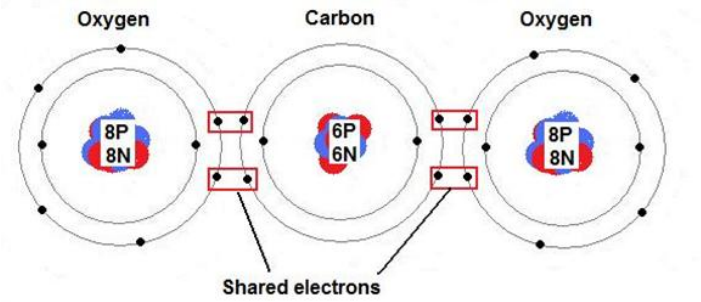
SNC1D
UNIT 2: CHEMISTRY
CHAPTER 6: UNDERSTANDING THE PROPERTIES OF COMPOUNDS

6.2: MOLECULAR COMPOUNDS

Read textbook for additional information.

COVALENT (or MOLECULAR) COMPOUNDS:

Some elements such as hydrogen, boron, carbon, and silicon do not form ions, but **share electrons** with other atoms. A **covalent bond** forms when a **pair of electrons** is **shared** between two atoms, in which the electrons are attracted to the nuclei (plural of nucleus) of both atoms. In some cases, two or even three **pairs of electrons** may be shared, producing multiple covalent bonds between two atoms. Simple **covalent molecules** form between **two or more non-metals**.



In the molecular compound formed between one carbon atom and two oxygen atoms (known as carbon dioxide), two covalent bonds are formed between carbon and each of the oxygen atoms. Count the number of electrons in the outer orbital for each atom (remember to count both electrons in the shared boxes).

MOLECULES See Page 234

A molecule is _____

Not all molecules are _____.

Molecules can include _____whereas

compounds are defined as being composed of _____.

Complete the chart:

substance	ionic bonds OR covalent bonds	molecular element OR molecular compound
Br_2		
CS_2		
MgO		
H_2O		

NAMING MOLECULAR COMPOUNDS **Page 235**

1. Name the first element of the compound.
2. Name the second element of the compound BUT change its suffix to an **~ide** ending.

3. Add Greek prefixes (as in the chart below) to indicate the number of each atom.

1	2	3	4	5	6	7	8	9	10
mono-	di-	tri-	tetra-	penta-	hexa-	hepta-	octa-	nona-	deca-

4. When there is only one atom of the ***first*** element, the prefix "mono-"is not written.

PROPERTIES OF MOLECULAR COMPOUNDS **Pages 236 – 237**

There are a wide variety of molecular compounds and the properties are hard to generalize because of the variation in physical and chemical properties. Compared to ionic compounds, covalent compounds...

- **do not dissolve in a solvent such as water as easily**
- **have lower melting and boiling points**
- **softer in texture**
- **poor conductors of electricity and heat**
- **may exist as a gas (CO_2), liquid (H_2O), or solid (I_2) at room temperature**

CHECK YOUR UNDERSTANDING:

1. Which type of elements are molecular compounds composed of?

2. What happens to electrons in a covalent bond?

3. A) What is the difference between a molecular element and a molecular compound?

   B) Circle all of the molecular compounds.

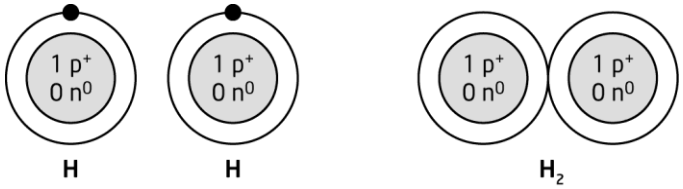
   H_2 HBr NaBr Br_2 SO_2 NH_3

4. For each molecule, write the chemical formula and state the number of atoms of each element.
   A) silicon tetrachloride B) dibromine heptoxide

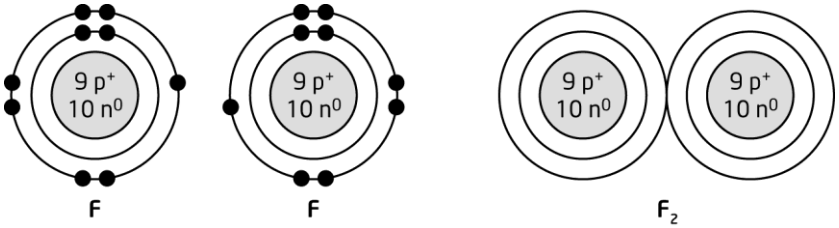
5. Why would wearing gloves made from a molecular compound, such as rubber, help to protect an electrician from being electrocuted?

