

Exam 4  
Chem 22  
April 22, 2010

Name Gary Snyder

page 1 (20) \_\_\_\_\_

2 (35) \_\_\_\_\_

total (200)

3 (40) \_\_\_\_\_

4 (40) \_\_\_\_\_

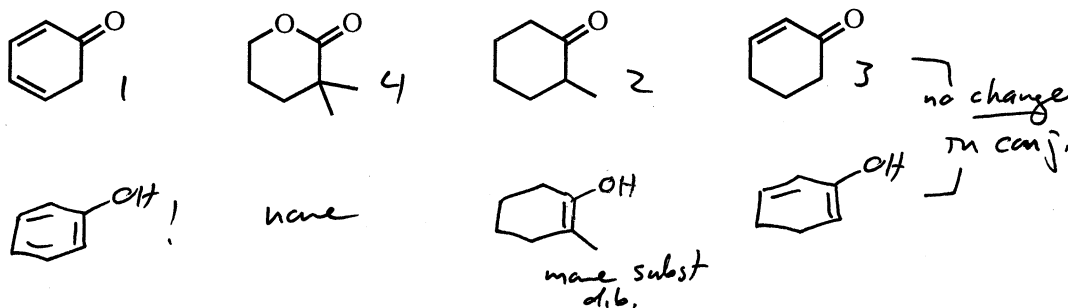
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5 (35) \_\_\_\_\_

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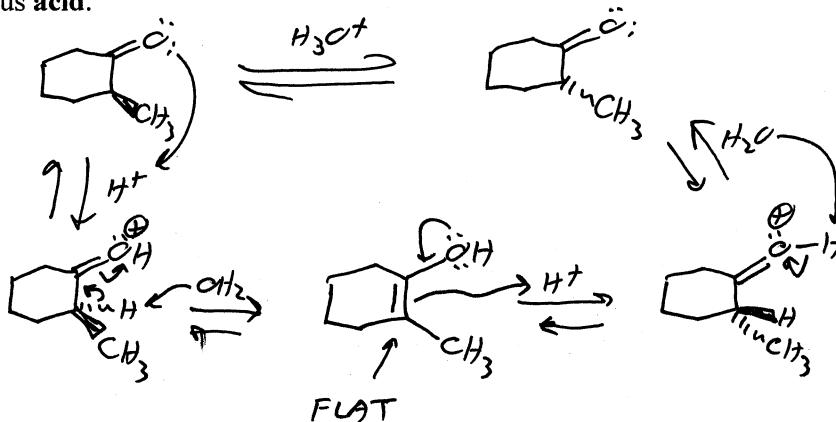
Please resist the temptation to deface this space.

1. (20 points) (a) Draw the most stable **enol** tautomer (if any) of each carbonyl compound below.



(b) Rank the carbonyl compounds above according to the amount of enol present at equilibrium, with 1 indicating the *most* enol and 4 indicating the *least*.

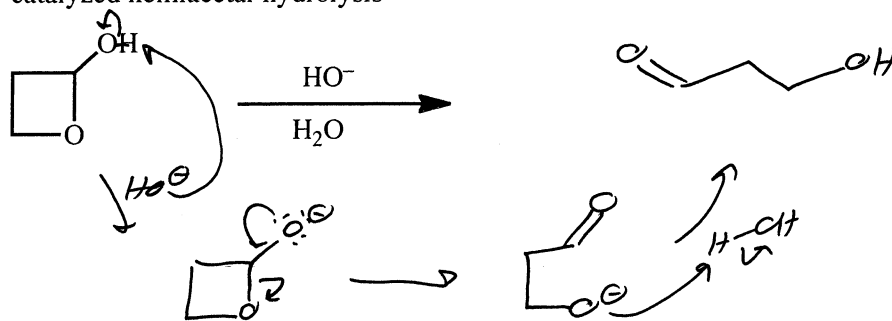
(c) The third carbonyl compound, 2-methylcyclohexanone, is chiral. Starting with either enantiomer of this ketone, write a mechanism to show how this compound racemizes in the presence of aqueous **acid**.



