

# Reviewing Element Names and Symbols

**Goal** • Review the names and symbols of various elements by finding them in the periodic table.

## What to Do

Complete the following tables. Refer to the periodic table in Appendix C of your textbook.

1. Write the full name of the element beside each symbol.

Symbol	Element name	Symbol	Element name
Cl		Ca	
C		Mg	
Ne		Si	
N		S	
He		P	
F		K	

2. Write the correct symbol next to the name of each element.

Element name	Symbol	Element name	Symbol
sodium		gold	
lithium		silver	
aluminum		copper	
boron		cobalt	

# Periodic Table Scavenger Hunt

**Goal** • Gain further understanding of the periodic table.

## What to Do

Answer each question in the space provided. Refer to the periodic table in Appendix C of your textbook.

- (a) How many periods does the periodic table have? \_\_\_\_\_

(b) How many groups does the periodic table have? \_\_\_\_\_
- (a) Where are the metals found in the periodic table? \_\_\_\_\_

(b) Where are the non-metals found in the periodic table? \_\_\_\_\_
- (a) Which elements are found around the “staircase” of the periodic table? \_\_\_\_\_

\_\_\_\_\_

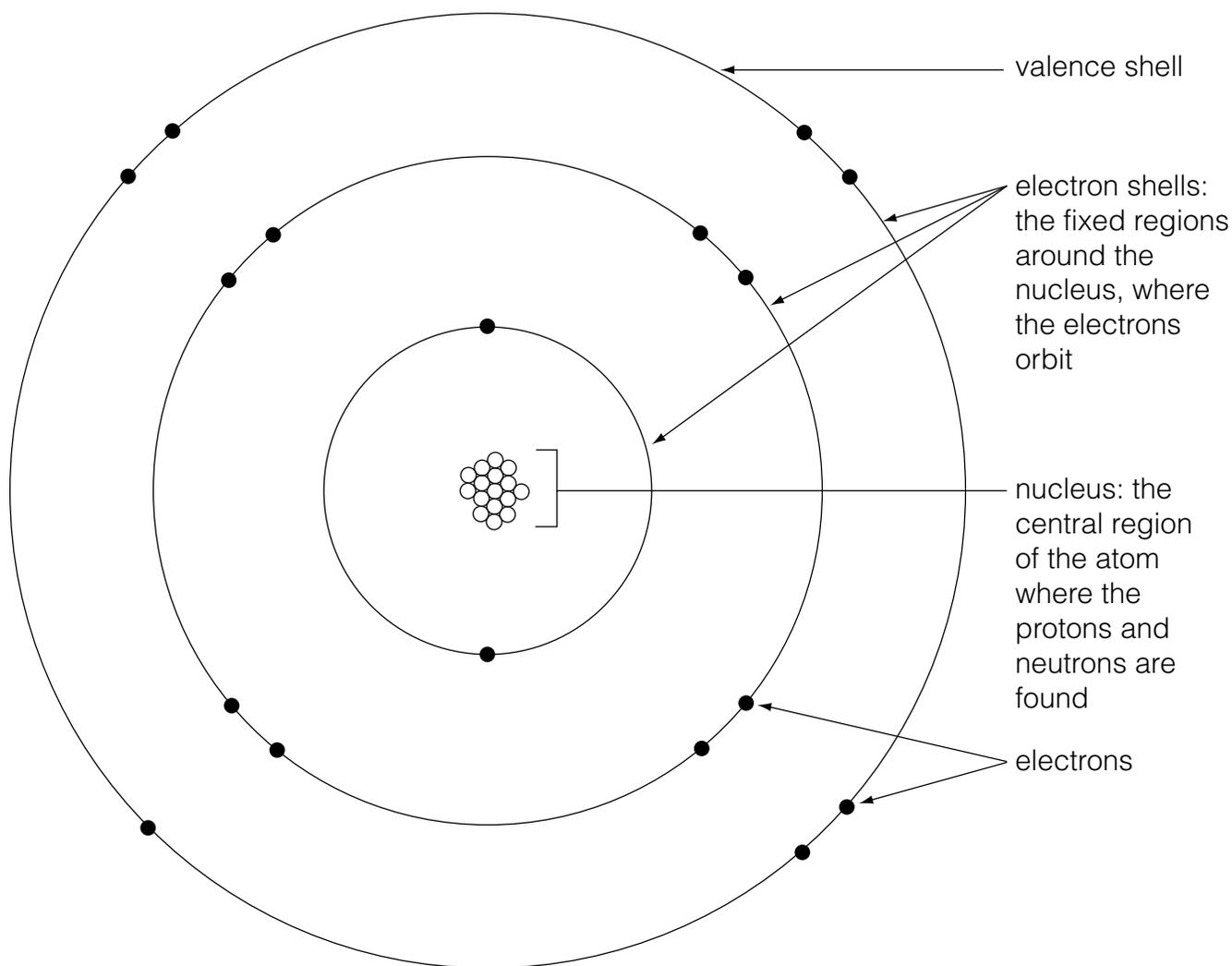
(b) Why are these elements at the “staircase” special? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_
- Which metal is a liquid at room temperature? \_\_\_\_\_
- What does the atomic number represent? \_\_\_\_\_

