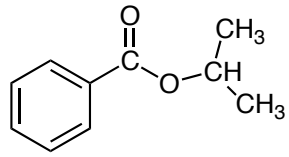
Long Island University, Department of Chemistry

Chem. 122, Sect 008, Exam 3, 100 pts, Spring, 2011

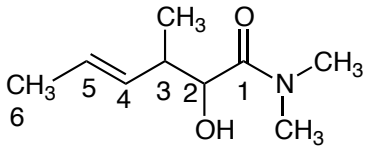
1. Name the following compounds. (10 pts)

(a)



isopropyl benzoate

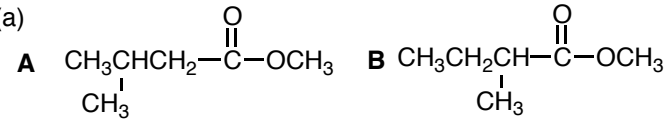
(b)



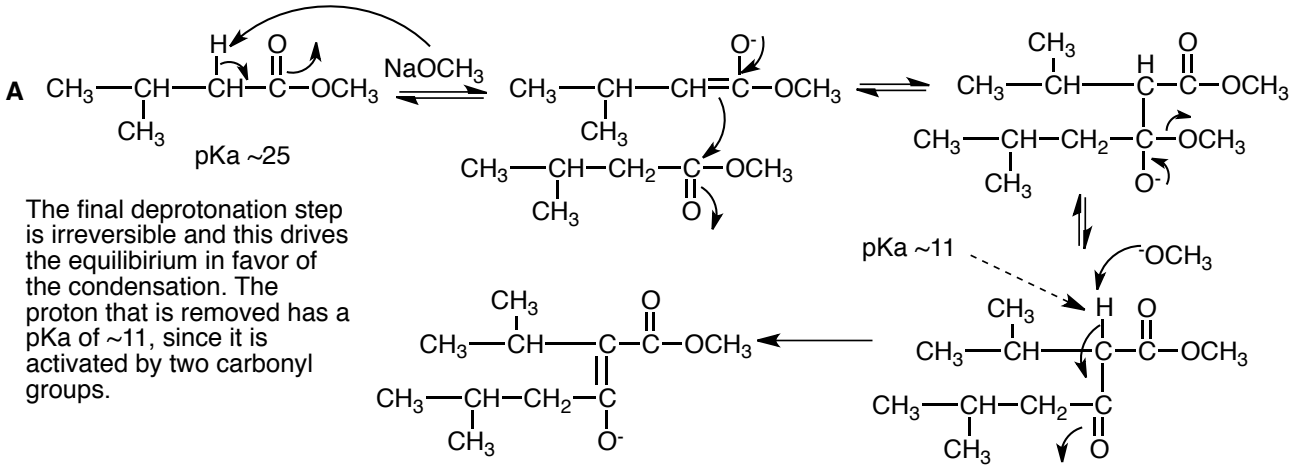
N,N-dimethyl-2-hydroxy-3-methyl-4-hexenamide

2. (a) Look at molecules **A** and **B**. One molecule could undergo a Claisen condensation in good yield while the other would give only a low yield. Explain briefly, showing the reaction that occurs for the molecule that undergoes the Claisen condensation in the higher yield. (b) Look at molecules **C** and **D.** Which molecule would have the greater concentration of enol in acidic conditions? Explain briefly, showing the enolization reaction for the molecule you choose. (20 pts)

(a)



Molecule **A** would form the greater concentration of Claisen product because it has two alpha-hydrogens and so can udergo the second, irreversible deprotonation to drive the equilibrium in favor of the condensation.

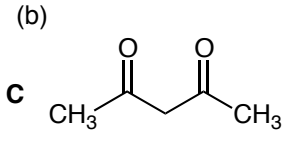


pKa ~25

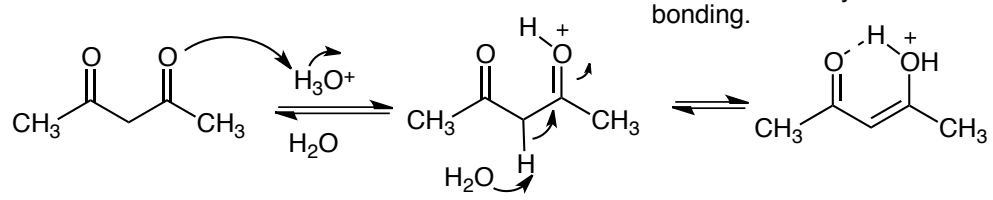
pKa ~11

The final deprotonation step is irreversible and this drives the equilibirium in favor of the condensation. The proton that is removed has a pKa of ~11, since it is activated by two carbonyl groups.

