Chapter 1

1. Determine which Lewis structure(s) is/are incorrect?
   a. 

   \[ \begin{array}{c}
   & \text{H} \\
   \text{O} & \text{C} & \text{O} \\
   & \text{O} \\
   \end{array} \]

   b. 

   \[ \begin{array}{c}
   \text{H} \\
   \text{H} & \text{C} & \text{N} & \text{H} \\
   \text{H} & \text{H} \\
   \end{array} \]

   c. 

   \[ \begin{array}{c}
   \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\
   \text{H} & \text{C} & \text{O} & \text{C} & \text{H} \\
   \text{H} & \text{H} & \text{H} & \text{H} & \text{H} \\
   \end{array} \]

2. With reference to compound A drawn below, label each compound as isomer, resonance, or neither. Assign formal charges to the oxygen atom drawn as well. (1.48)
3. Draw all possible resonance structures

4. Are the indicated atoms sp² hybridized? Why or why not?
5. Convert each molecule into skeletal structure
   a. (CH₃)₂CHCH₂CH₂CH(CH₃)₂
   b. 

6. Predict the geometry around each highlighted atom.
   a. 

Chapter 2


2. For the following acid-base equation, determine which side equilibrium lies and the equation for the equilibrium constant.

\[
\text{pK}_a = 4.75 \quad \text{and} \quad \text{pK}_a = 15.7
\]

3. Rank following in decreasing order of acidity.

4. For the following diagram: do 3 things.
   - Perform curved arrow mechanism
   - Label species with acid, base, conjugate acid, & conjugate base
   - Determine which side equilibrium lies

\[
\text{pK}_a = 4.75 \quad \text{and} \quad \text{pK}_a = 15.7
\]
5. Refer to the diagram:
   a) Is this a BL acid base pair or a Lewis acid base pair?
   b) Perform arrow pushing mechanism in forming the product.
   c) Label the molecules on the left with either electrophile or nucleophile.

6. Label all the functional groups you know in this molecule.

7. Which H is more acidic? Why?

8. Which of the following statements is/are true:
   A. Lewis acids include BL acids
   B. BL acids include Lewis acids
   C. Lewis acids and BL acids are mutually exclusive.
   D. None of them are true
9. For the following structure:
   A. label the most acidic H
   B. Label all sp2 hybridized Cs
   C. Draw the product when this molecule is reacted with HCl
   D. Label the ONLY trigonal pyramidal atom
   E. Label all Cs with a positive dipole

10. Last question:
    Lewis acid is an (electron/proton) (donor acceptor)
    Lewis Base is an (electron/proton) (donor/acceptor)
    BL acid is an (electron/proton) (donor/acceptor)
    BL base is an (electron/proton) (donor/acceptor)