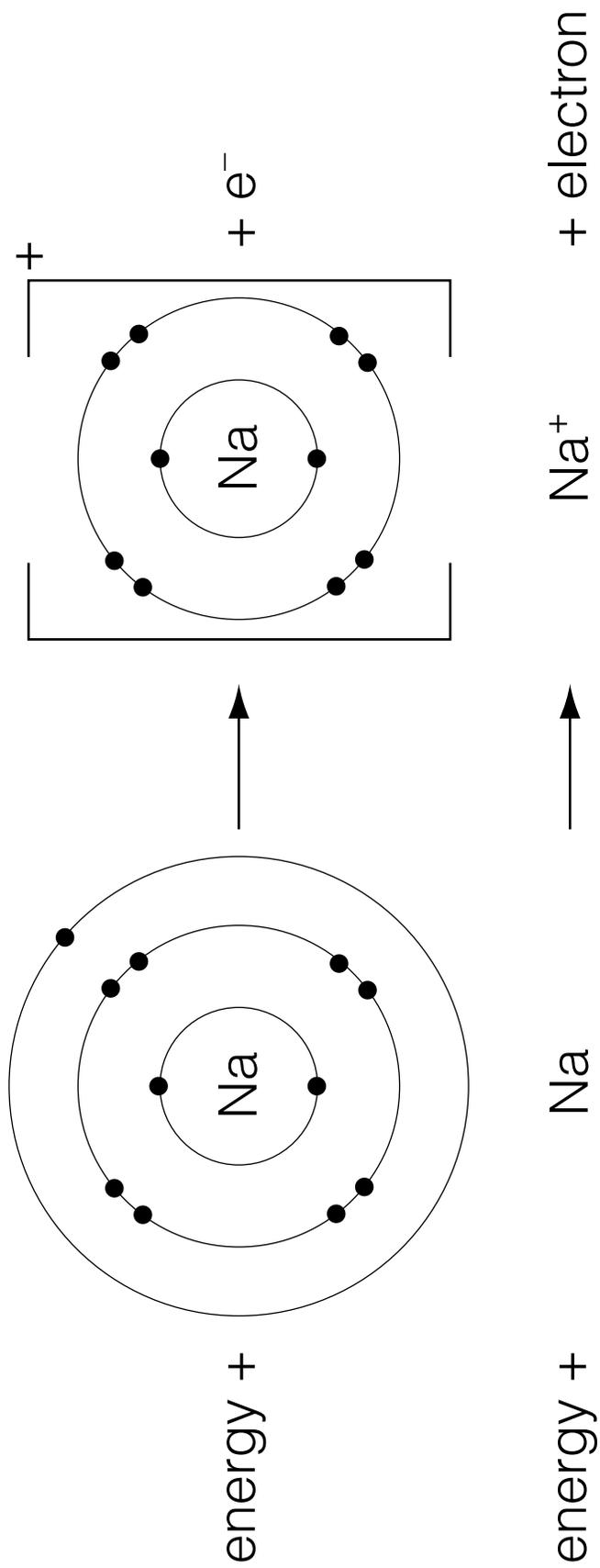
\_\_\_\_\_
- What does the atomic mass represent? \_\_\_\_\_

\_\_\_\_\_



- The outermost shell is called the *valence shell*. The electrons in the valence shell are called the *valence electrons*.
- The atoms of elements in Period 1 have one shell. This shell contains a maximum of 2 electrons.
- The atoms of elements in Period 2 have two shells. The valence shell contains a maximum of 8 electrons.
- The atoms of elements in Period 3 have three shells. The valence shell contains a maximum of 8 electrons.

# Anatomy of an Ion



# Keeping an ION That Electron!

**Goal** • Gain further understanding of how ions are formed.

## What to Do

Complete the table below.

Element name	Symbol	Nearest noble gas	Electron dot diagram of the charged ion	Charge (e.g., +1, +2, 0, -1, -2)
sulfur				
	O			
potassium				
	Cl			
neon				
sodium				
	F			

# Electron Shells

**Goal** • Practise drawing electron dot diagrams for different elements.

## What to Do

Complete the table below.

Element	Element symbol	Atomic number	Number of protons	Number of electrons	Period number	Number of shells	Electron dot diagram
aluminum							
silicon							
calcium							
	Li						
	B						
	P						

# Electron Dot Diagrams

**Goal** • Demonstrate your understanding of electron dot diagrams.

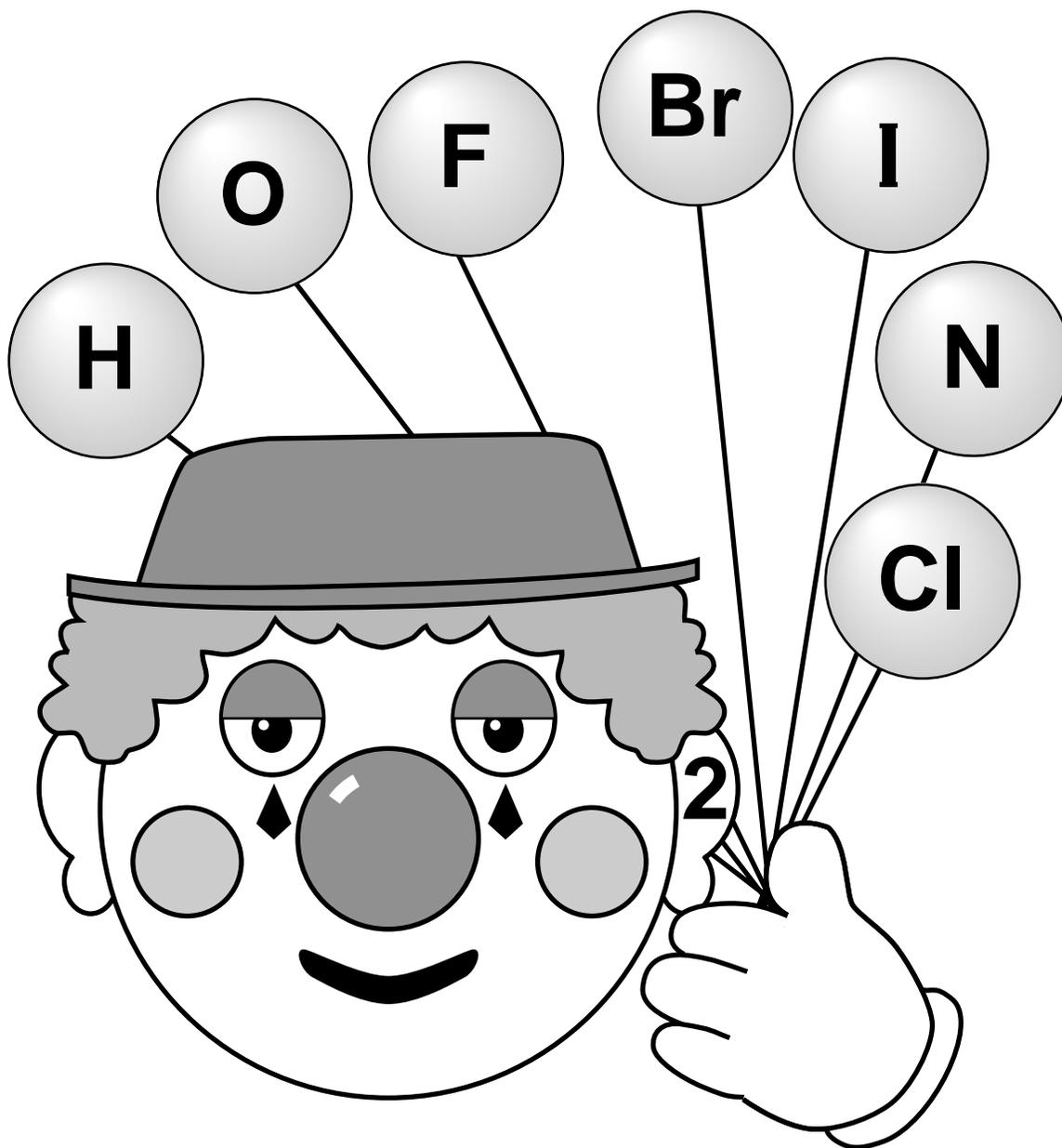
## What to Do

Complete the table below.