2. (20 points) Write the mechanisms of the two reactions below and draw the products. Show every step explicitly, including all proton transfers; do not use "+H<sup>+</sup>" and "-H<sup>+</sup>" abbreviations.

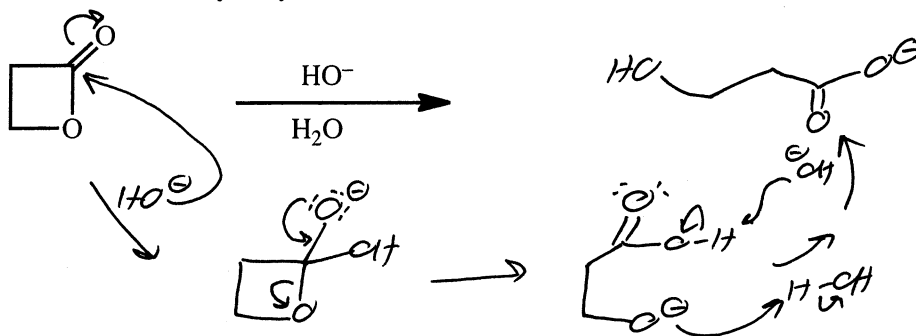
(a) base-catalyzed hemiacetal hydrolysis

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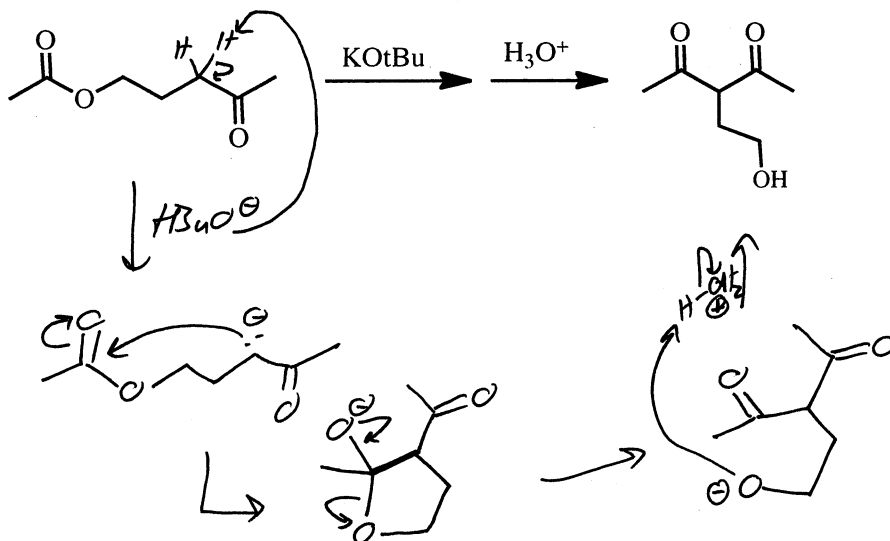


