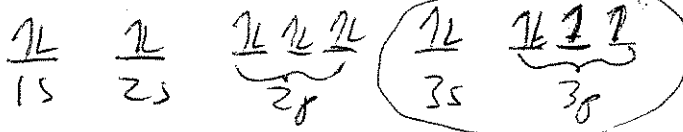
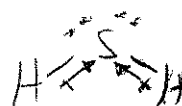
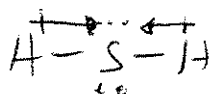
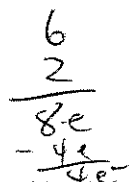


1. (3 pt) a) Write the orbital diagram for sulfur (ex. orbital diagram of H:  $\frac{1}{1s}$ )



b) Circle the portion of your orbital diagram that includes the valence electrons for this element.

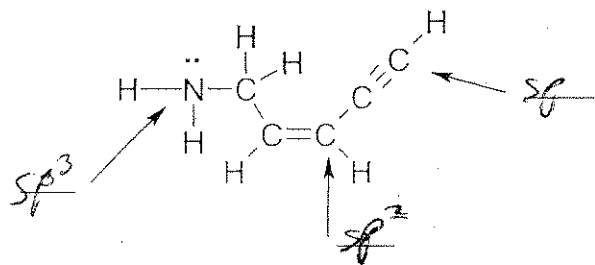
2. (8 pts) a) Draw the Lewis Structure for H<sub>2</sub>S.



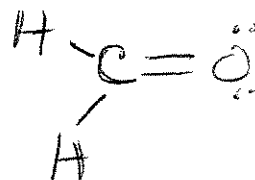
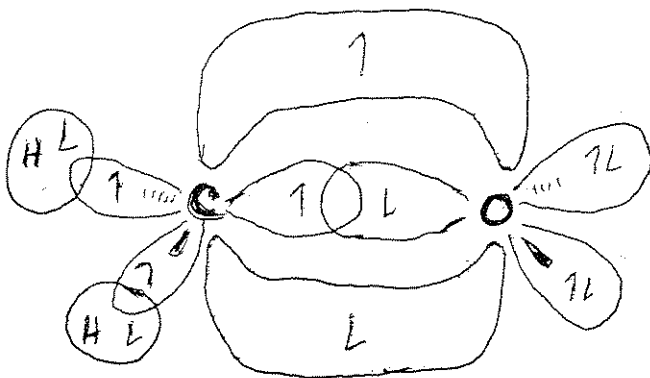
- b) What is the electronic geometry around the central atom in this molecule? tetrahedral
- c) What is the molecular geometry of the H<sub>2</sub>S molecule? bent
- d) What hybrid orbitals are used in bonding by the central atom? sp<sup>3</sup>
- e) What are the bond angles around the central atom? 109.5°
- f) Indicate on your Lewis structure above the direction of bond polarity of the H-S bonds, where the electronegativity of H = 2.1 and S = 2.5. Is this molecule polar? Yes or No (Circle answer)

3. (1 pt) What fraction of an sp<sup>2</sup> hybrid orbital is derived from p-atomic orbitals?  $\frac{2}{3}$

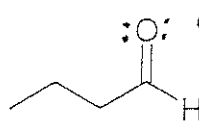
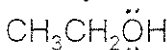
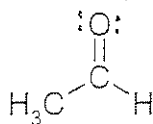
4. (3 pts) Write the hybridization of the indicated atoms in the Lewis structures shown below.



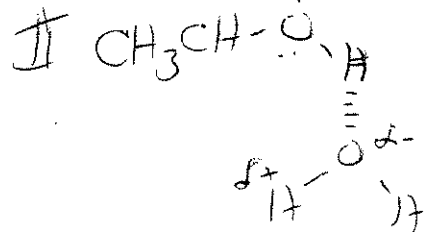
5. (2 pts) Draw the Lewis Structure of the molecule represented with orbitals as shown below.



6. (3 pts) Rank the following three compounds in order of their anticipated solubility in water.

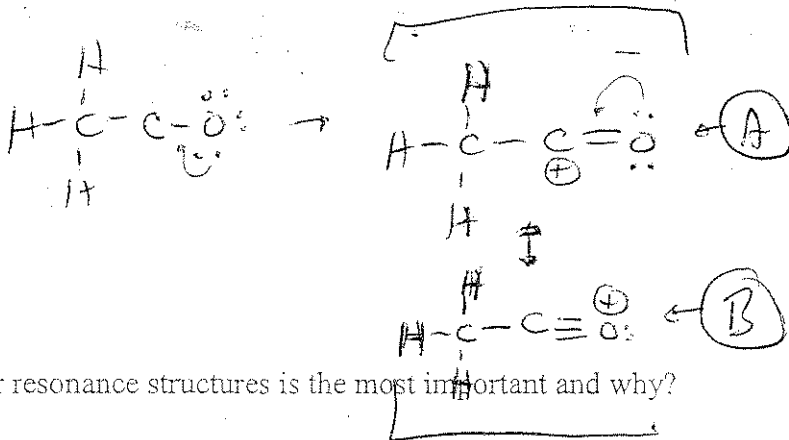


- a) I is more soluble than II, which is more soluble than III.  
 b) III is more soluble than I, which is more soluble than II.  
 c) II is more soluble than I, which is more soluble than III.  
 d) III is more soluble than II, which is more soluble than I.  
 e) II is more soluble than III, which is more soluble than I.



7. (5 pts) a) Draw 2 non-equivalent resonance structures for  $\text{CH}_3\text{CO}^+$ , indicating the non-zero formal charges on each atom in each resonance structure.

Val e<sup>-</sup>  
 C:  $2 \times 4 = 8$   
 O:  $1 \times 6 = 6$   
 H:  $3 \times 1 = 3$   
 Total =  $17$   
 $\frac{16e^-}{-10e^-} = 6e^-$



Structure (B) is the more important Lewis structure because all atoms have octets. In structure (A) carbon only has  $6e^-$ .