CHEM 3331, Professor Zhang, Spring 2014
Second hour exam, Mar 11, 2014

Printed Name: Exam Key Student ID:_____

Recitation TA Name:_____ Recitation day and time:_____

Scores:

1)

2)

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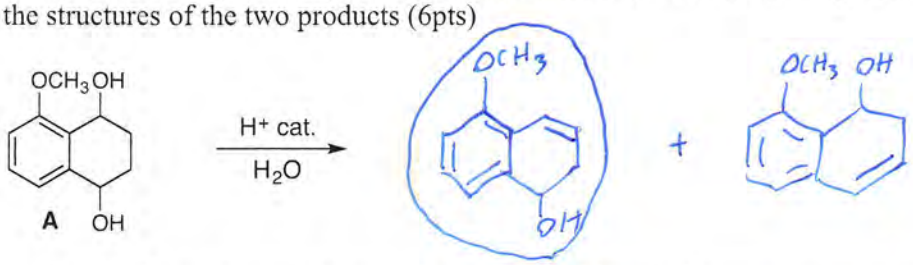
CU Honor Code Pledge: On my honor, as a University of Colorado at Boulder Student, I have neither given nor received unauthorized assistance.

This is a closed-book exam. The use of notes, models, calculators, scratch paper will not be allowed during the exam. Please put all your answers on the test. Use the backs of the pages for scratch.

Partial Periodic Table

1A	2A	3A	4A	5A	6A	7A	8A
1 H							2 He
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
						35 Br	
						53 I	

1) (20pts) a) Compound A is subjected to an acidic aqueous solution, which leads to the formation of two products (one major and one minor), each containing an alkene group. Give the structures of the two products (6pts)

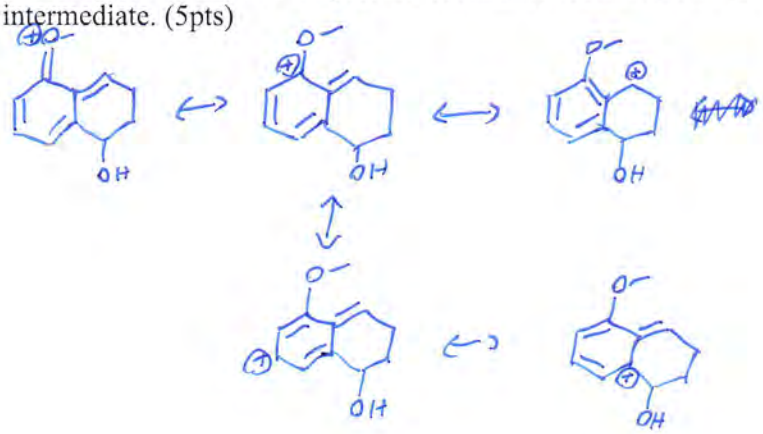


b) Which of these two products is the major one? Circle the major product. (3pts)

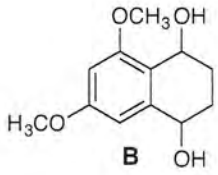
c) The reaction mechanism is (select one) (2pts):

a. S_N1 b. S_N2 c. E1 d. E2 e. Electrophilic aromatic substitution

d) The reactions above involve formation of reactive intermediate cations. For the major product, draw all the important resonance contributors to the structure of the cation intermediate. (5pts)



e) If compound B is subjected to the same reaction condition, will the reaction be faster or slower than compound A? Briefly explain the reasoning. (4pts)

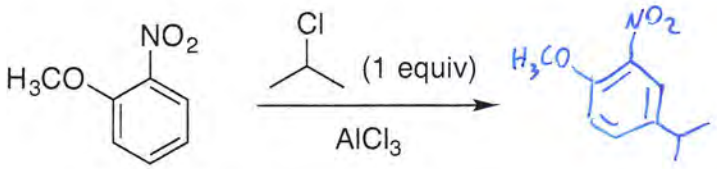


faster.
2 electron donating groups @ ortho & para positions speed up carbocation formation, which is the RDS

