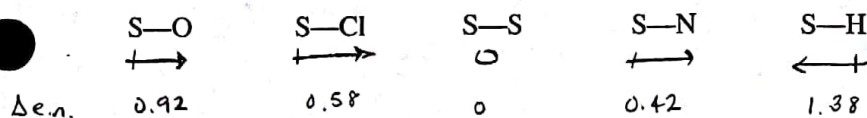


1. a. Identify the direction of polarity for each of the following bonds (
- $\rightarrow$
-).



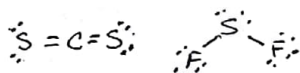
- b. Rank the previous bonds in order from highest to lowest polarity.



2. In each of the following pairs of molecules determine which is more polar. Explain your answer

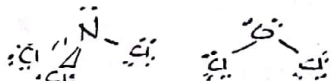
- a.
- CS_2
- or
- SF_2

SF_2 - asymmetric charge distribution where CS_2 is symmetric



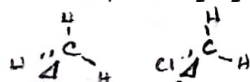
- b. nitrogen trichloride or oxygen dichloride

OCl_2 - greater $\Delta \text{e.n.}$ between $\text{O}-\text{Cl}$ than $\text{N}-\text{Cl}$



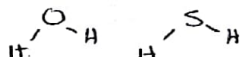
- c.
- CH_4
- or
- CH_2Cl_2

CH_2Cl_2 is asymmetric with polar bonds and CH_4 is symmetric



- d. water or hydrogen sulfide

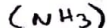
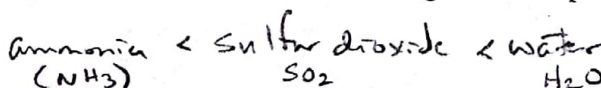
H_2O - greater $\Delta \text{e.n.}$ between $\text{O}-\text{H}$ than $\text{S}-\text{H}$



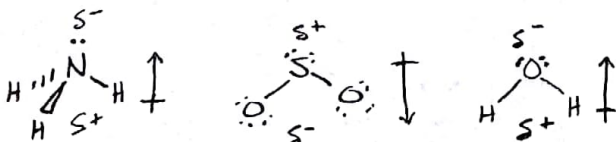
3. The Debye dipole moment values for ammonia, water and sulfur dioxide are 1.48, 1.85 and 1.63, respectively.

- a. Rank the three compounds in order of increasing molecular polarity

Dipole moment is measured by the separation of positive charge and negative charge (centers) in a molecule.

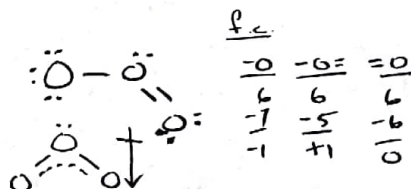
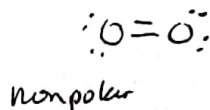


- b. Draw the geometric structures and show the relative dipole moments of each molecule.



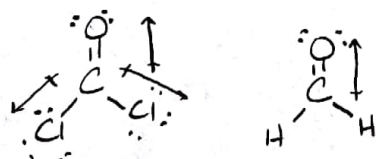
4. Oxygen gas (
- O_2
-) and ozone (
- O_3
-) differ in polarity where oxygen has no dipole moment and ozone has one. Predict the structures of the two molecules and explain the difference in dipole moments based on the structures.

$\frac{f_c}{1.6 \times 10^{-18}}$



Ozone has resonance with a formal charge difference due to the central oxygen being slightly oxidized (+1)

5. Draw geometric structures for
- CCl_2O
- and
- CH_2O
- . Predict which one has a greater dipole moment.



The CH_2O has a greater dipole moment because it has an asymmetry of charge. The chlorine in CCl_2O and oxygen all have δ^- charges, so the charge distribution is symmetric