

Name: _____ Key _____

CHEMISTRY 3331, Fall 1999
Professor Walba
First Hour Exam
September 23, 1999

scores:

- 1) 20
- 2) 20
- 3) 20
- 4) 20
- 5) 20

This is a closed-book "open model" exam. You may use models, but no notes or books. Please put all your answers on the test. Use the backs of the pages for scratch.

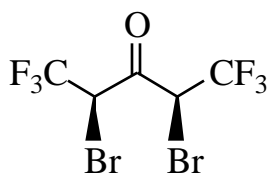
100

PLEASE read the questions carefully!

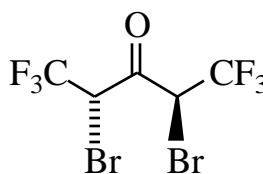
Partial Periodic Table

1A							8A
1 H	2A	3A	4A	5A	6A	7A	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) (20 pts) Questions 1a-d refer to the following compounds.



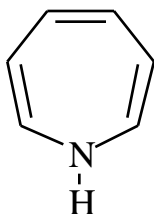
A



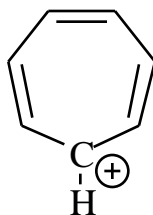
B

- a) How many ^1H signals do you expect for compound A in an achiral solvent? 1
- b) How many ^1H signals do you expect for compound A in a chiral solvent? 2
- c) How many ^1H signals do you expect for compound B in an achiral solvent? 1
- d) How many ^1H signals do you expect for compound B in a chiral solvent? 1

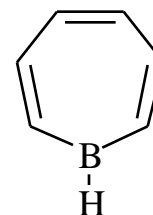
e) Indicate which of the following structures is aromatic. Note: In these structures H atoms are only shown on hetero atoms and on the cationic carbon atom. All other atoms fill their valence with H atoms as usual.



- Aromatic
- NOT aromatic



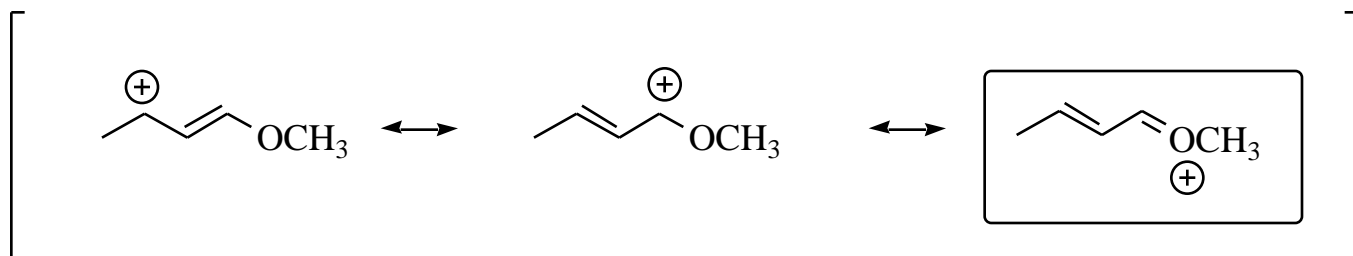
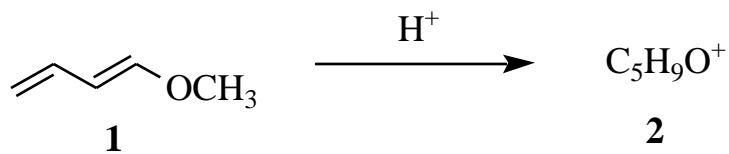
- Aromatic
- NOT aromatic



- Aromatic
- NOT aromatic

1. Continued

When treated with protic acid (H^+), the diene **1** gives a cation intermediate **2**.



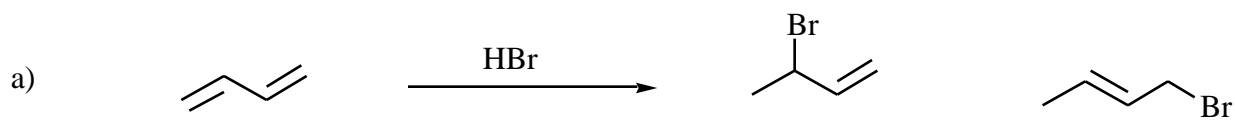
f) Write the three most important resonance contributors to the structure of cation **2**.

g) Circle the most important resonance contributor.