Element name	Symbol	Family	Electron dot diagram
sodium			
	Ne		
fluorine			
	Ca		
magnesium			
	K		

# HOFBrINCl the Clown

When two identical atoms link together, the arrangement is called a *diatomic molecule*. H-O-F-Br-I-N-Cl the Clown will help you remember diatomic molecules. Take a close look at his ear (and the number 2), and remember that all of these elements exist in pairs.



# Reviewing the Periodic Table of Elements

**Goal** • Demonstrate your understanding of the basic groups and periods associated with the periodic table of elements.

## What to Do

Answer each question in the space provided.

- Write the symbols for the first 20 elements in the periodic table below. You may want to refer to the periodic table in Appendix C of your textbook.
  - Using a yellow pencil crayon, shade the elements that belong to the group (family) of alkali metals.
  - Using an orange pencil crayon, shade the elements that belong to the group of alkaline earth metals.
  - Using a light green pencil crayon, shade the elements that are part of the halogen group.
  - Using a light blue pencil crayon, shade the elements that are part of the noble gas group.


- Why are the groups important in the periodic table?

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- What is special about the group of noble gases?

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- Describe two patterns in the periodic table.

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- Describe what happens to the elements in a group as you move vertically down the periodic table (as you go, for example, from an alkali metal in Period 1 to an alkali metal in Period 2).

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# Electrons and Their Shells Quiz

**Goal** • Demonstrate your understanding of elements and electron dot diagrams.

## What to Do

Complete the table below. Use the periodic table in Appendix C of your textbook for reference.

Element	Element symbol	Atomic number	Number of protons	Number of electrons	Period number	Number of shells	Electron dot diagram
oxygen							
	Mg						
		19					
	Be						
fluorine							
		10					

**Goal** • Explore ionic and covalent bonding.

### What to Do

Answer each question in the space provided.

1. What are three ways that an atom can acquire a valence shell like the valence shell of its closest noble gas?

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2. What is a cation?

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3. What is an anion?

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4. In your own words, define the term “ionic compound.”

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5. In your own words, define the term “ionic bond.”

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6. Draw the electron dot diagram for each ion below.

(a)  $\text{Cl}^-$

(b)  $\text{K}^+$

(c)  $\text{Ca}^{2+}$

**Goal** • Record your observations and data for Conduct an Investigation 5-B: Molecules or Ions?

**What to Do**

Answer each question in the space provided.

1. Follow the procedure in your textbook, and record your observations in the table below.

Substance	Appearance	Odour	Hardness	Solubility in water	Conductivity in aqueous solution	Relative melting point	Ionic/covalent
honey							
Epsom salts							
lauric acid							
washing soda							

2. (a) Which substances have edges with a characteristic shape?

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- (b) What does this suggest about the arrangement of their particles?

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3. (a) Which substances have no odour, or are hard and brittle?

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- (b) What do these properties suggest about the strength of the forces of attraction?

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**Goal** • Demonstrate your understanding of the periodic table and bonding.

**What to Do**

Match each description in column A with the correct term in column B. Write the letter for the term on the line beside the description.

<b>A</b>	<b>B</b>
___ 1. positively charged ion	(a) atomic number
___ 2. term used by chemists to describe the number of bonds that an atom forms in a compound	(b) periods
___ 3. charged atom	(c) valences
___ 4. bonds formed between anions and cations	(d) ion
___ 5. bond formed by atoms that share a pair of electrons	(e) cation
___ 6. number of protons or electrons in a neutral atom	(f) anion
___ 7. neutral particle that is composed of two or more atoms joined together by covalent bonds	(g) ionic bond
___ 8. horizontal rows of the periodic table	(h) diatomic molecule
___ 9. negatively charged atom	(i) molecule
___ 10. molecule that contains two atoms	(j) covalent bond

# Writing Names and Formulas

**Goal** • Record your answers to Think & Link Investigation 5-C: Writing Names and Formulas of Binary Ionic Compounds.

## What to Do

Answer the following questions as you work through Think & Link Investigation 5-C: Writing Names and Formulas of Binary Ionic Compounds.

1. Identify the binary compounds below.

- (a) HCl \_\_\_\_\_  
 (b) SO<sub>3</sub> \_\_\_\_\_  
 (c) MgCO<sub>3</sub> \_\_\_\_\_  
 (d) hydrogen sulfide \_\_\_\_\_  
 (e) copper sulfate \_\_\_\_\_

2. (a) Which types of elements combine to form ionic compounds?

\_\_\_\_\_

(b) Which types of elements combine to form molecular compounds?

\_\_\_\_\_

3. Identify each compound as ionic or molecular.

- (a) sodium sulfide \_\_\_\_\_  
 (b) PCl<sub>3</sub> \_\_\_\_\_  
 (c) nitrogen dioxide \_\_\_\_\_  
 (d) zinc oxide \_\_\_\_\_  
 (e) MgI<sub>2</sub> \_\_\_\_\_

4. Complete the following table.

Element		Anion	
fluorine	F	fluoride	F <sup>-</sup>
		chloride	
		bromide	
		oxide	
		sulfide	
		nitride	

5. Which of the following formulas are correct?

Rewrite the formulas that are not correct to make them correct.

