

CHEM 3331, Professor Zhang, Spring 2017  
Second hour exam, Mar 14, 2017

Printed Name: \_\_\_\_\_ Student ID: \_\_\_\_\_

Recitation TA Name: \_\_\_\_\_ Recitation day and time: \_\_\_\_\_

Scores:

- 1)
  - 2)
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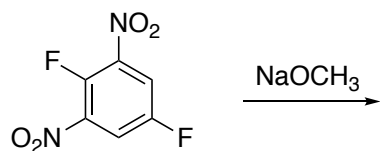
CU Honor Code Pledge: On my honor, as a University of Colorado at Boulder Student, I have neither given nor received unauthorized assistance.

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.

1A								8A	
1 H								2 He	
	2A	3A	4A	5A	6A	7A			
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) (26pts)

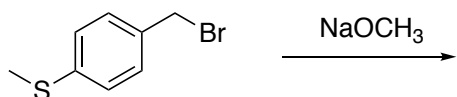
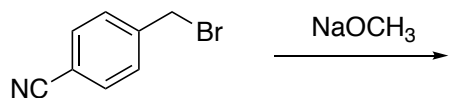
a) The following compound reacts with sodium methoxide (1.0 equivalent) to give two products. Give the structures of the two products. (6pts)



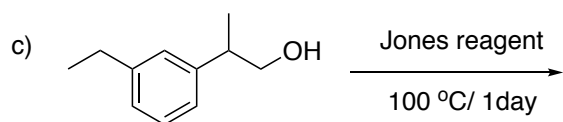
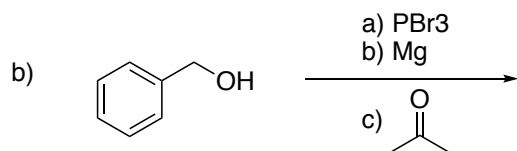
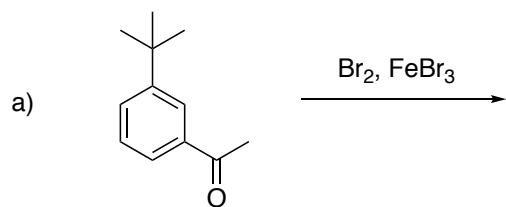
b) Circle the product that is more favored? (2pts)

c) The reactions above involve formation of reactive intermediate anions. For the more favored product, draw all the important resonance contributors to the structure of the anion intermediate. (10pts)

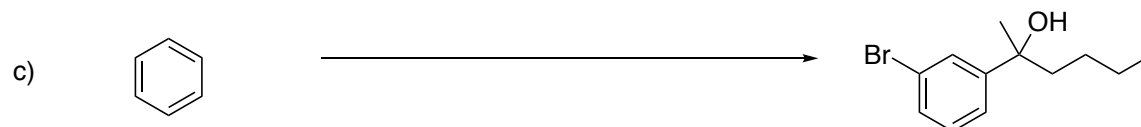
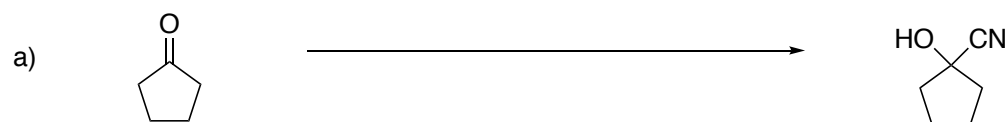
f) Give the structures of the products for the following reactions. Under the same conditions, circle the **faster** reaction? (8pts)



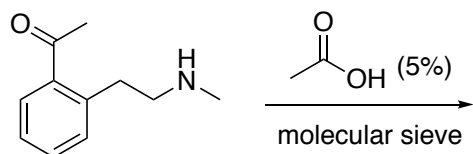
2) (16 pts) Give the single major product of each of the following reactions, carefully showing stereochemistry if appropriate. If a racemate is formed, show only one enantiomer, and label it "rac". All reactions have an appropriate aqueous work up.



3) (18 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.



4) (16 pts) Provide the product and mechanism for the following reaction. Show every intermediate with the proper charges and all the arrows required for each step of the reaction. (4 pts for product, 12 pts for mechanism).



5) (24 pts) Propose a synthesis of each of the following **two (2)** targets **from the given starting material**. Other allowed starting materials include 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.

