Name Date Class



**Atoms and Bonding**

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**Understanding Main Ideas**

Look at the diagram below. Then answer the following questions in the space provided.

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**1.** How many protons does a nitrogen atom have? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2.** How many valence electrons does a nitrogen atom have? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**3.** Is nitrogen reactive or stable? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4.** Neon (Ne), which has an atomic number of 10 is in Group 18 in the periodic table. To which
group does nitrogen belong? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**5.** The element directly below nitrogen in the periodic table is phosphorus (P). How many
valence electrons does phosphorus have? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**6.** Will the properties of nitrogen be more similar to the properties of neon or the properties
of phosphorus? Explain.

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**Building Vocabulary**

If the statement is true, write *true.* If the statement is false, change the underlined word
or words to make the statement true.

**7.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ An element’s reactivity is determined by the
number of protons found in an atom of the element.

**8.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ The force of attraction that holds two atoms
together is called a(n) chemical bond.

**9.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ In a(n) periodic table, dots around an
element’s symbol indicate the number of valence electrons in
an atom.

Name Date Class



**Atoms and Bonding**

**If the statement is true, write *true.* If the statement is false, change the underlined word
or words to make the statement true.**

**1.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ An atom’s valence electrons are those electrons that have the
highest energy.

**2.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Atoms tend to be stable and nonreactive if they have six
valence electrons.

**3.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ In the periodic table, the number of valence electrons in each
element decreases from left to right across each period.

**4.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ The reactivity of a metal depends on how easily it loses its
valence electrons.

**5.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Within each period in the periodic table, elements have similar
properties because they have the same number of valence electrons.

**Fill in the blank to complete each statement.**

**6.** The number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the atom of an element
determines its chemical properties.

**7.** The columns in the periodic table are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**8.** A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ shows the number of valence
electrons in an atom in pictorial fashion.

**9.** The attractive force that holds two atoms together is called a(n)
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**10.** Because it can either lose or share electrons when it combines with other elements,
each \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has some of the properties of metals and some of the
properties of nonmetals.

Name Date Class



**Elements Forming Compounds**

**Write the letter of the correct answer on the line at the left.**

**1.** \_\_\_ Ionic bonds form between two ions that
have

a ionic compounds

b negative charges

C positive charges

d opposite charges

**3.** \_\_\_ Compared to ionic compounds,
molecular compounds generally have

a a low boiling point

b greater densities

C more chemical bonds

d good conductivity

**Fill in the blank to complete each statement.**

**5.** A(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is an atom or group of atoms that has an electric charge.

**6.** The attraction between oppositely charged ions is called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**7.** When an atom loses a valence electron, it becomes a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ion.

**8.** In order to have a stable arrangement of 8 valence electrons, metal atoms are likely
to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ electrons.

**9.** In an ionic compound, the total positive charge of all the positive ions
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the total negative charge of all the negative ions.

**10.** Atoms form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ bond by sharing one pair of electrons.

**2.**  \_\_\_ Ions that are made of more than
one atom are called

a ionic compounds

b crystals

C polyatomic atoms

d ionic bonds

**4.** \_\_\_ Metallic bonding is

a a type of covalent bond

b a type of ionic bond

C an attraction between positive ions
and electrons

d an attraction between positive and
negative ions

Name Date Class



**Classifying Chemical Compounds**

**Write the letter of the correct answer on the line at the left.**

**1.** \_\_\_ Hard crystals, high melting points, and
electrical conductivity are properties of

a molecular compounds

b ionic compounds

C acids

d bases

**3.** \_\_\_ An acid has a pH value that is

a lower than 7

b equal to 7

C higher than 7

d none of the above

**2.** \_\_\_ Ammonia and baking soda are
common

a salts

b acids

C bases

d solutions

**4.** \_\_\_ The property of acids described as
the “wearing away” process is called

a erosion

b boiling point

C corrosion

d polar

**If the statement is true, write *true*. If the statement is false, change the underlined word
or words to make the statement true.**

**5.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ The strength of the ionic bonds and the attractions among all
the ions make the crystals of ionic compounds hard and brittle.

**6.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ The forces holding molecular compounds together are stronger
than the forces holding ionic compounds together.

**7.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ When acids react with metals such as copper, zinc, and iron,
metals disappear and hydrogen gas is produced.

**8.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Ionic compounds have low boiling points because the
attraction between positive and negative ions is so great.

**9.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Chemists use indicators to test acids.

**10.** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ The forces between molecules are much stronger than the
forces between ions.

