Organic Chemistry c3444y

3rd Hour Exam

Monday, March 26, 2001
Prof. Leighton

Name:_____ **ID#**_____

Signature:_____

- Write your name on every page.
- The exam is 5 pages long (*not* including this one). Please make sure you have all of the pages.
- Write complete ***but succinct*** answers. **Good Luck!**

Question 1 (20 pts): _____

Question 2 (25 pts): _____

Question 3 (20 pts): _____

Question 4 (20 pts): _____

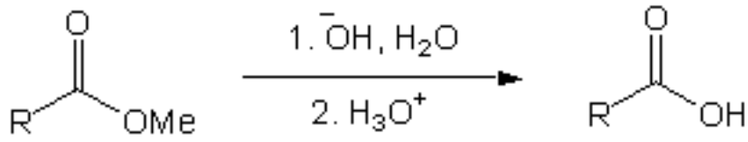
Question 5 (15 pts): _____

Total (100 pts):_____

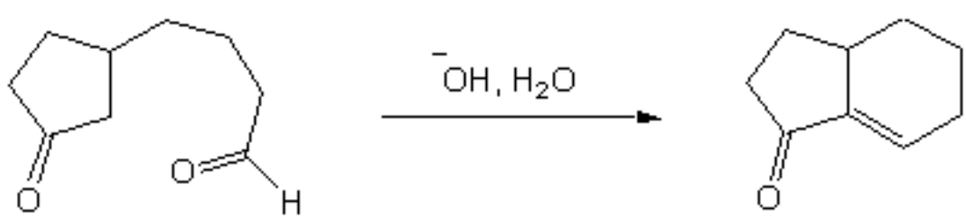
Name: _____

1. Provide detailed mechanisms for the following transformations:

a. (10 pts)



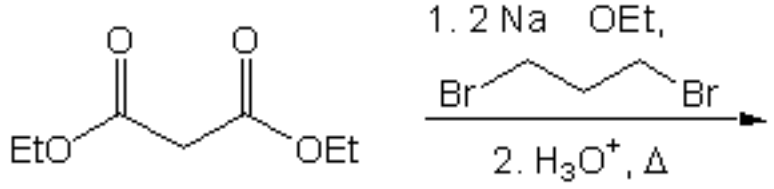
b. (10 pts)



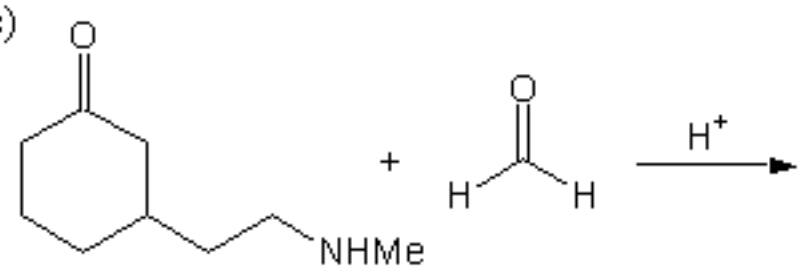
Name: _____

2. Predict the major product of the following reactions:

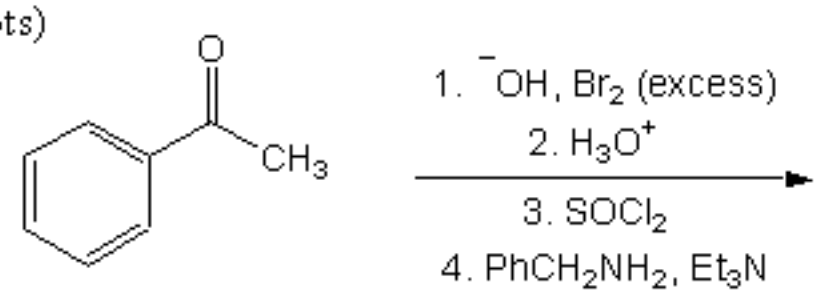
a. (9 pts)



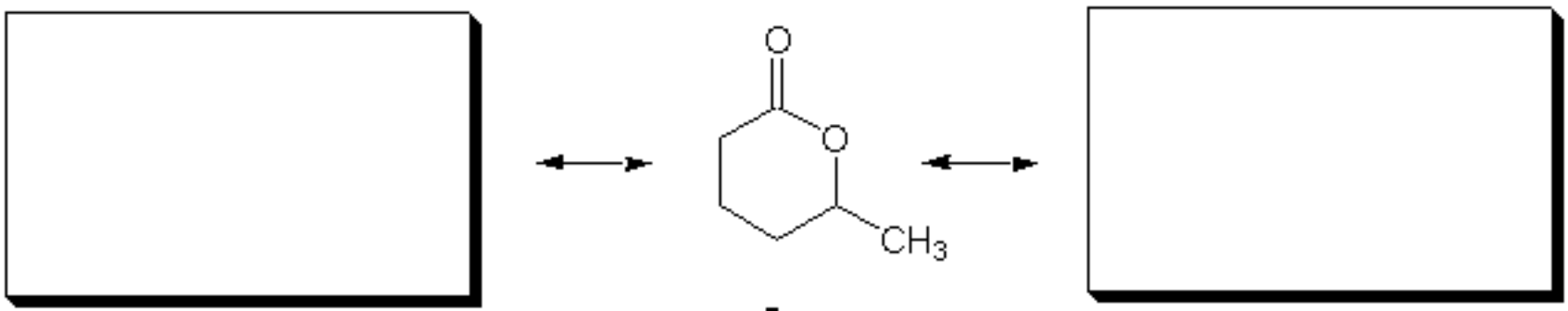
b. (8 pts)



c. (8 pts)