- (a) LiO \_\_\_\_\_  
 (b) MgO \_\_\_\_\_  
 (c) K<sub>2</sub>S \_\_\_\_\_  
 (d) AlBr<sub>3</sub> \_\_\_\_\_  
 (e) KN<sub>3</sub> \_\_\_\_\_

7. Use the cross-over method to write the formula for each compound.

- (a) beryllium fluoride \_\_\_\_\_  
 (b) sodium nitride \_\_\_\_\_  
 (c) calcium sulfide \_\_\_\_\_  
 (d) aluminum chloride \_\_\_\_\_  
 (e) lithium oxide \_\_\_\_\_  
 (f) magnesium nitride \_\_\_\_\_  
 (g) gallium sulfide \_\_\_\_\_  
 (h) barium bromide \_\_\_\_\_

9. Use the reverse cross-over method to find the charge on the cation in each compound.

- (a) Cu<sub>2</sub>S \_\_\_\_\_  
 (b) Fe<sub>2</sub>O<sub>3</sub> \_\_\_\_\_  
 (c) PbO<sub>2</sub> \_\_\_\_\_  
 (d) NiCl<sub>2</sub> \_\_\_\_\_  
 (e) CrN \_\_\_\_\_  
 (f) HgO \_\_\_\_\_

(continued)

10. Complete the following table using the classical system.

Element	Latin name	Ion with lower charge		Ion with higher charge	
iron	ferrum	ferrous	Fe <sup>2+</sup>	ferric	Fe <sup>3+</sup>
	cuprum		Cu <sup>+</sup>		Cu <sup>2+</sup>
	plumbum		Pb <sup>2+</sup>		Pb <sup>4+</sup>

11. Complete the following table using the Stock system.

Formula	Classical system	Stock system
FeCl <sub>3</sub>	ferric chloride	
FeO	ferrous oxide	
Cu <sub>2</sub> S	cuprous sulfide	
PbO <sub>2</sub>	plumbic oxide	

13. Write the chemical formula for each compound.

- (a) copper(I) oxide \_\_\_\_\_
- (b) lead(IV) bromide \_\_\_\_\_
- (c) iron(III) sulfide \_\_\_\_\_
- (d) nickel(III) fluoride \_\_\_\_\_
- (e) manganese(IV) fluoride \_\_\_\_\_

# Chemical Compounds and Formulas

**Goal** • Increase your understanding of the names and formulas of binary and polyatomic compounds.

## What to Do

Answer each question in the space provided.

1. Identify each compound as ionic or molecular.

- (a)  $\text{NaNO}_3$  \_\_\_\_\_
- (b)  $\text{MgSO}_4$  \_\_\_\_\_
- (c)  $\text{K}_2\text{CO}_3$  \_\_\_\_\_
- (d)  $\text{NaCl}$  \_\_\_\_\_
- (e)  $\text{MgBr}_2$  \_\_\_\_\_
- (f)  $\text{CO}_2$  \_\_\_\_\_
- (g)  $\text{H}_2\text{O}$  \_\_\_\_\_
- (h)  $\text{CH}_4$  \_\_\_\_\_

2. Name the following compounds.

- (a)  $\text{MgF}_2$  \_\_\_\_\_
- (b)  $\text{Na}_2\text{CO}_3$  \_\_\_\_\_
- (c)  $\text{K}_2\text{CO}_3$  \_\_\_\_\_
- (d)  $\text{NaCl}$  \_\_\_\_\_
- (e)  $\text{MgBr}_2$  \_\_\_\_\_
- (f)  $\text{KF}$  \_\_\_\_\_
- (g)  $\text{BeF}_2$  \_\_\_\_\_
- (h)  $\text{AlO}_3$  \_\_\_\_\_

3. Write the chemical formula for each compound.

- (a) lead(II) sulfate \_\_\_\_\_
- (b) ferric oxide \_\_\_\_\_
- (c) aluminum sulfate \_\_\_\_\_
- (d) potassium iodide \_\_\_\_\_
- (e) copper(II) sulfate \_\_\_\_\_
- (f) carbon dioxide \_\_\_\_\_
- (g) barium nitrate \_\_\_\_\_

# Naming Compounds and Formulas

**Goal** • Practise naming compounds and writing chemical formulas.

## What to Do

Answer each question in the space provided.

1. Name the following chemicals.

(a)  $\text{CaCl}_2$  \_\_\_\_\_

(b)  $\text{NaI}$  \_\_\_\_\_

(c)  $\text{MgI}_2$  \_\_\_\_\_

(d)  $\text{MgO}$  \_\_\_\_\_

(e)  $\text{BeO}$  \_\_\_\_\_

(f)  $\text{Li}_2\text{S}$  \_\_\_\_\_

2. Write the chemical formula for each compound below.

(a) potassium fluoride \_\_\_\_\_

(b) dihydrogen oxide \_\_\_\_\_

(c) calcium carbonate \_\_\_\_\_

(d) silver nitrite \_\_\_\_\_

(e) carbon dioxide \_\_\_\_\_

(f) barium oxide \_\_\_\_\_

3. Write the chemical formula for each compound.

(a) lead(II) oxide \_\_\_\_\_

(b) copper(II) chloride \_\_\_\_\_

(c) iron(III) oxide \_\_\_\_\_

(d) nickel(II) fluoride \_\_\_\_\_

(e) manganese(IV) sulfide \_\_\_\_\_

(f) iron(II) fluoride \_\_\_\_\_

(g) chromium(IV) bromide \_\_\_\_\_

4. Write the Stock system name for each compound.

(a)  $\text{MnO}_2$  \_\_\_\_\_

(b)  $\text{NiBr}_2$  \_\_\_\_\_

**Goal** • Demonstrate your understanding of naming compounds and writing chemical formulas.

### What to Do

Answer each question in the space provided.

1. Name the following chemicals.

(a) BeO \_\_\_\_\_

(b) NaBr \_\_\_\_\_

(c) KI \_\_\_\_\_

(d) MgS \_\_\_\_\_

(e) CaO \_\_\_\_\_

(f) LiCl \_\_\_\_\_

2. Write the chemical formula for each compound below.

(a) lithium fluoride \_\_\_\_\_

(b) potassium oxide \_\_\_\_\_

(c) sodium sulfate \_\_\_\_\_

(d) ammonium nitrite \_\_\_\_\_

(e) calcium hydroxide \_\_\_\_\_

(f) gallium oxide \_\_\_\_\_

3. Write the chemical formula for each compound.

(a) copper(II) oxide \_\_\_\_\_

(b) lead(II) bromide \_\_\_\_\_

(c) iron(II) sulfide \_\_\_\_\_

(d) nickel(III) fluoride \_\_\_\_\_

(e) manganese(IV) fluoride \_\_\_\_\_

(f) iron(III) fluoride \_\_\_\_\_

(g) chromium(II) chloride \_\_\_\_\_

4. Write the Stock system name for each compound.

(a) PbO<sub>2</sub> \_\_\_\_\_

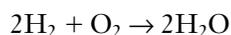
(b) NiCl<sub>3</sub> \_\_\_\_\_

# Chemical Equations and Their Parts

**Goal** • Review the concepts of chemical reactions and chemical equations.

## What to Do

Examine the chemical equation below. Then answer the questions that follow in the space provided.