(b) base-induced lactone hydrolysis

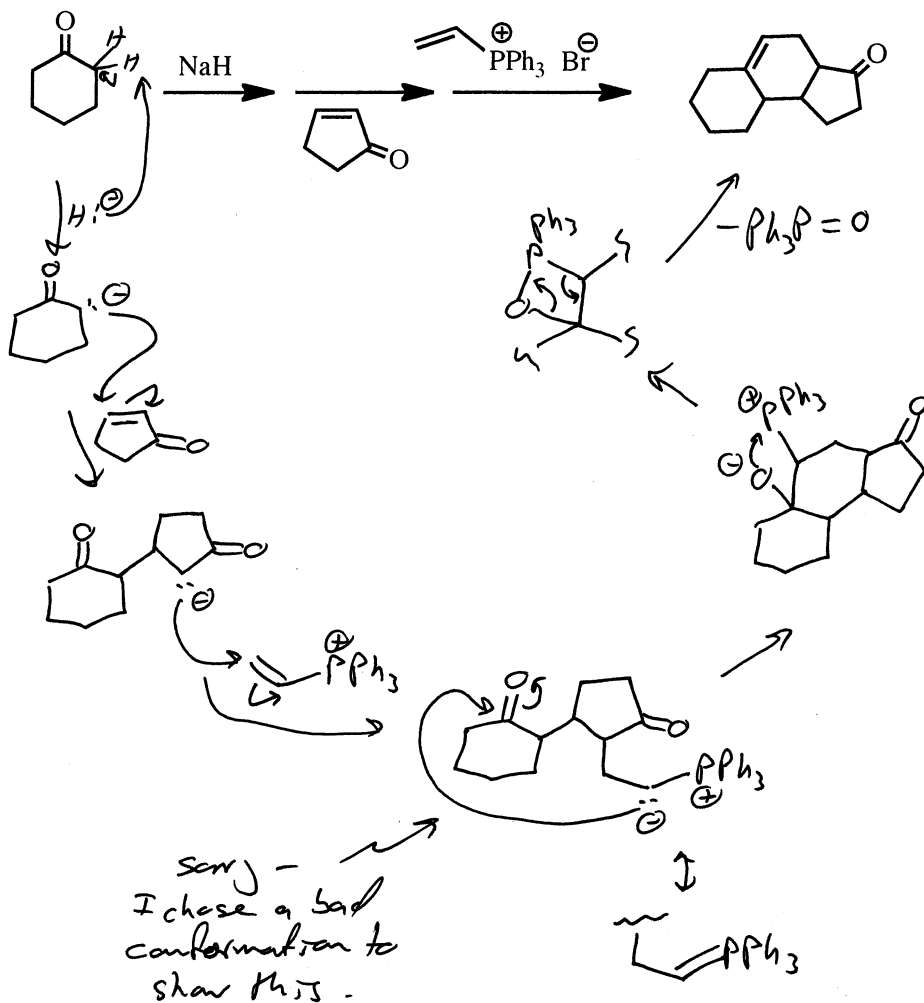
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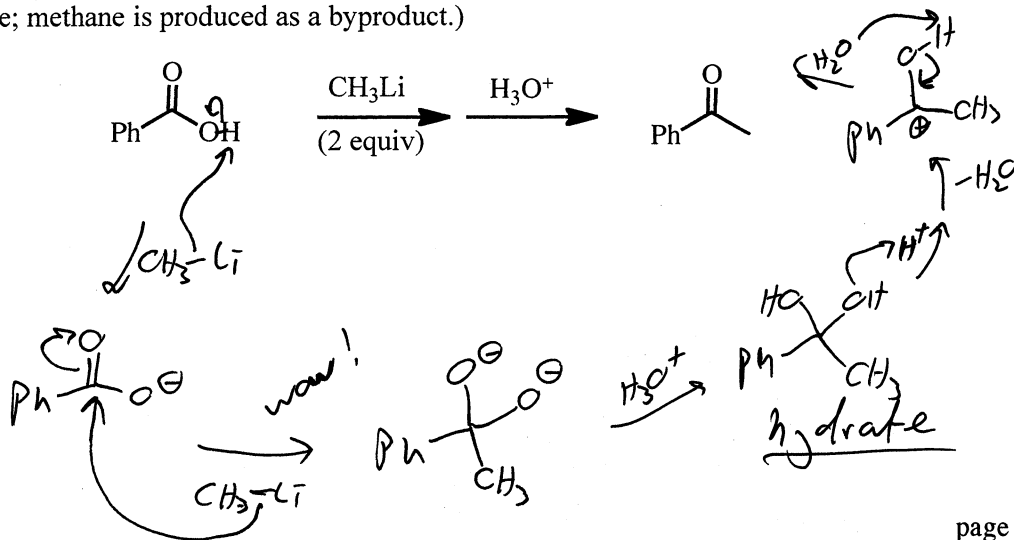
3. (15 points) Write a mechanism that accounts for the following transformation. Show each step clearly with curved arrows. Hint: no other product is formed in significant yield.



