide forms. \_\_\_\_\_
8. Evaporation \_\_\_\_\_
9. Ice melting \_\_\_\_\_
10. Milk sours. \_\_\_\_\_
11. Sugar dissolves in water. \_\_\_\_\_
12. Wood rotting \_\_\_\_\_
13. Pancakes cooking on a griddle \_\_\_\_\_
14. Grass growing in a lawn \_\_\_\_\_
15. A tire is inflated with air. \_\_\_\_\_
16. Food is digested in the stomach. \_\_\_\_\_
17. Water is absorbed by a paper towel. \_\_\_\_\_