

# Chemistry 2542

## Spring Semester 2008; Midterm 3 Exam

April 30, Wednesday, 1:00 to 1:50 pm

This exam has 6 problems (100 pts) on 8 pages. Make sure your copy is complete and correct.

Printed Name (LAST, First) \_\_\_\_\_

Your graded exams will be available Friday, May 2, before class.

Good Luck!

**Chemistry 2542**  
**Spring 2008; Midterm 3 Exam**

This exam has 6 problems on 8 pages. Make sure your copy is complete and correct.

Printed Name (Last, First) \_\_\_\_\_

**Scores:**

Problem 1: \_\_\_\_\_

Problem 2: \_\_\_\_\_

Problem 3: \_\_\_\_\_

Problem 4: \_\_\_\_\_

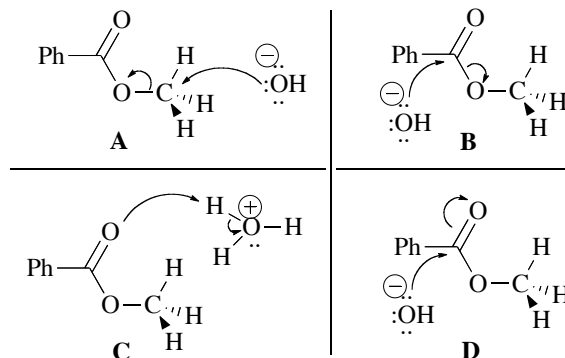
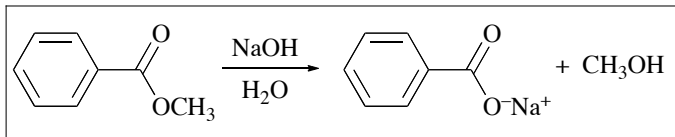
Problem 5: \_\_\_\_\_

Problem 6: \_\_\_\_\_

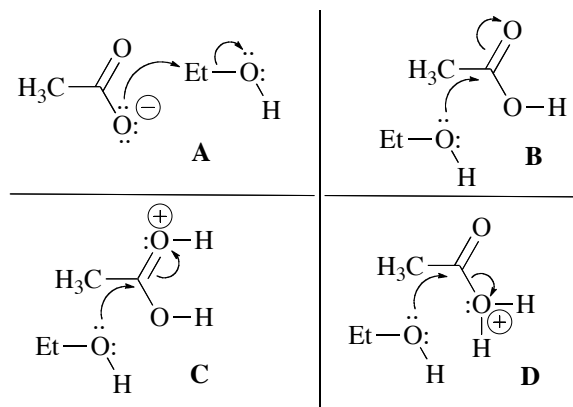
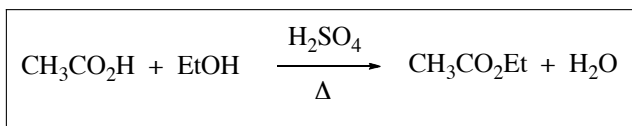
Total: \_\_\_\_\_

1. (15 pts) Answer the questions on mechanisms of the following reactions

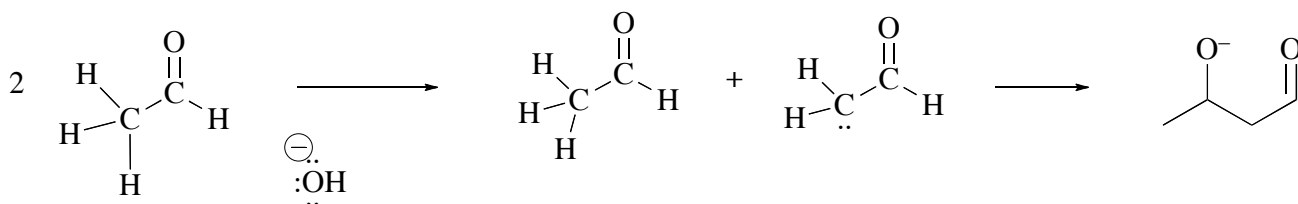
(a) Which one of the following four schemes (A-D) represents a step in the mechanism for the **saponification** reaction shown in the box (circle the correct answer; 5 pts)



(b) Which one of the following four schemes (A-D) represents an important step in the mechanism of the reaction in the box (circle the correct answer; 5 pts)

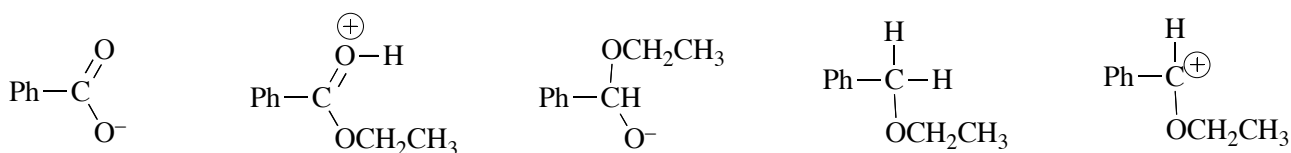
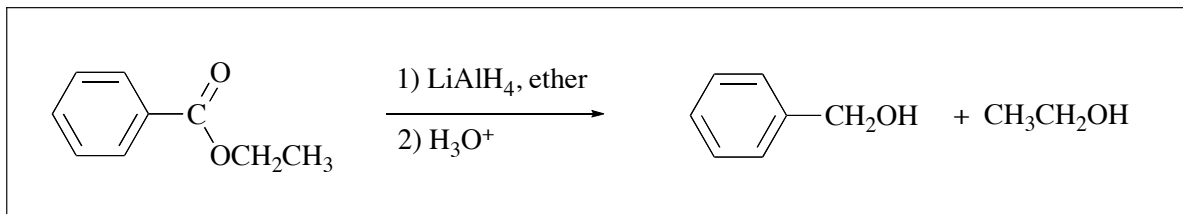


(c) Write **4** curved **arrows** and one **charge** missing in the mechanism for the **aldol condensation** (5 pts; 1 pt each):

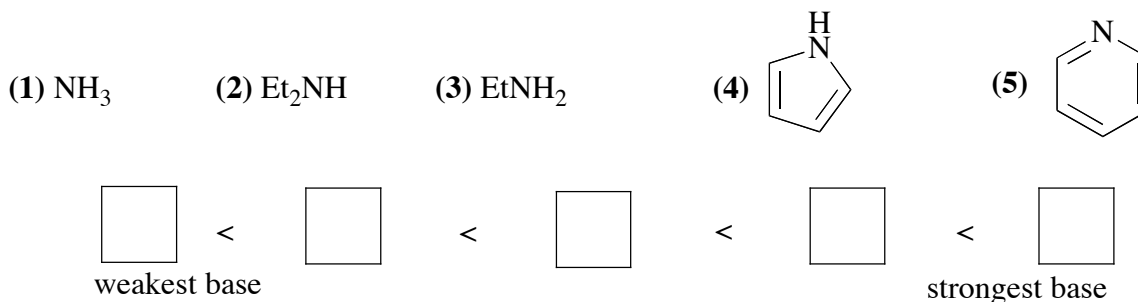


2. (15 pts) Answer the following questions.

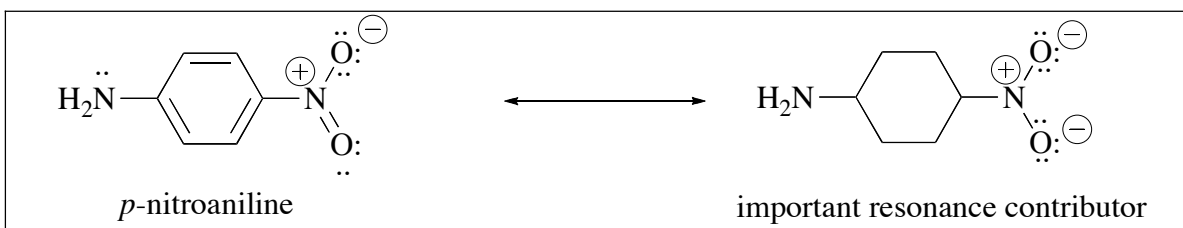
(a) (5 pts) Circle the structure of the **intermediate** product for the reaction in the box:



