

**Directed Reading for
Content Mastery**

**Overview
Elements and Their Properties**

Directions: Use the terms below to correctly complete the statements. Write the terms in the blanks to the left. Then find and circle each term in the puzzle.

metals
metalloids

lanthanide
hydrogen

alkali
noble gases

salts
allotropes

- lanthanide 1. Elements with atomic numbers from 58 through 71 are part of the _____ series.
- metalloids 2. _____ have both metallic and nonmetallic properties.
- allotropes 3. Diamond and graphite are _____ of carbon.
- metals 4. All of the elements in the boron group except boron are _____.
- salts 5. Halogens form _____ when combined with metals.
- noble gases 6. The _____ do not naturally mix with other elements to form compounds.
- alkali 7. The _____ metals are the most reactive group of elements.
- hydrogen 8. _____ is the only nonmetal on the left side of the periodic table.

O	T	N	M	E	W	U	I	D	F	A	S	R	Q	F	M	K	L	O
U	H	L	O	H	O	A	N	G	R	S	C	O	N	C	E	V	R	A
R	H	E	C	Y	Z	R	P	H	I	G	A	R	J	R	T	N	H	A
S	E	L	P	D	O	O	B	S	A	L	T	S	O	I	A	M	N	F
E	P	T	I	R	N	B	S	L	L	C	A	B	I	T	L	U	F	L
K	M	P	G	O	E	P	M	S	K	A	L	E	N	I	L	A	R	T
R	M	I	S	G	I	O	E	M	A	L	L	O	T	R	O	P	E	S
S	S	U	S	E	H	A	T	E	L	M	T	E	M	A	I	R	M	C
G	O	L	A	N	T	H	A	N	I	D	E	C	S	L	D	S	B	A
I	E	C	L	N	D	A	L	K	E	S	C	H	C	T	S	D	R	G
N	O	B	L	E	G	A	S	E	S	T	N	A	I	I	G	E	B	A

Meeting Individual Needs


**Directed Reading for
Content Mastery**
**Section 1 ■ Metals
Section 2 ■ Nonmetals**

Directions: Use the terms below to complete the puzzle. The letters in the vertical box answer question 10.

