

Final Exam
Organic Chemistry C3444—Section 2
Prof. Nuckolls
May 10, 2002

- Write your name on every page.
 - You should have 14 pages including this one.
 - Turn off your cellular phones.
 - Do your own work.
 - Good Luck!

Name: _____

Columbia I.D. #: _____

Signature: _____

Grading:

Section A _____ /60 points

Section B _____ /60 points

Section C _____ /60 points

Section D _____ /60 points

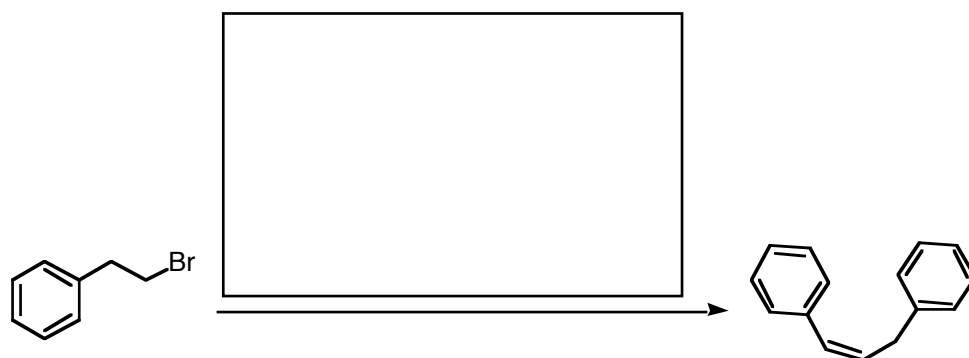
Section E _____ /60 points

Total _____ /300 points

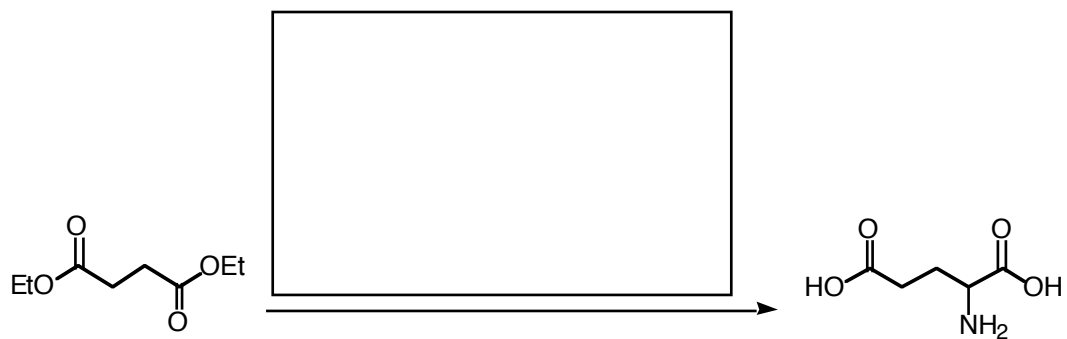
Section A. *Answer only 4 out of 5 of the following question. Clearly mark with an "X" the one that is not to be graded. If you answer all of them, only the first four will be counted.*

Write the answers to the questions below in the box provided. The syntheses may require multiple steps. To achieve partial credit for an *incorrect* answer you must show your work in the space below the equation. Mechanistic details are not necessary. (15 points each)

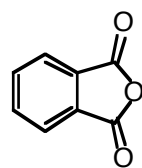
1.



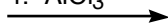
2.



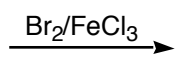
3.



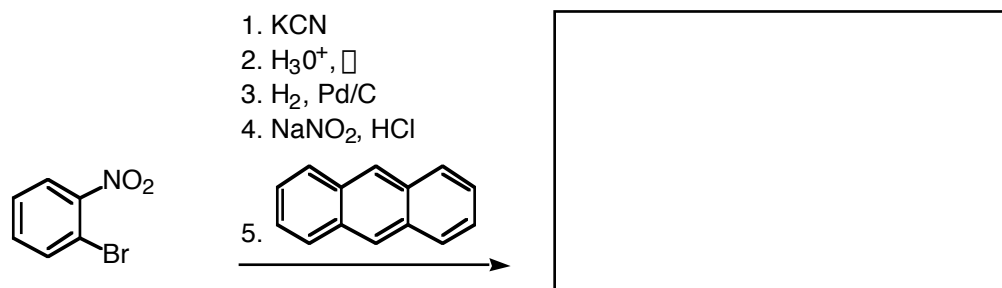
1. AlCl_3 , benzene
2. H_2 , Pd/C
3. SOCl_2
4. AlCl_3



4.



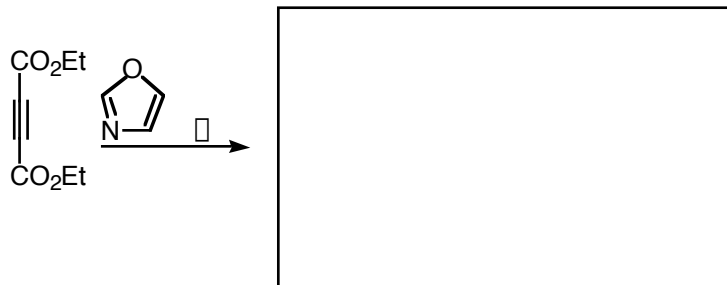
5.