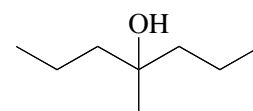
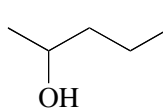
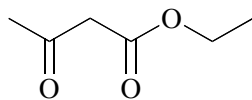
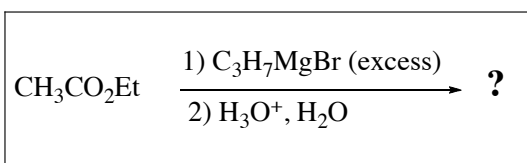
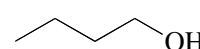
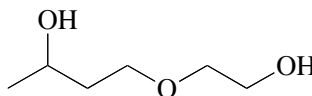
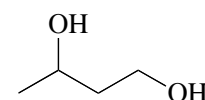
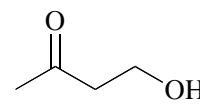
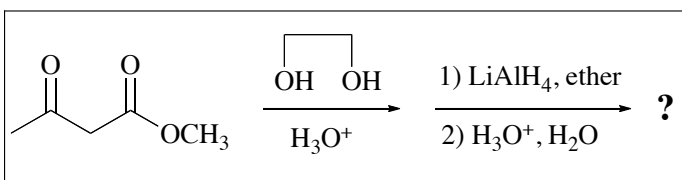
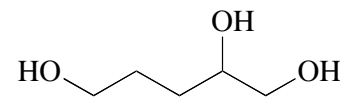
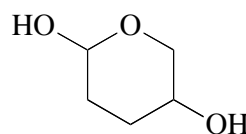
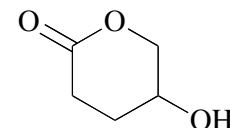
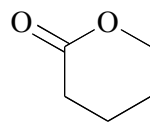
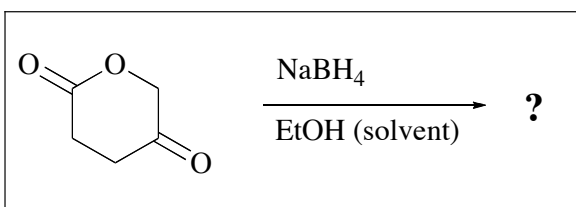
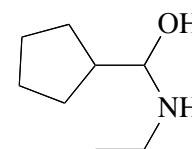
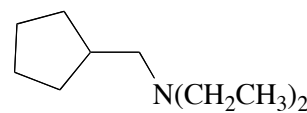
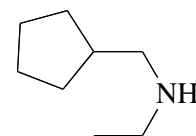
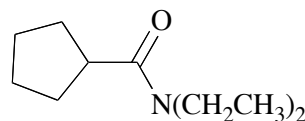
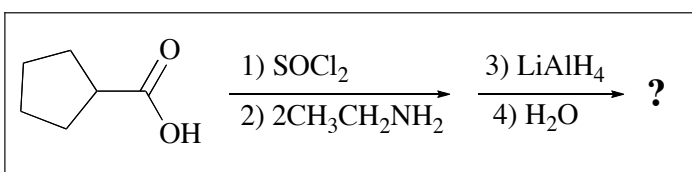
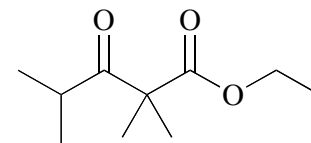
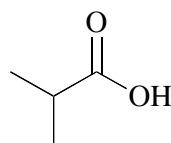
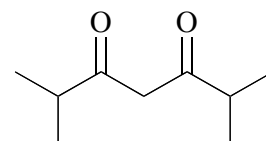
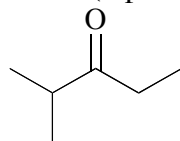
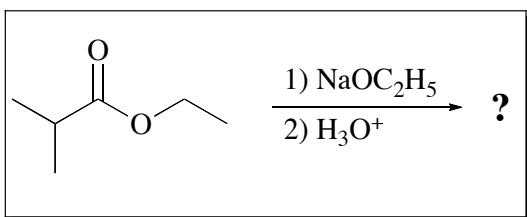
(b) (5 pts) Arrange the following compounds in order of increasing basicity (place a number **1-5** in the appropriate box, 1 pt each box):