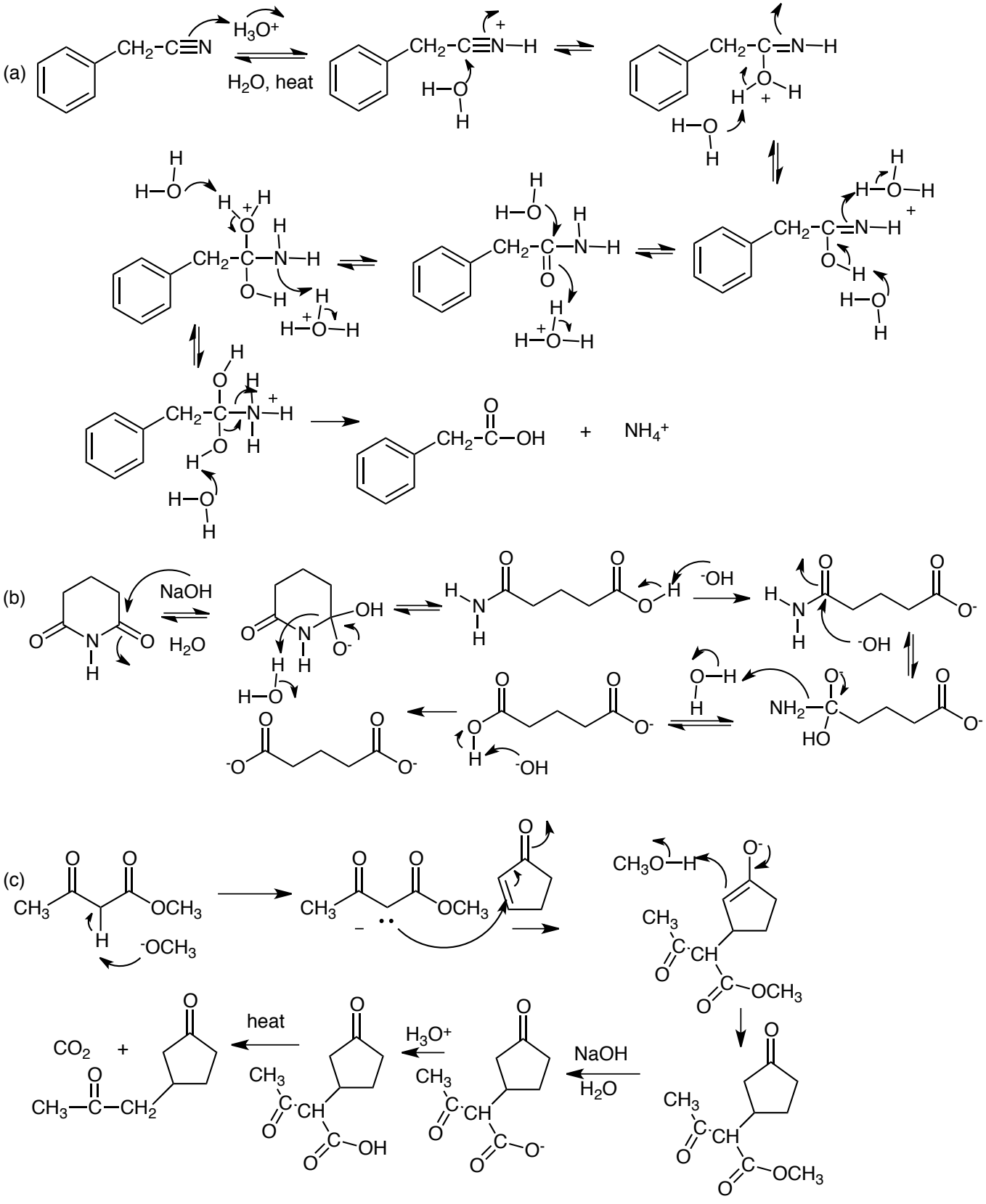
(b)