1. Complete the following table.

Symbol	H <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub> O
Name			
State at room temperature			
Colour			
Odour			
Simple gas test			

2. How are you sure that the equation above shows a chemical reaction?

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3. What other clues, not related to the equation above, might help you determine whether a physical or chemical change has occurred?

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4. In a balanced chemical equation, how do the number of atoms on the left side of the arrow compare with the number of atoms on the right side of the arrow?

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5. Atoms are neither created nor destroyed in a chemical reaction; they are just rearranged. Is this statement true for the equation above? Explain your answer.

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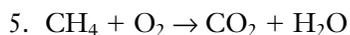
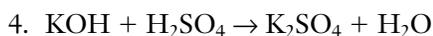
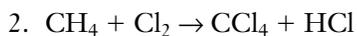
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# Balancing Chemical Equations

**Goal** • Practise balancing chemical equations.

## What to Do

Balance each skeleton equation on the line provided. Make sure that you include all the states.



# Chemical Equations

**Goal** • Demonstrate your ability to write and balance chemical equations.

## What to Do

Answer each question in the space provided.

1. Write the skeleton equation for each word equation below. Then balance the skeleton equation. Remember to include all the states of matter.

(a) methane + oxygen → carbon dioxide + water

Skeleton equation: \_\_\_\_\_

Balanced equation: \_\_\_\_\_

(b) sodium + chlorine → sodium chloride

Skeleton equation: \_\_\_\_\_

Balanced equation: \_\_\_\_\_

(c) iron(II) oxide → iron + oxygen

Skeleton equation: \_\_\_\_\_

Balanced equation: \_\_\_\_\_

(d) cupric oxide → copper + oxygen

Skeleton equation: \_\_\_\_\_

Balanced equation: \_\_\_\_\_

2. Complete the following table.

Element name	Element symbol	Latin name	Ion with lower charge		Ion with higher charge	
		ferrum	ferrous	Fe <sup>2+</sup>	ferric	Fe <sup>3+</sup>
		cuprum		Cu <sup>+</sup>		Cu <sup>2+</sup>
		plumbum		Pb <sup>2+</sup>		Pb <sup>4+</sup>
		stannum		Sn <sup>2+</sup>		Sn <sup>4+</sup>

**CHAPTER 5**  
**VOCABULARY CHECK**
**“Chemystery”**
**BLM 5-21**

**Goal** • Check your understanding of terms you learned in Chapter 5.

**What to Do**

Carefully read the instructions before answering each set of questions.

**Decoding**

Use the chart below to decode the following terms.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
q	w	e	r	t	y	u	i	o	p	a	s	d	f	g	h	j	k	l	z	x	c	v	b	n	m

- WKSCYVC \_\_\_\_\_
- JCDHIML \_\_\_\_\_
- VKEHIY \_\_\_\_\_
- HIYHV VIZJIGYM \_\_\_\_\_
- ZISCVGSC \_\_\_\_\_
- KYHIY \_\_\_\_\_
- ODIGJL \_\_\_\_\_
- JCDHIMHV EKXSC \_\_\_\_\_
- VIWKSCYE XIYM \_\_\_\_\_

**Fill in the Blanks**

Use the terms you decoded to complete the following sentences.

- An i \_\_\_\_\_ contains both anions and cations.
- The p \_\_\_\_\_ helps chemists make predictions about trends in the physical and chemical properties of the elements.
- A positively charged ion is a c \_\_\_\_\_.
- The columns in the periodic table are called g \_\_\_\_\_.
- The rows in the periodic table are called p \_\_\_\_\_.
- A c \_\_\_\_\_ forms when atoms share electrons.
- A m \_\_\_\_\_ is a neutral substance that is made up of two or more atoms.

**Goal** • Demonstrate and assess your understanding of the concepts you studied in Chapter 5.

**What to Do**

Carefully read the instructions before answering each set of questions.

**Fill in the Blanks**

Complete each sentence with the correct term.

- The rows in the periodic table are called \_\_\_\_\_.
- The columns in the periodic table are called \_\_\_\_\_.
- Electrons move rapidly around the nucleus in regions called \_\_\_\_\_.
- The bond that is created by the force of attraction between two oppositely charged ions is called a(n) \_\_\_\_\_.
- Two molecules, such as oxygen, that are bonded together are called a(n) \_\_\_\_\_  
(2 words)
- A(n) \_\_\_\_\_ is a substance that dissolves in water to produce a solution that conducts electricity.

**Short Answer**

Answer each question in the space provided.

- Which of the two substances, KBr or  $C_3H_8$ , is more likely to be an electrolyte? Explain your reasoning.  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Use the cross-over method to write the formula for each compound.
  - potassium nitride \_\_\_\_\_
  - calcium fluoride \_\_\_\_\_
  - lithium oxide \_\_\_\_\_
  - barium chloride \_\_\_\_\_
- What is the charge of the cations in the following compounds?
  - $Cu_2S$  \_\_\_\_\_
  - $NiCl_2$  \_\_\_\_\_
- Write the chemical formula for each compound.
  - copper(II) oxide \_\_\_\_\_
  - iron(II) sulfide \_\_\_\_\_
  - nickel(III) bromide \_\_\_\_\_

11. Write the chemical symbol for each ion.

(a) ammonium ion \_\_\_\_\_

(b) sulfate ion \_\_\_\_\_

(c) carbonate ion \_\_\_\_\_

12. Write the chemical formula for each compound.

(a) dinitrogen monoxide \_\_\_\_\_

(b) dinitrogen pentoxide \_\_\_\_\_

(c) nitrogen dioxide \_\_\_\_\_

13. Given the following word equation:

calcium + water  $\rightarrow$  calcium hydroxide + hydrogen gas

(a) Write the skeleton equation for this word equation.

\_\_\_\_\_

(b) Balance the skeleton equation.