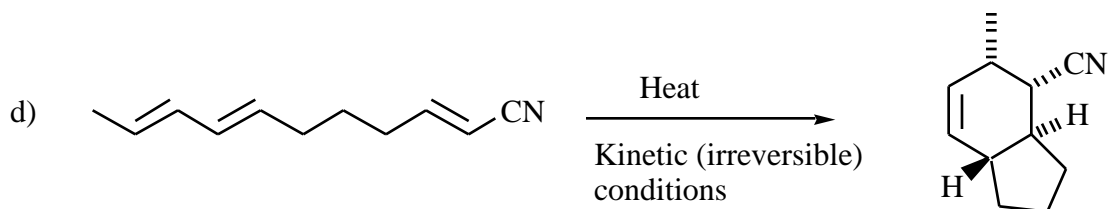
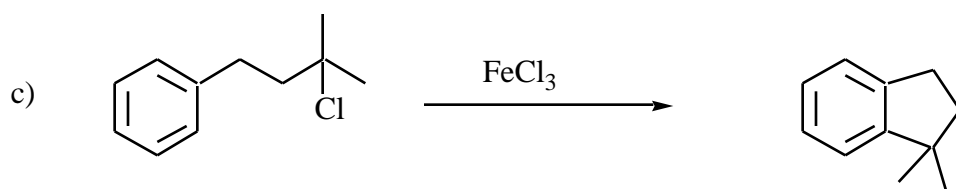
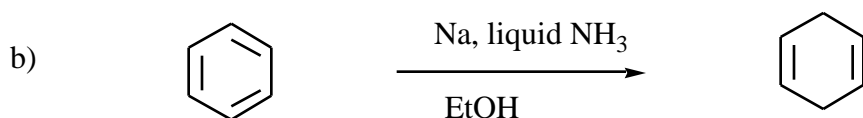
h) Give a ONE WORD explanation for your answer in part g. OCTETS

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2) (20 pts) Give the single major organic product (unless specifically asked for more products) for each of the following reactions. If a racemate is formed, consider this to be one product and show only one of the enantiomers. Carefully indicate the stereochemistry of the product if appropriate.

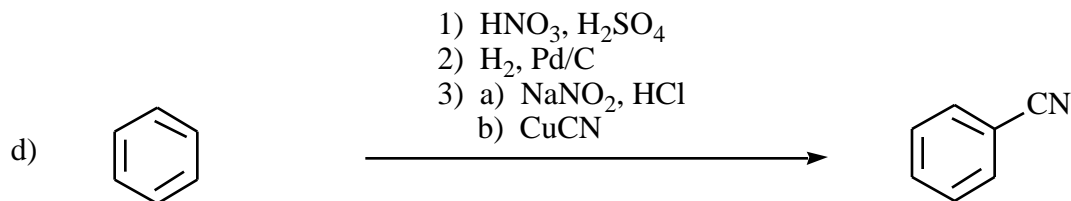
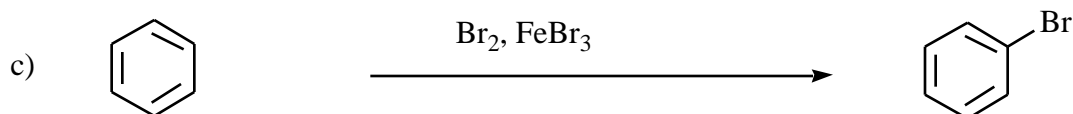
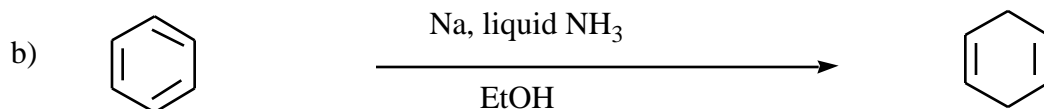
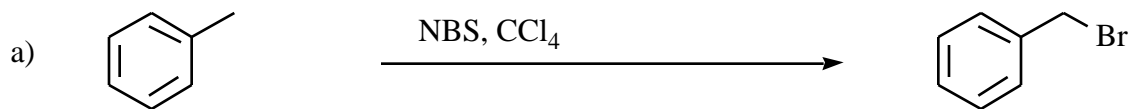


TWO major products!



