

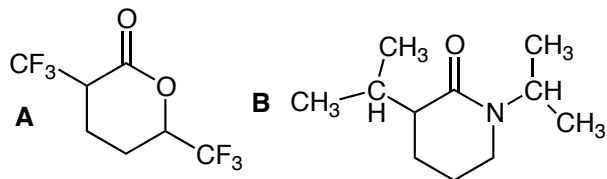
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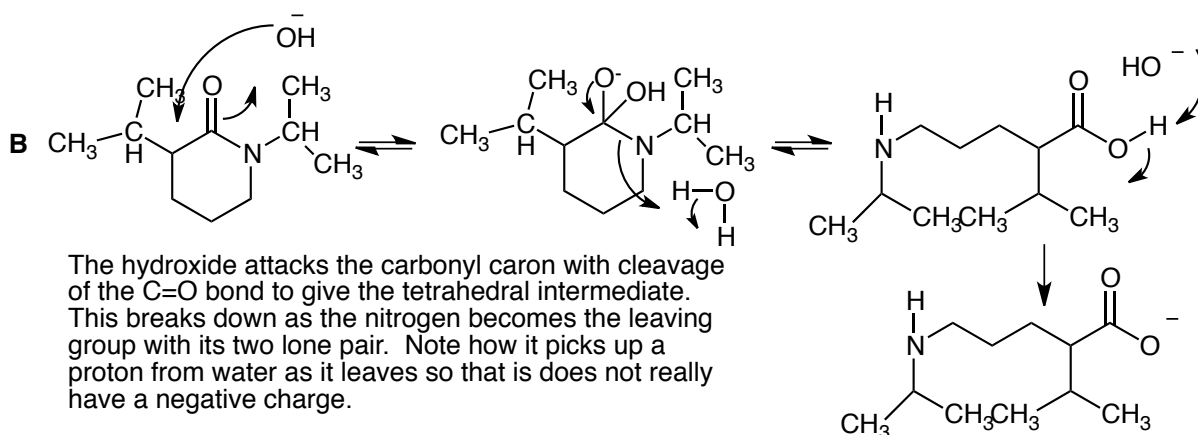
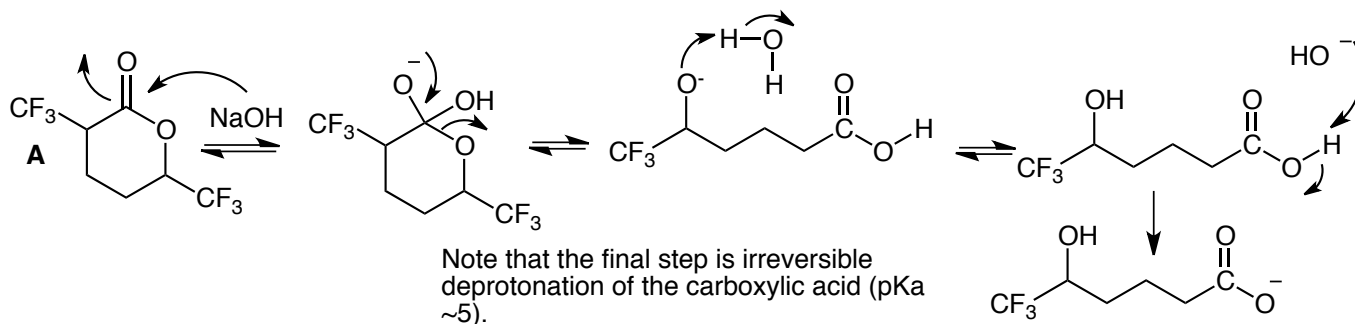
Chem. 122, Sect 008,

Quiz 3, 50 pts, Spring, 2011

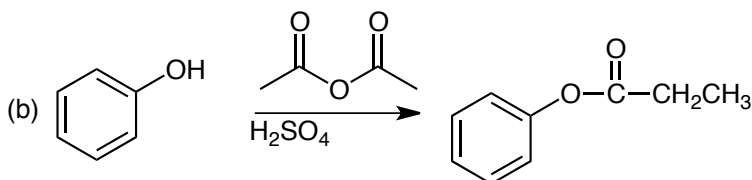
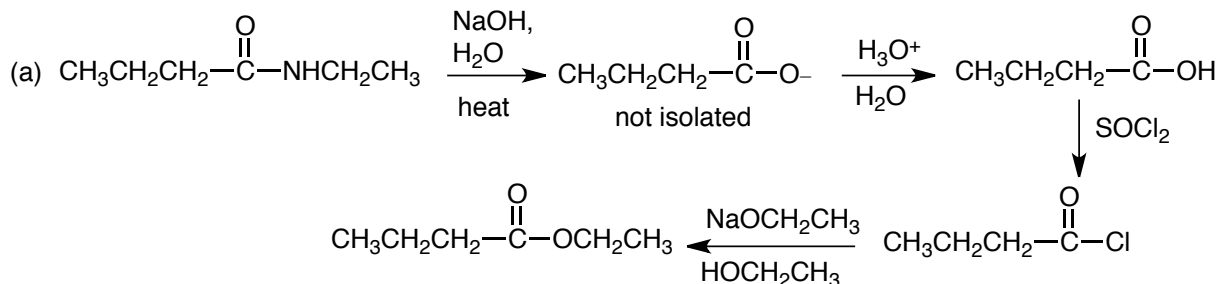
1. Which molecule below is more reactive to basic hydrolysis in NaOH/H₂O? Explain your choice briefly and show the hydrolysis reaction for BOTH molecules, giving all of the steps of the reaction mechanism. (20 pts)



