CHEM 343 – Principles of Organic Chemistry II – Summer 2014

Instructor: Paul J. Bracher

Quiz #3

Monday, July 21st, 2014

10:30 a.m. (in class)

Student Name (Printed)	
Student Signature	

Instructions & Scoring

- Please write your answers on the official answer sheet. No answers marked in this booklet will be graded.
- You may use any resources you wish and collaborate with others.
- Your quiz answer sheet may be photocopied.

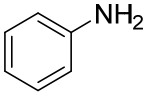
Problem	Points Earned	Points Available
I		28
II		21
III		21
IV		30
TOTAL		100

This quiz focuses on Chapters 22, 23, 24, and 25 in Janice Smith's *Organic Chemistry*, 4th ed.

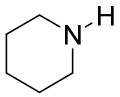
Problem I. Multiple choice (28 points total; +4 points for a correct answer, +1 point for an answer intentionally left blank, and 0 points for an incorrect answer). For each question, select the best answer of the choices given. Write the answer, legibly, in the space provided on the answer sheet.

(1) _____ Which of the following compounds is the strongest Brønsted–Lowry base?

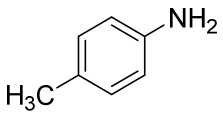
(a)



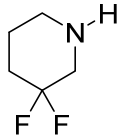
(b)



(c)



(d)



(e)

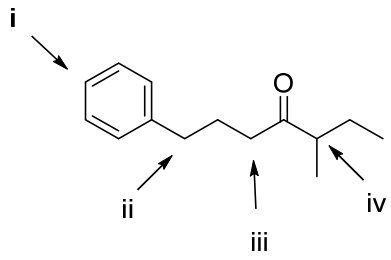
(2) _____ For which of the following reactions would HCl <u>not</u> serve the role of a <u>catalyst</u> in aqueous solution?

(a) hydrolysis of 2,2-dimethoxypropane (the dimethyl acetal of acetone)
(b) hydrolysis of ethyl acetate (an ester)
(c) isomerization of acetone to its enol tautomer
(d) hydrolysis of *N*,*N*-dimethylacetamide (a tertiary amide)
(e) hydrolysis of acetic anhydride (an acid anhydride)

(3) _____ Which of the following sets of reagents will generate the highest yield of a <u>secondary</u> amide from 1 millimole (1 mmol) of benzoyl chloride (an acid chloride)?

(a) 1 mmol of $CH_3CH_2NH_2$ + 1 mmol of pyridine
(b) 1 mmol of $CH_3CH_2NH_2$ + 1 mmol of NH_3
(c) 2 mmol of $CH_3CH_2NH_2$ + 1 mmol of NH_3
(d) 1 mmol of $(CH_3)_2NH$
(e) 2 mmol of $(CH_3)_2NH$

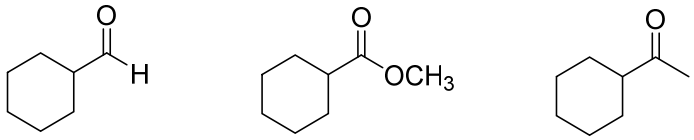
(4) _____ Which of the labeled carbon atoms on compound (**A**) has the most acidic hydrogen atom in the molecule?



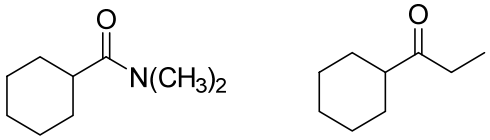
A

(a) i
(b) ii
(c) iii
(d) iv
(e) compound **A** has no hydrogen atoms

(5) _____ Which of the following compounds will react with excess aqueous I_2 and NaOH to form a yellow precipitate?

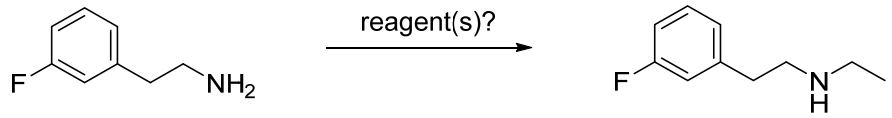


(a) (b) (c)



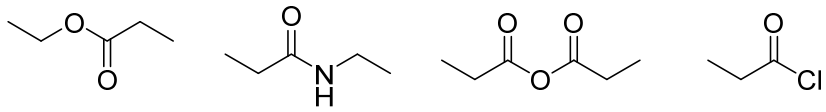
(d) (e)

(6) _____ Which of the following reagents is/are the best choice to effect the conversion drawn below?



(a) CH_3I
(b) CH_2CH_3I
(c) CH_2CH_3I, pyridine
(d) CH_2O (2 eq.)
(e) CH_3CHO, $NaBH_3CN$

(7) _____ Rank the following molecules in order of thermodynamic stability toward hydrolysis from <u>most-to-least</u> stable. (The most stable compound is listed first in each answer choice.)