1. Complete each diagram, as shown in Figure 6.16 on page 233 of your textbook, and in Figure 6.18 on page 234 of your textbook.

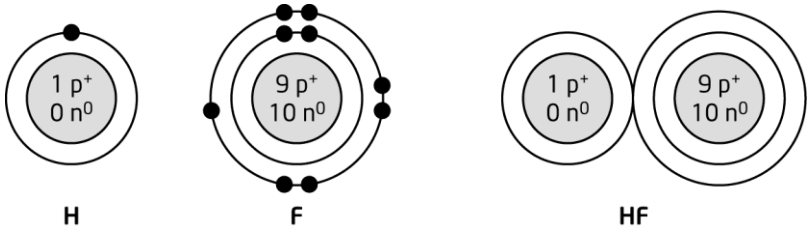
A.



B.

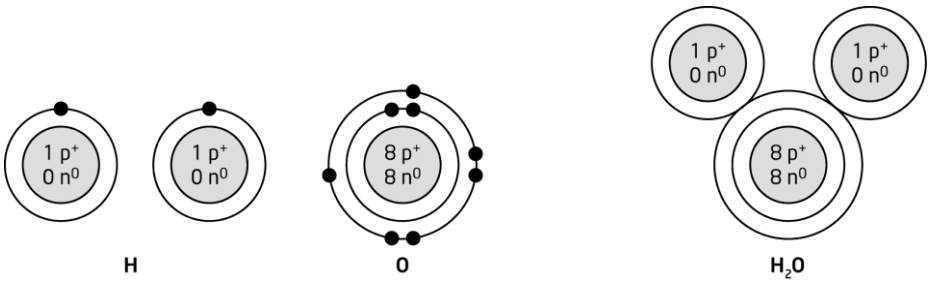


C.

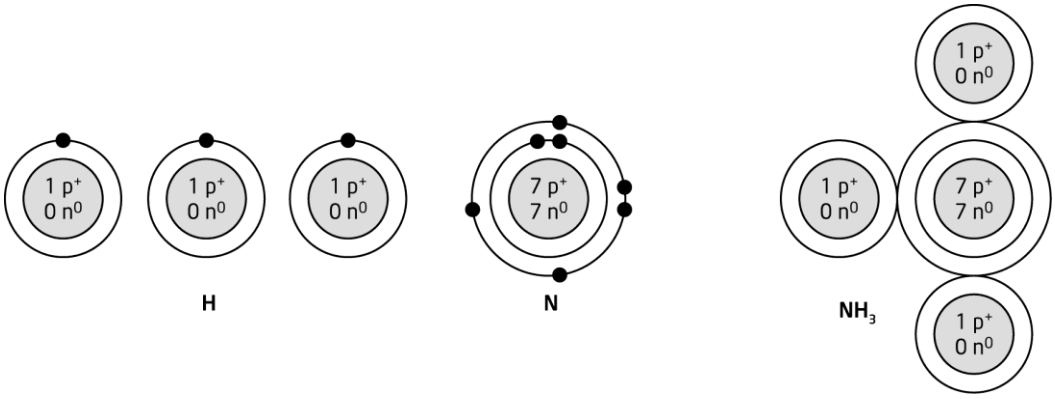


2. Some covalent bonds can share more than one pair of electrons. Complete these diagrams as shown in Figure 6.3 on page 223 of your textbook.

A.

