NAME DATE CLASS

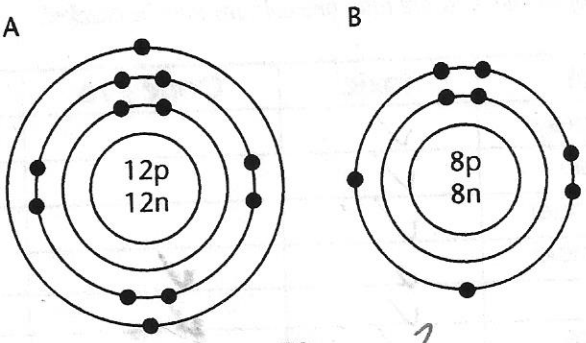
Chapter 11

REINFORCEMENT

Use with Text Pages 304–311

• Kinds of Chemical Bonds

Answer the questions about the diagram shown below. Write your answers in the spaces provided.



1. How many electrons will atom A lose to atom B? 2

2. What kind of chemical bond will be formed between atom A and atom B if atom A loses electrons and atom B gains these electrons? An ionic bond

3. If atom A gives up electrons to atom B, what will the electrical charge of atom A be? 2+

4. If atom B gains electrons from atom A, what will the electrical charge of atom B be? Why? 2−; Atom B will have 2 more electrons than it has protons, resulting in an overall negative charge.

5. What is an atom with an electrical charge called? ions

6. If atom A and atom B form a compound, what will the total charge of the compound be? Why? The compound will be neutral because the positive charges of atom A will be equal to the negative charges of atom B.

Complete the table comparing ionic compounds and covalent compounds.

Characteristic	Ionic	Covalent
How formed	Atoms gain or lose e−	Electrons are shared by other atoms
Smallest particles	ions	molecules
Usual state of compound at room temperature	solid	liq. or gas

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Chapter 11

REINFORCEMENT

Use with Text Pages 312–313

Hazardous Compounds at Home

Classify each of the hazardous materials listed in the table below as toxic, corrosive, or flammable. Place a check mark (✔) in the correct column of the table. More than one column may be checked.

Product	Toxic	Corrosive	Flammable
Insect spray	✓		
Gasoline	✓		✓
Paint thinner	✓		✓
Battery acid	✓	✓	
Bleach	✓	✓	
Antifreeze	✓		
Drain cleaner	✓	✓	
Oven cleaner	✓	✓	
Kerosene	✓		✓
Toilet cleaner	✓	✓	
Disinfectants	✓		

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Answer the following questions on the lines provided.

1. How is a corrosive material harmful to the human body? A corrosive material attacks and destroys the tissue that make up the human body.

2. How can hazardous materials that get into the groundwater supply be harmful to humans? The hazardous material that enter the groundwater can pass unchanged through sewage treatment plants + enter the drinking water

3. What kinds of products can be used in place of aerosols? gels, lotions, nonaerosol sprays

4. How would you share your knowledge of hazardous household chemicals with others? Accept all reasonable answers

5. What is a safe alternative to using drain cleaner to unplug a clogged drain? a plumber's snake or a plunger

6. What does *toxic* mean? poisonous

7. Why should household cleaning products be stored in a place where children and animals cannot easily get them? Many household products contain hazardous materials that could be dangerous for children or pets.

8. What should you do with the oil you remove from a car during an oil change? Recycle it.

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Chapter 11

REINFORCEMENT

Use with Text Pages 314–320

• Formulas and Names of Compounds

Use the Periodic Table of Elements on pages 286–287 of your textbook to identify the oxidation numbers of the elements in each group.

1+ 1. any element in Group 1

1− 2. any element in Group 17

2+ 3. any element in Group 2

0 4. any element in Group 18

2− 5. any element in Group 16

Answer the following questions in the spaces provided. Use the periodic table if you need help.

1. What is the usual oxidation number of oxygen? 2−
2. What is the usual oxidation number of hydrogen? 1+
3. What name is given to many of the elements that have more than one oxidation number? transition element
4. What is the sum of the oxidation numbers in a compound? zero
5. What is an oxidation number? a positive or negative number assigned to an element to show its combining ability in a compound.

Write the formulas for the following compounds. Use the Periodic Table of the Elements in your textbook for help.

1. copper(II) sulfate $CuSO_4$
2. calcium chloride $CaCl_2$
3. iron(II) oxide FeO
4. copper(I) oxide Cu_2O
5. sodium sulfide Na_2S

Complete the following table by providing the name of the compound and the total number of atoms in each formula given.