(c) (5 pts) Finish drawing of the important resonance contributor of ***p*-nitroaniline** that explains its **low basicity** (1 pt for each of the *five missing fragments*):



3. (20 pts) Circle the **product** in the following reactions (4 pts each):

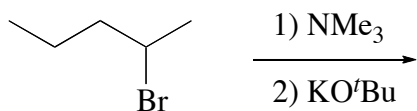
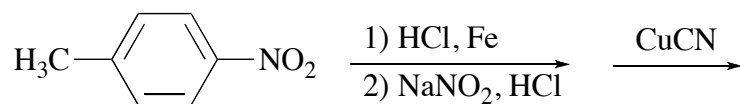
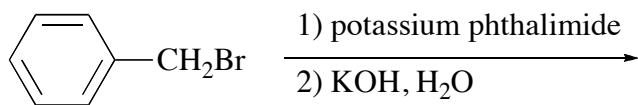


CH<sub>3</sub>CH(OH)C<sub>3</sub>H<sub>7</sub>

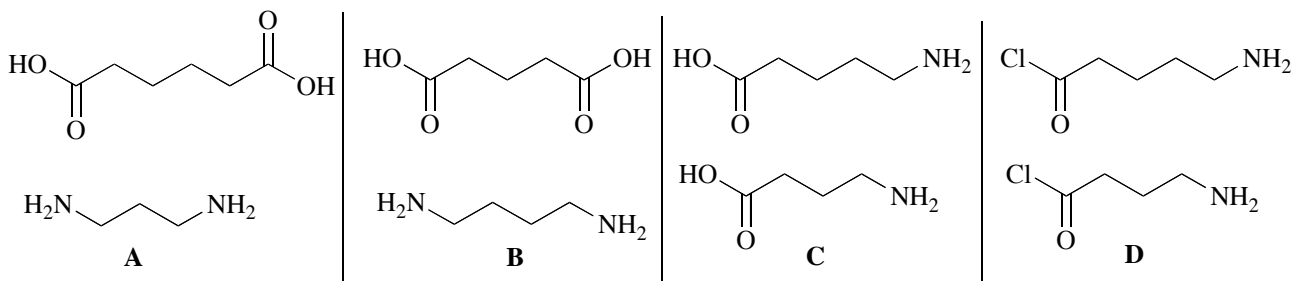
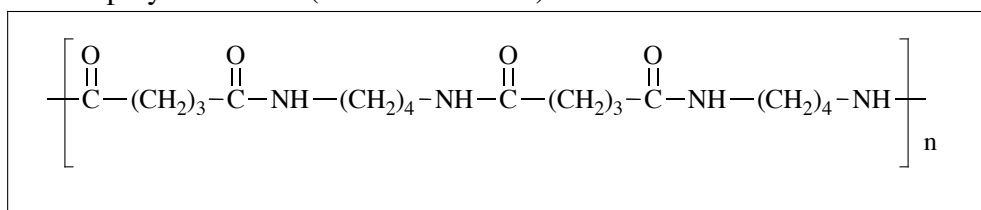
CH<sub>3</sub>CO<sub>2</sub>C<sub>3</sub>H<sub>7</sub>

4. (20 pts) Answer the following questions:

