Name _____ Test 1 (10/5)
CHEM 0201 (Organic) Fall 2011

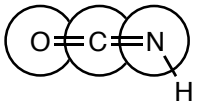
1. (8 pts each) Draw Lewis structures for the following condensed structures.

a. CH_3CHCO b. $CH_3C(O)NH_2$

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

2. (10 pts.) Determine the hybridization of the circled atoms in the following molecules. Lewis, Kekulé, and condensed structures are provided.

a.

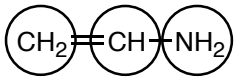


O _____

C _____

N _____

b.

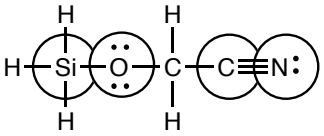


N _____

C _____ C _____

left right

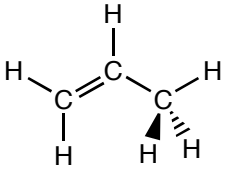
c.



Si _____ C _____

O _____ N _____

3. (10 pts.) A wedge and dashed three-dimensional Kekulé structure of propene is drawn below. Using the valence bond model, describe the double. Remember to name the orbitals (hybrid or atomic orbitals) that are being used, and remember to specify the symmetry of the bonds that form (σ or π) from the interaction of the hybrid or atomic orbitals.



4. An incomplete MO diagram for the molecule C_2 is drawn below.

a. (2 pts.) Label the atomic orbitals.

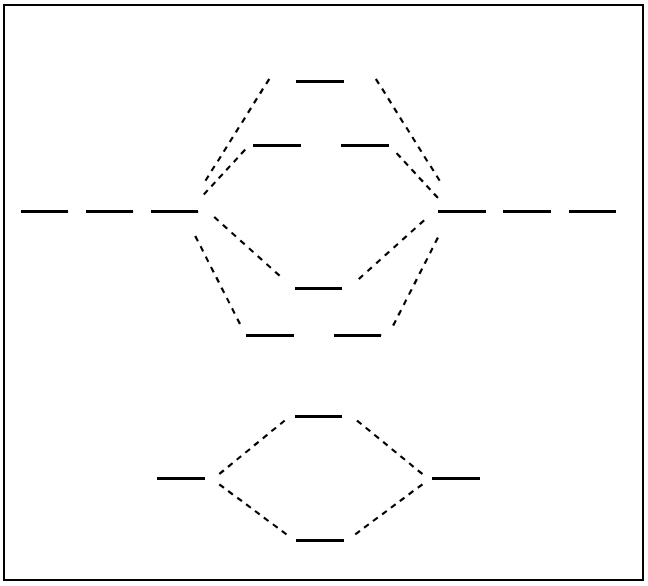
b. (2 pts.) Label the molecular orbitals.

c. (2 pts.) Populate the atomic orbitals with the appropriate number of electrons.

d. (2 pts.) Populate the molecular orbitals with the appropriate number of electrons.

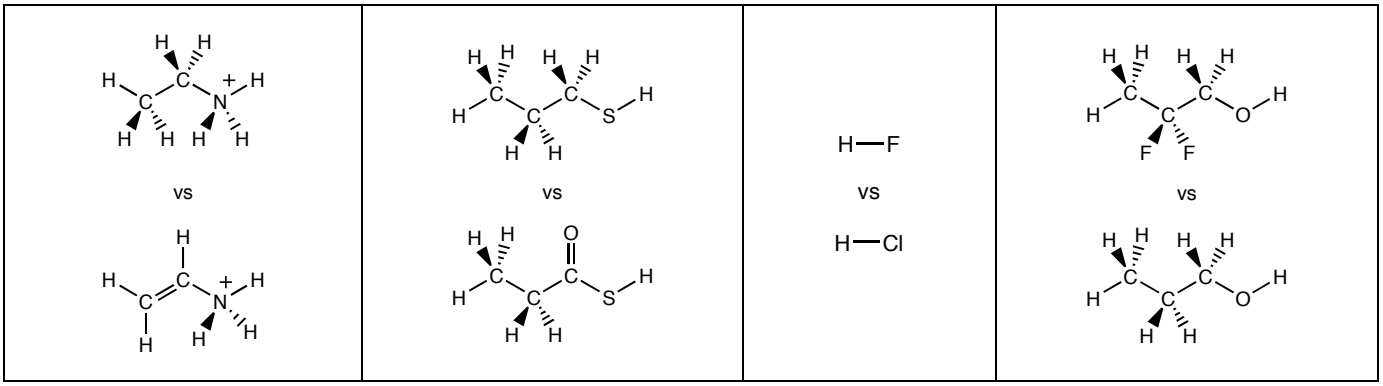
e. (2 pts.) Determine the bond order for C_2.

f. (4 pts.) The C_2 molecule has been observed, but it has never been isolated. Using MO theory, explain why the C_2^{2-} ion is more easily isolated (usually as CaC_2).

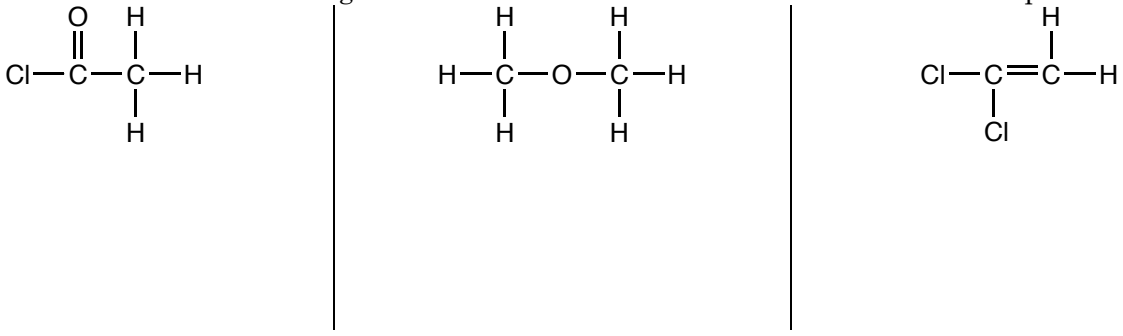


5. a. (4 pts.) For each of the following molecules, identify the acidic proton.

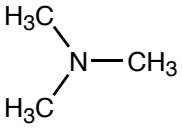
b. (8 pts.) For each pair of molecules below, determine which is the stronger acid.



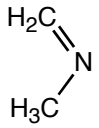
6.(9 pts.) Using wedge (▬◀) and dashed (┈┈) bonds where appropriate, draw three-dimensional representations of the following molecules. Kekulé and condensed structures are provided.



7. (10 pts.) Explain why the top molecule is the stronger base.



stronger base



weaker base

8. (10 pts.) Using ideas like effective nuclear charge and valance shell, explain why fluorine is the most electronegative element on the periodic table.

9. (6 pts.) An antibonding orbital is pictured below. Describe the traits that makes this orbital high in energy.