Formula	Name	Number of atoms
NH_4OH	ammonium hydroxide	7
NH_4Cl	ammonium chloride	6
Ag_2O	silver oxide	3
K_2SO_4	potassium sulfate	7
$Ca(NO_3)_2$	calcium nitrate	9
Na_2S	sodium sulfide	3

GIVE NAMES of Polyatomic Ions

Ammonium NH_4^+

Sulfate SO_4^{2-}

Nitrate NO_3^-

Hydroxide OH^-

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Chapter 11

STUDY GUIDE

Use with Text Pages 314–320

• Formulas and Names of Compounds

Match each term in Column II with its description in Column I. Write the letter of the correct term in the space provided.

14/14

Column I		Column II
j	1. prefix meaning six	a. bi-
g	2. prefix meaning many	b. ion
a	3. prefix meaning two	c. binary
c	4. compound composed of two elements	d. anhydrous
b	5. positively or negatively charged atom	e. polyatomic ion
e	6. positively or negatively charged group of atoms	f. subscript
i	7. compound that has water chemically attached to its ions	g. poly-
h	8. number assigned to an element to show its combining ability in a compound	h. oxidation number
d	9. without water	i. hydrate
f	10. number that tells how many atoms of an element are in a unit of the compound	j. hexa-

The words in each group below are related. Write a sentence, using all the words in the group, that shows how the words are related.

Example:
compound, properties, elements
The properties of a compound differ from the properties of the elements making up the compound.

1. hydrate, water, ions A hydrate is a compound that has water chemically attached to its ions.
2. oxidation number, element, compound The oxidation number of an element can be used to determine its combining ability in a compound
3. zero, oxidation numbers, noble gases The oxidation number of an element can be used to determine its combining ability in a compound.
4. oxidation number, Roman numeral, element The name of a compound containing an element with more than one oxidation number must include a Roman numeral after the name of the element.

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Chapter 11

STUDY GUIDE

Use with Text Pages 312–313

• Chemical Risks in the Home

Use the definitions of the types of hazardous compounds given below to decide if each of the materials described is toxic, corrosive, or flammable. In the space provided, write T for toxic, C for corrosive, and F for flammable.

T = toxic: poisonous

C = corrosive: substance that can attack, weaken, and destroy metals, human tissues, and other materials

F = flammable: burns readily

C **1.** After working with a car battery, you should wash your hands carefully and avoid contact between the battery acid and your clothing. Battery acid can weaken and cause holes to form in a fabric.

T **2.** An insecticide is a chemical preparation used to kill unwanted insect pests.

T **3.** Flea sprays and roach sprays are commonly used insecticides.

F **4.** Gasoline ignites easily in the presence of a spark or a flame.

T **5.** Each year many pets die from drinking water from puddles that have been contaminated with antifreeze.

C **6.** Maria poured some liquid drain cleaner into her sink. Later, she discovered that the drain was no longer clogged, but a hole had formed in the pipe.

F **7.** Petroleum products, such as oil and kerosene, can be highly explosive.

C **8.** Too much bleach in a washer can weaken fabric and cause holes to form.

T **9.** Herbicides are chemical preparations used to kill weeds.

Answer the following questions on the lines provided.

1. What is a hazardous compound? a compound that contains materials that can affect the health and safety of people

2. Some aerosols contain petroleum products. Are these aerosols corrosive, toxic, or flammable?

flammable

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Chapter 11

STUDY GUIDE

Use with Text Pages 304–308

• Kinds of Chemical Bonds

In the blank, write the letter of the term that is defined by each phrase.

b 1. force that holds together the atoms in a compound
a. chemical formula b. chemical bond

b 2. an atom that has an electrical charge
a. element b. ion

a 3. molecule that does not have oppositely charged ends
a. nonpolar molecule b. ion

b 4. molecule that has oppositely charged ends
a. covalent molecule b. polar molecule

b 5. number and sign written by the symbol of an ion to indicate its charge
a. subscript b. superscript

a 6. force of attraction between the opposite charges of the ions in an ionic compound
a. ionic bond b. polar bond

a 7. bond that forms between atoms when they share electrons
a. covalent bond b. polar bond

In the blank, write the letter of the term or phrase that correctly completes each statement.

b 8. In the symbol Na^+, the + sign is a _____ .
a. subscript b. superscript

a 9. A chloride ion, Cl^-, has _____ .
a. a negative charge b. no charge

a 10. The compound NaCl is an example of _____ .
a. an ionic compound b. a polar compound

b 11. When Na^+ and Cl^- unite to form the compound sodium chloride, the compound that forms is _____ .
a. positively charged b. neutral

a 12. Neutral particles formed as a result of the sharing of electrons are called _____ .
a. molecules b. ions

b 13. At room temperature, most covalent compounds are _____ .
a. solids b. liquids or gases

a 14. At room temperature, most ionic compounds are _____ .
a. solids b. liquids or gases

