

CHEM 3331-100 Spring 2007

Exam 3

Professor R. Hoenigman

High = 105

Low = 31

Average = 85

I pledge to uphold the CU Honor Code:

Signature _____

Name (printed) _____

Last four digits of your student ID number _____

Recitation TA _____

Recitation number, day, and time _____

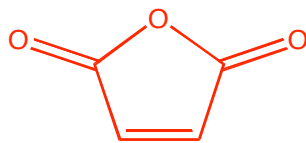
You have 1 hour and 30 minutes to complete this exam.
No model kits or calculators allowed.
Periodic table and scratch paper are attached.

DO NOT TURN THIS PAGE UNTIL INSTRUCTED TO DO SO.

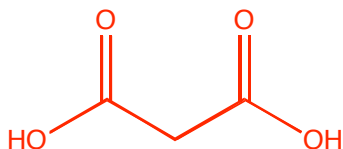
Recitation Sections:

| # | Day | Time | TA | SCORE: | |
|-----|----------|-------|-----|-----------------|-----------------|
| 122 | Monday | 5 pm | Tom | | |
| 121 | Tuesday | 8 am | Tom | Page 1 _____/20 | Page 3 _____/30 |
| 131 | Tuesday | 12 pm | Tom | | |
| 132 | Tuesday | 12 pm | Lee | Page 2 _____/20 | Page 4 _____/30 |
| 161 | Thursday | 8 am | Tom | | |
| 171 | Thursday | 12 pm | Lee | | |
| | | | | TOTAL _____/100 | |

Extra Credit (5 pts) Draw maleic anhydride.



1. (5 pts) Draw malonic acid.

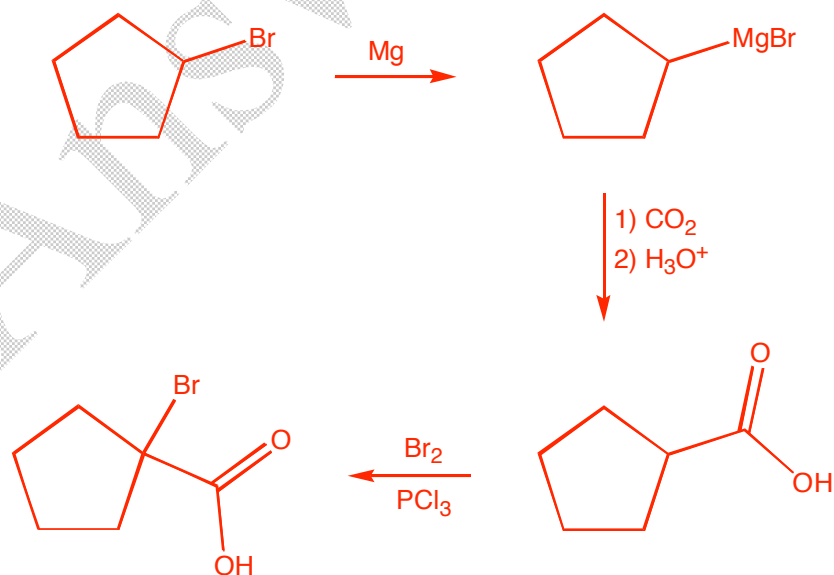


2. (5 pts) What are the two main steps of a nucleophilic acyl substitution reaction?