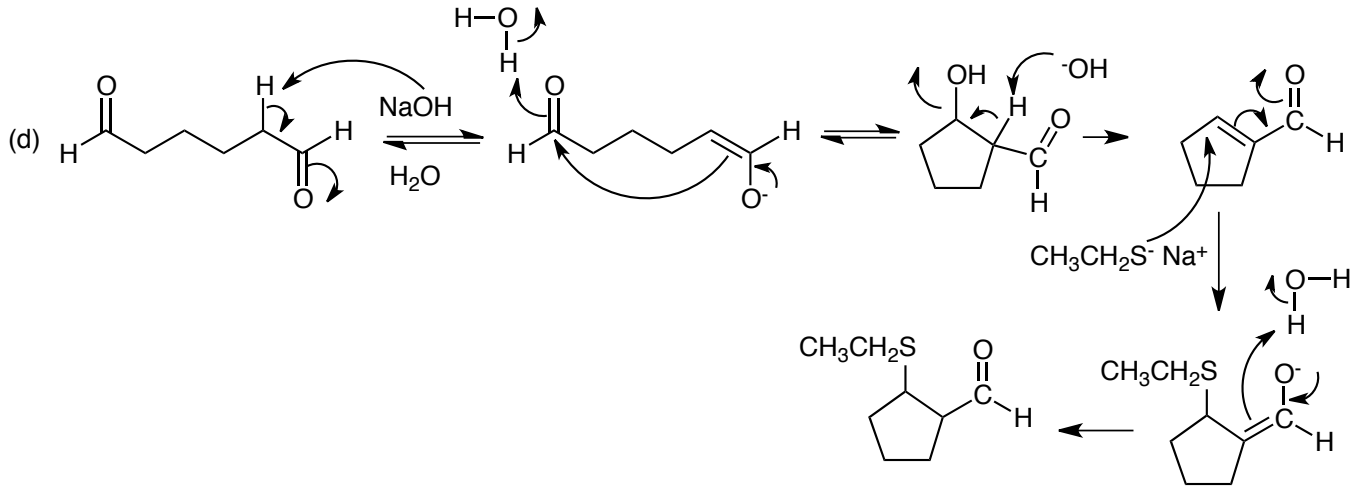


Molecule **C** would form the greatr concentration of enol in acidic conditions since the proton on the carbon between the two carbonyls is quite acidic since it is activated by two EWG's. The resulting enol is stabilized by conjugation with the other carbonyl C=O bond and by intramolecular H-bonding.

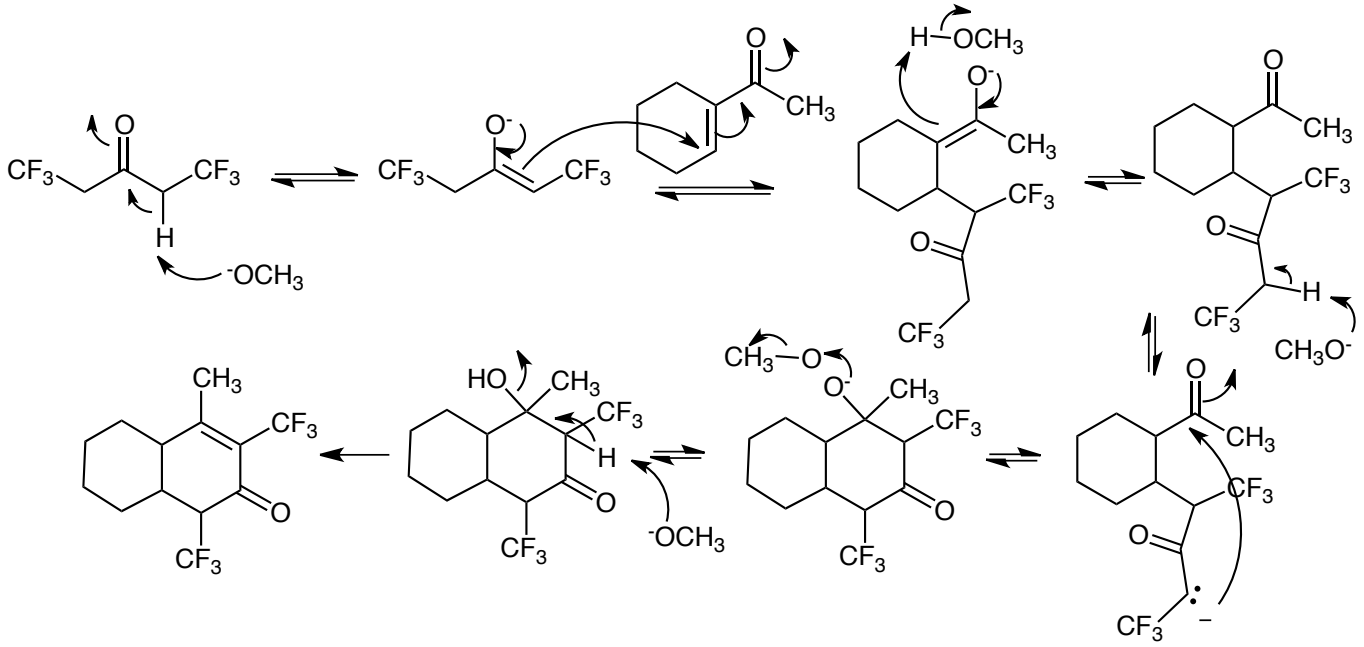


3. Give the product of the following reactions and in each case show the complete reaction mechanism by which it is formed. (40 pts)