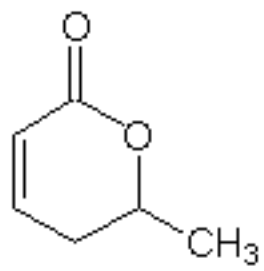
3. a. (10 pts) In class we discussed two different resonance structures for esters. First draw these resonance structures using lactone **A**. Then underneath each resonance structure predict what you think would be the effect of that resonance structure on the IR C=O stretch relative to the reference of ~1720 cm^{-1} for ketones.



A

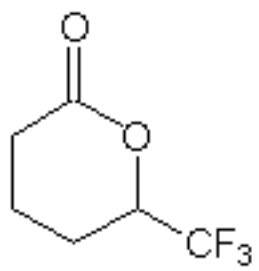
b. (5 pts) Would you expect the frequency of the C=O stretch of lactone **B** to be higher or lower than that of lactone **A**? Use resonance structures to explain your *CONCISE* answer.

B



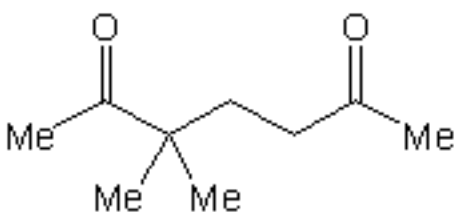
c. (5 pts) Would you expect the frequency of the C=O stretch of lactone **C** to be higher or lower than that of lactone **A**? Use resonance structures to explain your *CONCISE* answer.

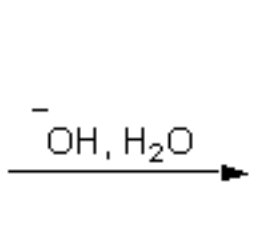
C

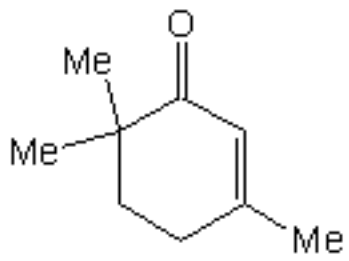


Name: _____

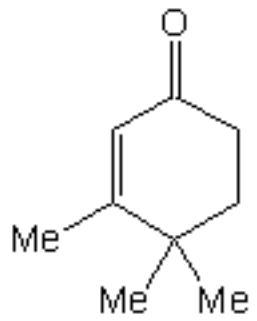
4. a. (6 pts) Consider the following intramolecular aldol condensation. This result is fully consistent with the two rules we use to determine the likely product of intramolecular aldol condensation reactions. State clearly and concisely these two rules.







Product

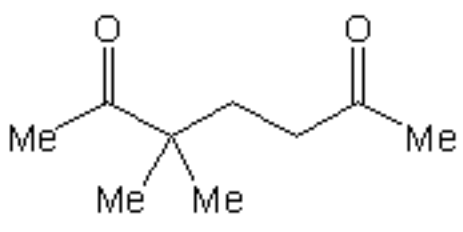


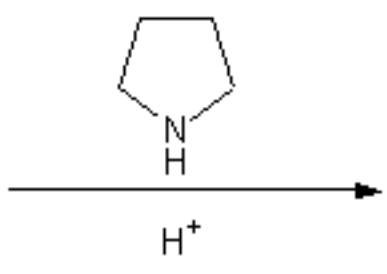
Not Formed

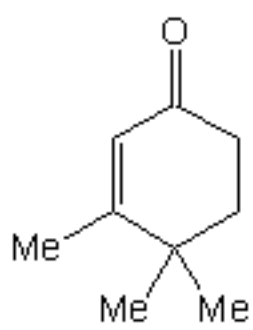
RULE 1:

RULE 2:

b. (14 pts) Interestingly, if the same starting diketone is treated with an amine and some acid, the other product is formed preferentially. Your task is to describe what is happening here. You do not need to write a detailed mechanism, but you do need to show some key intermediates that demonstrate you know what is happening here, and you need to explain why this product is formed and not the same one as in the reaction above (*Hint: this is NOT a Mannich*).







Name: _____

5. (15 pts) Mechanistically, the following reaction can be thought of as a modified Robinson Annulation. Provide a detailed mechanism to account for this amazing reaction: