

CHEM 3331, Professor Zhang, Spring 2017
First hour exam, Feb 14, 2017

Printed Name: _____ Student ID: _____

Recitation TA Name: _____ Recitation day and time: _____

Scores:

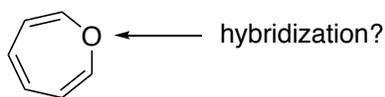
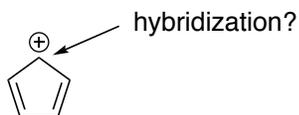
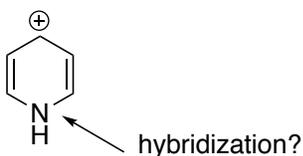
- 1)
 - 2)
 - 3)
 - 4)
 - 5)
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CU Honor Code Pledge: On my honor, as a University of Colorado at Boulder Student, I have neither given nor received unauthorized assistance.

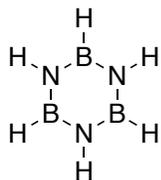
This is a closed-book exam. The use of notes, models, calculators, scratch paper will not be allowed during the exam. Please put all your answers on the test. Use the backs of the pages for scratch.

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		

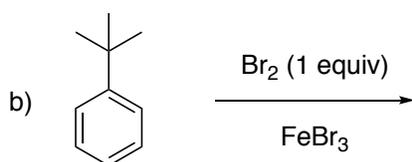
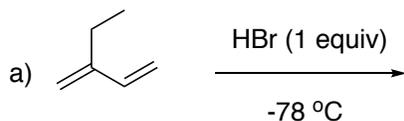
- 1) (34pts) a) Indicate whether the following **three (3)** molecules are aromatic, non-aromatic, or anti-aromatic. Assume all the molecules are planar (4 pts each).
 b) Provide the hybridization of the atoms indicated with an arrow (4 pts each).



- c) Explain why borazole (sometimes called inorganic benzene, structure shown below) is a very stable compound. (10 pts)

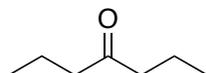
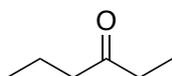


- 2) (20 pts) Give the single major product of reaction (a) and (b), and propose reagents for accomplishing reaction (c) and (d). Carefully showing stereochemistry only if appropriate. If a racemate is formed, show only one enantiomer, and label it "rac". (5 pts each)

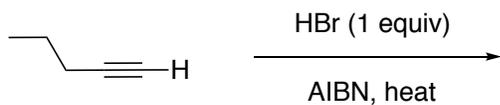




3) (10 pts) Alkyne hydration would be a good preparative method for **one** of the following compounds? Please circle it and draw the structure of the starting material.



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).



Initiation:

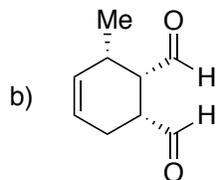
Propagation:

Termination
(one reaction is enough):

5) (20 pts) Propose a synthesis of each of the following **two (2)** targets. 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.



Starting with any **hydrocarbon** (consisting of carbon and hydrogen atoms only) organic molecules containing **five (5)** carbons or less.



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