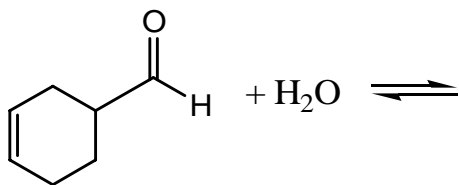


1. (3 pts) For the reaction below, draw the hydrate that would be formed.

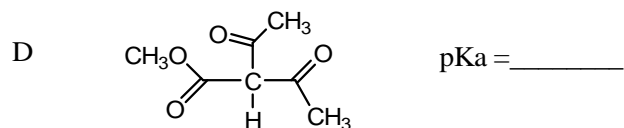
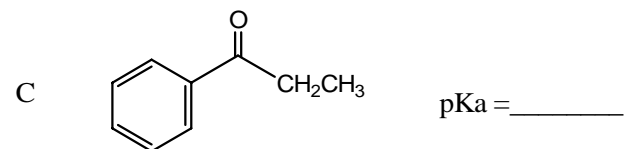
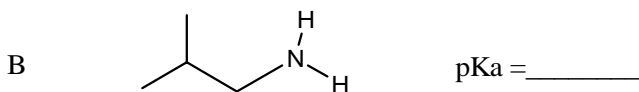
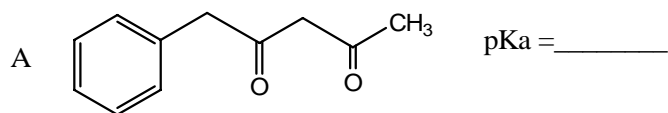


Hydrate

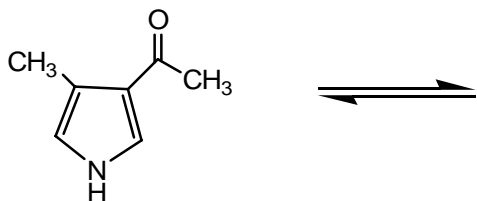
2.a (4 pts) Match the pK_a values listed below with the most acidic hydrogen(s) in A, B C and D. Possible pK_a values: pK_a = 35 pK_a = 20, pK_a = 10.5, pK_a = 5.0

b. (2 pts) For each compound (A,B, C and D) **circle the hydrogen(s)** that are most acidic.

c. (2 pts) Which compound(s) (A-D) would be completely deprotonated by NaOH?
(Note: the pK_a of water is 15.7) _____



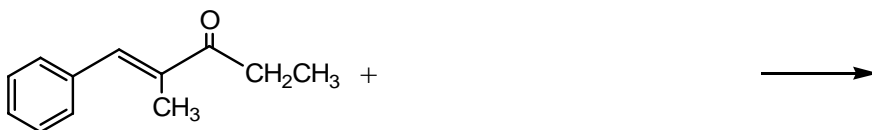
3 a. (4 pts) Draw the enol form for the keto compound shown below. Circle the side in which the equilibrium is shifted.



enol

b. (2 pts) What is the name given to the relationship between an enol and a keto form (circle one): Enantiomers, Ketomers, Intimate, 'Just friends', Tautomers, Thermomers

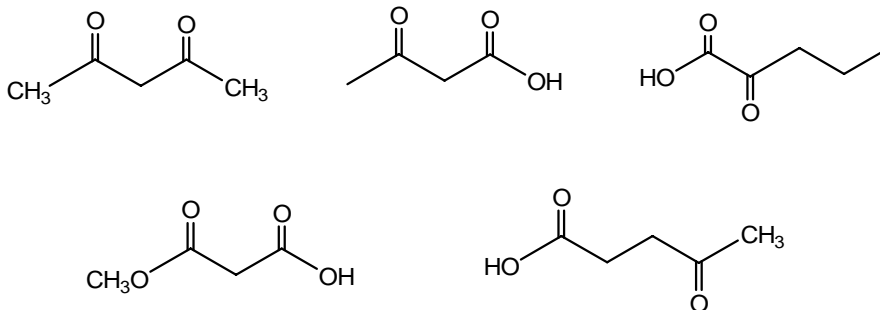
4. (8 pts) For the reaction below the ketone is reacted with LDA (lithium diisopropyl amide) to generate an enolate. **Draw the structure of LDA and the enolate.** Be sure to fully depict the enolate by showing all pertinent resonance structures.



