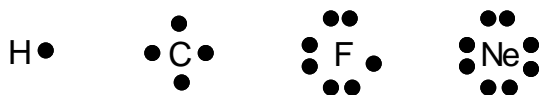


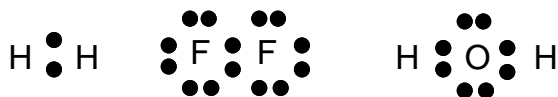
Covalent Molecules : Notes/W.S. - 10

One way to represent an atom is with a Lewis-dot (or electron-dot) structure. Some examples are shown below.



The dots represent the electrons in the outermost shell. These electrons are the valence electrons. They are responsible for the chemical properties of the atom.

The Lewis-dot method can be used to represent molecules. The bonding is called covalent. In a **covalent bond**, non-metallic atoms share electrons. In this type of bond, atoms generally want to have eight electrons in their outermost shell (H wants two). This is called the **octet rule**. Examples are shown below.

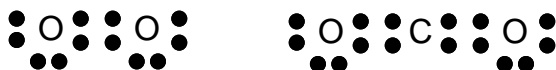


In the first picture, the H₂ molecule is shown. Both hydrogen atoms have a full outer shell of two electrons. The two electrons are shared by both atoms. The second picture shows an F₂ molecule. Each fluorine atom normally has seven electrons in its outer shell. But in this molecule, a pair of electrons is shared, so that each atom has eight electrons in its outermost shell. The third picture shows an H₂O molecule. Each atom of this molecule has a full outer shell. In each case above, covalent bonds are represented by a pair of electrons.

Double and Triple Bonds

In a single covalent bond, one pair of electrons is shared. In some molecules, atoms share two pairs of electrons. This is a double bond. If three pairs of electrons are shared, it is a triple bond. In general, it requires more energy to break a double or triple bond than it does to break a single bond.

The oxygen molecule and the carbon dioxide molecule have double bonds. The nitrogen molecule has a triple bond. In each molecule, the atoms are surrounded by eight electrons.



Double Bond



Triple Bond

Questions.

1) Draw the Lewis-dot structure for each of the following atoms.

a) B

b) N

c) S

d) O^{2-}

2) Draw the Lewis-dot structure for the following molecules. The bonds are single bonds.

a) HCl

b) Cl_2

c) NH_3

d) CH_4

e) SiF_4

f) PCl_3

g) CH_2Cl_2

h) OCl_2

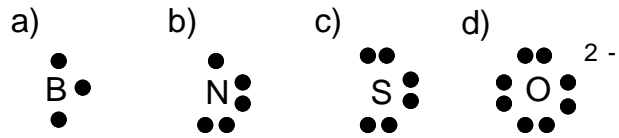
i) NH_4^+

3) Draw the structure for SO. It has a double bond.

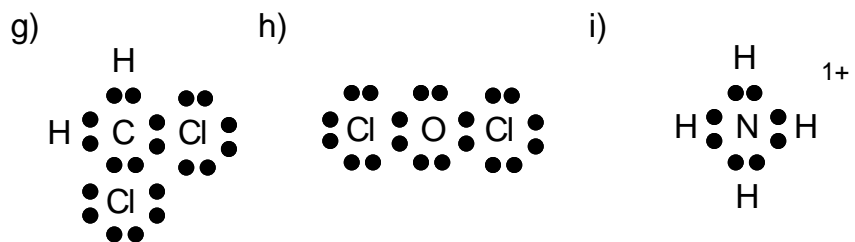
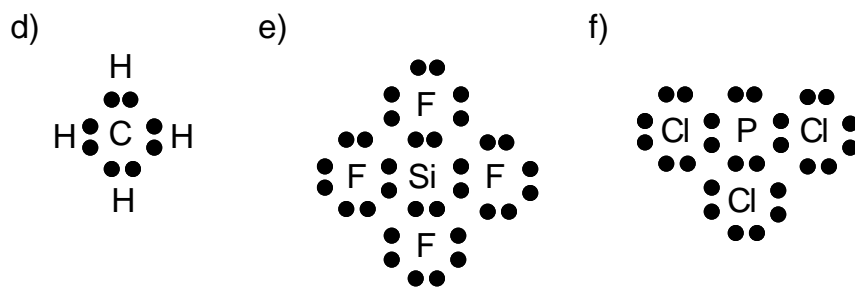
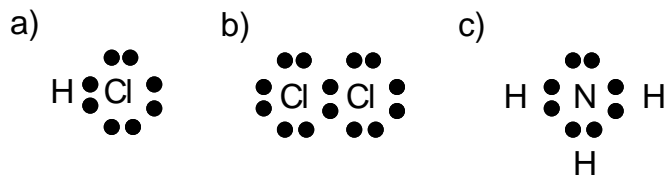
4) Draw the structure for CO. It has a triple bond.

Answers :

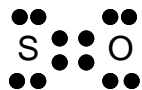
1)



2)



3)



4)