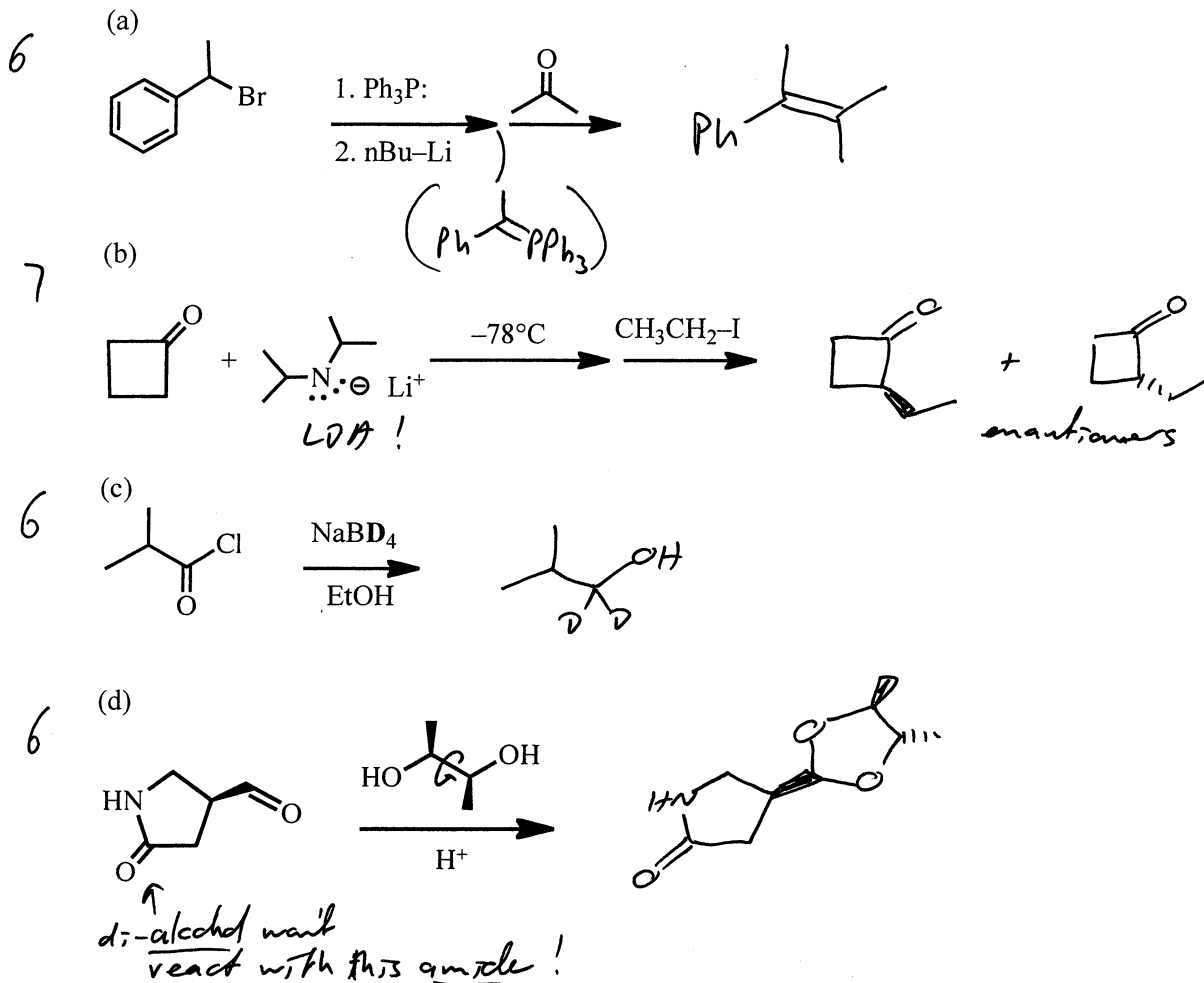
4. (25 points) As promised, here's a problem from the last HW set. Write the complete mechanism, showing every step clearly.