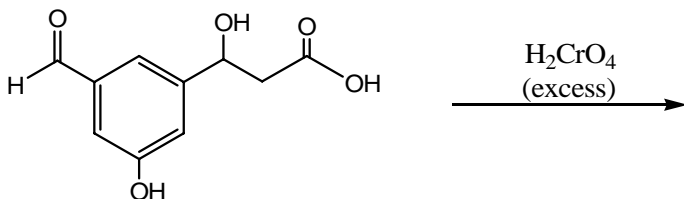
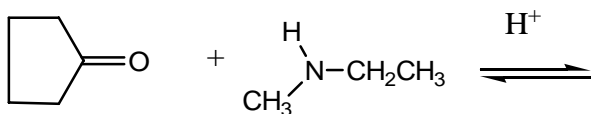
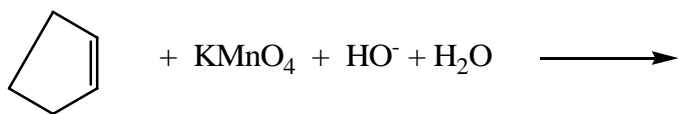
Lithium diisopropyl amide

'enolate'

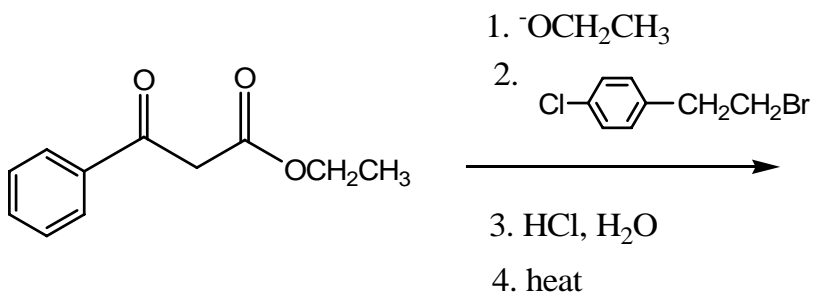
5. (6 pts) Circle which of the following compounds would be expected to decarboxylate (lose CO₂) when heated?



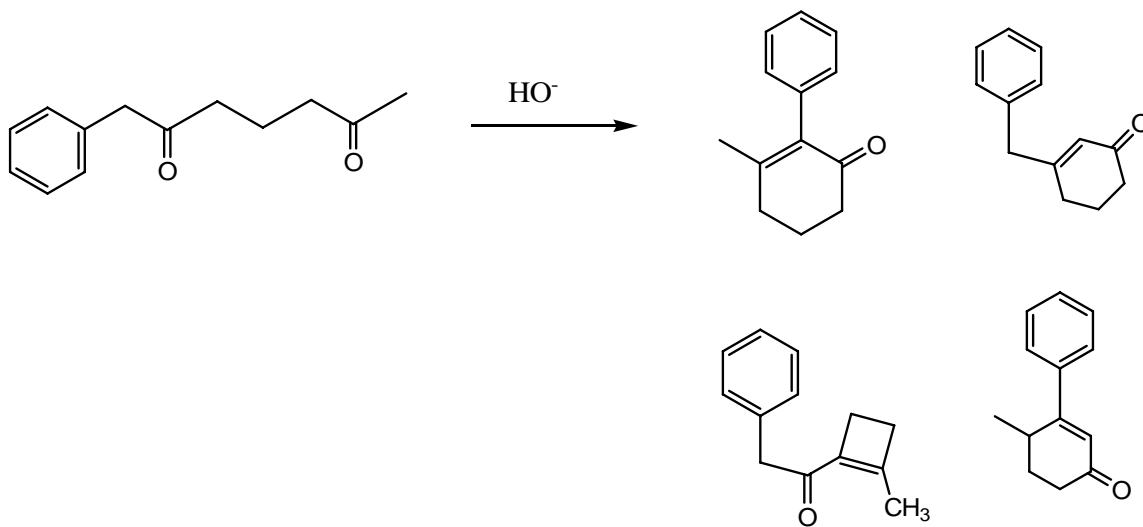
6. (6 pts each) Draw the expected organic products of the reactions shown below (show stereochemistry when pertinent):