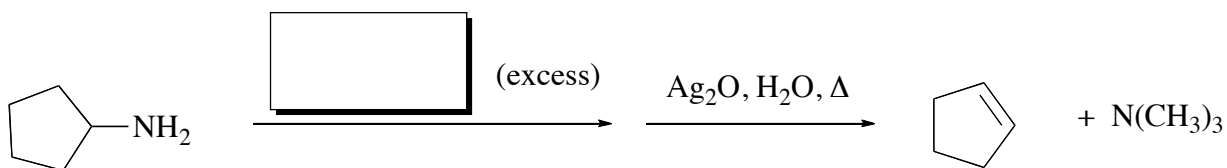
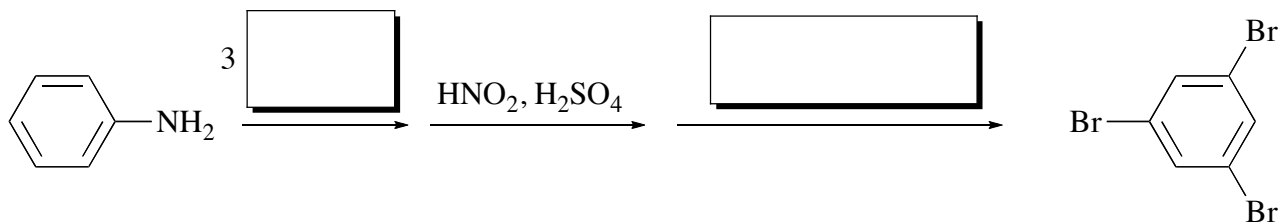
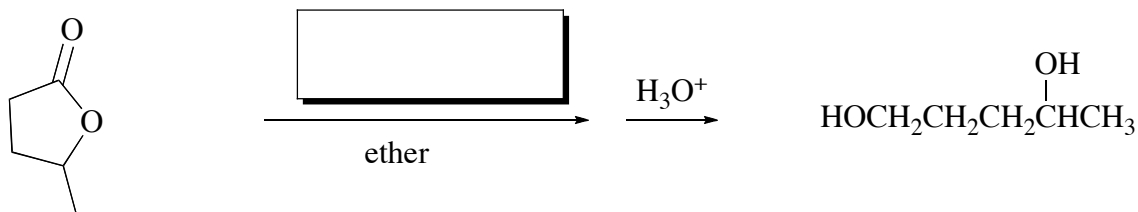
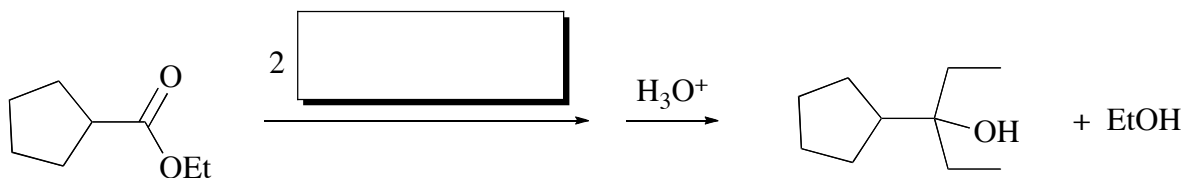
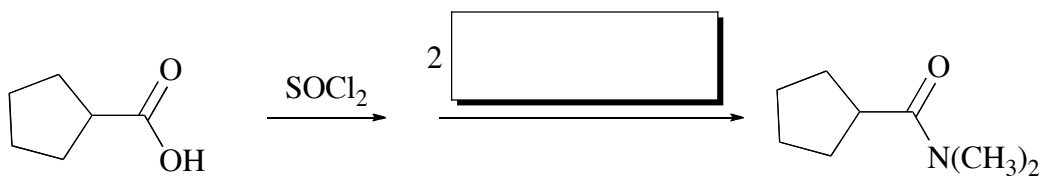
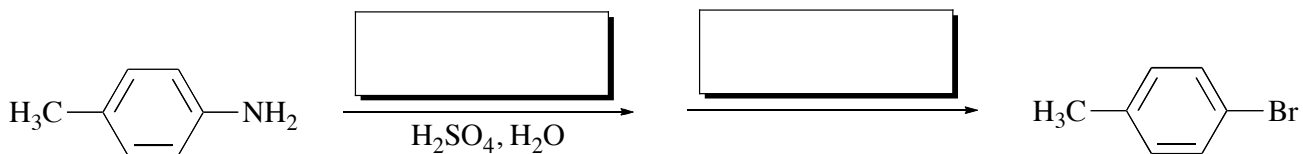
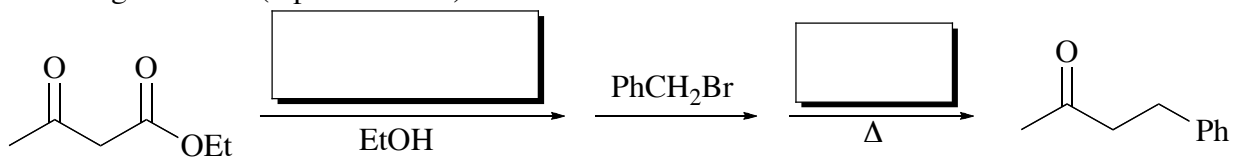
(a) (15 pts) Draw the structure of the main product for each the following reactions (5 pts each product)