Total points for this page

2) (20 pts) Give the single major product of each of the following reactions, carefully showing stereochemistry if appropriate. If a racemate is formed, show only one enantiomer, and label it "rac". All reactions have an appropriate aqueous work up. (4 pts each)

a)



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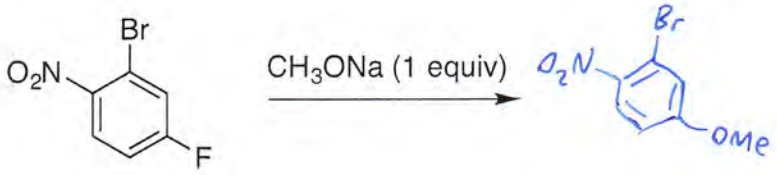
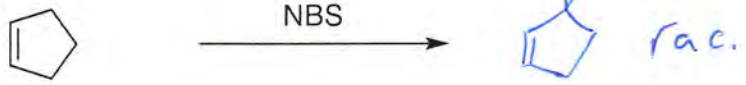
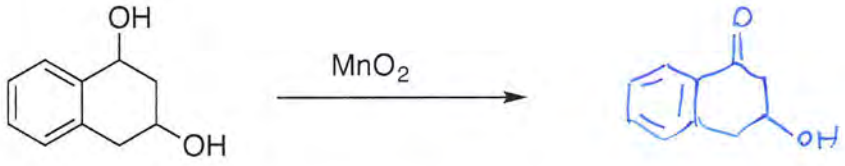


c)

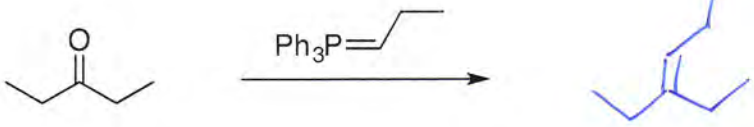


rac.

d)



e)



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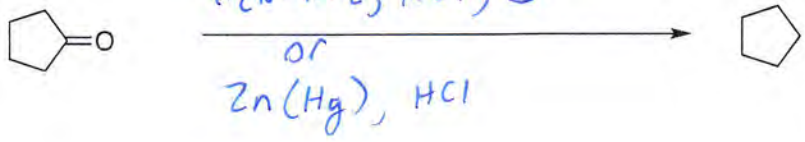
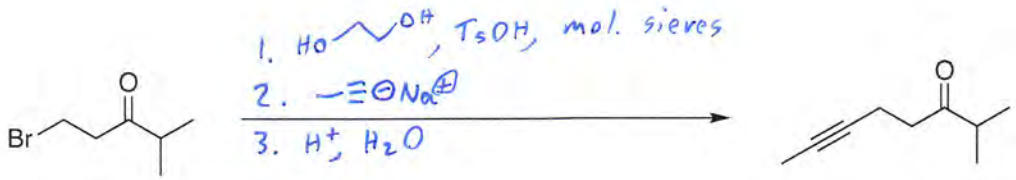
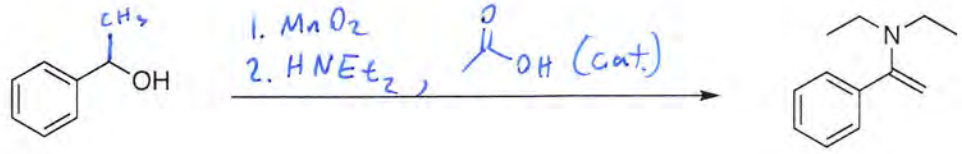
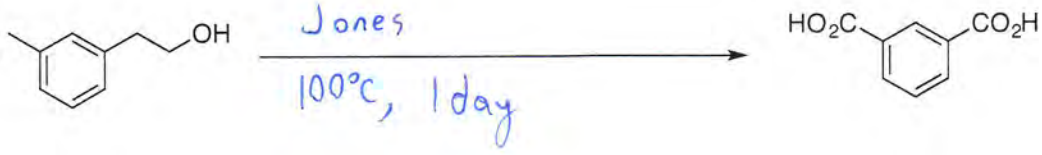
3) (20 pts) Propose reagents for accomplishing the following transformations. NOTE: more than one step may be required! Try to make your synthesis efficient (i.e. the desired product should be the major product, and generally a shorter synthesis is better than a longer one). You must use the starting material given; you may use any other reagents you need.

