

CHEM 347 – Organic Chemistry II (for Majors)

Instructor: Paul J. Bracher

Quiz #4

Due in Monsanto Hall 103 by:
Friday, April 4th, 2014, 7:00 p.m.

Student Name (Printed)	
Student Signature	

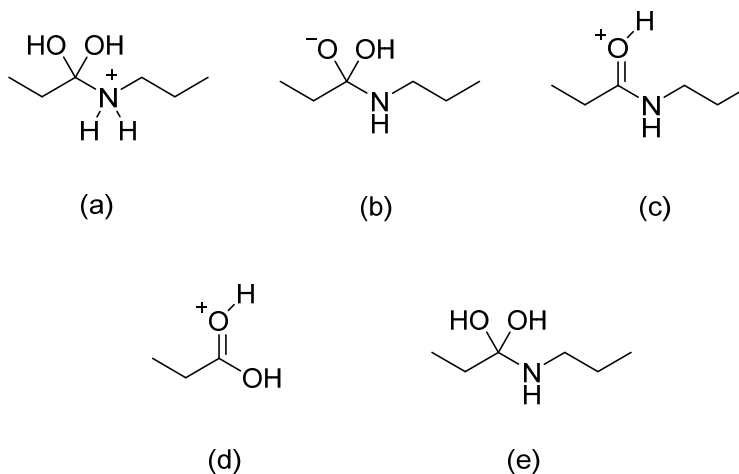
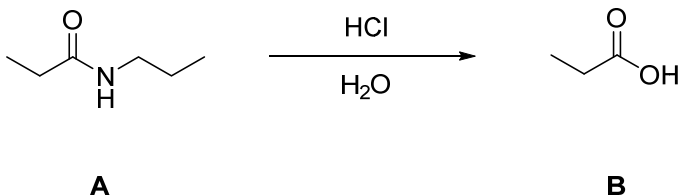
Instructions & Scoring

- This quiz must be turned in by the due date listed above.
- You are allowed access to any materials you wish and may discuss the questions with other students.
- Place your answers on the official answer sheet. If you print your own, please print it back-to-back on a single sheet of paper.
- Your quiz may be photocopied.

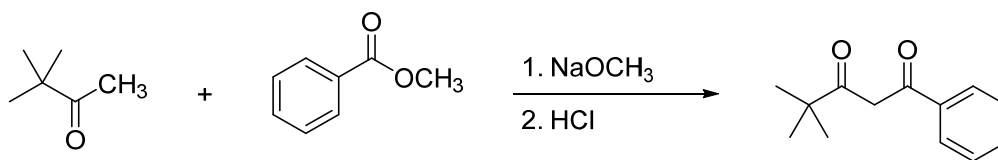
Problem	Points Earned	Points Available
I		24
II		25
III		21
IV		15
V		15
TOTAL		100

Problem I. Multiple choice (24 points total; +4 points for a correct answer, +1 points for an answer intentionally left blank, and 0 points for an incorrect answer.) For each question, select the best answer of the choices given. Write the answer, legibly, in the space provided on the answer sheet.

- (1) _____ Which of the following species is not an intermediate in the mechanism for the formation of **B** from **A** in water with hydrochloric acid?



- (2) _____ Which of the following statements best describes the following reaction?

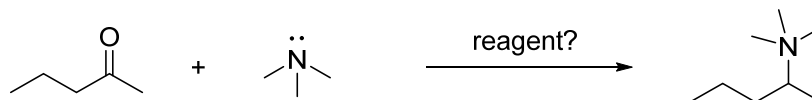


- (a) the reaction requires a catalytic amount of sodium methoxide
 (b) methanol is produced as a byproduct
 (c) CO₂ is produced as a byproduct
 (d) Statements (a) and (b) are correct
 (e) Statements (a), (b), and (c) are correct

(3) _____ Which of the following reactions would not produce phenol after workup with mildly acidic water?

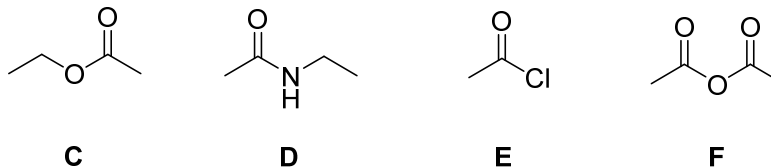
- (a) PhN_2^+ + water
- (b) phenyl acetate + H_3O^+ + heat
- (c) phenyl acetate + NaOH + heat
- (d) phenylmagnesium bromide + water
- (e) all of these reactions will produce phenol after workup

(4) _____ Which of the following reagents is the best choice for the following conversion?



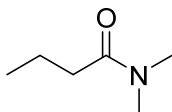
- (a) LiAlH_4
- (b) H_2 , Pd-C
- (c) NaBH_4
- (d) NaBH_3CN
- (e) None of the above reagents will effect this conversion

(5) _____ Rank the following molecules in order of slowest-to-fastest rate of reaction in hot acidic water to liberate acetic acid. The slowest-reacting compound is listed first in each answer choice.

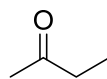


- (a) $\text{C} < \text{D} < \text{E} < \text{F}$
- (b) $\text{D} < \text{C} < \text{F} < \text{E}$
- (c) $\text{E} < \text{F} < \text{C} < \text{D}$
- (d) $\text{D} < \text{C} < \text{E} < \text{F}$
- (e) $\text{D} < \text{F} < \text{C} < \text{E}$

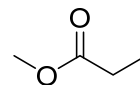
(6) _____ Which of the following compounds is the weakest acid (i.e., has the highest pK_a)?