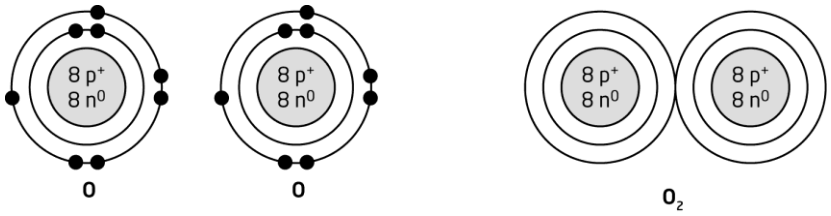


B.

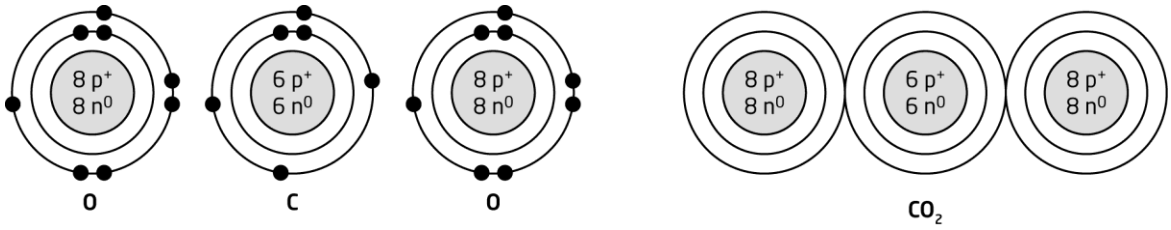


3. Elements with room for two more electrons can form double bonds by sharing two pairs of electrons. Complete these diagrams as shown in Figure 6.3 on page 223 of your textbook.

A.



B.



6.2 REVIEW

1. Circle ALL of the covalent compounds.

   A. carbon disulfide B. lithium carbonate C. OCl_2 D. P_2O_5 E. S_8

2. A) Circle the pair(s) of elements which will form a covalent compound.

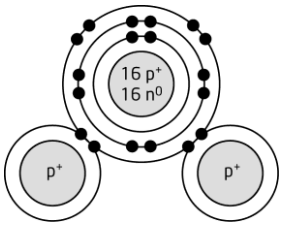
   i) sulfur and carbon ii) aluminum and fluorine iii) copper and iron

   B) Elements will form a covalent compound if they are both _____ .

3. The atoms in ammonia (NH_3) are held together by covalent N−H bonds.
   We call N−H bonds "covalent bonds" because they _____ .

4. Complete the sentences using the words in the box.

a covalent	an ionic	electrons	protons	bonds



   The model shown represents _____ compound

   because the _____ are shared in the _____.

5. Write the chemical formula for each compound.

   A. carbon monoxide: _____ B. sulfur dichloride: _____

   C. nitrogen trifluoride: _____ D. diphosphorus pentabromide: _____

   E. tetraphosphorus decasulfide: _____ F. dinitrogen tetroxide: _____

6. Name each compound.

A. S_2O_7 _____ B. CBr_4 _____

C. OCl_2 _____ D. P_4O_6 _____

7. Complete the sentences using the words in the box.

high	low	strong	weak

Ice, which is made of H_2O molecules, melts at a _____ temperature.

This is because molecules have _____ bonds.

Salt, which is made of Na^+ and Cl^- ions, melts at a _____ temperature.

This is because ionic compounds have _____ bonds.

8. Choose the best answer to complete the sentence.
Most covalent compounds are poor electrical conductors because they are _____.

A. not composed of ions, so electrons are held tightly so they do not conduct electricity.
B. composed of ions, so electrons are held tightly and so they do not conduct electricity.
C. not composed of ions, so electrons are held loosely so they do not conduct electricity.
D. composed of ions, so electrons are held loosely so they do not conduct electricity.

9. Complete the sentences using the correct choices from the box.

small	large	covalent	ionic	plastic toys
bottles	text books	wooden tables	shopping bags	many years
several months	only a few days			

A polymer is a very _____ _____ compound. Polymers are used to make such things as _____, _____, and _____. Polymers can cause environmental problems because they take _____ to degrade.