

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
density

mass
properties

physical
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*.

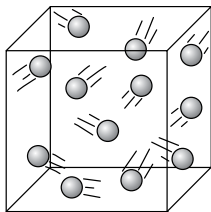
- _____ 7. Chemical formula H_2O
- _____ 8. Forms green carbonate when exposed to moist air
- _____ 9. Remains unchanged when in the presence of nitrogen
- _____ 10. Colorless
- _____ 11. Solid at normal temperatures and pressures
- _____ 12. Ability to combine with another substance
- _____ 13. Melting point
- _____ 14. Liquid at normal temperatures and pressures
- _____ 15. Boiling point is $100^\circ C$
- _____ 16. Conducts electricity
- _____ 17. Density is $\frac{1g}{cm^3}$

Section 3.1 *continued*

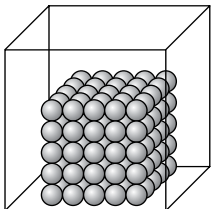
In your textbook, read about states of matter.

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

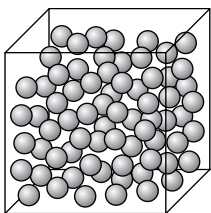
18.



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.

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

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Chemical Change

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.

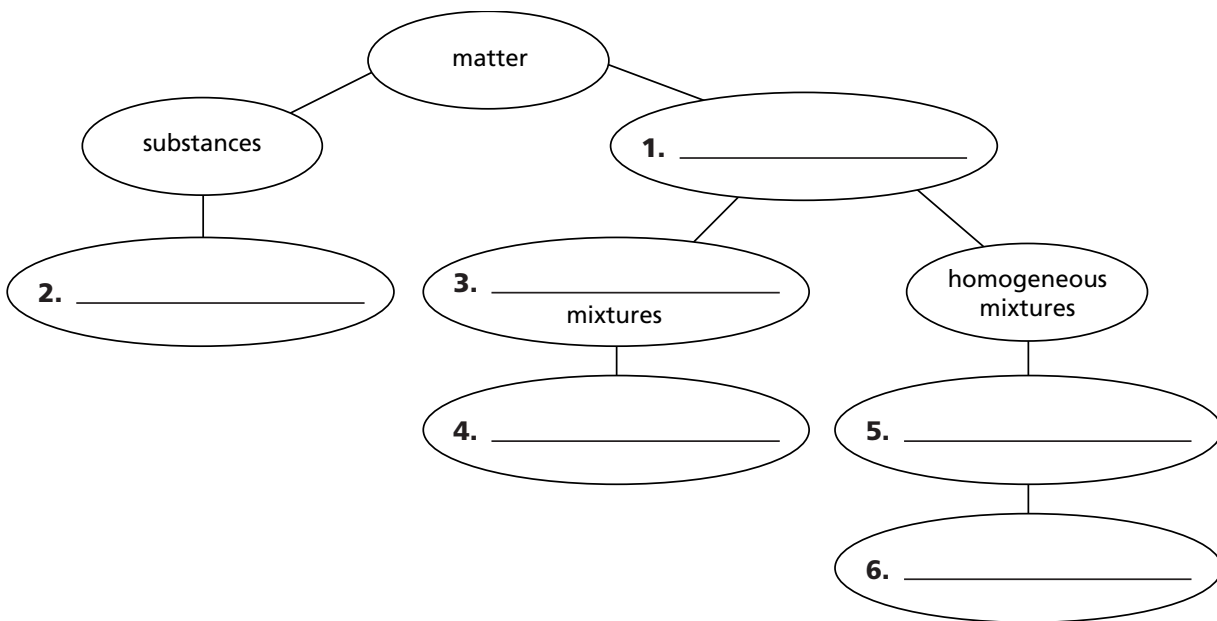
22. In a laboratory, 178.8 g of water is separated into hydrogen gas and oxygen gas. The hydrogen gas has a mass of 20.0 g. What is the mass of the oxygen gas produced?

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 mixtures	salt-water mixture solutions	sand-water mixture water
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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

- _____ 7. Separates substances on the basis of the boiling points of the substances
- _____ 8. Separates by formation of solid, pure particles from a solution
- _____ 9. Separates substances based on their movement through a special paper
- _____ 10. Separates solids from liquids by using a porous barrier

Column B

- a. filtration
- b. distillation
- c. crystallization
- d. chromatography

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.

- A substance that cannot be separated into simpler substances by physical or chemical means is a(n)
 - compound.
 - mixture.
 - element.
 - period.
- A chemical combination of two or more different elements is a(n)
 - solution.
 - compound.
 - element.
 - period.
- Which of the following is an example of an element?
 - water
 - air
 - sugar
 - oxygen
- Which of the following is an example of a compound?
 - gold
 - silver
 - aspirin
 - copper
- What are the horizontal rows in the periodic table called?
 - block elements
 - groups or families
 - grids
 - periods
- What are the vertical columns in the periodic table called?
 - block elements
 - groups or families
 - grids
 - periods

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

- | | |
|--------------------------|------------------|
| _____ 7. silicon | _____ 10. nickel |
| _____ 8. sodium chloride | _____ 11. ice |
| _____ 9. francium | |

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

- | | |
|-------------------|--------------------|
| _____ 12. neon | _____ 15. titanium |
| _____ 13. calcium | _____ 16. fluorine |
| _____ 14. iron | |

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.

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

- 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.