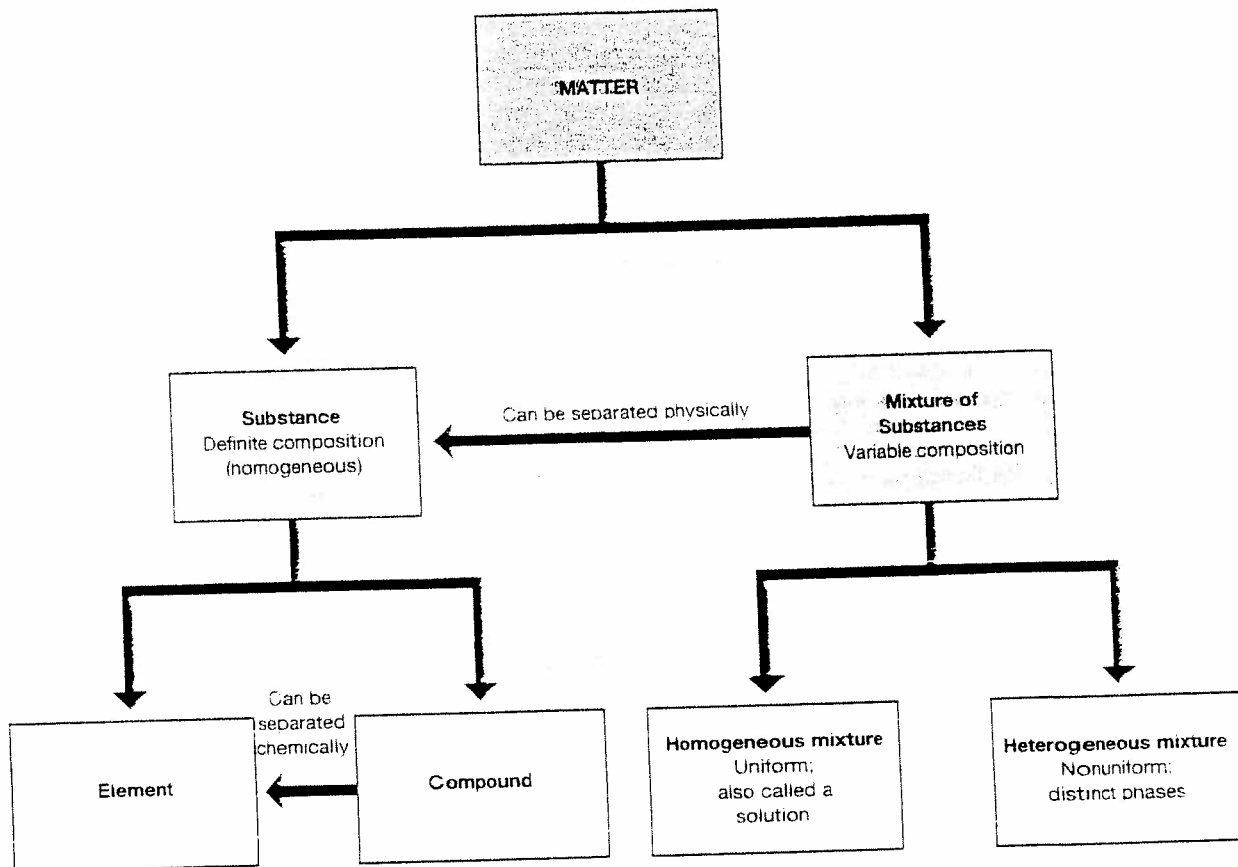


## 2

**INTERPRETING GRAPHICS**

Use with Section 2.3



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.

MIXTURE

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.

PHYSICAL

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

a. air → oxygen + nitrogen

PHYSICAL

b. water → hydrogen + oxygen

CHEMICAL

c. salt water → water + sodium chloride

PHYSICAL

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

a. sulfur

SUBSTANCE

b. air

MIXTURE

c. concrete

MIXTURE/SUBSTANCE

d. water

SUBSTANCE

## 23

## 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
- chemical change
- compound
- 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. ELEMENTS
2. COMPOUNDS
3. ELEMENTS
4. PROPORTION
5. CHEMICAL
6. COMPOUND
7. MIXTURE
8. SYMBOL
9. C
10. K

## Part B True-False

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

- ST 9. Heating a chemical compound produces elements.
- NT 10. Compounds can be broken down into elements by physical means.
- AT 11. An element is the simplest form of matter that has a unique set of properties.
- AT 12. Compounds are represented by chemical formulas.

