Name _____ Date _____ Class _____

# 2.1 PROPERTIES OF MATTER

## Section Review

### Objectives

- Identify physical properties and physical changes
- Distinguish intensive properties from extensive properties
- Differentiate among three states of matter

### Vocabulary

- mass
- volume
- extensive property
- intensive property
- substance
- physical property
- solid
- liquid
- gas
- vapor
- physical change

### Part A Completion

*Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.*

Properties used to describe matter can be classified as __1__ or __2__. The __3__ of an object is a measure of the amount of matter the object contains. The __4__ of an object is a measure of the space occupied by the object. An extensive property is one that depends on the __5__ of matter. An intensive property is one that depends on the __6__ of matter.

A __7__ is matter that has uniform and definite composition. A solid has a definite __8__ and __9__. A liquid has a definite volume, but takes the __10__ of its container. A __11__ takes both the shape and volume of its container.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____

### Part B True-False

*Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.*

_____ 11. Matter has mass and occupies space.

_____ 12. A liquid has a definite shape.

_____ 13. Heating a solid to 200°C will cause it to change to a liquid.

_____ 14. Gases are easier to compress than liquids.

Name _____ Date _____ Class _____

## Part C Matching

*Match each description in Column B to the correct term in Column A.*

| Column A | Column B |
|---|---|
| _____ 15. volume | a. a quality or condition of a substance that can be observed or measured without changing the substance's composition |
| _____ 16. mass | b. matter that takes both the shape and volume of its container |
| _____ 17. substance | c. matter that has a uniform and definite composition |
| _____ 18. physical property | d. measure of the space occupied by an object |
| _____ 19. solid | e. matter that has a definite volume and takes the shape of its container |
| _____ 20. liquid | f. a change to a material that does not change its composition |
| _____ 21. gas | g. gaseous state of a substance that generally exists as a liquid or solid at room temperature |
| _____ 22. vapor | h. matter that has a definite shape and volume |
| _____ 23. physical change | i. the amount of matter that an object contains |
| _____ 24. extensive property | j. depends on the type of matter in a sample |
| _____ 25. intensive property | k. depends on the amount of matter in a sample |

## Part D Questions and Problems

*Answer the following questions in the space provided.*

26. Classify each of the following as a solid, liquid, gas, or vapor.

a. steam — a. _____

b. apple juice — b. _____

c. gasoline — c. _____

d. hockey puck — d. _____

e. air — e. _____

27. State whether the following changes are physical changes.

a. melting butter — a. _____

b. breaking a window — b. _____

c. burning gasoline — c. _____

d. boiling water — d. _____

Name _____ Date _____ Class _____

# 2.2 MIXTURES

## Section Review

### Objectives

- Classify a sample of matter as a substance or a mixture
- Distinguish between homogeneous and heterogeneous samples of matter
- Describe two ways that components of mixtures can be separated

### Vocabulary

- mixture
- heterogeneous mixture
- homogeneous mixture
- solution
- phase
- filtration
- distillation

### Part A Completion

*Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.*

A physical blend of two or more substances is a __1__. **1.** _____

A mixture has a composition that varies. Mixtures may be identified **2.** _____

as __2__ or __3__. Homogeneous mixtures are also known **3.** _____

as __4__ and have uniform properties. Any part of a sample **4.** _____

with uniform composition and properties is called a __5__. **5.** _____

Many mixtures can be separated into their components by **6.** _____

__6__ methods. __7__ is a method of separation that involves **7.** _____

boiling a liquid, which is then condensed.

### Part B True-False

*Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.*

_____ **8.** Homogeneous mixtures can be separated by distillation.

_____ **9.** A solution has a uniform composition.

_____ **10.** A heterogeneous mixture contains two or more phases.

_____ **11.** Solutions are liquids.

Name _____ Date _____ Class _____

## Part C Matching

*Match each description in Column B to the correct term in Column A.*

| Column A | Column B |
|---|---|
| _____ 12. mixture | a. a mixture that has a uniform composition throughout |
| _____ 13. heterogeneous mixture | b. any part of a sample that has uniform composition and properties |
| _____ 14. homogeneous mixture | c. a mixture that is not uniform in composition |
| _____ 15. solution | d. separation of a liquid by boiling followed by condensation |
| _____ 16. phase | e. another name for a homogeneous mixture |
| _____ 17. distillation | f. a physical blend of two or more components |
| _____ 18. filtration | g. a method for separating a solid from a liquid in a heterogeneous mixture |