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Chapter 11

STUDY GUIDE

Use with Text Pages 298–303

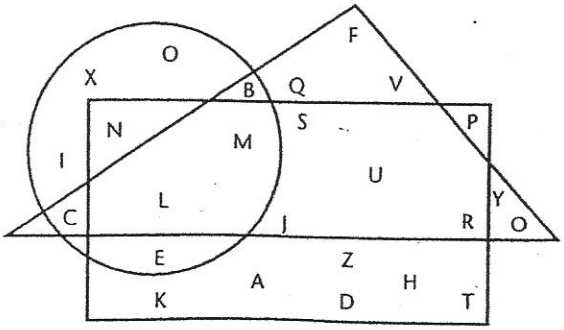
• Why Atoms Combine

The definitions of several key terms about how atoms combine are given below. In the blanks, write the term from the word list that makes each definition complete.

atoms	chemical symbol	compound	electrons	force
number	ratios	elements	energy level	

1. **Chemical formula:** tells what atoms elements make up a compound and the ratios of the atoms of those elements
2. **Subscript:** a number in a chemical formula written after a chemical symbol that tells how many atoms of an element are in a unit of the compound
3. **Chemically stable:** a condition of an atom when its outer energy level electrons is completely filled with electrons
4. **Chemical bond:** a condition in which a force holds together the atoms in a substance

Use the diagram below to select eight letters to form a word found in this chapter. Use the statements as hints to help you select the correct letters. Circle each letter as you find it in the diagram. Write the word in the space provided. Then define the term.



1. The first letter must be in both the triangle and the circle, but not in the rectangle.
2. The second letter must be in the triangle only.
3. The third letter must be in the circle, triangle, and rectangle.
4. The fourth letter must be in the rectangle only.
5. The fifth letter must be in the circle only.
6. The sixth letter must be in both the rectangle and the triangle, but not in the circle.
7. The seventh letter must be in both the rectangle and circle, but not in the triangle.
8. The eighth letter must be in the part of the rectangle that is below the triangle.

The word is C O M P O U N D. Definition: A ____ is

1 2 3 4 5 6 7 8

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Chapter 11

CHAPTER REVIEW

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• Chemical Bonds

Part A. Vocabulary Review

Determine whether the italicized term makes each statement true or false. If the statement is true, write the word "true" in the blank. If the statement is false, write in the blank the term that makes the statement true.

true 1. A compound that is *toxic* is poisonous.

flammable 2. A *corrosive* compound is one that burns readily.

chemical force (bond) 3. A force that holds the atoms in a compound together is a *polyatomic ion.*

true 4. An atom is *chemically stable* when its outer energy level is filled with electrons.

chemical formula 5. A *chemical symbol* tells what elements make up a compound and the ratios of the atoms of those elements.

true 6. A compound that can attack and destroy metals, human tissues, and other materials is *corrosive.*

polar 7. A molecule that has a positive end and a negative end is a *nonpolar* molecule.

a covalent 8. A bond that forms between atoms when they share electrons is *an ionic* bond.

an oxidation numb. 9. A positive or negative number that is assigned to an element to show its combining ability in a compound is *a subscript.*

true 10. A compound that is composed of only two elements is a *binary* compound.

true 11. A group of atoms with a positive or negative charge is a *polyatomic ion.*

hydrate 12. A *molecule* is a compound that has water chemically attached to its ions.

true 13. The force of attraction between the opposite charges of the ions in an ionic compound is an *ionic bond.*

nonpolar 14. Molecules that do not have oppositely charged ends are *polar* molecules.

true 15. A *chemical bond* is formed when atoms gain, lose, or share electrons.

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Chapter 11 Review (continued)

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Part B. Concept Review

Place a plus (+) beside each statement that agrees with what was said in your textbook. Place a minus (–) beside each statement that does not agree and rewrite the statement so that it is correct.

\+ **1.** Compounds have properties unlike those of their elements.

\+ **2.** In a chemical formula, a subscript tells how many atoms of an element are in a unit of a compound.

\+ **3.** A chemical bond occurs when atoms lose, gain, or share electrons.

\– **4.** Because each noble gas has an outer energy level that is completely filled with electrons, these elements form chemical bonds easily.

These elements do not form chemical bonds easily because their outer energy level is completely filled.

\+ **5.** Hazardous materials should be stored in their original containers.

\– **6.** A covalent bond is the force of attraction between the opposite charges of the ions in an ionic compound.

A covalent bond is the bond that forms btwn. atoms when they share electrons.

\+ **7.** Neutral particles formed as a result of covalent bonding are called molecules.

\– **8.** An element that loses electrons when bonding with other atoms has a negative oxidation number.

An element that loses electrons when bonding with other atoms has a positive oxidation number.

\+ **9.** When writing the formula of a compound, the symbol of the element with the positive oxidation number comes first.

\+ **10.** When cobalt chloride unites with water to form cobalt hexahydrate, its formula is written $CoCl_2 \cdot 6H_2O$.