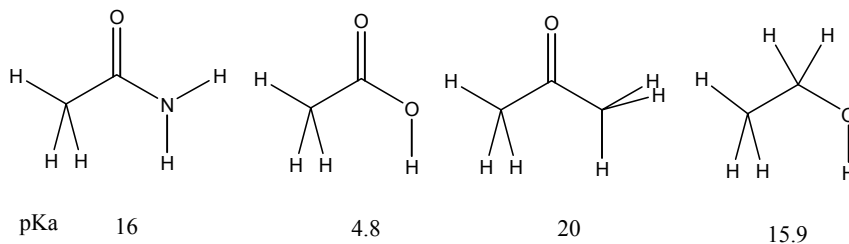


Organic Chemistry - CHEM 231A

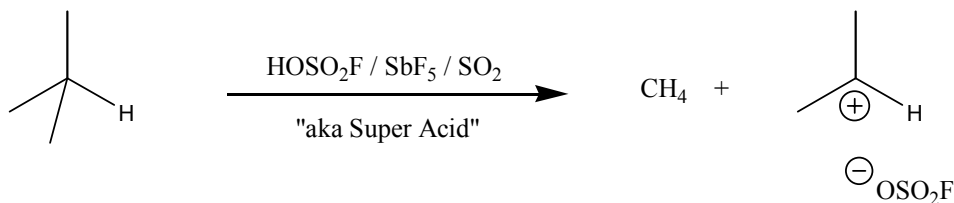
Problem Set #2

Due October 12, 2001

1. Draw the most stable conformation for the following molecules using three-dimensional drawings and Newman projections and explain briefly.
 - 1a. 2,3-dimethylbutane
 - 1b. 4-methyl-pentan-2-ol
 - 1c. 2,2,3,4,5-pentamethylhexane
2. Consider the following molecules with the following pKa values: (25 points)



- 2a. What is an acid? What factors are involved in making an acid a strong acid?
- 2b. Circle the MOST Acidic atoms for each molecule.
- 2c. Number the molecules in the order from most acidic (1) to least acidic (4).
- 2d. Thoroughly explain your reasoning behind the ordering of the molecules. Include a discussion of the meaning of pKa and why the characteristics of each specific molecule help us understand the pKa for EACH molecule. Discussing them in order may be appropriate.
- 2e. Mixtures of fluoro-sulfuric acid and antimony pentafluoride in sulfur dioxide as solvent have been called a "Super Acid". Knowing what you know about acids, consider the following reaction.



Explain the reaction. What reacted with what? Be specific and use curved arrows to show the movement of electrons. What kind of reaction is it?

3. Consider the reaction of 4-methyl-2-(4'-methylphenyl)-pentane with Cl₂ in the presence of light.
 - 3a. Draw the molecule and label all of the different types of the hydrogens.
 - 3b. What would the NMR spectrum of the starting material look like?
 - 3c. What products would you expect from this reaction?
 - 3d. What would the major product be? Explain.
 - 3e. Draw an energy diagram for this reaction.
 - 3f. If Br₂ was used instead of Cl₂ what would be the major product?
4. Draw the most stable conformations of the following molecules and explain your rationale for your choice:
 - 4a. cis-2,3 dimethylcyclohexane
 - 4b. trans 4-methyl-1-t-butylcyclohexane
- 4c. 1-ethyl-2,4-dimethylcyclohexane (draw all constitutional and conformational isomers)

