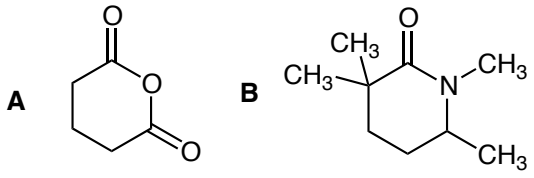
Name .....

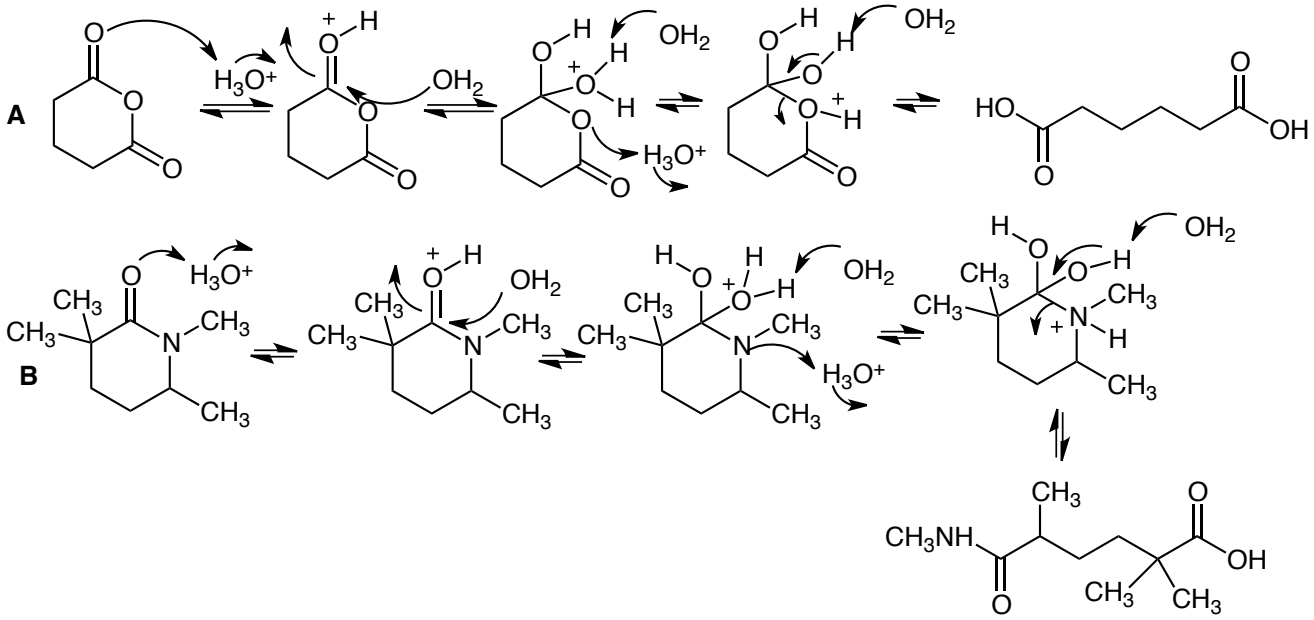
L.I.U.

Chem. 122, Sect 007, Quiz 3, 50 pts, Spring, 2011

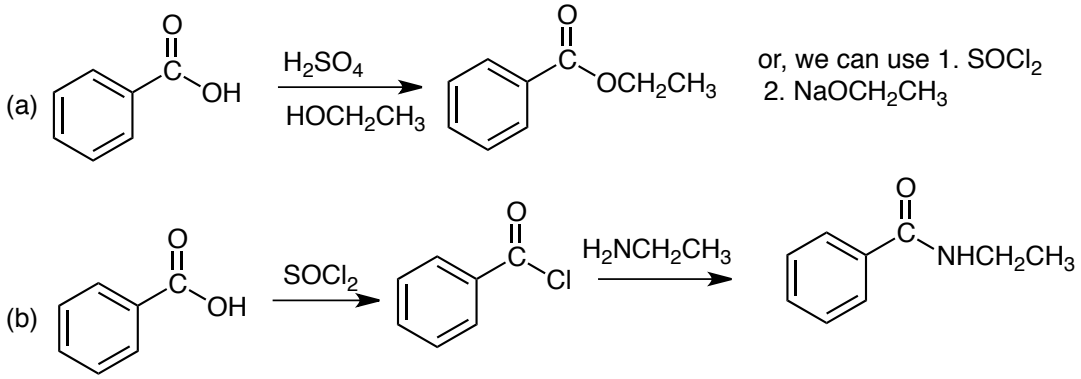
1. Which molecule below is more reactive to acidic hydrolysis in H_3O^+/H_2O? Explain your choice briefly and show the hydrolysis reaction for BOTH molecules, giving all of the steps of the reaction mechanism. (20 pts)