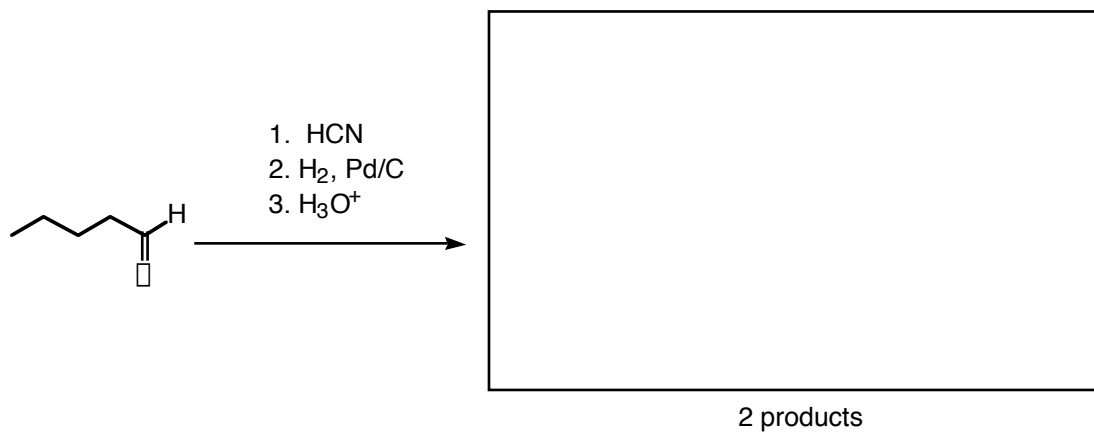
Section B. Answer only 4 out of 5 of the following question. Clearly mark with an "X" the one that is not to be graded. If you answer all of them, only the first four will be counted.

Write the answers to the questions below in the box provided. The syntheses may require multiple steps. To achieve partial credit for an *incorrect* answer you must show your work in the space below the equation. Mechanistic details are not necessary. (15 points each)

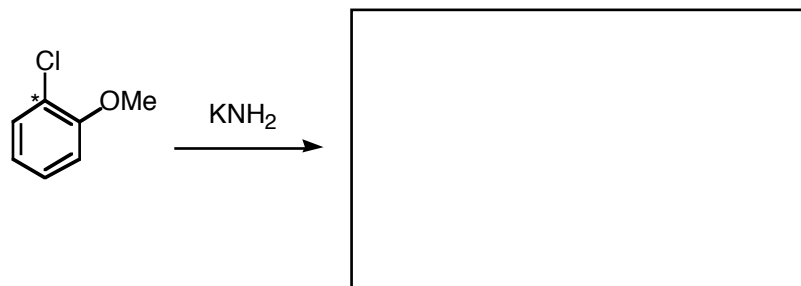
1.



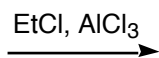
2. What is the stereochemical relationship between the two products?



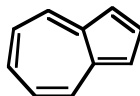
3. Show the position of the starred carbon in the product.



4. At least two products result from the reaction shown below. Draw two of their structures.



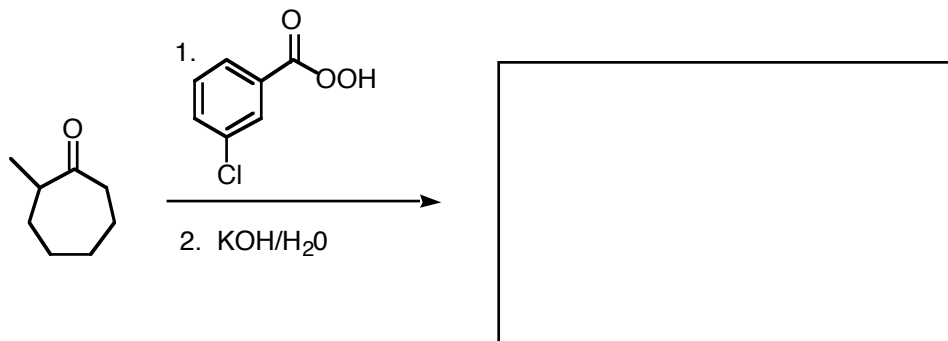
5. Draw a reasonable resonance structure for the compound below and based structure on that predict the direction of dipole moment. Explain *briefly*.



