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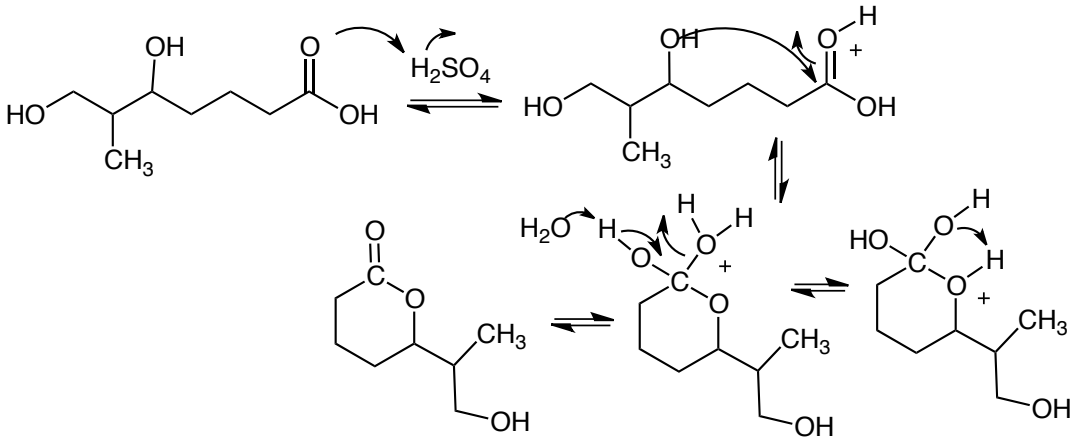
ANSWER KEY

L.I.U.

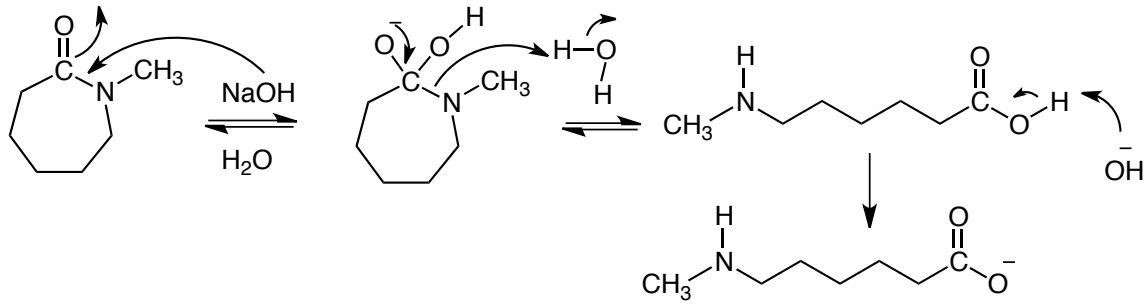
Chem. 122, Sect 009, Quiz 3, 50 pts, Spring, 2012

1. Give the products(s) of the following reactions, showing ALL steps of the reaction mechanisms. (20 pts)

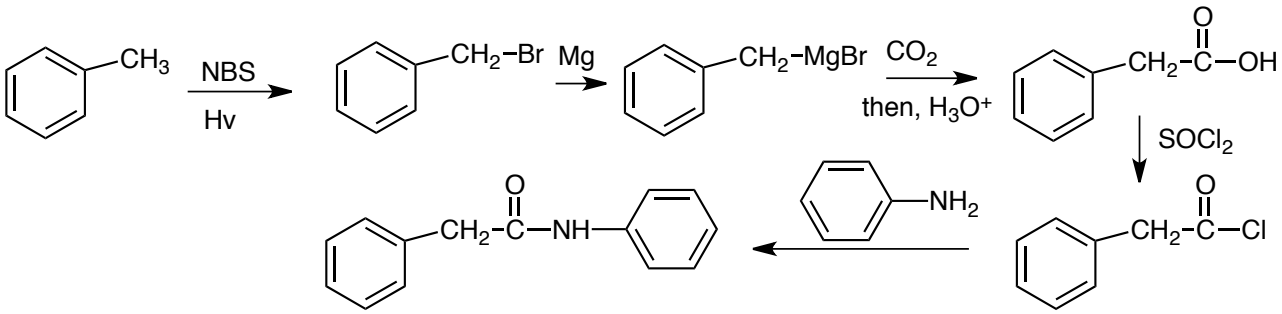
(a)



(b)



2. Synthesize the following molecule from the starting material on the left as shown. (10 pts)



3. In the last step in Lab 14, we heat *p*-nitroacetanilide in 1 M aqueous hydrochloric acid until all the solid dissolves. Then we cool the reaction mixture and add ammonium hydroxide. (a) Show the reaction that occurs in the aqueous acid. (b) What is the purpose of adding the ammonium hydroxide (NH_4OH)? Explain by showing the reaction that occurs in this step. (6 pts)