a) 

b) 

c) 

d) 

e) 

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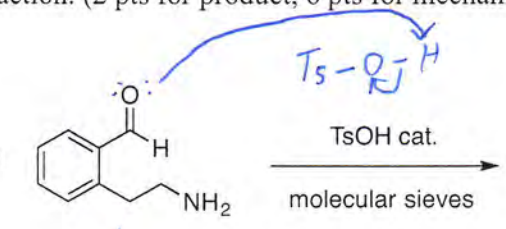
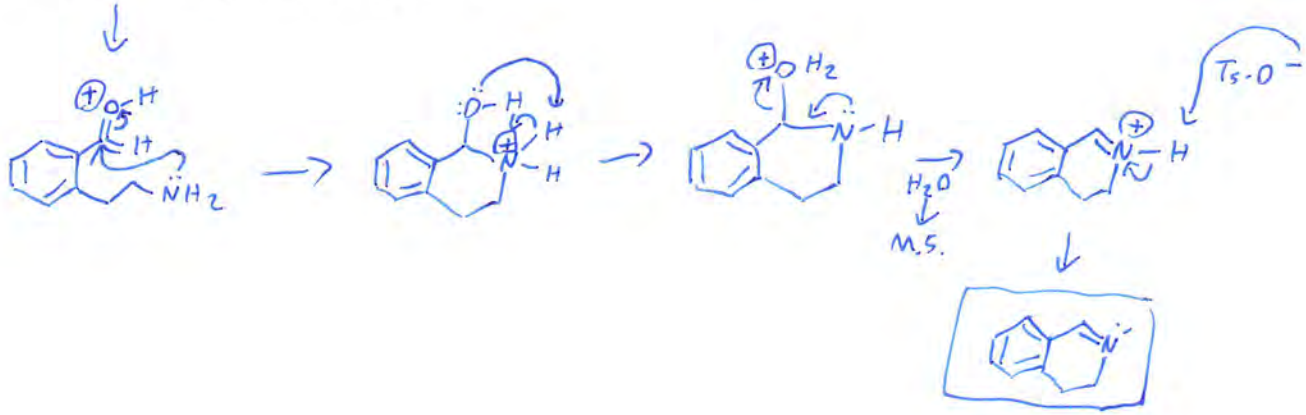
4) (16 pts) Provide the products and mechanisms for the following **two (2)** reactions. Show every intermediate with the proper changes and all the arrows required for each step of the reaction. (2 pts for product, 6 pts for mechanism).

a)





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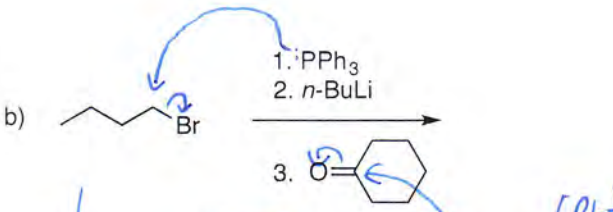