## Part D Questions and Problems

*Answer each of the following questions in the space provided.*

19. State whether each of the following is a homogeneous or heterogeneous mixture.

    a. table salt dissolved in water — a. _____

    b. carbon mixed with sand — b. _____

    c. filtered apple juice — c. _____

    d. vegetable soup — d. _____

    e. fresh squeezed lemonade — e. _____

20. Classify each of the following as a substance or a mixture.

    a. table sugar (sucrose) — a. _____

    b. hot tea — b. _____

    c. table salt (sodium chloride) — c. _____

    d. vinegar — d. _____

# Matter Practice

Name: _____

Date: _____

Hour: _____

1. Explain why compounds are always homogeneous, but mixtures can be either homogeneous or heterogeneous.

2. A white powder is in a beaker. Which statement(s) can be said <u>for sure</u> about the powder?

   I. It is homogeneous
   II. It is heterogeneous
   III. It is a mixture.
   IV. It is a compound.

   A) I only  B) I and IV only  C) I and III only  D) III only  E) none of these

3. Classify the following as chemical changes (C) or physical changes (P). Place a C or P in the blanks as appropriate.

   _____ a) a dead fish rotting
   _____ b) dissolving salt in water
   _____ c) boiling salt water until just salt remains
   _____ d) melting steel
   _____ e) bending steel
   _____ f) cracking ice

4. Identify the following as an element (E), compound (C), or mixture (M).

   _____ a) calcium
   _____ b) calcium and oxygen in the same container
   _____ c) calcium and oxygen atoms bonded
   _____ d) water
   _____ e) sodium
   _____ f) sand

5. How many phases and how many states are in a mixture made out of sand, saltwater, oil and ice.

# HOMOGENEOUS VS. HETEROGENEOUS MATTER

Name _____

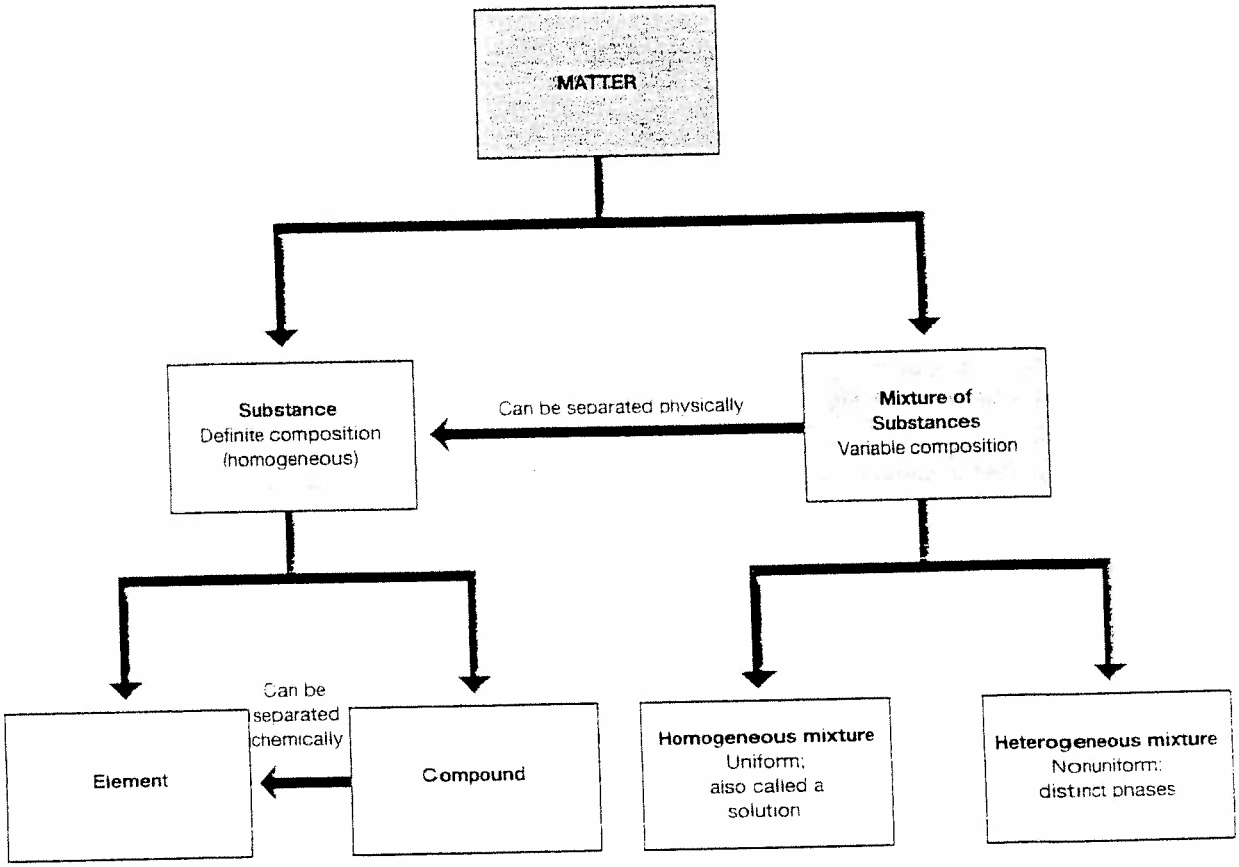
Classify the following substances and mixtures as either homogeneous or heterogeneous. Place a √ in the correct column.