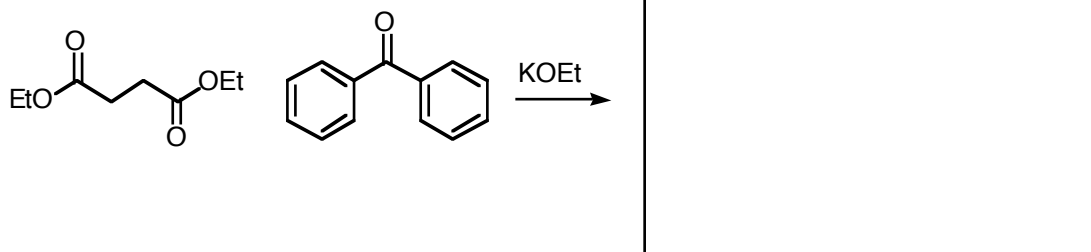
Section C. Answer only 4 out of 5 of the following question. Clearly mark with an "X" the one that is not to be graded. If you answer all of them, only the first four will be counted.

Write the answers to the questions below in the box provided. The syntheses may require multiple steps. To achieve partial credit for an *incorrect* answer you must show your work in the space below the equation. Mechanistic details are not necessary. (15 points each)

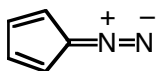
1.



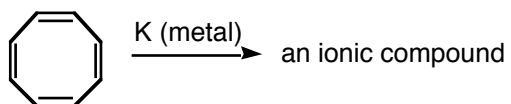
2.



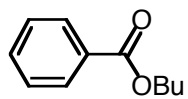
3. Diazoalkanes are typically very reactive. In the box provided draw structures and give an explanation of why the compound below is relatively stable?



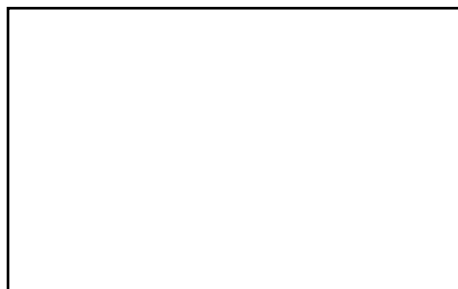
4 In the following transformation potassium metal donates electrons. Draw the product. What would you predict the shape of this molecule to be? Briefly explain why?



5.

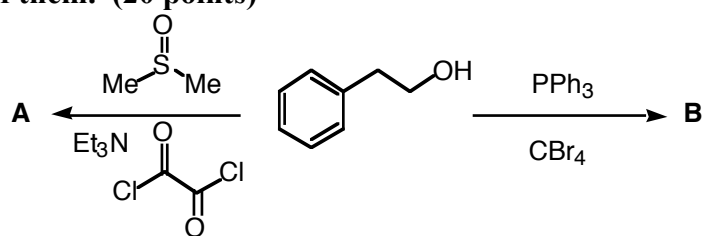


1. DIBAL (H_3O^+ workup)
2. KCN, EtOH
3. CrO_3 anhydrous

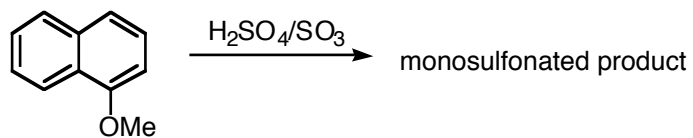


Section D.

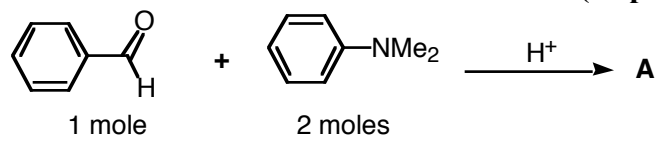
1. What are the products “A” and “B” below? Write a detailed mechanism for the formation of each of them. (20 points)



2. Show a mechanism for (a) the formation of the electrophilic species, (b) its attack by the substituted naphthalene shown below, (c) all resonance forms for the cationic intermediate, and (d) conversion to the monosulfonated product. Discuss *briefly* why that regioisomer is the preferred one. (20 points)

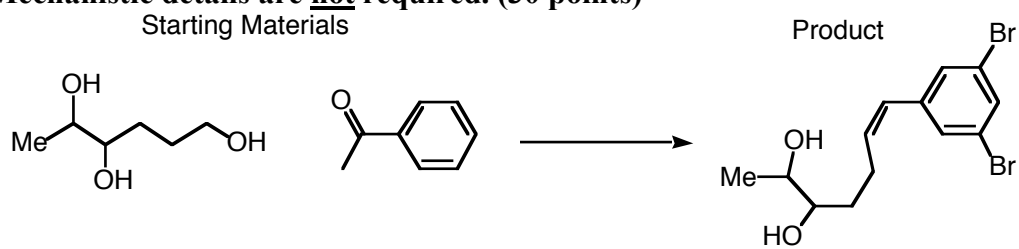


3. What is "A"? Write a detailed mechanism for its formation. (20 points)



Section E.

1. Show the steps to achieve the following transformation from the starting materials given. Mechanistic details are not required. (30 points)



2. Show the steps to achieve the following transformation from the starting material given. Introduce reagents and building blocks that have *no more than 4 contiguous carbons*. Mechanistic details are not required. (30 points).

