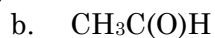


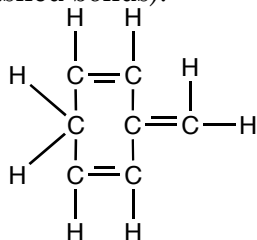
1. (12 pts.) Draw Lewis structures for the following molecules.



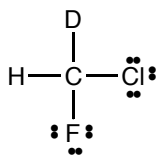
2. (8 pts.) Describe (name) the orbitals (hybrids and AO's) used to form the C to N bonds in $\text{H}_2\text{C}=\text{NH}$.

3. (4 pts. ea.) Draw three-dimensional representations for the following molecules (using wedge and dashed bonds).

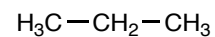
a.



b.

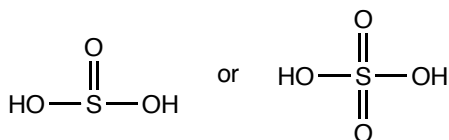


c.

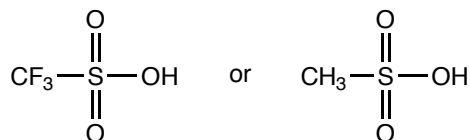


4. (2 pts. ea.) For each of the following pairs of acids, identify the stronger acid.

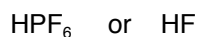
a.



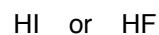
b.



c.



d.



5. The molecular orbital diagram for HF is drawn below.

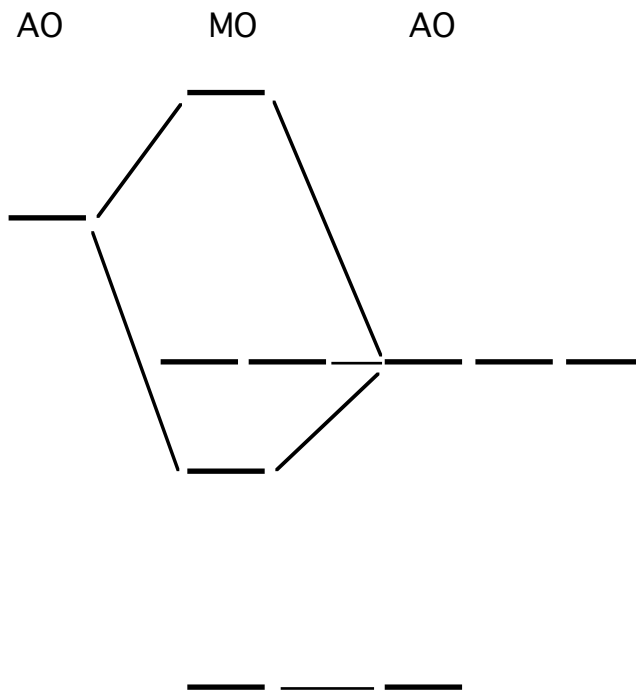
a. (4 pts.) Label the atomic orbitals; i.e., label s and p orbitals, and label the sets of orbitals that represent the H atom and the is F atom.

b. (2 pts.) Add the electrons where appropriate.

c. (2 pts.) Determine the bond order for HF.

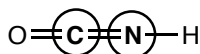
d. (2 pts.) If an electron is added to HF to form HF^- what will happen to the strength of the bond? Explain.

e. (2 pts.) If an electron is removed from HF to form HF^+ what will happen to the strength of the bond? Explain.

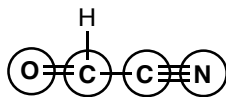


6. (2 pt. ea.) Determine the hybridization at the indicated atoms (lone pairs have **not** been included in the following structures).

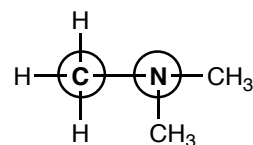
a.



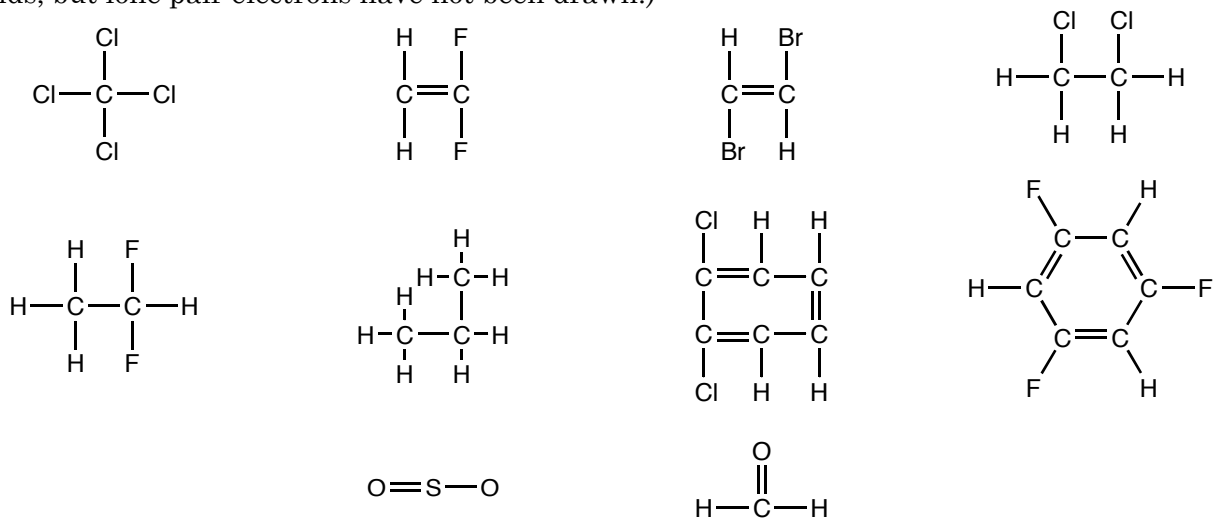
b.



c.



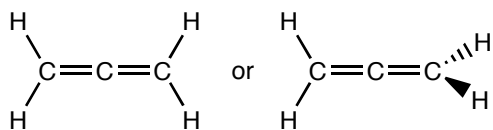
7. (1 pt. ea.) Identify (circle) the polar molecules. (All of the molecules have the correct number of bonds, but lone pair electrons have not been drawn.)



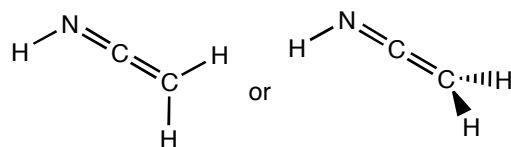
8. (6 pts.) A σ -bond is weaker than a π -bond. Which is stronger, a double bond or a single bond? Explain.

9. (3 pts. ea.) Circle the correct structures (lone pairs are not drawn).

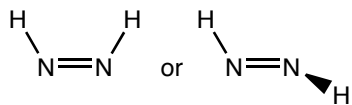
a.



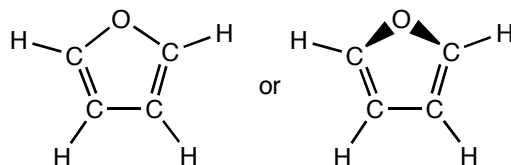
b.



c.



d.



10. (4 pts.) Even though NH_3 only has one lone pair, it is more basic than H_2O . Explain why NH_3 is more basic than H_2O . When explaining this apparent contradiction, consider (1) that for a molecule to be basic its electrons must be available to attract a proton, and (2) O is more electronegative than nitrogen.