(b) (5 pts) What pair of reagents (A-D) is required to manufacture the following polyamide through a polycondensation polymerization (circle the answer):

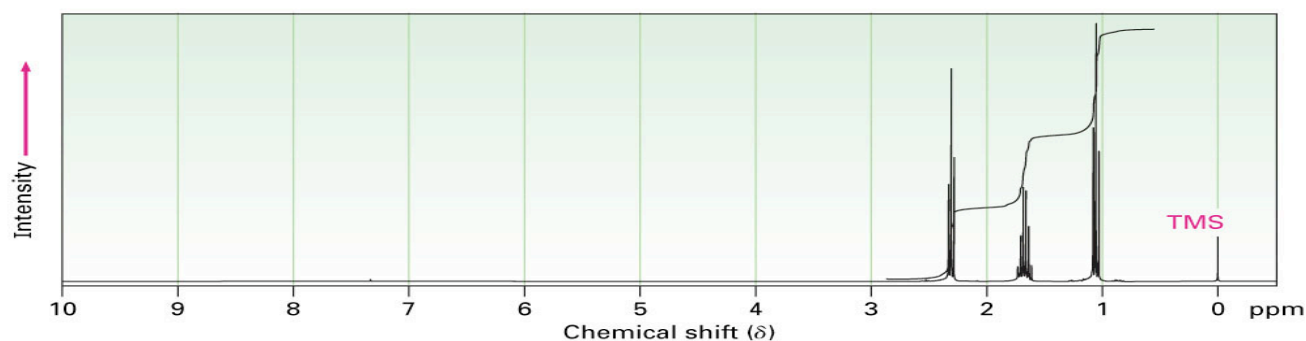
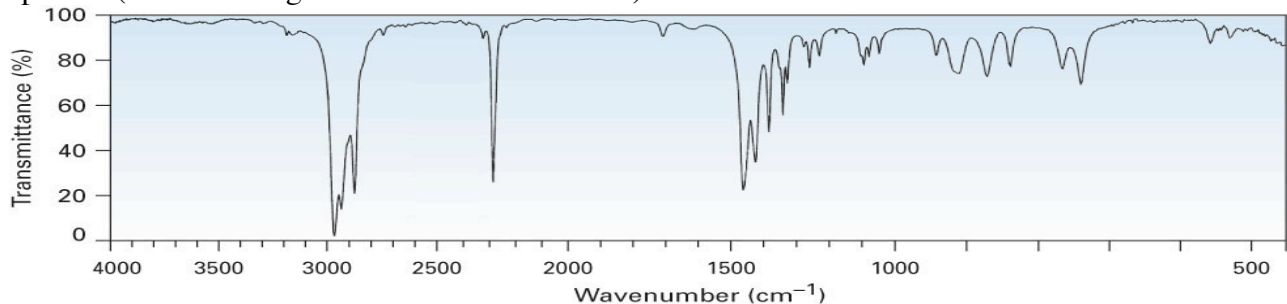


5. (20 pts) Place in each box the molecule of a reagent that is required to perform each of the following reactions (2 pts each box):



6. (10 pts) Answer the following questions:

(a) (6 pts) Draw the structure of a compound,  $C_4H_7N$  that exhibits the following  $^1H$  NMR and infrared spectra. (The NMR signal at delta 1.7 is a sextet.)



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Answer:

(b) (4 pts) Circle the **product** in the following reaction. The  $^1H$  NMR of the product is shown.