diatomic

hydrogen

flourine

transition

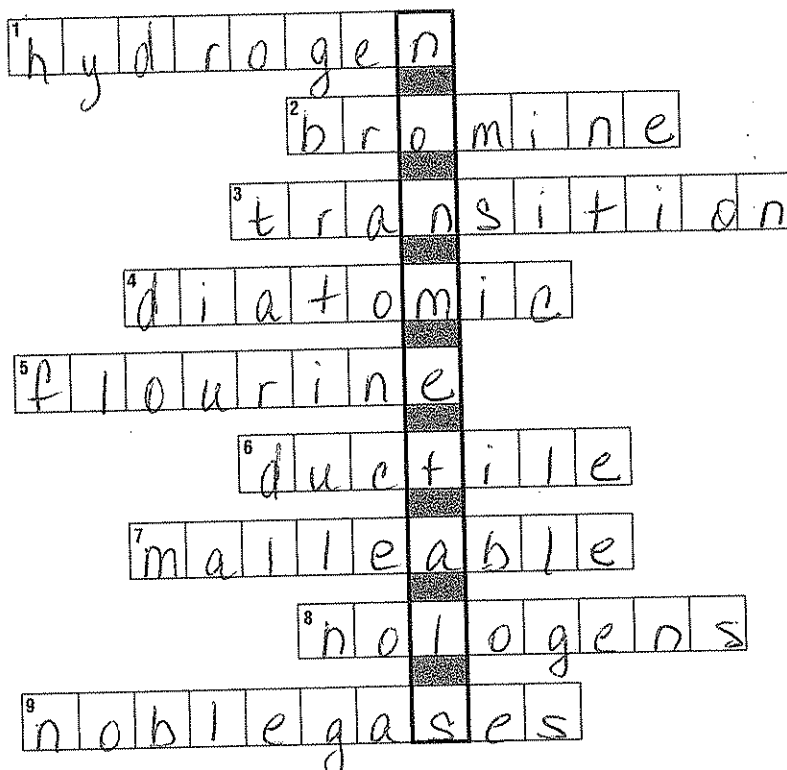
noble gases

halogens

malleable

ductile

bromine



- _____ is the only nonmetal on the left side of the periodic table.
- _____ is the only liquid nonmetal.
- Metals in Groups 3 through 12 of the periodic table are called _____ elements.
- Two atoms of the same element, when bonded, form a(n) _____ molecule.
- _____ is the most chemically active element.
- Copper is useful as wire in a lamp because it conducts electricity and is _____.
- Aluminum can be made into foil and cans because it is _____.
- Fluorine, chlorine, bromine, and iodine are _____.
- The elements in Group 18 are commonly known as the _____.
- What category of elements is found on the right side of the periodic table?

Directed Reading for Section 3 ■ Mixed Groups

Content Mastery

Directions: Complete the table below using the correct terms from the list. You will use some terms more than once. Some terms might not be used.

metal	14	nonmetal	coal, oil, natural gas
multivitamins	13	metalloid	sand, rock, soil
paint	siding on buildings	16	laundry products

Element	Group number	Metal, nonmetal, or metalloid	Found in/Used for
1. sulfur	16	nonmetal	paint
2. silicon	14	metalloid	sand, rock, soil
3. boron	13	metalloid	laundry products
4. selenium	16	nonmetal	multivitamins
5. carbon	14	nonmetal	organic compounds
6. aluminum	13	metal	siding on buildings

Directions: Select the term from the following list that correctly completes each statement. Use each word only once.

nitrogen

metalloids

transuranium

allotropes

carbon

- metalloids 7. Elements with properties of both metals and nonmetals are called _____.
- allotropes 8. _____ are different forms of the same element, but with different molecular structures.
- transuranium 9. Elements having more than 92 protons, the atomic number of uranium, are called _____ elements.
- carbon 10. All organic compounds contain _____.
- nitrogen 11. Elements in the _____ group share electrons and form covalent compounds with other elements.



Key Terms

Elements and Their Properties

Directions: Draw a line connecting each definition to its term.

- | | |
|--|----------------------|
| 1. consists of two atoms of the same element in a covalent bond | metals |
| 2. element in Group 3 through Group 12 of the periodic table | malleable |
| 3. positively charged metallic ions surrounded by a cloud of electrons | diatomic molecule |
| 4. capable of being hammered or rolled into sheets | metallic bonding |
| 5. elements that are shiny, good conductors of heat and electricity, and solids at room temperature | radioactive element |
| 6. elements that conduct an electric current under certain conditions | transition element |
| 7. elements that are usually gases or brittle solids at room temperature, do not conduct heat or electricity well, and are not shiny | nonmetals |
| 8. element having more than 92 protons, the atomic number of uranium | ductile |
| 9. the ability to be drawn into wires | metalloids |
| 10. forms of the same element that have different molecular structures | semiconductors |
| 11. element whose nucleus breaks down, giving off particles and energy | allotropes |
| 12. elements having properties of metals and nonmetals | transuranium element |

SECTION

1

Reinforcement

Metals

Directions: Complete the table below by writing the name of each of the following metals under the correct heading. Use the periodic table in your textbook if you need help.

barium	sodium	iron	magnesium	francium
strontium	cadmium	zinc	nickel	mercury
gold	cobalt	calcium	radium	silver
chromium	potassium	lithium	copper	cesium

1. Alkali metals	2. Alkaline earth metals	3. Transition elements	
sodium	calcium	iron	gold
francium	beryllium	copper	zinc
potassium	strontium	silver	mercury
cesium	magnesium	cobalt	nickel
lithium	radium	cadmium	

Directions: For each of the following, write the letter of the term or phrase that best completes the sentence.