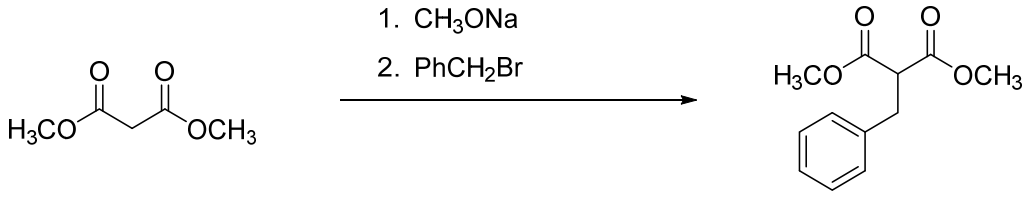


B **C** **D** **E**

(a) **B** > **C** > **D** > **E**
(b) **C** > **B** > **E** > **D**
(c) **C** > **B** > **D** > **E**
(d) **C** > **E** > **B** > **D**
(e) **D** > **E** > **B** > **C**

Problem II. Mechanism (21 points).

(1) (15 points) Draw a sensible mechanism for the following reaction. Remember to use proper "curved arrow notation" to account for the redistribution of electrons in the making and breaking of bonds. Show all significant resonance forms that account for the stability of the intermediates in the reaction.

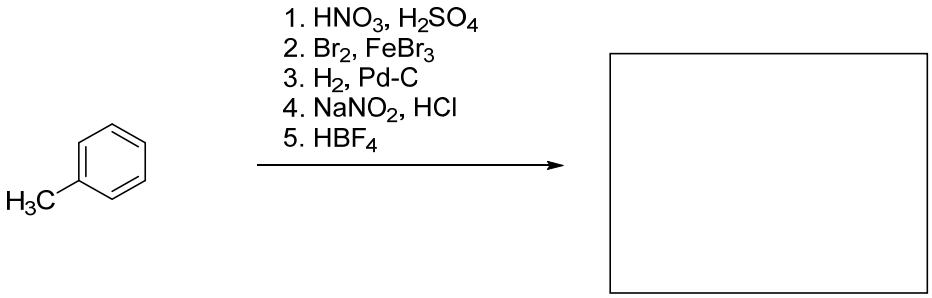


F **G**

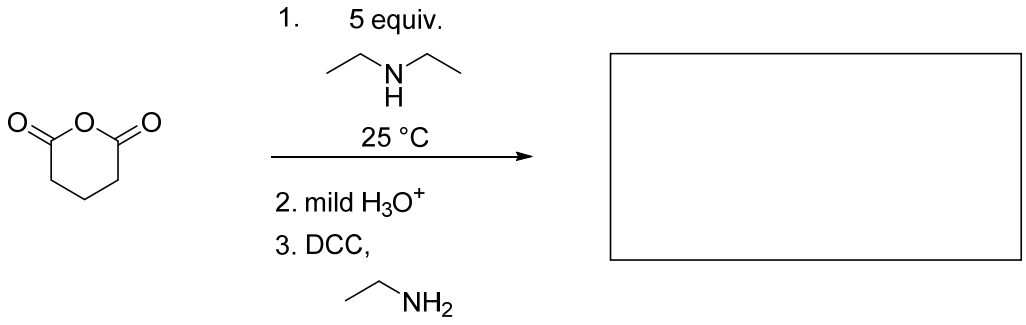
(2) (6 points) What product will form if compound **G** is heated in hot aqueous acid?

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.

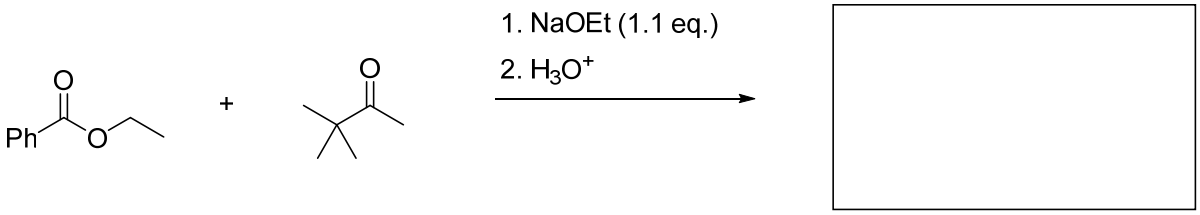
(1) (7 points)



(2) (7 points)

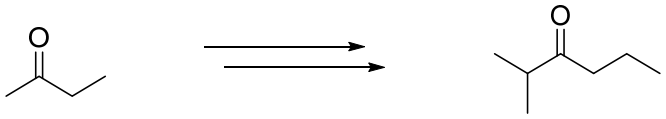


(3) (7 points)



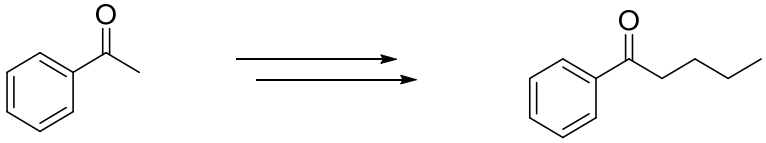
Problem IV. Synthesis (30 points). Design efficient synthetic routes for compounds **H** and **J** from the indicated starting materials and any other reagents you wish, but be sure to follow the constraints listed!

(1) (15 points) Synthesize compound **H** from the indicated starting material using LDA as your only base.



H

(2) (15 points) Synthesize compound **J** using no base stronger than sodium ethoxide (NaOEt). Hint: you might want to use diethyl carbonate (EtOCOOEt) as a reagent.



J