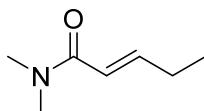
(a)



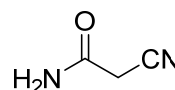
(b)



(c)



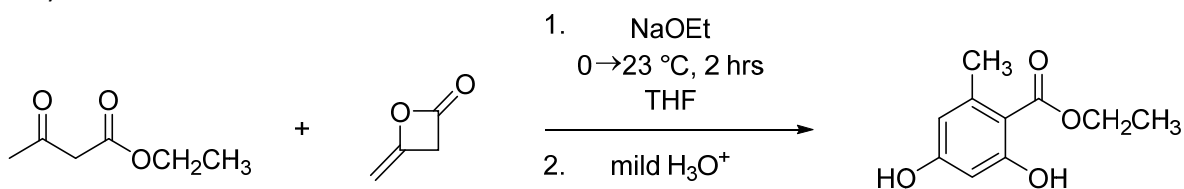
(d)



(e)

Problem II. Mechanism (25 points). Draw a sensible mechanism for the transformation shown below. Remember to use proper “curved arrow notation” to account for the movement of electrons in the making and breaking of bonds. Show all steps (i.e., draw all intermediates). For this problem, you only need to draw one resonance form for any intermediates with multiple resonance forms.

(a) (20 points)



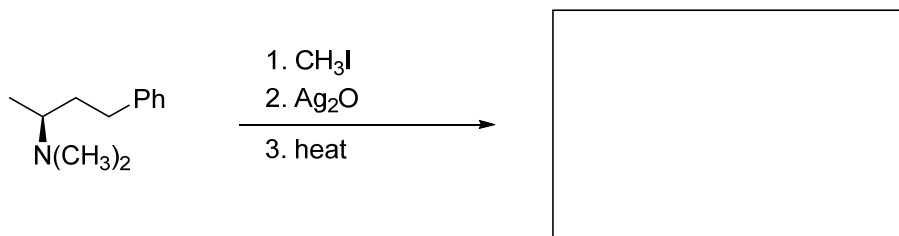
37%

(b) (5 points)

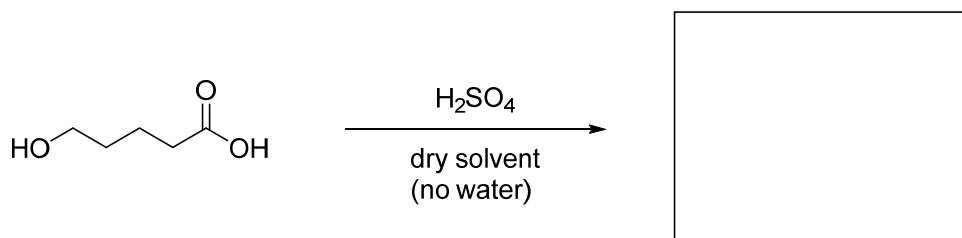
The last step of the mechanism for the reaction above involves a tautomerization. Usually, keto tautomers are favored over enol tautomers. Explain what provides the driving force to favor the enol tautomer in this reaction.

Problem III. Reactions (21 points). The following chemical reactions are missing their starting materials, products, or reagents. Write the missing compounds into the empty boxes below, as appropriate. For missing products, draw the single organic product that you expect to be produced in the highest yield among all of the possibilities. In some cases, there will be more than one correct answer that will merit full credit.

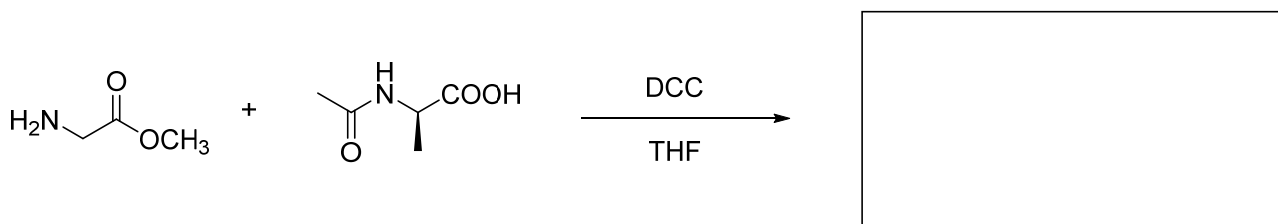
(1) (7 points)



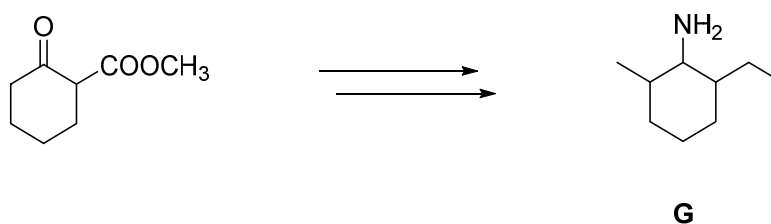
(2) (7 points)



(3) (7 points)



Problem IV. Synthesis (15 points). Design an efficient synthesis of compound **G** from the indicated starting material and any other reagents you wish.



Problem V. Synthesis (15 points). Design an efficient synthesis of compound **H** using aniline and any compounds you wish with three or fewer carbon atoms as the only sources of carbon in the product. (Any reagents or solvents you use that have more than three carbon atoms can't contribute carbon atoms to the final product.)