\_\_\_\_\_

14. How many valance electrons does each atom have?

(a) oxygen \_\_\_\_\_

(b) boron \_\_\_\_\_

15. In which group of the periodic table is iodine found?

\_\_\_\_\_

16. When an ionic compound is named or its formula is written, which ion is placed first, the anion or the cation?

\_\_\_\_\_

### BLM 5-1, Reviewing Element Names and Symbols/ Reinforcement

**Goal:** Students review the names and symbols of various elements by finding them in the periodic table.

**Answers:**

1.

Symbol	Element name	Symbol	Element name
Cl	chlorine	Ca	calcium
C	carbon	Mg	magnesium
Ne	neon	Si	silicon
N	nitrogen	S	sulfur
He	helium	P	phosphorous
F	fluorine	K	potassium

2.

Element name	Symbol	Element name	Symbol
sodium	Na	gold	Au
lithium	Li	silver	Ag
aluminum	Al	copper	Cu
boron	B	cobalt	Co

### BLM 5-2, Periodic Table Scavenger Hunt/Skill Builder

**Goal:** Students gain further understanding of the periodic table.

**Answers:**

- (a) 7 (b) 18
- (a) on the left side (b) on the right side
- (a) the metalloids: C, Si, B, As, Sb, Te, Po, At  
(b) The metalloids have properties of both metals and non-metals.
- mercury
- The atomic number represents the number of protons in the atom's nucleus.
- The atomic mass represents the mass of the atom

relative to the mass of a  $^{12}_6\text{C}$  atom. Elements have different isotopes: there are different forms of the atom with different numbers of neutrons in them, therefore different masses. This results in the atomic mass being a decimal, rather than a whole number.

### BLM 5-3, Anatomy of an Atom/ Overhead Master

**Answers:** not applicable

### BLM 5-4, Anatomy of an Ion/ Overhead Master

**Answers:** not applicable

### BLM 5-5, Keeping an ION That Electron!/Science Inquiry

**Goal:** Students gain further understanding of how ions are formed.

**Answers:**

Element name	Symbol	Nearest noble gas	Electron dot diagram of the charged ion	Charge (e.g., +1, +2, 0, -1, -2)
sulfur	S	argon	$\begin{array}{c} \cdot\cdot \\ \times \text{S} \times \\ \cdot\cdot \end{array} 2-$	-2
oxygen	O	neon	$\begin{array}{c} \cdot\cdot \\ \times \text{O} \times \\ \cdot\cdot \end{array} 2-$	-2
potassium	K	argon	$\begin{array}{c} \cdot\cdot \\ \cdot \text{K} \cdot \\ \cdot\cdot \end{array} +$	+1
chlorine	Cl	argon	$\begin{array}{c} \cdot\cdot \\ \cdot \text{Cl} \times \\ \cdot\cdot \end{array} -$	-1
neon	Ne	neon	$\begin{array}{c} \cdot\cdot \\ \cdot \text{Ne} \cdot \\ \cdot\cdot \end{array}$	0
sodium	Na	neon	$\begin{array}{c} \cdot\cdot \\ \cdot \text{Na} \cdot \\ \cdot\cdot \end{array} +$	+1
fluorine	F	neon	$\begin{array}{c} \cdot\cdot \\ \cdot \text{F} \times \\ \cdot\cdot \end{array} -$	-1

### BLM 5-6 Electron Shells/Skill Builder

**Goal:** Students practise drawing electron dot diagrams for different elements.

**Answers:**

Element	Element symbol	Atomic number	Number of protons	Number of electrons	Period number	Number of shells	Electron dot diagram
aluminum	Al	13	13	13	3	3	$\begin{array}{c} \cdot \\ \text{Al} \cdot \\ \cdot \end{array}$
silicon	Si	14	14	14	3	3	$\begin{array}{c} \cdot \\ \cdot \text{Si} \cdot \\ \cdot \end{array}$
calcium	Ca	20	20	20	4	4	$\begin{array}{c} \cdot \\ \text{Ca} \cdot \end{array}$
lithium	Li	3	3	3	2	2	$\begin{array}{c} \cdot \\ \text{Li} \end{array}$
boron	B	5	5	5	2	2	$\begin{array}{c} \cdot \\ \text{B} \cdot \\ \cdot \end{array}$
phosphorus	P	15	15	15	3	3	$\begin{array}{c} \cdot \cdot \\ \cdot \text{P} \cdot \\ \cdot \end{array}$

**BLM 5-7, Electron Dot Diagrams/  
Assessment**

**Goal:** Students demonstrate their understanding of electron dot diagrams.

**Answers:**

Element name	Symbol	Family	Electron dot diagram
sodium	Na	alkali metals	• Na
neon	Ne	noble gases	•• :Ne: ••
fluorine	F	halogens	•• • F • ••
calcium	Ca	alkaline earth metals	• Ca•
magnesium	Mg	alkaline earth metals	• Mg•
potassium	K	alkali metals	• K

**BLM 5-8, HOFBrINCl the Clown/  
Overhead Master**

**Answers:** not applicable

### BLM 5-9, Reviewing the Periodic Table of Elements/Assessment

**Goal:** Students demonstrate their understanding of the basic groups and periods associated with the periodic table of elements.

**Answers:**

1. Refer to the periodic table in Appendix C.
2. They have similar properties, and their behaviour is predictable.
3. They have a full outer shell. They are very stable and therefore inert.
4. There are several patterns in the periodic table. The metals are on the left side of the table, the

non-metals are on the right side, and the metalloids are in a staircase pattern to the right. Elements in Period 1 have one electron shell, elements in Period 2 have two electron shells, and elements in Period 3 have three electron shells. Elements in a group have the same number of outer (valence) shell electrons.

5. The elements increase in reactivity.

### BLM 5-10, Electrons and Their Shells Quiz/Assessment

**Goal:** Students demonstrate their understanding of elements and electron dot diagrams.

**Answers:**

Element	Element symbol	Atomic number	Number of protons	Number of electrons	Period number	Number of shells	Electron dot diagram
oxygen	O	8	8	8	2	2	<pre>       ••      •O•       •           </pre>
magnesium	Mg	12	12	12	3	3	<pre>       •      Mg•           </pre>
potassium	K	19	19	19	4	4	<pre>       •      K           </pre>
beryllium	Be	4	4	4	2	2	<pre>       •      Be •           </pre>
fluorine	F	9	9	9	2	2	<pre>       ••      •F•       ••           </pre>
neon	Ne	10	10	10	2	2	<pre>       ••      •Ne•       ••           </pre>

### BLM 5-11, Ionic and Covalent Bonding/Reinforcement

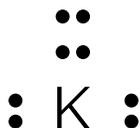
**Goal:** Students explore ionic and covalent bonding.

