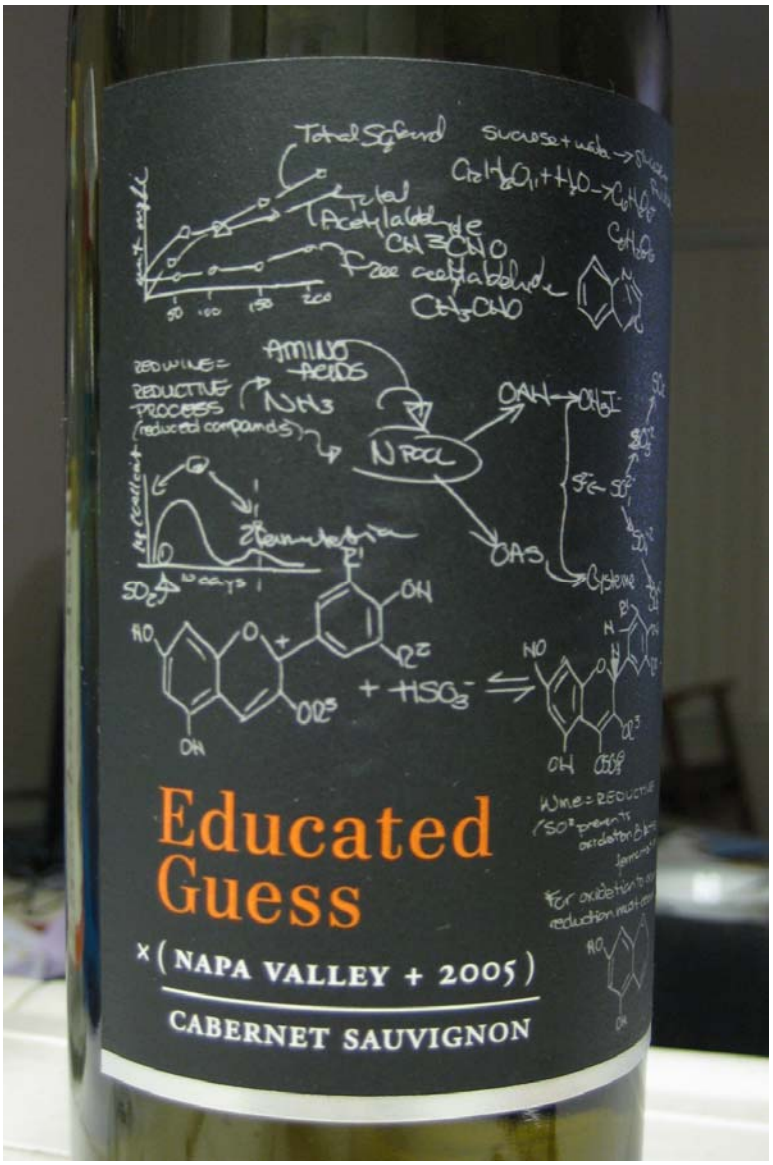
CHEMISTRY 302
11:15 AM
EXAM 3
1 MAY 2009

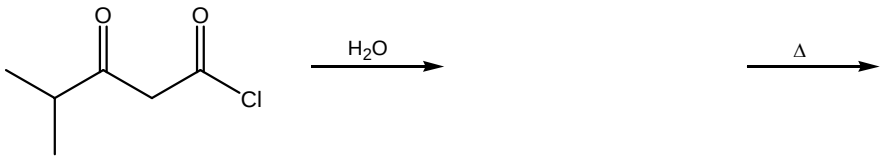
Name: _____

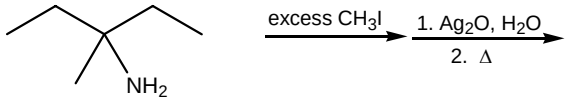
Note: Your exam should consist of 5 pages including the cover page and grade tabulation sheet. Skim the entire exam, and solve the easiest problems first. Exams not returned when time is called will not be graded.

