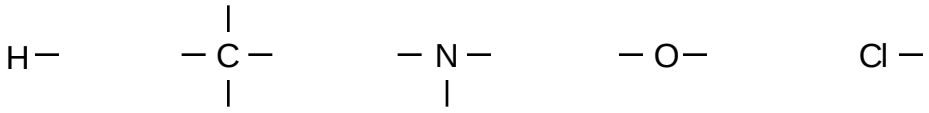
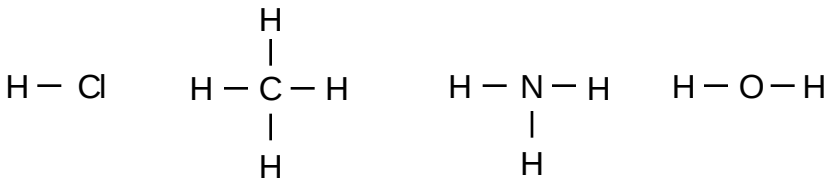
Organic Molecules : Notes/W.S. - 20

Another way to represent a molecule is by drawing a short line for a covalent bond instead of drawing a pair of electrons as in a Lewis-dot structure. **Each atom in a covalent molecule is connected by a number of lines equal its combining capacity**. The combining capacity is equal to the magnitude of the usual charge on the atom. Uncombined atoms can be represented as shown below.

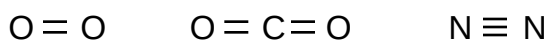


Hydrogen can form one covalent bond, carbon can form four, nitrogen can form three, oxygen can form two and chlorine can form one.

We can represent molecules with each atom connected by the correct number of bonds. This method works well for many molecules. Examples of molecules with single bonds are shown below.

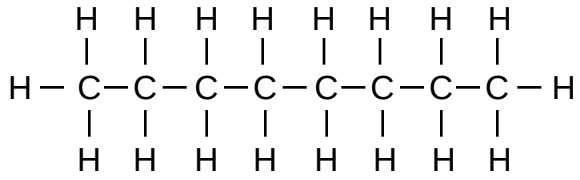


The molecules above are hydrogen chloride, methane, ammonia, and water. Examples of molecules with double and triple bonds are shown below.

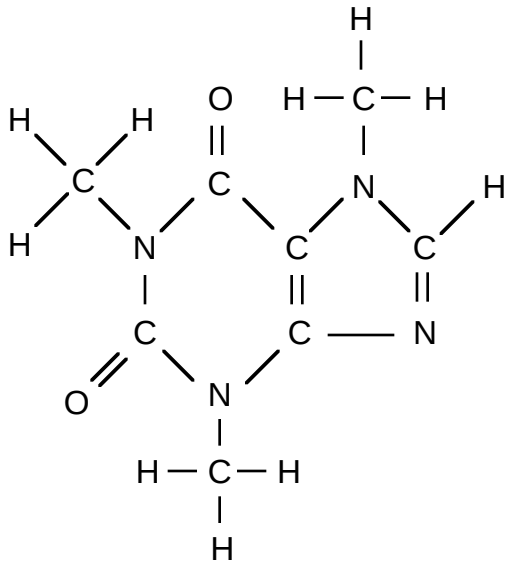


This method can be used to represent **organic molecules**. All organic molecules contain carbon. Since carbon can form four bonds, millions of different large organic molecules exist. Two examples are shown below. Each atom is surrounded by the correct number of bonds.

Octane (component of gasoline) C_8H_{18}



Caffeine (in coffee) $C_8H_{10}N_4O_2$



Problems.

1) Draw a picture of the following molecules.

a) HF b) H_2S c) SO

d) OF_2 e) C_2H_6 f) HPO_2

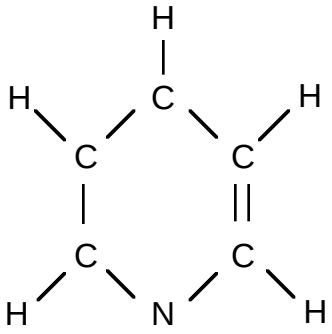
2) Draw diagrams for the following compounds.

a) chloroform $CHCl_3$ b) hydrogen cyanide HCN

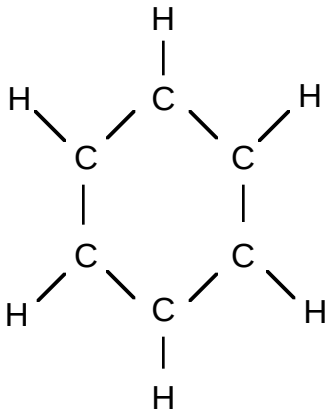
c) ethyl alcohol C_2H_5OH d) methylamine CNH_5

e) ethene C_2H_4 f) acetic acid CH_3COOH

3)a) Find **<u>two</u>** errors in this diagram of pyridine.

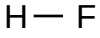


b) Find **<u>three</u>** errors in this diagram of benzene.



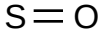
Answers: 1)

a)



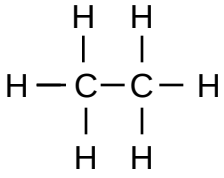
b)

c)



d)

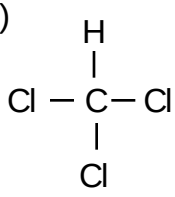
e)



f)

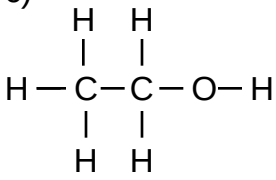
2)

a)

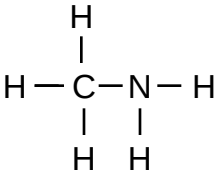


b)

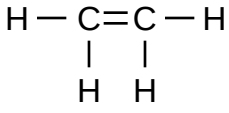
c)



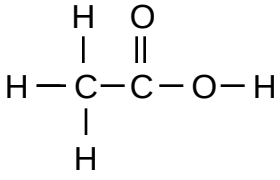
d)



e)

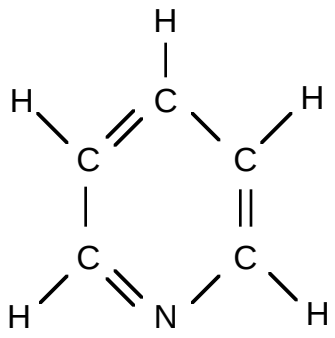


f)



3)

a)



b)