

Chem 30C, Spring 2005

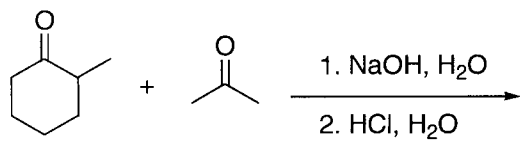
1st Midterm Exam

Prof. Ohyun Kwon, UCLA

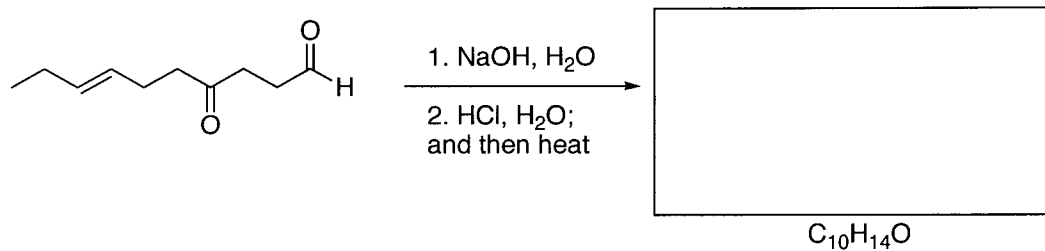
Your Name (Please Print)

Question	Your points
1 (12 points)	
2 (15 points)	
3 (16 points)	
4 (12 points)	
5 (15 points)	
6 (15 points)	
7 (15 points)	
8 (20 points)	
9 (10 points)	
Total (130 points)	

1. (12 points) When a 1:1 mixture of 2-methyl cyclohexanone and acetone is treated with sodium hydroxide, six aldol products can be formed. Draw the structures of the six products.

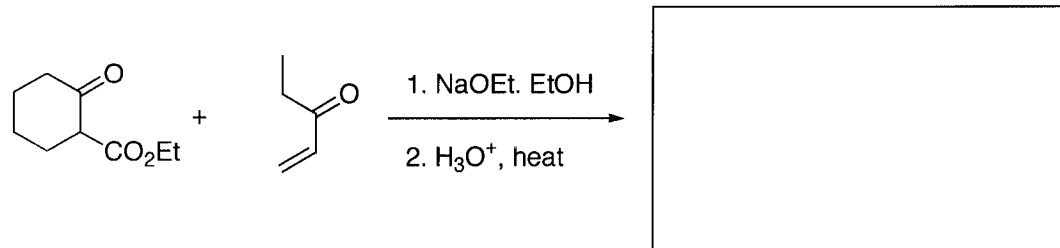


2. (15 points) When treated with base, the following compound undergoes an intramolecular aldol condensation to give a product containing a cycle in 78% yield. Draw the structure of the product. Propose a reaction mechanism for the formation of the product. And explain why one product forms dominantly.

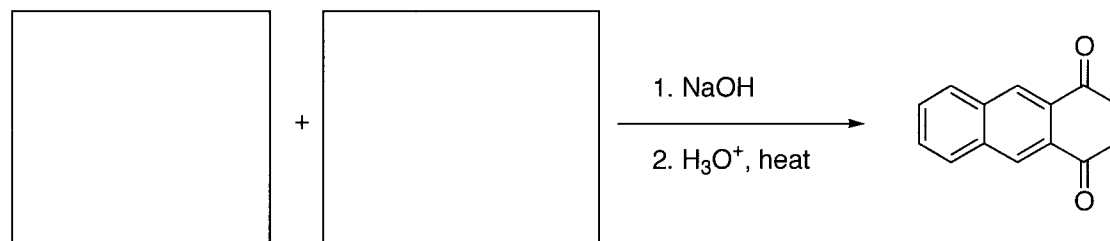


3. (16 points) Provide starting material(s) or product for each transformation.

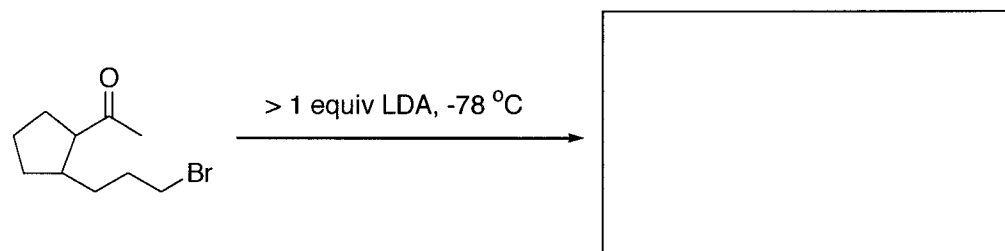
(a)



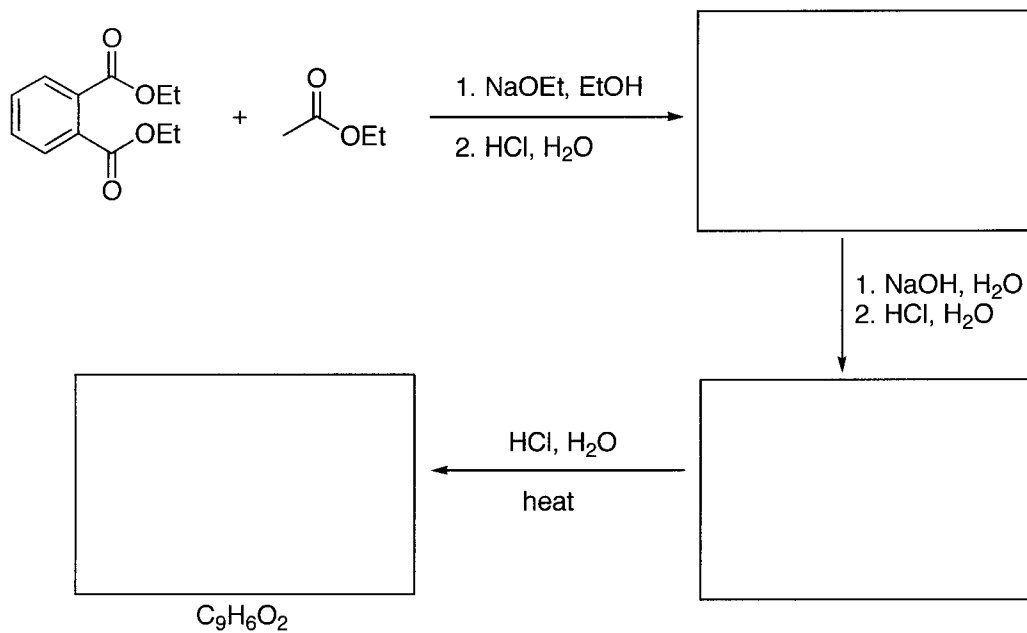
(b)



(c)



4. (12 points) Using diethyl phthalate and ethyl acetate, a diketone, $C_9H_6O_2$, can be formed. Provide reaction product for each transformation.



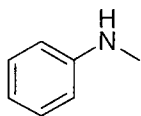
5. (a) (6 points) Draw structural formulas for these compounds.

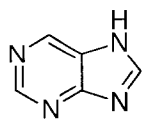
Piperidine

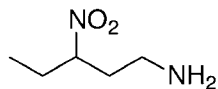
3-*N,N*-diethylaminophenol

Lithium diisopropylamide (LDA)

(b) (9 points) Name the following molecules.

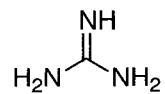




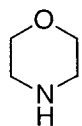


6. (15 points) Select the stronger base in each pair of amines and briefly explain why.

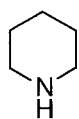
(a) Et_3N and



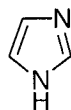
(b)



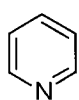
and



(c)

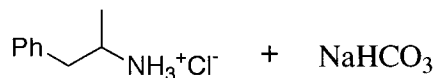
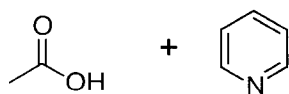


and

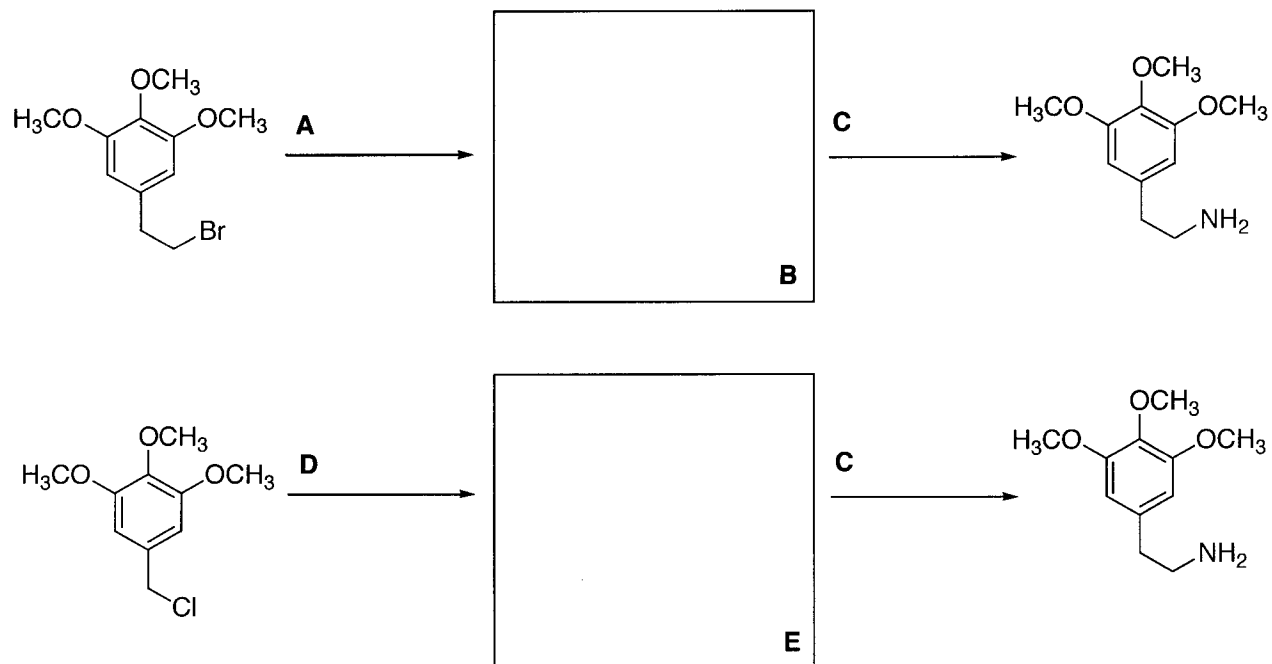


7. (a) (9 points) Unlike chiral alkanes, a chiral amine cannot be resolved at ambient temperature. Name the phenomenon that is responsible for this observation and briefly explain it.

(b) (6 points) Complete the following acid-base reactions and predict the direction of equilibrium (to the right or to the left) for each. Consult the pK_a values from the table attached at the end of the exam.



8. (20 points) What are the reaction conditions **A**, **C**, and **D** and the structures of **B** and **E** ?



9. (10 points) An amine of unknown structure contains one nitrogen and nine carbon atoms. The ^{13}C NMR spectrum shows only five signals, all between 20 and 60 ppm. Three cycles of Hofmann elimination sequence give trimethylamine and 1,4,8-nonatriene. Propose possible structural formulas for the amine.