

Describing Chemical Reactions

◆ Understanding Main Ideas

Balance the equations on the lines below. State whether the reaction is a synthesis, decomposition, or replacement reaction.

Given Equation	Balanced Equation	Type of Reaction
$\text{FeS} + \text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2\text{S}$	_____	_____
$\text{Na} + \text{F}_2 \rightarrow \text{NaF}$	_____	_____
$\text{HgO} \rightarrow \text{Hg} + \text{O}_2$	_____	_____

- Describe in words the chemical composition of the molecules involved and the reaction represented by the equation: $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
- Use the principle of conservation of mass to explain why the equation above is balanced. $\rightarrow 2$.

◆ Building Vocabulary

Match each term with its definition by writing the letter of the correct definition in the right column on the line beside the term in the left column.

_____ 3. chemical equation	a. materials present after a reaction
_____ 4. chemical formula	b. reaction where substances combine to form a more complex compound
_____ 5. decomposition	c. indicates how many atoms of each element are in one molecule
_____ 6. coefficient	d. uses symbols to show chemical reactions
_____ 7. products	e. reaction where one element replaces another in a compound
_____ 8. reactants	f. ratio of elements in a compound
_____ 9. conservation of mass	g. materials present before a reaction
_____ 10. synthesis	h. numbers telling how many molecules are involved in a chemical reaction
_____ 11. replacement reaction	i. reaction where compounds are broken down into simpler products
_____ 12. subscript	j. matter is not created or destroyed during a chemical reaction

SECTION 1-2

SECTION SUMMARY

Describing Chemical Reactions

Guide for Reading

- ◆ What does a chemical equation tell you?
- ◆ How does mass change during a chemical reaction?
- ◆ What are three categories of chemical reactions?

A **chemical equation** is a shorter, easier way to show chemical reactions using symbols instead of words.

Each element is represented by a one- or two-letter **symbol**. A compound is represented by a **chemical formula**, which shows the ratio of elements in the compound. The chemical formula also shows the number of atoms of each element in one molecule of a compound. The formula for water is H_2O . Notice that the number 2 is lower and smaller than the letter symbols of the elements. This number is called a **subscript**. In this case, it shows that there are two atoms of hydrogen in a molecule of water. The symbol for oxygen doesn't have a subscript. This means there is only one oxygen atom in a water molecule.

A chemical equation summarizes the changes in a chemical reaction. The materials you have at the beginning are the **reactants**. When the reaction is complete, you have different materials, called the products of the reaction. A **chemical equation uses symbols to show the reactants and products of a chemical reaction**. The formulas for all the reactants are written on the left side of the equation and the formulas for all of the products are on the right. You read the arrow (\rightarrow) as "yields."

At the end of a reaction, **the same atoms exist, but they are grouped together in different molecules. The amount of matter in a chemical reaction does not change, so the total mass of the reactants must equal the total mass of the products**. This principle, called the **conservation of mass**, states that matter is not created or destroyed during a chemical reaction.

A balanced chemical equation must show the same number of each type of atom in the reactants and the products. To balance an equation, coefficients may be needed. A **coefficient** is a number *in front* of a chemical formula in the equation. It tells you how many molecules or atoms of each reactant take part in the reaction.

Many chemical reactions may be classified in one of three categories: synthesis, decomposition, or replacement. When two or more substances (elements or compounds) combine to make a more complex compound, the process is called a **synthesis** reaction. A **decomposition** reaction breaks down compounds into simpler products. A reaction in which one element replaces another in a compound, or in which two elements in separate compounds trade places, is called a **replacement reaction**.