Name_____Date_____ Period_____

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_2O

_____ **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

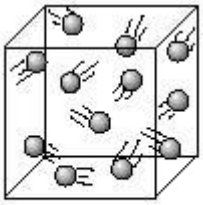
_____ **16.** Conducts electricity

_____ **17.** Density is $\frac{1\text{g}}{\text{cm}^3}$

Name_____Date_____ Period_____

In your textbook, read about states of matter.

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

18. 

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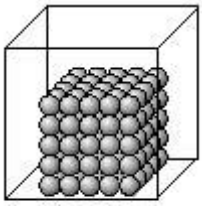
19. 

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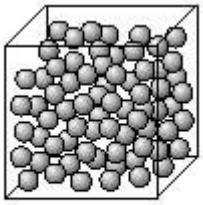
20. 

_____

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.

Name_____Date_____ Period_____

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. _____	**9.** _____
2. _____	**10.** _____
3. _____	**11.** _____
4. _____	**12.** _____
5. _____	**13.** _____
6. _____	**14.** _____
7. _____	**15.** _____
8. _____	**16.** _____

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

Column A	Column B
_____ **17.** The new substances that are formed in a chemical reaction	**a.** chemical change
_____ **18.** A chemical reaction that involves one or more substances changing into new substances	**b.** reactants
_____ **19.** Shows the relationship between the reactants and products in a chemical reaction	**c.** products
_____ **20.** States that mass is neither created nor destroyed in any process	**d.** chemical equation
_____ **21.** The starting substances in a chemical reaction	**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?

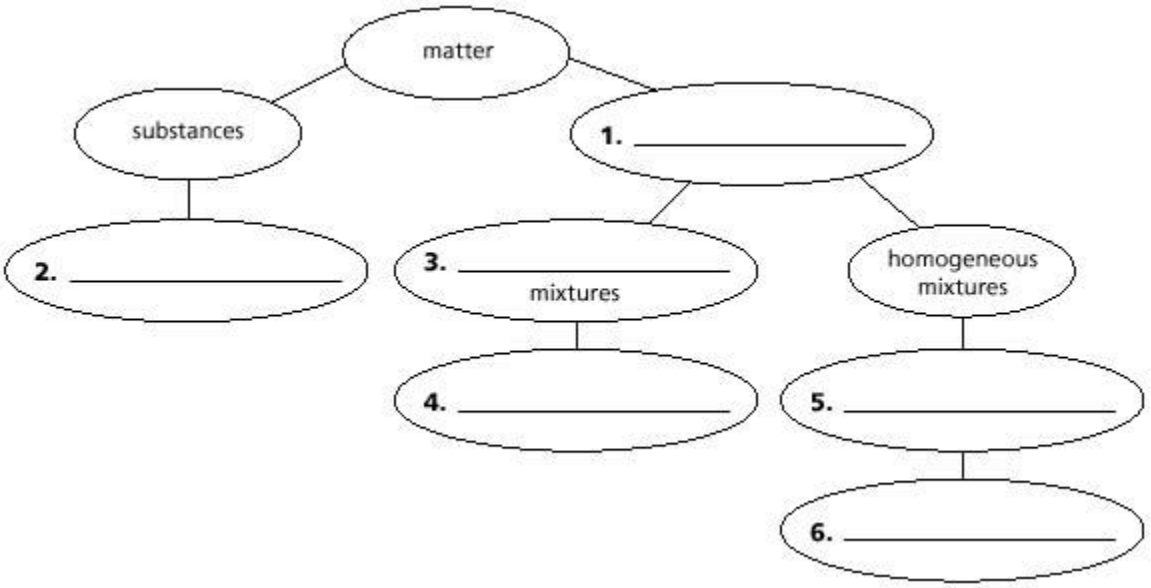
Name_____Date_____ Period_____

Section 3.3 Mixtures of Matter

In your textbook, read about pure substances and mixtures.

Use the words below to complete the concept map.

heterogeneous	salt-water mixture	sand-water mixture
mixtures	solutions	water



In your textbook, read about separating mixtures.

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

Column A	Column B
_____ **7.** Separates substances on the basis of the boiling points of the substances	**a.** filtration
_____ **8.** Separates by formation of solid, pure particles from a solution	**b.** distillation
_____ **9.** Separates substances based on their movement through a special paper	**c.** crystallization
_____ **10.** Separates solids from liquids by using a porous barrier	**d.** chromatography

Name_____Date_____ Period_____

Section 3.4 Elements and Compounds

In your textbook, read about elements and compounds.

Circle the letter of the choice that best completes the statement or answers the question.

1. A substance that cannot be separated into simpler substances by physical or chemical means is a(n)
a. compound. **b.** mixture. **c.** element. **d.** period.

2. A chemical combination of two or more different elements is a(n)
a. solution. **b.** compound. **c.** element. **d.** period.

3. Which of the following is an example of an element?
a. water **b.** air **c.** sugar **d.** oxygen

4. Which of the following is an example of a compound?
a. gold **b.** silver **c.** aspirin **d.** copper

5. What are the horizontal rows in the periodic table called?
a. block elements **b.** groups or families **c.** grids **d.** periods

6. What are the vertical columns in the periodic table called?
a. block elements **b.** groups or families **c.** grids **d.** periods

Label each substance as either an *element* or a *compound*.

_____ **7.** silicon

_____ **8.** sodium chloride

_____ **9.** francium

_____ **10.** nickel

_____ **11.** ice

Write the symbol for each element. Use the periodic table on pages 72-73 in your textbook if you need help.

_____ **12.** neon

_____ **13.** calcium

_____ **14.** iron

_____ **15.** titanium

_____ **16.** fluorine

Name_____Date_____ Period_____

In your textbook, read about the law of definite proportions.

Use the law of definite proportions and the equation below to answer the questions.

The law of definite proportions states that regardless of the amount, a compound is always composed of the same elements in the same proportion by mass.

$$\text{Mass percentage of an element (\%)} = \frac{\text{mass of element}}{\text{mass of compound}} \times 100\%$$

17. A 20.0-g sample of sucrose contains 8.4 g of carbon. What is the mass percentage of carbon in sucrose? Show your work.

18. Sucrose is 51.50% oxygen. How many grams of oxygen are in 20.0 g of sucrose? Show your work.

19. A 2-g sample of sucrose is 6.50% hydrogen. What is the mass percentage of hydrogen in 300 g of sucrose? Explain your reasoning.

20. Two compound samples are found to have the same mass percentages of the same elements. What can you conclude about the two samples?

In your textbook, read about the law of multiple proportions.

Use the law of multiple proportions to answer the questions and complete the table below.

The law of multiple proportions states that if the elements X and Y form two compounds, the different masses of Y that combine with a fixed mass of X can be expressed as a ratio of small whole numbers.

21. Two compound samples are composed of the same elements, but in different proportions. What can you conclude about the two samples?

_____

For each compound in the table, fill in the ratio of the mass of oxygen to the mass of hydrogen.

Compound	Mass of Oxygen	Mass of Hydrogen	Mass O/Mass H
H_2O	16 g	2 g	**22.**

Name_____Date_____ Period_____

H_2O_2	32 g	2 g	**23.**

24. Write a brief statement comparing the two mass ratios from the table.

_____

_____

25. Are H_2O and H_2O_2 the same compound? Explain your answer.

_____

_____