CHM 1010 **GAGE**

BOND AND MOLECULAR POLARITY WORKSHEET

1. Rank the following bonds from highest to lowest polarity using electronegativity values. Indicate the direction of charges with the dipole moment symbol if the bond is polar.

	S—O	S—Cl	S—S	S—N
	+--->	+--->		+--->
ΔEN	1.0	0.5	0	0.5

S—O > S—Cl = S—N > S--S

2. Below are a series of molecules along with their molecular dipole moments. Rank the molecules from least to most polar based on the dipole moments. Sketch the geometry of the molecules and show the dipole moment direction.

Molecule	NH_3	O_3	H_2O	CCl_2O	SO_2	CH_2O
Dipole Moment (debyes)	1.48	0.52	1.85	1.19	1.63	2.27

O_3 < CCl_2O < NH_3 < SO_2 < H_2O < CH_2O

b. Explain why CCl_2O is much less polar than CH_2O

Although these molecules have the same basic geometry, CH_2O is more polar because there is a highly electronegative O distributed in one direction and H's which are not very electronegative in the other two directions. For CCl_2O, there are highly electronegative elements distributed in all three directions around the central atom.

3. Using bond polarities and geometries, rank the following sets of molecules from least to most polar. Sketch the geometry of the molecules and show the molecular dipole moment direction.

a. CH_3F CH_4 CH_2F_2 CF_4

$CF_4 = CH_4 < CH_3F < CH_2F_2$

b. CH_4 HF H_2O NH_3

$CH_4 < NH_3 < H_2O < HF$