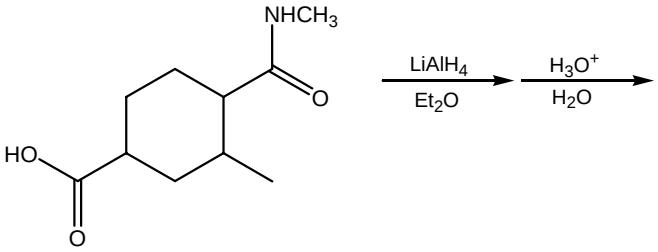


PLEASE DO NOT OPEN THIS EXAM UNTIL YOU ARE INSTRUCTED TO DO SO.

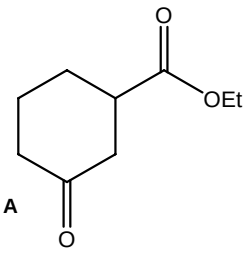
1. (6 pts each) Predict the major product of the following reactions. Mechanisms and explanations are not necessary.

a. 

b. 

c. 

2. (14 pts) Only one of the keto esters to the right can be formed by a Claisen (Dieckmann) condensation. Determine which one, show the necessary reactant(s), and write a complete mechanism for the reaction you propose. For partial credit, you may show any correct Claisen mechanism.



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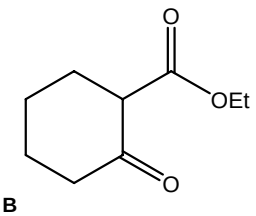
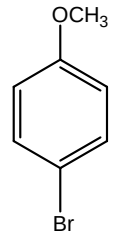
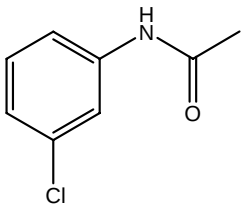


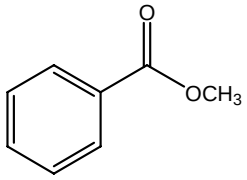
B

3. (10 pts) When 1,2-dichloro-3-cyanobenzene is treated with $NaOCH_3$ at 100 ^oC, one major product is obtained. Write an equation for the substitution, showing the product you expect. Give a mechanism to account for the formation of your proposed product.

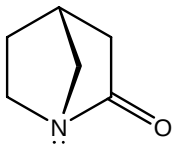
4. (10 pts each) Show how you would convert nitrobenzene into the following compounds. Assume any reagents you need are available. Mechanisms and explanations are not required. Answer any TWO of the three parts.

(a) 

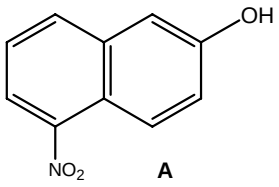
(b) 

(c) 

5. (10 pts) The amide shown to the right exhibits an IR stretch for the carbonyl at 1751 cm^{-1}. Relative to the normal stretching range for an amide carbonyl (1680-1700 cm^{-1}), this value is quite high. Using a combination of drawings and words, explain why the amide carbonyl of this amide exhibits an unusually high stretching frequency.



6. a. (8 pts) Which of the phenols to the right is the stronger acid. Justify your answer using both words and drawings. Show any resonance structures that are central to your argument.



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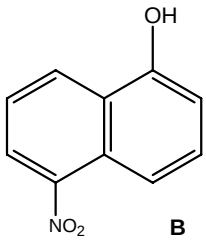
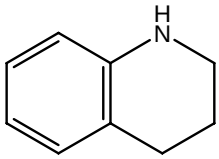


B

b. (8 pts) Which of the amines to the right is the stronger base? Justify your answer using both words and drawings. Show any resonance structures that are central to your argument.



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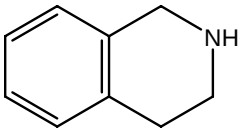

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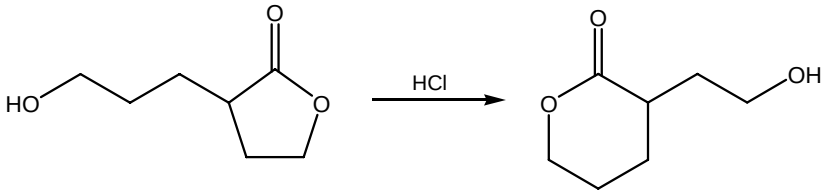
7. (12 pts) Provide a mechanism for the reaction shown below.



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Page	Points	Score
2	32	
3	40	
4	28	
Total	100	