

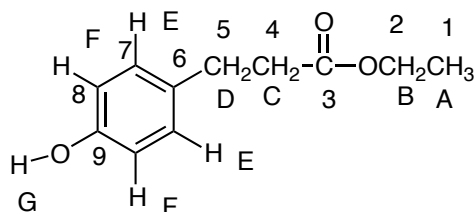
ANSWER KEY

Long Island University, Department of Chemistry

Chem. 122, Sect 007,

Exam 2, 150 pts, Spring, 2011

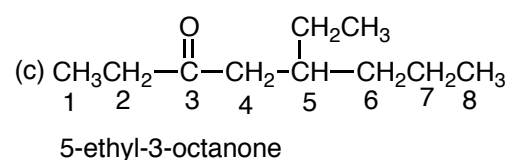
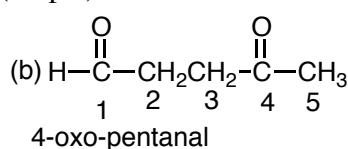
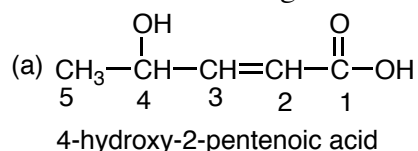
1. For the following molecule, predict (a) the number of carbon signals (b) the number of proton signals and their multiplicities and (c) give three significant IR absorptions and indicate what functional group each absorption each corresponds to. (15 pts)



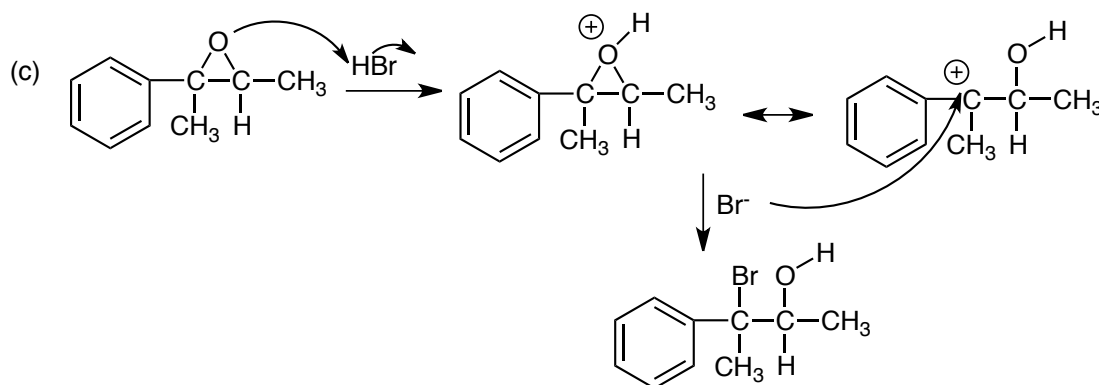
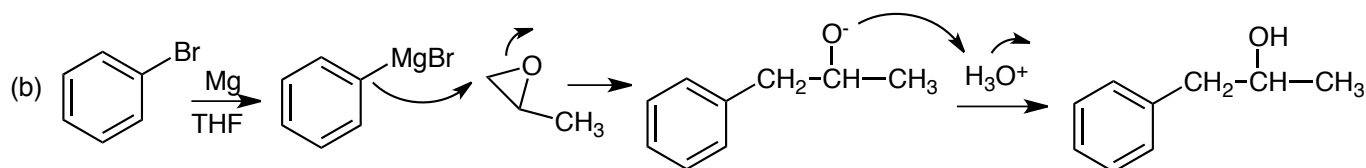
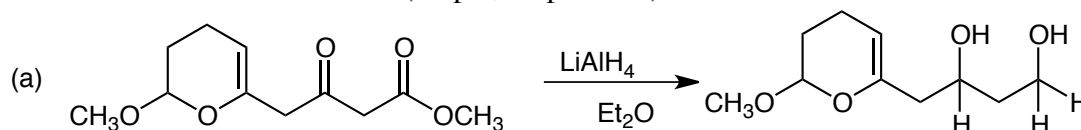
There are 9 carbon signals and 7 proton signals; H_A = triplet, 3H; H_B = quartet, 2H; H_C and H_D = triplet, 2H; H_E and H_F = doublet, 2H; H_G = singlet, 1H.

Characteristic IR peaks: ester = 1730 - 1750 cm⁻¹, Sp² C-H = 3000-3100 cm⁻¹; OH = 3200-3500 cm⁻¹; Sp³C-H = 3000-2860 cm⁻¹

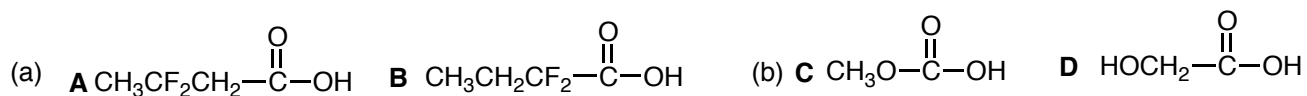
2. Name the following molecules. (15 pts)



3. Give the product of the following reactions. It is not necessary to show the reaction mechanism but do show all intermediates formed. (30 pts, 10 pts each)



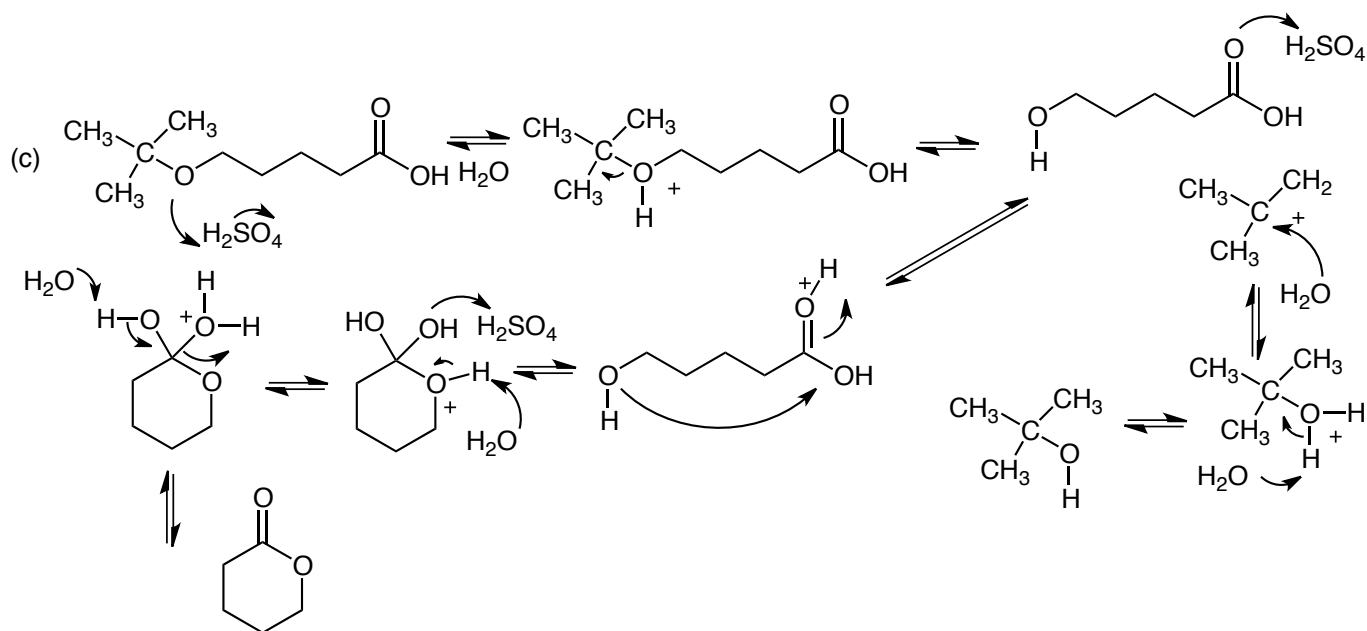
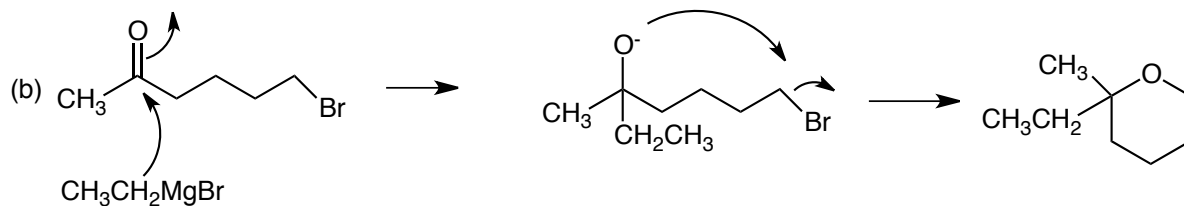
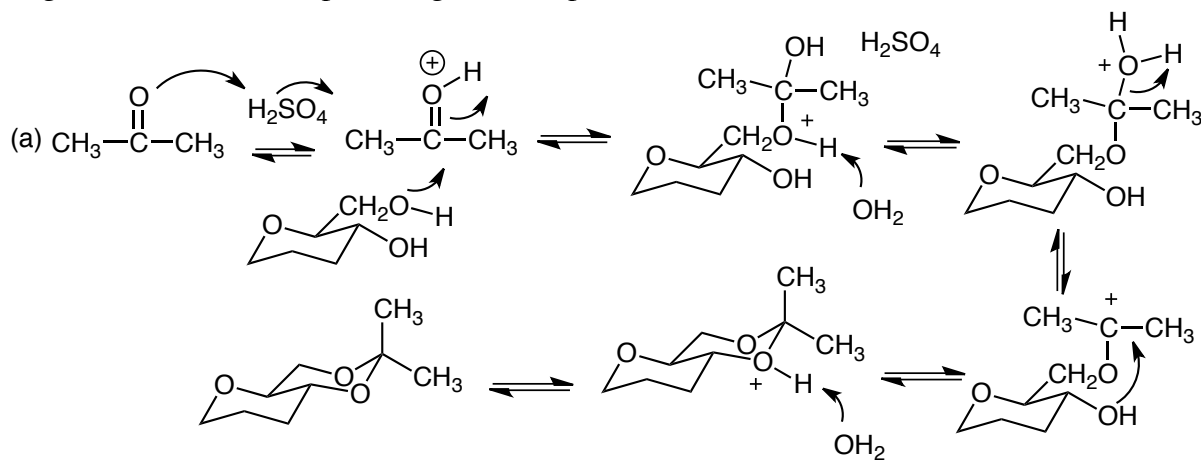
4. Look at the following pairs of molecules and in each case choose which is the stronger acid of that pair and briefly explain your reasoning. (15 pts)



(a) **B** is the stronger acid because the strongly electronegative fluorines withdraw electron density from the carbonyl, making it more positive and more electron withdrawing, thereby weakening the O-H bond.

(b) **D** is more acidic since the oxygen lone pair in **C** DONATES electron density via resonance to the carbonyl pi system, making the carbonyl carbon less positive and less electron withdrawing.

5. Show how the following transformations occur, giving all of the steps of the mechanisms. No other reagents are needed except those given. (45 pts)



6. Synthesize **two** of the following **three** molecules from the starting materials given on the left as shown. Do all **three** for extra credit. (30 pts)