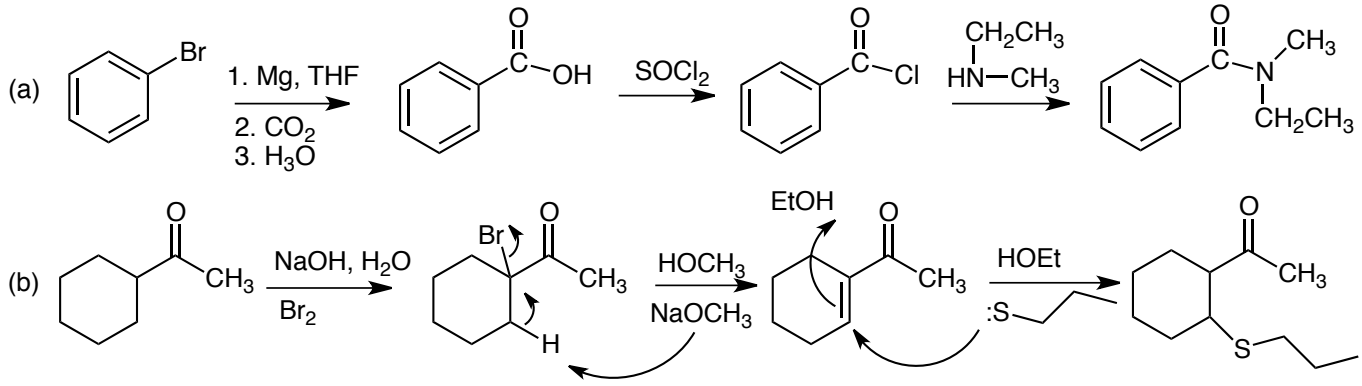

(a)
H_3O^+
H_2O, heat
NH_4^+
(b)
NaOH
H_2O
^-OH
(c)
$^-OCH_3$
heat
CO_2
H_3O^+
NaOH
H_2O

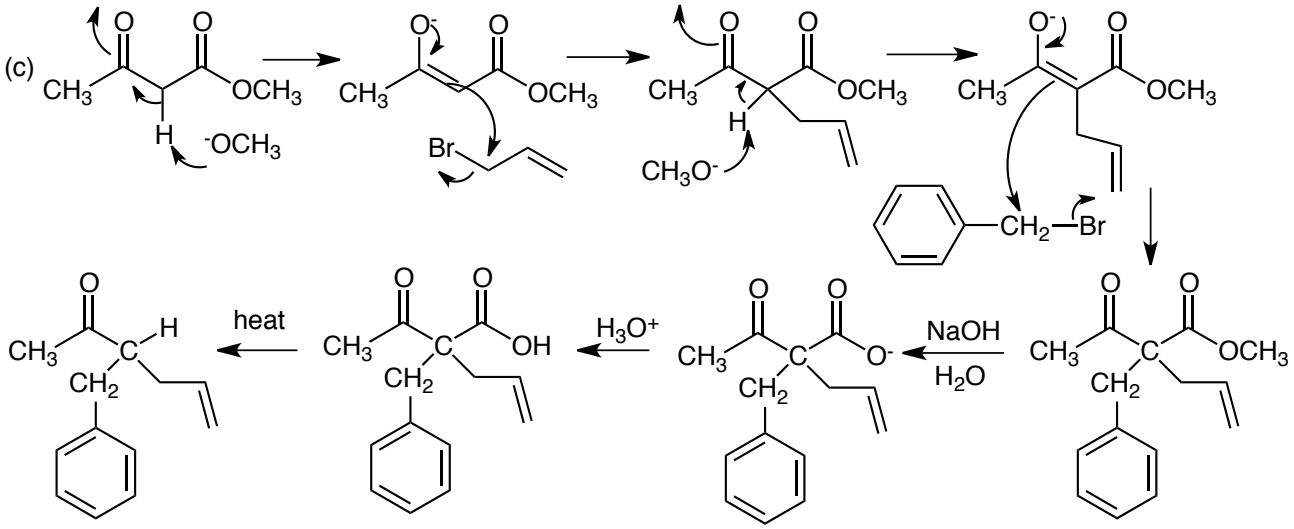


4. Show how the following reaction occurs, giving all steps of the mechanism. No other reagents are needed except those given. (10 pts)



5. Synthesize **TWO** of the molecules shown on the right from the starting materials given on the left. Do all three for extra credit. (20 pts).




(c)
CH3
O
O
OCH3
H
-OCH3
O-
Br
CH3O-
CH2
Br
NaOH
H2O
H3O+
heat
OH