| | HOMOGENEOUS | HETEROGENEOUS |
|---|---|---|
| 1. flat soda pop | | |
| 2. cherry vanilla ice cream | | |
| 3. salad dressing | | |
| 4. sugar | | |
| 5. soil | | |
| 6. aluminum foil | | |
| 7. black coffee | | |
| 8. sugar water | | |
| 9. city air | | |
| 10. paint | | |
| 11. alcohol | | |
| 12. iron | | |
| 13. beach sand | | |
| 14. pure air | | |
| 15. spaghetti sauce | | |

Name _____ Date _____ Class _____

# 2 INTERPRETING GRAPHICS

Use with Section 2.3



Name _____ Date _____ Class _____

*Use the flowchart on the previous page, redrawn from Figure 2.8 in your textbook, to answer the following questions.*

1. Motor oil is available in various grades (10W30, 10W40, and so on). Is motor oil a homogenous mixture or a compound? Explain.

_____

_____

_____

2. Iron ore is a heterogenous mixture that contains iron oxide. Iron ore can be smelted to produce pure iron. Is iron smelting a chemical or physical process? Explain.

_____

_____

_____

3. Classify each of the following as physical or chemical separations.

   a. air → oxygen + nitrogen

   _____

   b. water → hydrogen + oxygen

   _____

   c. salt water → water + sodium chloride

   _____

4. Classify each of the following as mixtures or substances.

   a. sulfur

   _____

   b. air

   _____

   c. concrete

   _____

   d. water

   _____

Name _____ Date _____ Class _____

# 2.3 ELEMENTS AND COMPOUNDS

## Section Review

### Objectives

- Explain the difference between an element and a compound
- Distinguish between a substance and a mixture
- Identify the chemical symbols of elements, and name elements, given their symbols

### Vocabulary

- element
- compound
- chemical change
- chemical symbol

### Part A Completion

*Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.*

A substance is either a(n) ___1___ or a(n) ___2___.

Compounds are made up of ___3___, which are always present in the same ___4___ in a given compound. Compounds can be broken down into simpler substances by ___5___ means.

If the composition of a material is fixed, it is a ___6___.

If the composition of a material may vary, it is a ___7___.

Each element is represented by a one- or two-letter ___8___. For example, carbon is represented by the symbol ___9___, while potassium is represented by the symbol ___10___.

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

### Part B True-False

*Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.*

_____ 9. Heating a chemical compound produces elements.

_____ 10. Compounds can be broken down into elements by physical means.

_____ 11. An element is the simplest form of matter that has a unique set of properties.

_____ 12. Compounds are represented by chemical formulas.

Name _____ Date _____ Class _____

## Part C Matching

*Match each description in Column B to the correct term in Column A.*

| Column A | Column B |
|---|---|
| _____ 13. element | a. substance that can be separated into simpler substances only by chemical means |
| _____ 14. compound | b. a physical blend of two or more components |
| _____ 15. mixture | c. one or two letters that represent an element |
| _____ 16. chemical symbol | d. simplest form of matter that has a unique set of properties |
| _____ 17. chemical change | e. a change that produces matter with a different composition than the original matter |

## Part D Questions and Problems

*Answer the following questions in the space provided.*

**18.** Classify each substance as an element or a compound.

a. water — a. _____

b. oxygen — b. _____

c. table salt — c. _____

d. sucrose — d. _____

e. gold — e. _____

**19.** Write the chemical symbols for each of the following elements.

a. potassium — a. _____

b. lead — b. _____

c. sodium — c. _____

d. chlorine — d. _____

e. sulfur — e. _____

**20.** Name the chemical elements represented by the following symbols.

a. Cu — a. _____

b. H — b. _____

c. Ag — c. _____

d. Fe — d. _____

e. N — e. _____

Name _____ Date _____ Class _____

# 2.4 CHEMICAL REACTIONS

## Section Review

### Objectives

- Describe what happens during a chemical change
- Identify four possible clues that a chemical change has taken place
- Apply the law of conservation of mass to chemical reactions

### Vocabulary

- chemical property
- chemical reaction
- reactant
- product
- precipitate
- law of conservation of mass

### Part A Completion

*Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.*

Substances change into new substances during a(n) ___1___ reaction. A change in which the properties of a substance change, but not its composition, is a ___2___ change. If the composition changes, then a ___3___ change has occurred. The only way to be sure a ___4___ change has occurred is to test the ___5___ composition of a sample before and after a change. The law of ___6___ states that mass is conserved in any physical change or chemical reaction. In other words, ___7___ is neither created nor destroyed.