**Answers:**

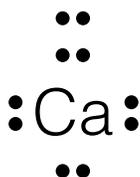
1. An atom may give up electrons, may gain electrons, or may share electrons.
2. a positively charged ion
3. a negatively charged ion
4. substances composed of cations and anions
5. the attraction between oppositely charged ions
6. (a)  $\text{Cl}^-$



(b)  $\text{K}^+$



(c)  $\text{Ca}^{2+}$



### BLM 5-12, Molecules or Ions?/ Science Inquiry

**Goal:** Students record their observations and data for Conduct an Investigation 5-B: Molecules or Ions?

**Answers:** Tables will vary. See the Teacher's Resource for appropriate answers.

### BLM 5-13, Chemistry Match-Up/ Assessment

**Goal:** Students demonstrate their understanding of the periodic table and bonding.

**Answers:**

1. (e)
2. (c)
3. (d)
4. (g)
5. (j)
6. (a)
7. (i)
8. (b)
9. (f)
10. (h)

### BLM 5-14, Writing Names and Formulas/Science Inquiry

**Goal:** Students record their answers to Think & Link Investigation 5-C: Writing Names and Formulas of Binary Ionic Compounds.

**Answers:**

1. (a) hydrogen chloride  
(b) sulfur oxide  
(c) magnesium carbonate  
(d)  $\text{H}_2\text{S}$   
(e)  $\text{CuSO}_4$
2. (a) metals and non-metals  
(b) two non-metals
3. (a) ionic  
(b) molecular  
(c) molecular  
(d) ionic  
(e) ionic
- 4.

Element		Anion	
fluorine	F	fluoride	$\text{F}^-$
chlorine	Cl	chloride	$\text{Cl}^-$
bromine	Br	bromide	$\text{Br}^-$
oxygen	O	oxide	$\text{O}^{2-}$
sulfur	S	sulfide	$\text{S}^{2-}$
nitrogen	N	nitride	$\text{N}^{3-}$

5. (a)  $\text{Li}_2\text{O}$   
(b) to (d) correct  
(e)  $\text{K}_3\text{N}$
7. (a)  $\text{BeF}_2$   
(b)  $\text{Na}_3\text{N}$   
(c)  $\text{CaS}$   
(d)  $\text{AlCl}_3$   
(e)  $\text{Li}_2\text{O}$   
(f)  $\text{Mg}_3\text{N}_2$   
(g)  $\text{Ga}_2\text{S}_3$   
(h)  $\text{BaBr}_2$
9. (a)  $\text{Cu}^+$   
(b)  $\text{Fe}^{3+}$   
(c)  $\text{Pb}^{4+}$   
(d)  $\text{N}^{2+}$   
(e)  $\text{Cr}^{3+}$   
(f)  $\text{Hg}^{2+}$

10.

Element	Latin name	Ion with lower charge		Ion with higher charge	
iron	ferrum	ferrous	Fe <sup>2+</sup>	ferric	Fe <sup>3+</sup>
copper	cuprum	cuprous	Cu <sup>+</sup>	cupric	Cu <sup>2+</sup>
lead	plumbum	plumbous	Pb <sup>2+</sup>	plumbic	Pb <sup>4+</sup>

11.

Formula	Classical system	Stock system
FeCl <sub>3</sub>	ferric chloride	iron(III) chloride
FeO	ferrous oxide	iron(II) oxide
Cu <sub>2</sub> S	cuprous sulfide	copper(IV) sulfide
PbO <sub>2</sub>	plumbic oxide	lead(IV) oxide

13. (a) Cu<sub>2</sub>O                      (d) NiF<sub>3</sub>  
 (b) PbBr<sub>4</sub>                      (e) MnF<sub>4</sub>  
 (c) Fe<sub>2</sub>S<sub>3</sub>

### BLM 5-15, Chemical Compounds and Formulas/Reinforcement

**Goal:** Students increase their understanding of the names and formulas of binary and polyatomic compounds.

**Answers:**

1. (a) ionic                      (e) ionic  
 (b) ionic                      (f) molecular  
 (c) ionic                      (g) molecular  
 (d) ionic                      (h) molecular
2. (a) magnesium fluoride  
 (b) sodium carbonate  
 (c) potassium carbonate  
 (d) sodium chloride  
 (e) magnesium bromide  
 (f) potassium fluoride  
 (g) beryllium fluoride  
 (h) aluminum oxide

3. (a) PbSO<sub>4</sub>                      (e) CuSO<sub>4</sub>  
 (b) Fe<sub>2</sub>O<sub>3</sub>                      (f) CO<sub>2</sub>  
 (c) Al<sub>3</sub>(SO<sub>4</sub>)<sub>2</sub>                      (g) BaNO<sub>3</sub>  
 (d) KI

### BLM 5-16, Naming Compounds and Formulas/Reinforcement

**Goal:** Students practise naming compounds and writing chemical formulas.

**Answers:**

1. (a) calcium chloride                      3. (a) PbO  
 (b) sodium iodide                      (b) CuCl<sub>2</sub>  
 (c) magnesium iodide                      (c) Fe<sub>2</sub>O<sub>3</sub>  
 (d) magnesium oxide                      (d) NiF<sub>2</sub>  
 (e) beryllium oxide                      (e) MnS<sub>2</sub>  
 (f) lithium sulfide                      (f) FeF<sub>2</sub>
2. (a) KF                      (g) CrBr<sub>4</sub>  
 (b) H<sub>2</sub>O                      4. (a) Manganese(IV)  
 (c) CaCO<sub>3</sub>                      oxide  
 (d) AgNO<sub>2</sub>                      (b) Nickel(II)  
 (e) CO<sub>2</sub>                      oxide  
 (f) BaO

### BLM 5-17, Chemical Formulas Quiz/Assessment

**Goal:** Students demonstrate their understanding of naming compounds and writing chemical equations.

**Answers:**

1. (a) beryllium oxide                      (d) magnesium sulfide  
 (b) sodium bromide                      (e) calcium oxide  
 (c) potassium iodide                      (f) lithium chloride
2. (a) LiF                      (d) NH<sub>4</sub>NO<sub>3</sub>  
 (b) K<sub>2</sub>O                      (e) Ca(OH)<sub>2</sub>  
 (c) Na<sub>2</sub>S                      (f) Ga<sub>2</sub>O<sub>3</sub>

