

Chemistry 2301

Workshop 1 Solutions
Drawing Organic Molecules

1.

atom	electronic configuration	# of valence electrons
H	$1s^1$	1
C	$1s^2 2s^2 2p^2$	4
N	$1s^2 2s^2 2p^3$	5
O	$1s^2 2s^2 2p^4$	6
S	$1s^2 2s^2 2p^6 3s^2 3p^4$	6
Br	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$	7

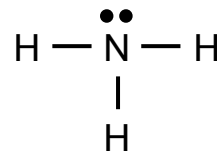
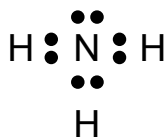
One easy mnemonic for the number of valence electrons: although it is technically equal to the total number of electrons in the highest orbital level [Br: (2 in 4s) + (5 in 4p) = 7], you can just look at the group number in the periodic table [Br is in Group 7].

2.

Lewis *dot* structures

Lewis *dash-bond* structures

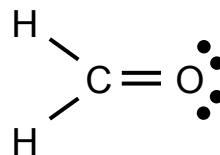
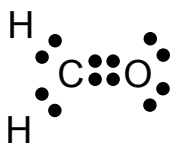
ammonia
(NH₃)



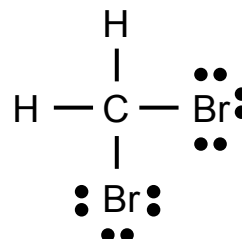
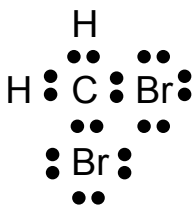
Lewis *dot* structures

Lewis *dash-bond* structures

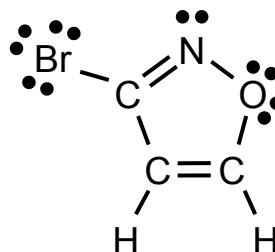
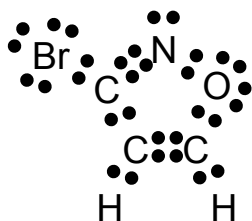
formaldehyde
(H₂CO)



dibromomethane
(CH₂Br₂)



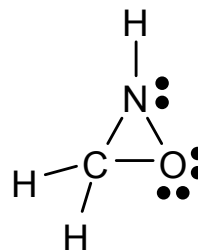
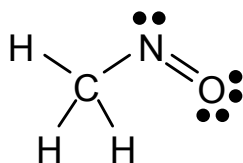
3-bromo-1,2-oxazole
(C₃H₂NOBr)



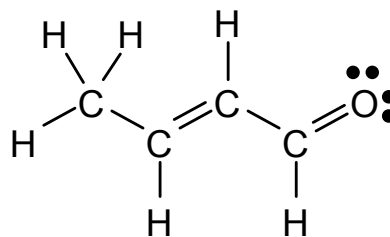
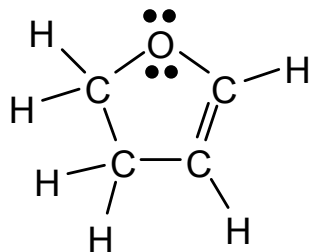
Most importantly, each of the atoms heavier than H in the structures above has 8 electrons associated with it (either as lone pairs or shared in bonds). Each H has only 2 electrons (almost always shared in a bond).

3.

CH₃NO

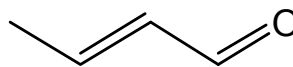
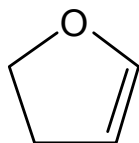
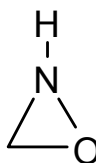
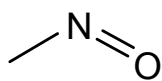


C₄H₆O

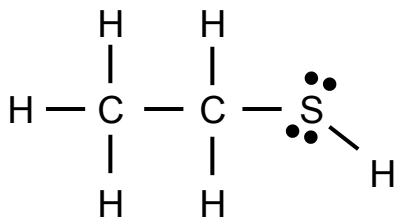


(+ many more possibilities)

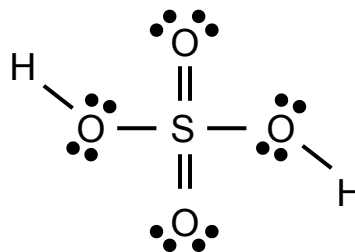
Line-angle structures:



4.



ethanethiol
(added to natural gas
so that it smells;
obeys octet rule)



sulfuric acid
(disobeys octet rule;
S has 12 electrons in
valence shell)

In a way, sulfur obeys its own “octet rule”, where the number of available orbital spots for electrons can be 8, 10, or 12.