

Chapter 6 Chemical Bonds

Section 6.2 Covalent Bonding**(pages 165–169)**

This section discusses the formation of covalent bonds and the factors that determine whether a molecule is polar or nonpolar. It also discusses attractions between molecules.

Reading Strategy (page 165)

Relating Text and Visuals As you read the section, look closely at Figure 9. Complete the table by describing each type of model shown. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

| Molecular Models | |
|----------------------|---|
| Model | Description |
| Electron dot diagram | Dots represent valence electrons |
| Structural formula | A line represents a pair of shared valence electrons. |
| Space-filling | Three-dimensional spheres represent atoms. |
| Electron cloud | Electron clouds represent atoms. |

Covalent Bonds (pages 165–167)

- Define a covalent bond. A covalent bond is a chemical bond in which two atoms share a pair of valence electrons.
- A molecule is a _____ group of atoms that are joined together by one or more covalent bonds. Circle the correct answer.
negative **neutral** positive
- Is the following sentence true or false? In a covalent bond, the atoms are held together by the attractions between the shared electrons and the protons in each nucleus. true
- Circle the correct answer. Nitrogen has five valence electrons. How many pairs of electrons must two nitrogen atoms share in order for each atom to have eight valence electrons?
a. one
b. two
c. three

Chapter 6 Chemical Bonds

Unequal Sharing of Electrons (pages 167–168)

5. Use the words in the box to fill in the blanks.

| | | |
|----------|----------|--------|
| chlorine | hydrogen | oxygen |
|----------|----------|--------|

In a hydrogen chloride molecule, the shared electrons spend more time near the chlorine atom than near the hydrogen atom.

6. Define a polar covalent bond.
- A polar covalent bond is a covalent bond in which electrons are not shared equally.

7. When atoms form a polar covalent bond, the atom with the greater attraction for electrons has a partial _____ charge. Circle the correct answer.

neutral positive **negative**

8. Is the following sentence true or false? In a molecule of a compound, electrons are always shared equally by both atoms.
- false

9. Circle the letter of each factor that determines whether a molecule is polar or nonpolar.

- a. the number of atoms in the molecule
b. the type of atoms in the molecule
c. the shape of the molecule

10. Compare the shapes of carbon dioxide and water molecules. Circle the letter of the polar molecule.

- a. carbon dioxide **b.** water

**Attraction Between Molecules** (page 169)

11. Water has a higher boiling point than carbon dioxide because

attractions between polar molecules are stronger than attractions between nonpolar molecules.

12. Is the following sentence true or false? Attractions among nonpolar molecules explain why nitrogen can be stored as a liquid at low temperatures and high pressures.
- true