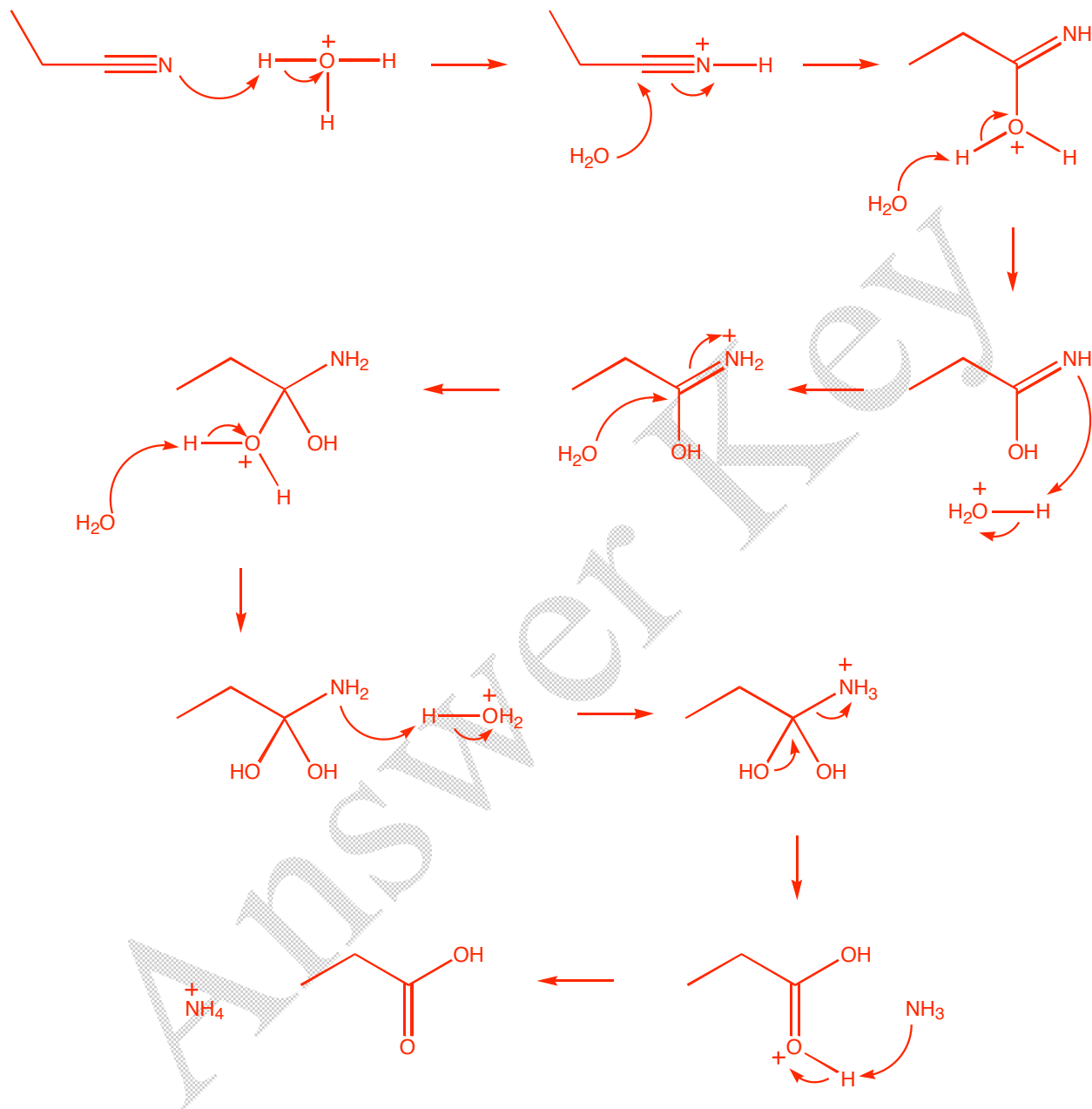
- 1) Nucleophilic attack at the carbonyl carbon to generate a tetrahedral intermediate.
- 2) Dissociation of the tetrahedral intermediate.

3. (10 pts) Propose an efficient synthesis of 1-bromocyclopentanecarboxylic acid from cyclopentyl bromide.

Book Problem 19.24f

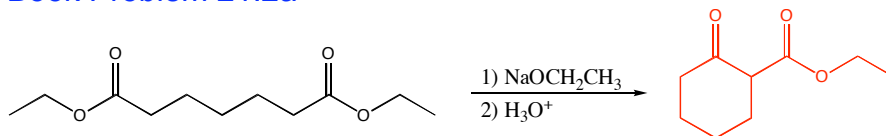


4. (20 pts) Using arrows to show the flow of electrons, propose a mechanism for the hydrolysis of propanenitrile in acidic solution.

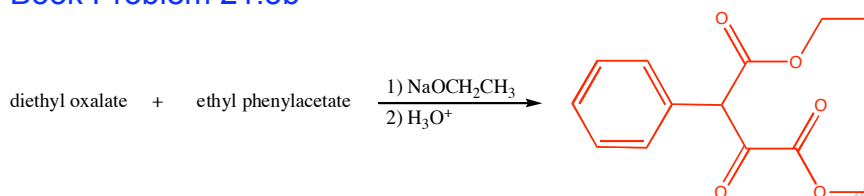


5. (20 pts) Draw the major organic product(s) of the following reactions. Write NR if no reaction occurs. Be sure to show stereochemistry if necessary.