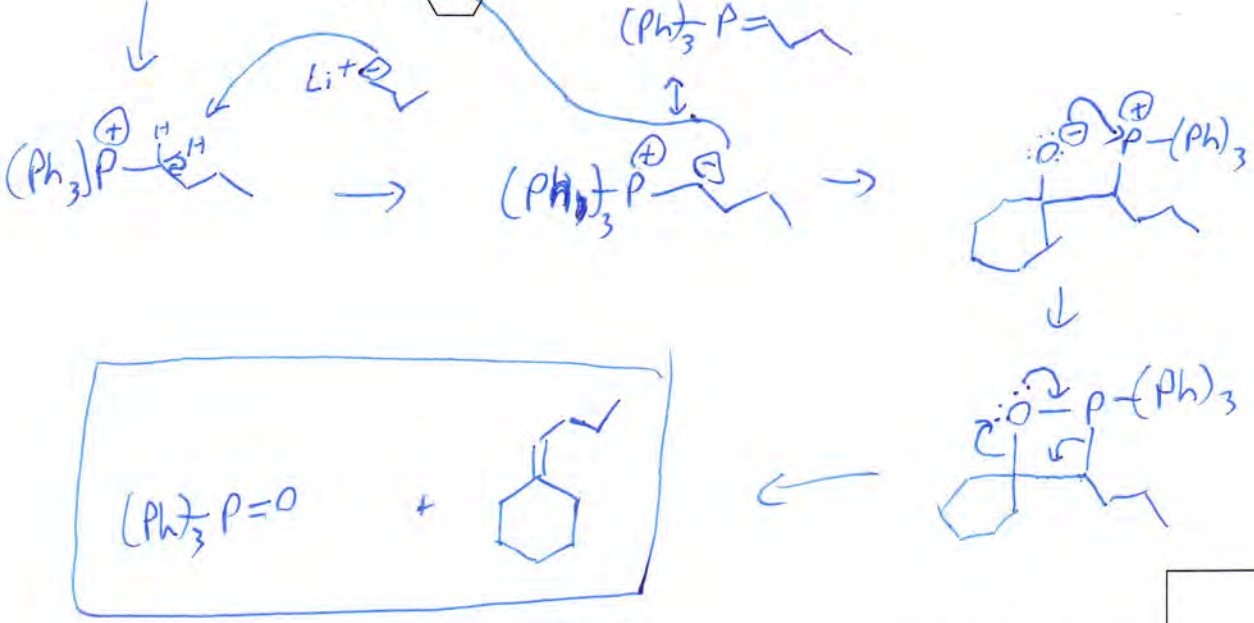

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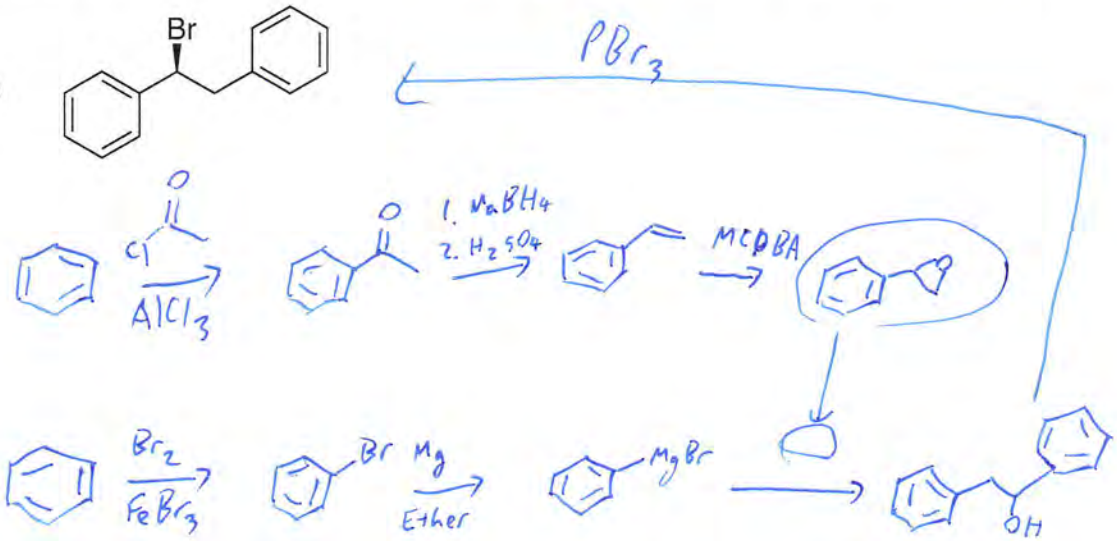
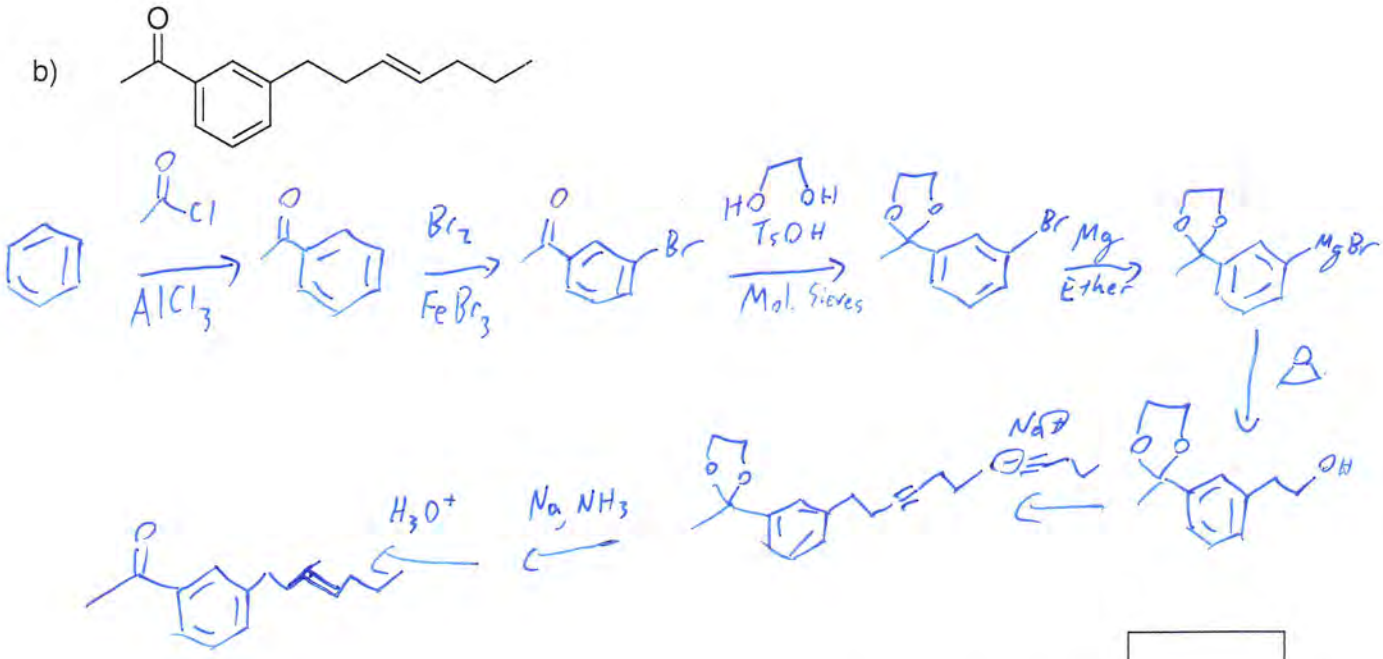
5) (24 pts) Propose a synthesis of each of the following **three (3)** targets. Allowed starting materials include benzene, triphenylphosphine, and/or any other organic molecules containing **five (5)** carbons or less. You may use any necessary inorganic reagents. Try to make your synthesis efficient (i.e. the desired product should be the major product, and generally a shorter synthesis is better than a longer one). More than one step may be required.

a)



b)



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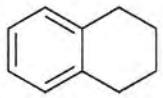
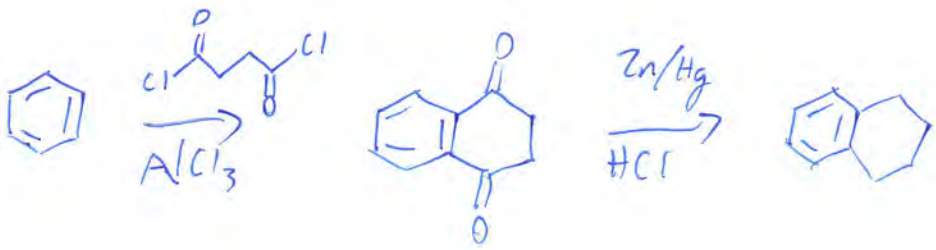
c) 



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