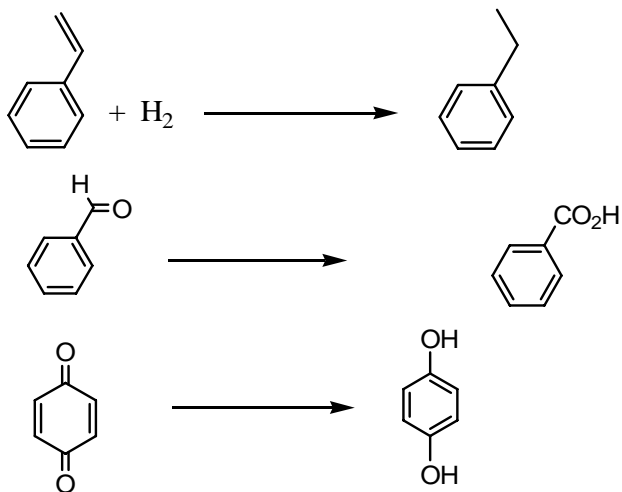
7. (6 pts) Fill in the **final product** of the acetoacetic ester synthesis shown below. You do not have to draw the structures after each step.



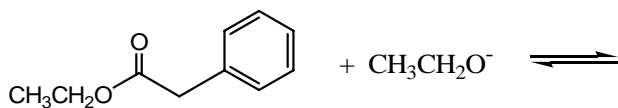
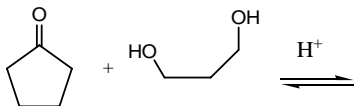
8. (5 pts) Circle the most likely product for the intramolecular Aldol condensation reaction shown below.



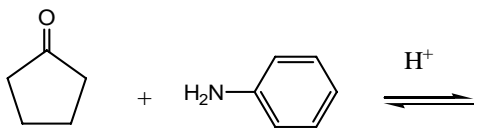
9 (6 pts) For each reaction, is the organic molecule being oxidized or reduced?

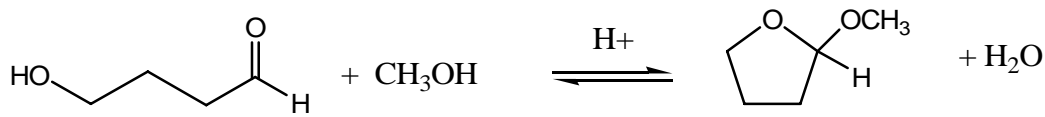
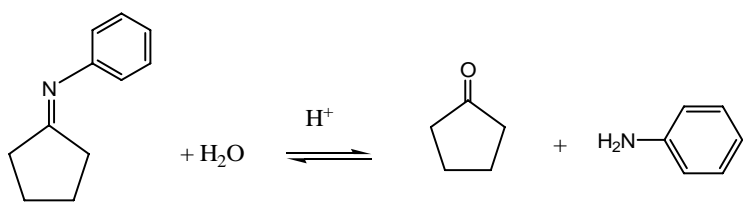
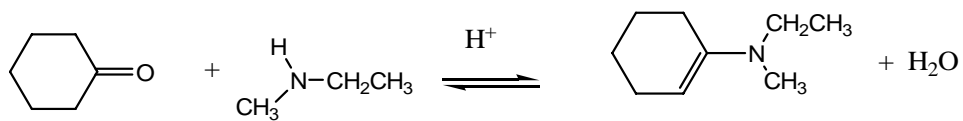


10 (12 pts each) Draw the **mechanism** and product for **two** the reactions contained on the next 2 pages. **It is your choice on which 2 you do.** Note that some of the reactions do not have the product drawn in while others do.



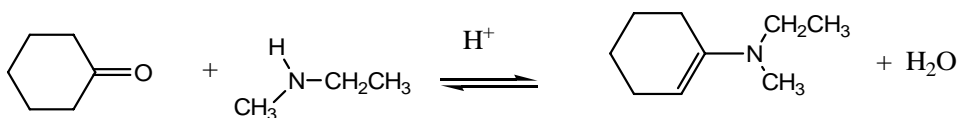
A Claisen reaction





11. (6 pts) For the reaction mechanism drawn below (#1-4) cross out the ones that are not 'legitimate'—that are erroneous.

12. (4 pts) Why is acid (H^+) necessary to catalyze the reaction below?



Bonus question (3 pts) The following compound is produced by an aldol condensation between what two ketones?