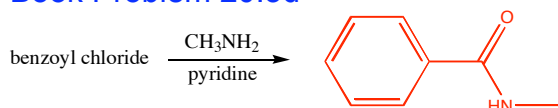
A. **Book Problem 21.2a**



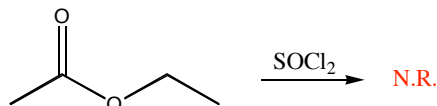
B. **Book Problem 21.3b**



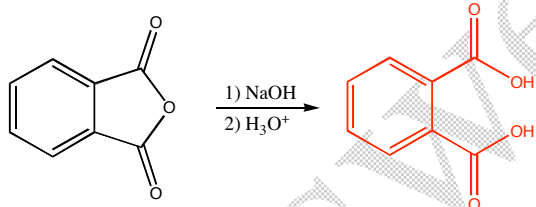
C. **Book Problem 20.3d**



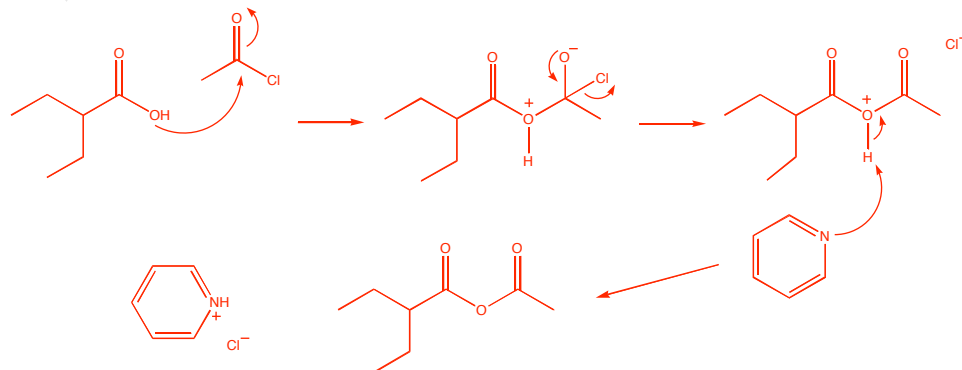
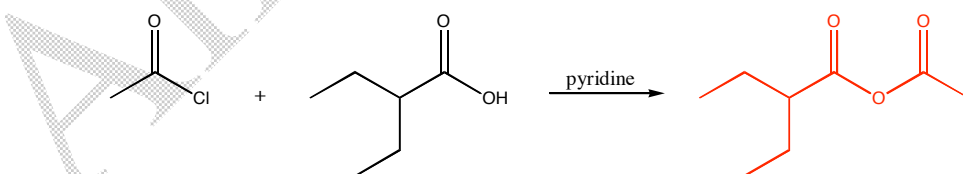
D.



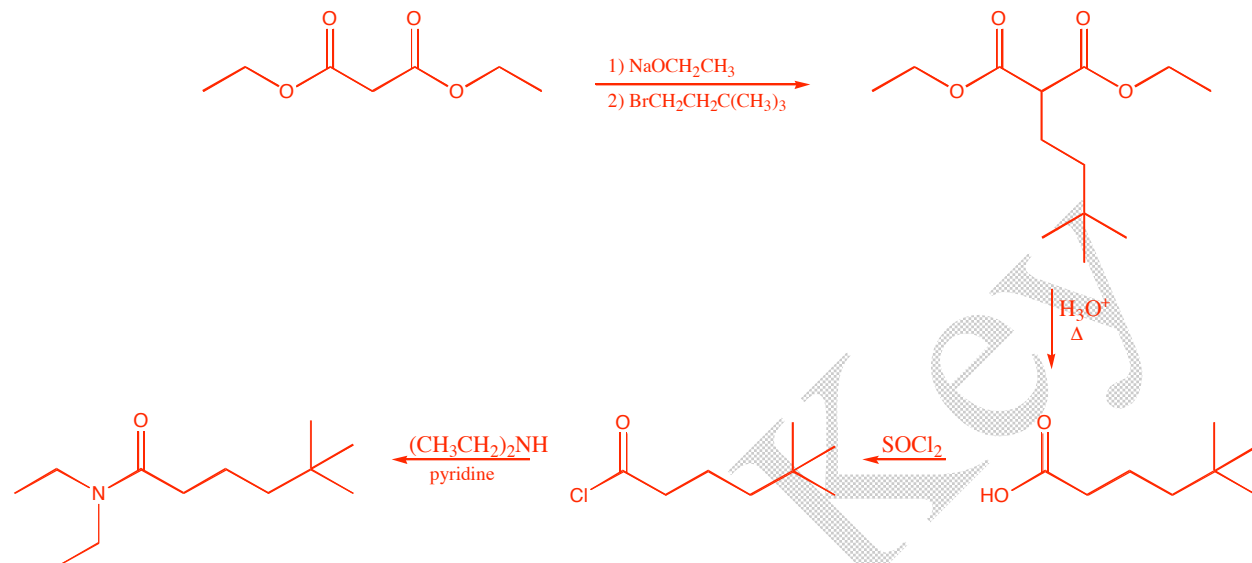
E. **Book Problem 20.5d**



6. (10 pts) Fill in the organic product(s) of the following reaction and give a mechanism for its formation.



7. (15 pts) Use the malonic ester synthesis and any other necessary transformations to synthesize *N,N*-diethyl-5,5-dimethylhexanamide. You must start with diethyl malonate, but you may use any reagents you like.



8. (15 pts) Propose an efficient synthesis for the ketone below. You must start your synthesis with the Claisen condensation of methyl acetate. You may use any other reactions and reagents you like.