3. (a) CuO (e) MnF<sub>4</sub> 2. CH<sub>4</sub>(g) + 4Cl<sub>2</sub>(g) → CCl<sub>4</sub>(l) + 4HCl(aq)  
 (b) PbBr<sub>2</sub> (f) FeF<sub>3</sub> 3. 2NO(g) + O<sub>2</sub>(g) → 2NO<sub>2</sub>(g)  
 (c) FeS (g) CrCl<sub>2</sub> 4. 2KOH(aq) + H<sub>2</sub>SO<sub>4</sub>(aq) → K<sub>2</sub>SO<sub>4</sub>(s) + H<sub>2</sub>O(l)  
 (d) NiF<sub>3</sub> 5. CH<sub>4</sub>(g) + 2O<sub>2</sub>(g) → CO<sub>2</sub>(g) + 2H<sub>2</sub>O(l)  
 4. (a) Pb(IV) (b) Ni(III)Cl 6. 2Al(OH)<sub>3</sub>(aq) + 3H<sub>2</sub>SO<sub>4</sub>(aq) → Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>(s) + 6H<sub>2</sub>O(l)  
 7. Ca(NO<sub>3</sub>)<sub>2</sub>(aq) + Na<sub>2</sub>CO<sub>3</sub>(aq) → CaCO<sub>3</sub>(s) + 2NaNO<sub>3</sub>(aq)

### BLM 5-18, Chemical Equations and Their Parts/Reinforcement

**Goal:** Students review the concepts of chemical reactions and chemical equations.

**Answers:**

1.

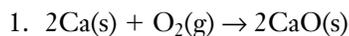
Symbol	H <sub>2</sub>	O <sub>2</sub>	H <sub>2</sub> O
Name	hydrogen	oxygen	dihydrogen oxide (water)
State at room temperature	gas	gas	liquid
Colour	colourless	colourless	colourless
Odour	odourless	odourless	odourless
Simple gas test	makes a burning splint pop	makes a glowing splint burn	n/a <b>Note:</b> Cobalt chloride paper changes colour, but this test is not introduced until Chapter 6.

2. Bubbles are produced, and a new product is formed.  
 3. There is a colour change, and an odour is produced.  
 4. There are equal numbers of atoms on each side of the equation (the law of conservation of mass).  
 5. Yes. To make water, a chemist requires two parts of hydrogen gas for every one part of oxygen gas.

### BLM 5-19, Balancing Chemical Equations/Reinforcement

**Goal:** Students practise balancing chemical equations.

**Answers:**



### BLM 5-20, Chemical Equations/Assessment

**Goal:** Students demonstrate their ability to write and balance chemical equations.

**Answers:**

1. (a) CH<sub>4</sub>(g) + O<sub>2</sub>(g) → CO<sub>2</sub>(g) + H<sub>2</sub>O(l)  
 CH<sub>4</sub>(g) + 2O<sub>2</sub>(g) → CO<sub>2</sub>(g) + 2H<sub>2</sub>O(l)  
 (b) Na(s) + Cl<sub>2</sub>(g) → NaCl(s)  
 2Na(s) + Cl<sub>2</sub>(g) → 2NaCl(s)  
 (c) FeO(s) → Fe(s) + O<sub>2</sub>(g)  
 2FeO(s) → 2Fe(s) + O<sub>2</sub>(g)  
 (d) CuO(s) → Cu(s) + O<sub>2</sub>(g)  
 2CuO(s) → 2Cu(s) + O<sub>2</sub>(g)

2.

Element name	Element symbol	Latin name	Ion with lower charge		Ion with higher charge	
iron	Fe	ferrum	ferrous	Fe <sup>2+</sup>	ferric	Fe <sup>3+</sup>
copper	Cu	cuprum	cuprous	Cu <sup>+</sup>	cupric	Cu <sup>2+</sup>
lead	Pb	plumbum	plumbous	Pb <sup>2+</sup>	plumbic	Pb <sup>4+</sup>
tin	Sn	stannum	stannous	Sn <sup>2+</sup>	stannic	Sn <sup>4+</sup>

### BLM 5-21, “Chemystery”/ Vocabulary Check

**Goal:** Students check their understanding of terms they learned in Chapter 5.

**Answers:**

- |                   |                    |
|-------------------|--------------------|
| 1. valence        | 9. covalent bond   |
| 2. periods        | 10. ionic compound |
| 3. cation         | 11. periodic table |
| 4. ionic compound | 12. cation         |
| 5. molecule       | 13. groups         |
| 6. anion          | 14. periods        |
| 7. groups         | 15. covalent bond  |
| 8. periodic table | 16. molecule       |

### BLM 5-22, Chapter 5 Test/ Assessment

**Goal:** Students demonstrate and assess their understanding of the concepts they studied in Chapter 5.

**Answers:**

- periods
- groups
- shells
- ionic bond
- diatomic molecule
- electrolyte

7. KBr is more likely to be an electrolyte because it is an ionic compound. When it dissolves in water, it is likely to carry a charge.

- |  |                                   |
|--|-----------------------------------|
| 8. (a) K <sub>3</sub> N  | (c) Li <sub>2</sub> O             |
| (b) CaF <sub>2</sub>   | (d) BaCl <sub>2</sub>             |
| 9. (a) 1 <sup>+</sup>  | (b) 2 <sup>+</sup>                |
| 10. (a) CuO  | (c) NiBr <sub>3</sub>             |
| (b) FeS  |                                   |
| 11. (a) NH <sub>4</sub> <sup>+</sup>   | (c) CO <sub>3</sub> <sup>2-</sup> |
| (b) SO <sub>4</sub> <sup>2-</sup>  |                                   |
| 12. (a) N <sub>2</sub> O   | (c) NO <sub>2</sub>               |
| (b) N <sub>2</sub> O <sub>5</sub>  |                                   |
| 13. (a) Ca + H <sub>2</sub> O → Ca(OH) <sub>2</sub> + H <sub>2</sub>             |                                   |
| (b) Ca(s) + 2H <sub>2</sub> O(l) → Ca(OH) <sub>2</sub> (aq) + H <sub>2</sub> (g) |                                   |
| 14. (a) six  | (b) three                         |
| 15. Group 17   |                                   |
| 16. the cation   |                                   |