A is more reactive than **B**. As we have said, in general, amides are less reactive than anhydrides because the nitrogen is a much better electron donor to the carbonyl carbon than oxygen and in the anhydride there are two caronyl groups competing for the lone pair. The nitrogen is less ectronegtive and the C-N bond is shorter. And **B** is more hindered due to the CH_3 groups

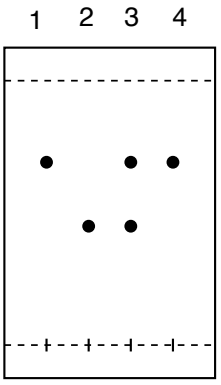


2. Synthesize the following molecules from the starting materials on the left as shown. (10 pts)



3. Look at the following TLC plate for the nitroaniline experiment and answer the questions. (8 pts)

Name .....



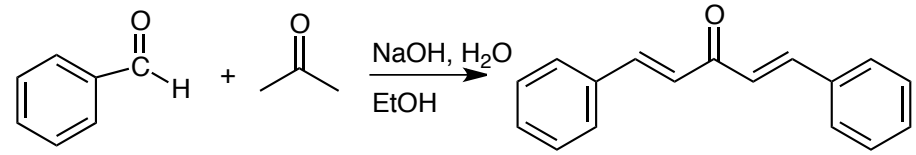
Lane 1 = pure *ortho*-nitroaniline
Lane 2 = pure *para*-nitoraniline
Lane 3 = unrecrystallized product
Lane 4 = recrystallized product

(a) How many products were produced in the reaction and what were they? (b) Was the recrystallization successful in purifying the product? Explain briefly. (c) Which is more soluble in water, the recrystallization solvent, *ortho* or *para*-nitroaniline? Explain your reasoning briefly.

(a) The reaction formed two products, *ortho*- and *para*-nitroaniline. (b) The recrystallization was successful in that only one compound was left after recrystallization, *ortho*-nitroaniline. (c) The *para*-isomer must be more soluble in water since it stayed in the water during the recrystallization process, while the *ortho*-isomer crystallized from solution.

3. For the preparation of dibenzalacetone (a) write the overall reaction. You do not need to show the mechanism. (b) If 0.016 mol of benzaldehyde and 0.008 mol acetone and 0.02 mol sodium hydroxide were used, what was the limiting reagent? (6 pts)

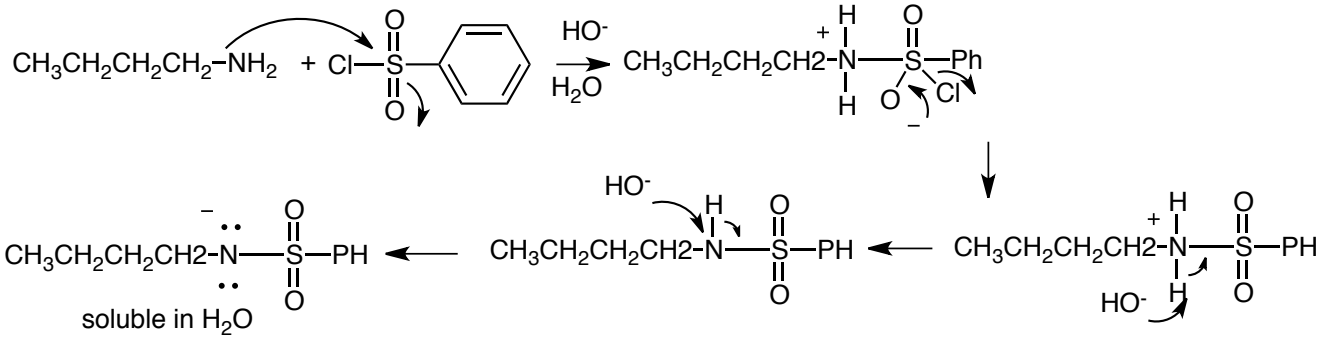
(a)



(b) Both benzaldehyde and acetone were present in the same number of equivalents and so they are both limiting reagents.

5. In the unknown amine experiment, show the reaction that occurs between butylamine ($C_4H_9NH_2$) and benzenesulfonyl chloride ($C_6H_5SO_2Cl$) in aqueous KOH solution. (b) How many layers would be formed? Explain. (6 pts)

(a)



(b) Only one layer is formed because in the basic conditions the final step of formation of the anion which is soluble in the aqueous conditions. Remember, normal amines are not deprotonated by hydroxide. It is only due to the strong electron withdrawing effect of the sulfonyl group that this last step occurs. The resulting anion is stabilized by resonance.