- c 4. The transition elements are in Groups _____.
 a. 1-12 b. 3-13 c. 3-12 d. 3-5
- d 5. The most highly reactive of all metals are the _____.
 a. coinage metals c. iron triad
 b. alkaline earth metals d. alkali metals
- a 6. The alkali metals make up _____ of the periodic table.
 a. Group 1 b. Group 2 c. Group 16 d. Group 18
- b 7. The elements that make up the iron triad are
 a. radioactive c. alkali metals
 b. transition d. alkaline earth metals
- c 8. The inner transition metals include the _____.
 a. alkali metals and halogens c. lanthanides and actinides
 b. carbon group and noble gasses d. alkaline earth metals only
- b 9. The alkaline earth metals make up _____ of the periodic table.
 a. Group 1 b. Group 2 c. Group 17 d. Group 18

SECTION

2

Reinforcement

Nonmetals

Directions: Complete the following table that compares the properties of metals and nonmetals by supplying the information requested.

Characteristic	Metal	Nonmetal
1. Appearance of solid	shiny	dull
2. Is it malleable?	yes	no
3. Is it ductile?	yes	no
4. Does it conduct heat well?	yes	no
5. Does it conduct electricity well?	yes	no
6. Most common state at room temperature.	solid	gas
7. Does it conduct electricity well?	yes	no

Directions: In the spaces provided, list two properties for each nonmetal listed.

8. hydrogen gas, forms diatomic molecules, highly reactive
9. fluorine active gas, forms diatomic mole., 7 electrons (valence)
10. chlorine gas, forms diatomic mole. 7 valence electrons
11. bromine liquid at room temp., 7 valence electrons
12. iodine shiny, gray solid, sublimates, 7 valence electrons
13. helium 2 valence electrons, not reactive, gas
14. neon 8 valence electrons, not reactive, gas

Directions: Answer the following questions on the lines provided.

15. How does bromine differ from the other nonmetals?

Bromine is the only nonmetal that is a liquid at room temperature.

16. How does the location of hydrogen on the periodic table differ from the locations of the other nonmetals?

Hydrogen is the only nonmetal on the left side of the periodic table.

SECTION 3

Reinforcement

Mixed Groups

Directions: The elements that make up groups 13 through 16 of the periodic table are listed below. Classify each element as a metal, metalloid, or nonmetal by writing its name under the correct heading in the table. Refer to the periodic table of the elements in your textbook for information on each element.

Boron Group

boron
aluminum
gallium
indium
thallium

Nitrogen Group

nitrogen
phosphorus
arsenic
antimony
bismuth

Carbon Group

carbon
silicon
germanium
tin
lead

Oxygen Group

oxygen
sulfur
selenium
tellurium
polonium

1. Metals	2. Metalloids	3. Nonmetals
aluminum	boron	carbon
gallium	silicon	nitrogen
indium	germanium	phosphorus
thallium	antimony	oxygen
tin	tellurium	sulfur
lead	polonium	selenium
bismuth	arsenic	

Directions: Answer the following questions in the spaces provided.

4. Why is it useful to create neptunium by bombarding uranium with protons, even though neptunium disintegrates in about two days?

When neptunium falls apart it is used in nuclear reactors and smoke detectors.

5. What are allotropes?

Forms of the same element w/ different molecular structures

6. Describe the appearance of two allotropes of silicon.

One is hard gray substance. One is a brown powder.