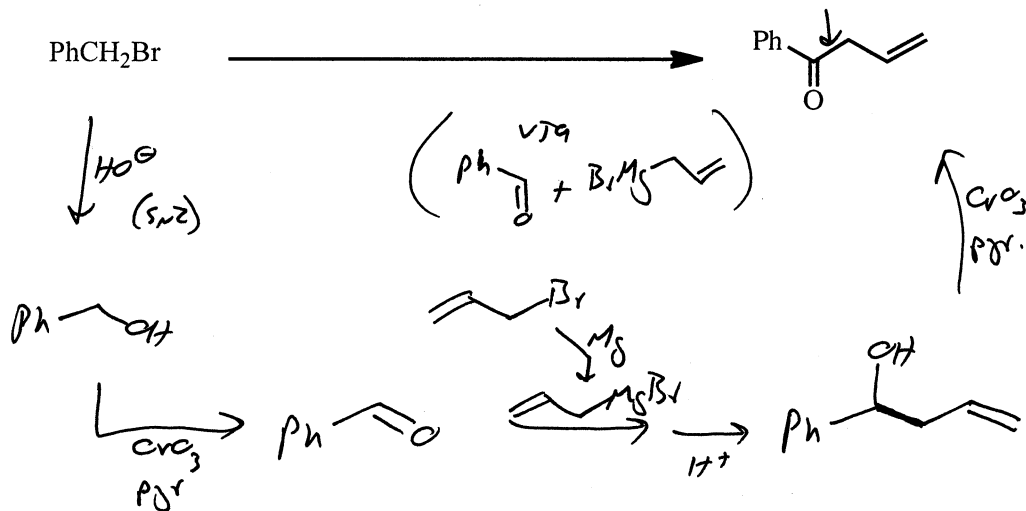
5. (15 points) Write a mechanism to explain the following reaction. (This is one that you haven't seen before; methane is produced as a byproduct.)



6. (25 points) Draw the products of the following reactions, including stereochemistry, where relevant. Label products to indicate stereoisomeric relationships as appropriate.



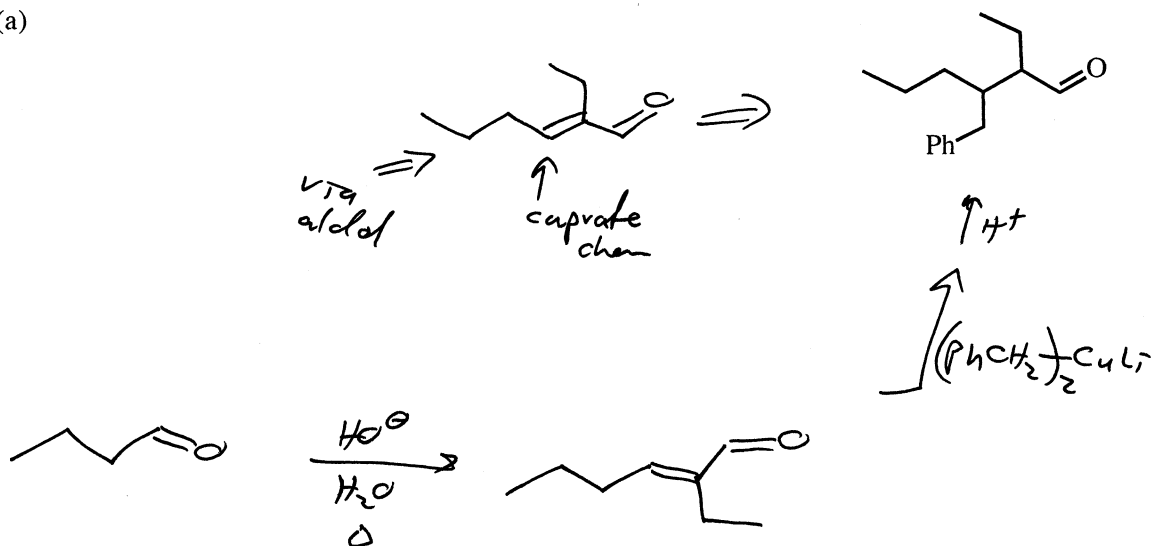
7. (15 points) How would you convert benzyl bromide to the unsaturated ketone below, using only compounds from the Chemical Store (2nd to last page of this exam)?





9. (20 points) Suggest a synthesis of the aldehyde below by using only compounds available in the Chemical Store.

(a)



10. (15 points) How would you carry out the following transformation? Use any reagents you feel are appropriate.