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

### Part B True-False

*Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.*

_____ 9. A physical change is reversible.

_____ 10. In a chemical reaction, reactants are changed into products.

_____ 11. The amount of matter present appears to change during a chemical reaction.

Name _____ Date _____ Class _____

_____ 12. Matter can be created during a chemical reaction.

_____ 13. The substances formed in a chemical reaction are called reactants.

## Part C Matching

*Match each description in Column B to the correct term in Column A.*

| Column A | Column B |
|---|---|
| _____ 14. chemical reaction | a. solid that forms and settles out of a liquid mixture |
| _____ 15. reactants | b. starting substances in a chemical reaction |
| _____ 16. product | c. ability of a substance to undergo a specific chemical change |
| _____ 17. chemical property | d. substance formed in a chemical reaction |
| _____ 18. precipitate | e. process in which one or more substances change into one or more new substances |

## Part D Questions and Problems

*Answer the following questions in the space provided.*

19. When 400 grams of wood are burned, 30 grams of ash remain. What happened to the missing 370 grams of matter?

_____

_____

20. Some car batteries give off a potentially explosive mixture of gases. What kind of change is taking place in the battery?

_____

_____

21. When 16 grams of methane gas combine with 64 grams of oxygen, 44 grams of carbon dioxide form, plus water. What mass of water is produced?

_____

_____

Name _____ Date _____

# 2 MATTER AND CHANGE

## Practice Problems

*In your notebook, solve the following problems.*

## SECTION 2.1 PROPERTIES OF MATTER

1. Which of the following is *not* a physical change?
   a. dissolving sugar in water
   b. burning gasoline in an engine
   c. evaporating sea water to obtain salt
   d. slicing a piece of bread
2. Which of the following is *not* a property of a gas?
   a. has a definite shape
   b. has an indefinite volume
   c. assumes the shape of its container
   d. is easily compressed
3. Which of the following is *not* a physical property of sucrose?
   a. solid at room temperature
   b. decomposes when heated
   c. dissolves in water
   d. tastes sweet
4. Which of the following is in a different physical state at room temperature than the other three?
   a. salt b. sugar c. flour d. water
5. Complete the following table.

| Physical state | Definite Shape? | Definite Volume? | Easily Compressed? |
|---|---|---|---|
| gas | | | |
| | no | | no |
| | yes | | |

*Use the Table 2.1 to answer the following questions.*

6. Which substance is a colored gas?
7. Which liquids boil at a lower temperature than water?
8. Classify the following properties as extensive or intensive.
   a. color b. volume c. mass d. boiling point

Name _____ Date _____ Class _____

## SECTION 2.2 MIXTURES

1. How might you separate a mixture of water and salt?
2. What is a homogeneous mixture?
3. Which of the following mixtures are homogeneous? Which are heterogeneous?

   a. gasoline b. chunky peanut butter c. oil and vinegar salad dressing

4. Which of the following are substances? Which are mixtures?

   a. ethanol b. motor oil c. vinegar d. neon

## SECTION 2.3 ELEMENTS AND COMPOUNDS

1. What elements make up ammonia, chemical formula $NH_3$?
2. Name the elements represented by the following chemical symbols.

   a. Pb b. K c. Au d. Fe

3. Classify the following as elements, compounds, or mixtures.

   a. table salt b. water c. iron d. stainless steel

4. Write the chemical symbol for each of the following elements.

   a. tin b. sodium c. silver d. carbon

5. A liquid is allowed to evaporate and leaves no residue. Can you determine whether it was an element, a compound, or a mixture?
6. Which of the following is not an element?

   a. copper b. sulfur c. sucrose d. helium

## SECTION 2.4 CHEMICAL REACTIONS

1. Which one of the following is a chemical change?

   a. Gasoline boils.
   b. Oxygen is added to gasoline.
   c. Gasoline burns.
   d. Gasoline is poured into a tank.

2. Classify each of the following changes as physical or chemical.

   a. A puddle is dried by the sun.
   b. A dark cloth is faded by sunlight.
   c. Bread is toasted.
   d. Soap is mixed with water.

3. Carbon dioxide plus water yields carbonic acid.

   a. Name the product(s) of this reaction.
   b. Name the reactant(s) of this reaction.

4. If 44 grams of carbon dioxide react completely with 18 grams of water, what is the mass of carbonic acid formed?
5. In an engine, octane combines with oxygen to form carbon dioxide and water. If 22.8 grams of octane combine completely with 80 grams of oxygen to form 70.4 grams of carbon dioxide, what mass of water is formed?
6. What is the name of the chemical law on which problems 4 and 5 are based?