7. Name three allotropes of carbon.

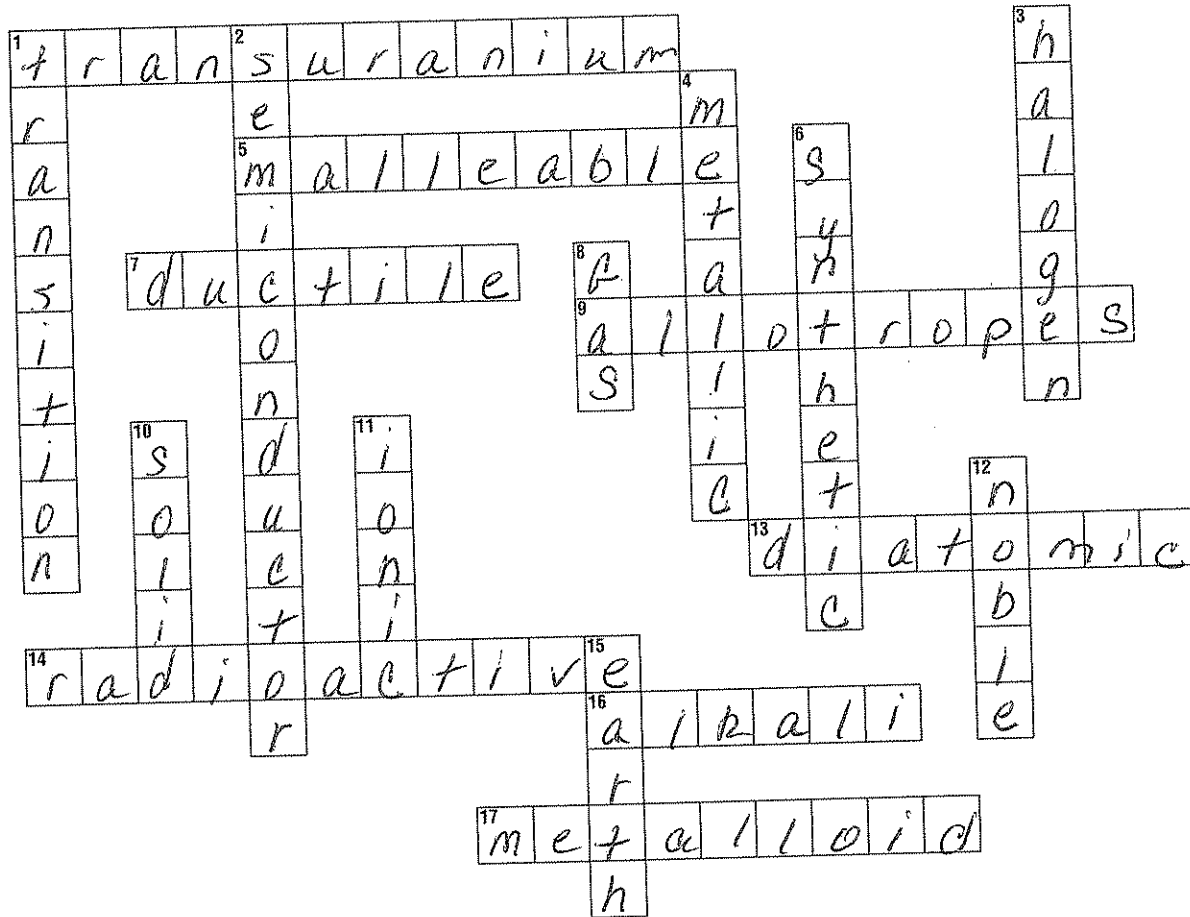
diamond, graphite, buckminsterfullerene

Chapter Review

Elements and Their Properties

Part A. Vocabulary Review

Directions: Use the clues below to complete the crossword puzzle.



Across

- Element with more than 92 protons
- Able to be hammered or rolled into sheets
- Able to be drawn into wire
- Different forms of same element with different molecular structures
- Molecule that consists of two atoms of the same element
- Elements that give off particles and energy
- Element in Group 1
- Element with metallic and nonmetallic properties

Down

- Elements in Groups 3–12
- Substance that conducts electricity under certain conditions
- Forms a salt when it gains an electron from a metal
- Type of bonding in which a “sea of electrons” surrounds positively charged ions
- Not naturally occurring
- State of all elements in Group 18
- State of most metals at room temperature
- Halogens form salts by _____ bonding.
- Gases with full outer energy levels
- Elements in Group 2 are alkaline _____ metals