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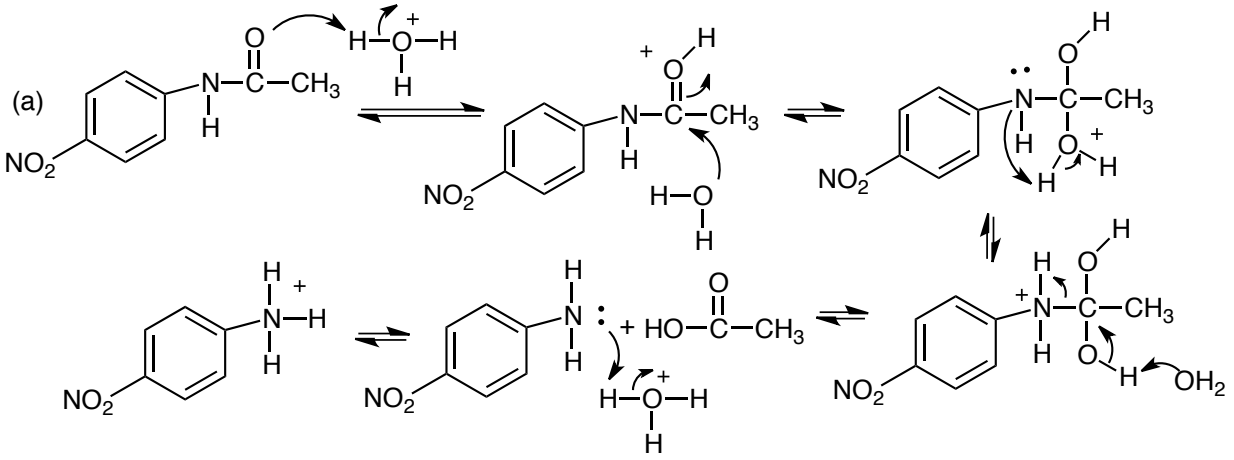
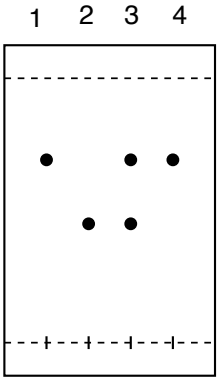


4. Look at the following TLC plate for the nitroaniline experiment and answer the questions. (6 pts)



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? Expalin briefly. (c) Which is more soluble in the recrystallization solvent (i.e. water), *ortho* or *para*-nitroaniline? Explain your reasoning briefly.

(a) Two products were produced in the reaction, *ortho* and *para*-nitroaniline. (b) Yes, the recrystallization was successful. Only one compound was isolated, pure *ortho*-nitroaniline. (c) *Para*-nitroaniline is more soluble in water since it stayed in the water layer while the *ortho*- derivative crystallized out.

5. One student's unknown amine formed two layers when mixed with benzenesulfonyl chloride ($C_6H_5SO_2Cl$) in aqueous KOH solution. It also formed a yellow-brown insoluble material in the nitrous acid test. (a) What was the unknown amine, primary, secondary or tertiary? (b) Show all the reactions that occurred when mixed with the benzene sulfonyl chloride/KOH. (c) Would the product formed in the initial reaction be soluble in aqueous hydrochloric acid? Briefly explain your answer. (8 pts)

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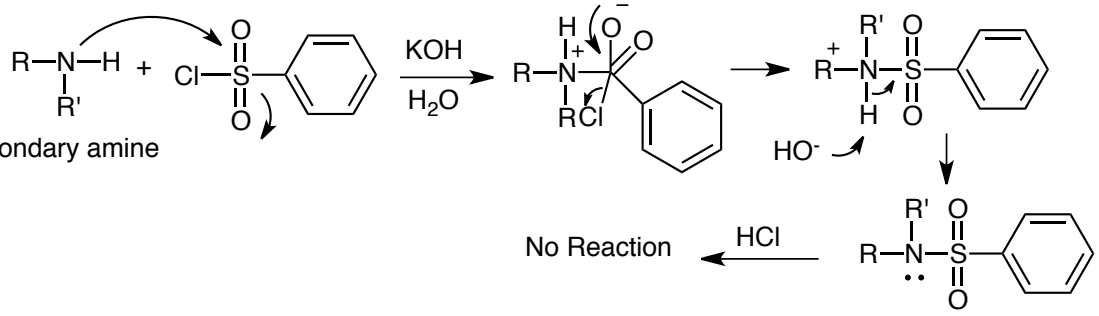

There is no reaction of the product with HCl because the amine lone pair is delocalized onto the strongly electron withdrawing sulfonyl group.