

CHEM 3331, Professor Zhang, Spring 2013
First hour exam, Feb 12, 2013

Printed Name: _____ Student ID: _____

Recitation TA Name: _____ Recitation day and time: _____

Scores:

- 1)
 - 2)
 - 3)
 - 4)
 - 5)
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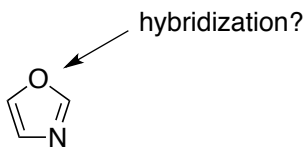
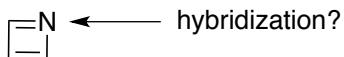
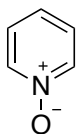
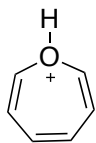
CU Honor Code Pledge: On my honor, as a University of Colorado at Boulder Student, I have neither given nor received unauthorized assistance.

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.

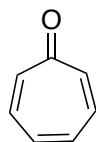
1A								8A
1 H							2 He	
	2A	3A	4A	5A	6A	7A		
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne	
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	
						35 Br		
						53 I		

1) (20 pts) a) Indicate whether the following **six (6)** molecules are aromatic, non-aromatic, or anti-aromatic. (2 pts each).

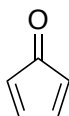
b) For the **last two (2)** molecules, also provide the hybridization of the atoms indicated with an arrow (2 pts each).



b) Cycloheptatrienone (**1**) is stable, but cyclopentadienone (**2**) is so reactive that it cannot be isolated. Explain why, taking the polarity of the carbonyl group into account. (4 pts)

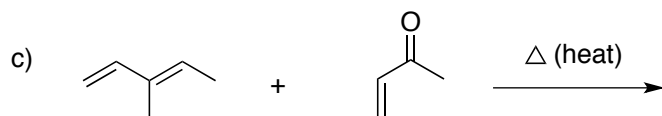
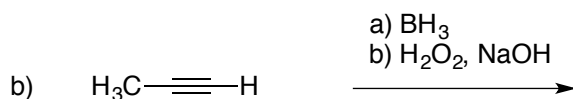
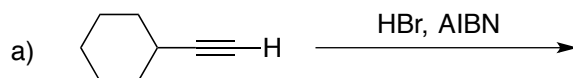


1

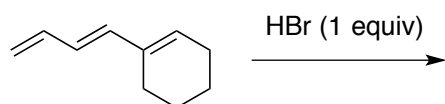


2

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". (4 pts each)



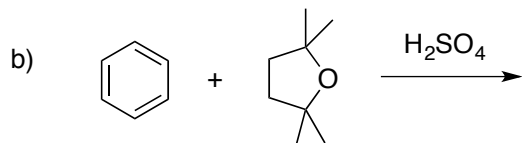
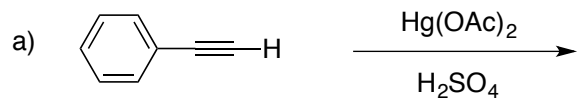
d) Provide all the major and minor products expected from the reaction shown below (under kinetic condition); indicate which is (are) major and which is (are) minor. (8 pts)



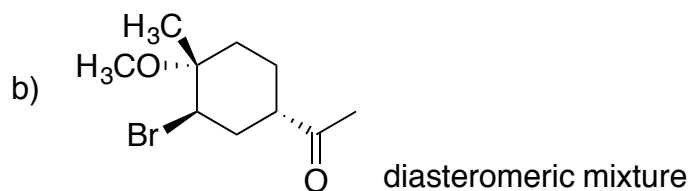
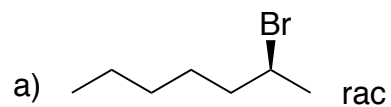
3) (20 pts) Propose reagents for accomplishing the following transformations. NOTE: more than one step may be required! Try to make your synthesis efficient (i.e. the desired product should be the major product, and generally a shorter synthesis is better than a longer one). You must use the starting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



4) (18 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. (3 pts for product, 6 pts for mechanism).



5) (22 pts) Propose a synthesis of each of the following **three (3)** targets, starting with benzene and/or any other organic molecules containing **six (6)** 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.



c)