### Part C Matching

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

Column A	Column B
<u>D</u> 13. element	a. substance that can be separated into simpler substances only by chemical means
<u>A</u> 14. compound	b. a physical blend of two or more components
<u>B</u> 15. mixture	c. one or two letters that represent an element
<u>C</u> 16. chemical symbol	d. simplest form of matter that has a unique set of properties
<u>E</u> 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. <u>COMPOUND</u> |
| b. oxygen     | b. <u>ELEMENT</u>  |
| c. table salt | c. <u>COMPOUND</u> |
| d. sucrose    | d. <u>COMPOUND</u> |
| e. gold       | e. <u>ELEMENT</u>  |
19. Write the chemical symbols for each of the following elements.
- |              |              |
|--------------|--------------|
| a. potassium | a. <u>K</u>  |
| b. lead      | b. <u>Pb</u> |
| c. sodium    | c. <u>Na</u> |
| d. chlorine  | d. <u>Cl</u> |
| e. sulfur    | e. <u>S</u>  |
20. Name the chemical elements represented by the following symbols.
- |       |                    |
|-------|--------------------|
| a. Cu | a. <u>COPPER</u>   |
| b. H  | b. <u>HYDROGEN</u> |
| c. Ag | c. <u>SILVER</u>   |
| d. Fe | d. <u>IRON</u>     |
| e. N  | e. <u>NITROGEN</u> |

**24**

**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. CHEMICAL
2. PHYSICAL
3. CHEMICAL
4. CHEMICAL
5. \_\_\_\_\_
6. CONSERVATION MATTER
7. MATTER

**Part B True-False**

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

- ST 9. A physical change is reversible.
- T 10. In a chemical reaction, reactants are changed into products.
- NT 11. The amount of matter present appears to change during a chemical reaction.

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

NT 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

E 14. chemical reaction

a. solid that forms and settles out of a liquid mixture

B 15. reactants

b. starting substances in a chemical reaction

D 16. product

c. ability of a substance to undergo a specific chemical change

C 17. chemical property

d. substance formed in a chemical reaction

A 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?

GAS/SMOKE

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

CHEMICAL

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?

36 GRAMS

## 2

## MATTER AND CHANGE

## Practice Problems

In your notebook, solve the following problems.

## SECTION 2.1 PROPERTIES OF MATTER

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

Physical state	Definite Shape?	Definite Volume?	Easily Compressed?
gas	NO	NO	YES
LIQUID	no	YES	no
SOLID	yes	YES	NO

Use the Table 2.1 to answer the following questions.

- Which substance is a colored gas? CHLORINE
- Which liquids boil at a lower temperature than water? ETHANOL
- Classify the following properties as extensive or intensive.
  - color  
IN
  - volume  
EX
  - mass  
EX
  - boiling point  
IN

## SECTION 2.2 MIXTURES

- How might you separate a mixture of water and salt? *EVAPORATE H<sub>2</sub>O*
- What is a homogeneous mixture? *SAME THROUGHOUT*
- Which of the following mixtures are homogeneous? Which are heterogeneous?
  - gasoline ←
  - chunky peanut butter →
  - oil and vinegar salad dressing ↖
- Which of the following are substances? Which are mixtures?
  - ethanol
  - motor oil
  - vinegar
  - neon

## SECTION 2.3 ELEMENTS AND COMPOUNDS

- What elements make up ammonia, chemical formula NH<sub>3</sub>? *NITROGEN/HYDROGEN*
- Name the elements represented by the following chemical symbols.
  - Pb *LEAD*
  - K *POTASSIUM*
  - Au *GOLD*
  - Fe *IRON*
- Classify the following as elements, compounds, or mixtures.
  - table salt *COMPOUND*
  - water *COMPOUND*
  - iron *ELEMENT*
  - stainless steel *MIXTURE*
- Write the chemical symbol for each of the following elements.
  - tin *Sn*
  - sodium *Na*
  - silver *Ag*
  - carbon *C*
- A liquid is allowed to evaporate and leaves no residue. Can you determine whether it was an element, a compound, or a mixture? *COMPOUND - NOTHING LEFT*
- Which of the following is not an element?
  - copper
  - sulfur
  - sucrose
  - helium

## SECTION 2.4 CHEMICAL REACTIONS

- Which one of the following is a chemical change?
  - Gasoline boils.
  - Gasoline burns. *CHEM*
  - Oxygen is added to gasoline.
  - Gasoline is poured into a tank.
- Classify each of the following changes as physical or chemical.
  - A puddle is dried by the sun. *P*
  - Bread is toasted. *C*
  - A dark cloth is faded by sunlight. *C*
  - Soap is mixed with water. *P*
- Carbon dioxide plus water yields carbonic acid.
  - Name the product(s) of this reaction. →
  - Name the reactant(s) of this reaction. →
- If 44 grams of carbon dioxide react completely with 18 grams of water, what is the mass of carbonic acid formed?
- 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?
- What is the name of the chemical law on which problems 4 and 5 are based?

*CONSERVATION OF MATTER*