A will react faster since it is an ester and it has the strong electron withdrawing CF₃ groups and is less hindered than **B**. The nitrogen in the amide **B** is a much better electron donor to the carbonyl carbon than the oxygen since it is small and less electronegative. Therefore the amide carbonyl is less electron deficient and less reactive.

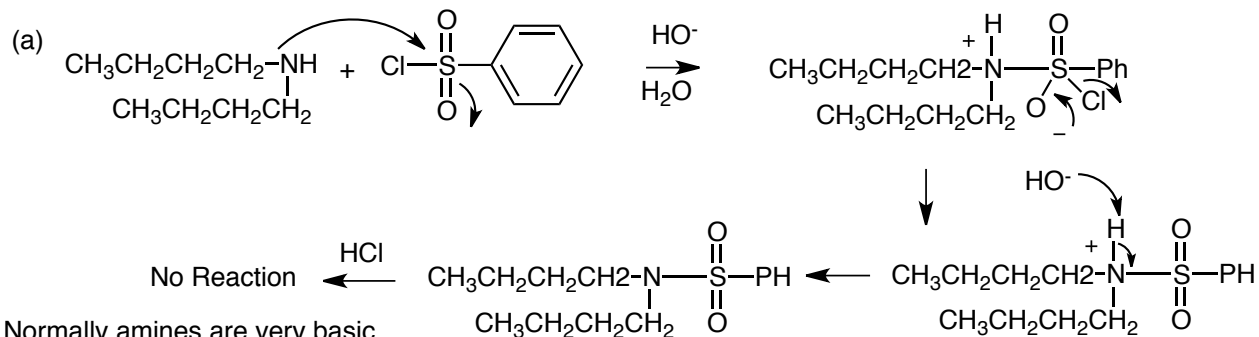


2. Synthesize the following molecules from the starting materials on the left as shown. (10 pts)



Name

3. In the unknown amine experiment, show the reaction that occurs between dibutylamine $[(C_4H_9)_2NH]$ and benzenesulfonyl chloride ($C_6H_5SO_2Cl$) in aqueous KOH solution. (b) How many layers would be formed? Explain. (c) Would the product of this reaction, if separated from the aqueous solution, be soluble in 1.0 M HCl? Explain briefly. (10 pts)



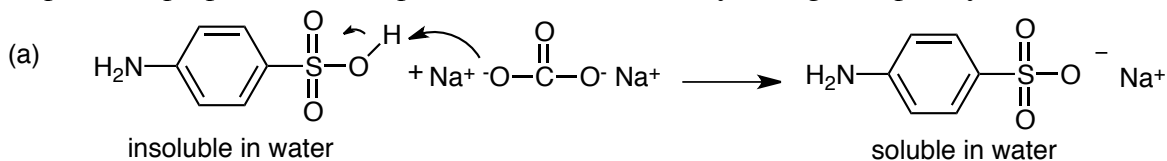
Normally amines are very basic but the lone pair on the nitrogen is delocalized on to the sulfonyl group and is not available for reaction with HCl.

The product is insoluble in H_2O . The anion cannot be formed.

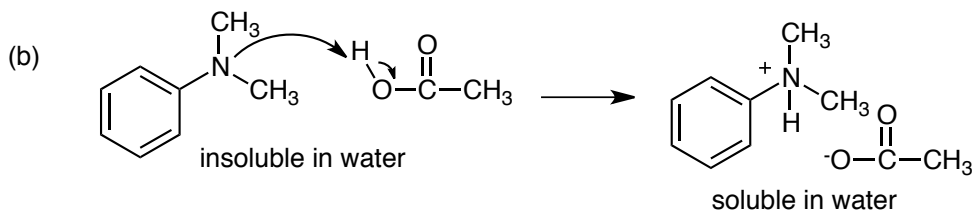
(b) So we we two layers. The product is not soluble in H_2O because we cannot make the anion.

(c) The product is not soluble in HCl because we can not protonate it to make the cation.

3. In the preparation of methyl orange, (a) show the reaction that occurs when sulfanilic acid ($HOSO_2C_6H_4NH_2$) is added to 0.5 M sodium carbonate solution and briefly explain the purpose of this step. (b) Show the reaction that occurs when N,N-dimethylaniline ($[(CH_3)_2NC_6H_5]$) is added to acetic acid and explain the purpose of this step. (c) What color is methyl orange? Explain your answer. (10 pts)



The purpose of this step is to make the sulfanilic acid soluble in water.



The purpose of this step is to make the N,N-dimethylaniline soluble in water as the cation.

(c) Methyl orange is orange at $pH > 4.2$ and red at lower pH ($pH < 3.2$).