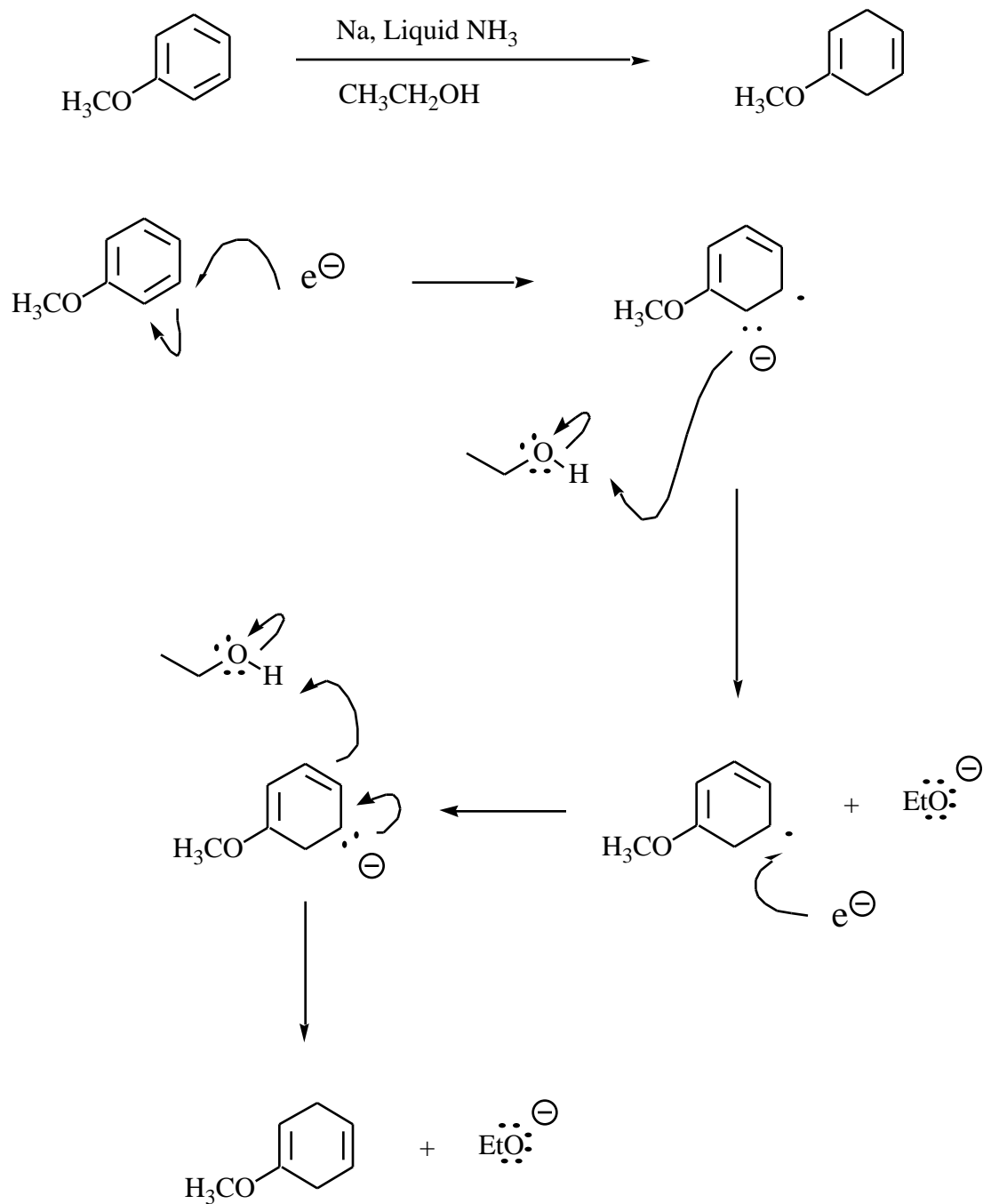
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3) (20 pts) Propose reagents for accomplishing the following transformations. NOTE: more than one step may be required! Try to make your synthesis efficient (i.e. the desired product should be the major product). You must use the starting material given, and you may use any other organic or inorganic reagent you want.



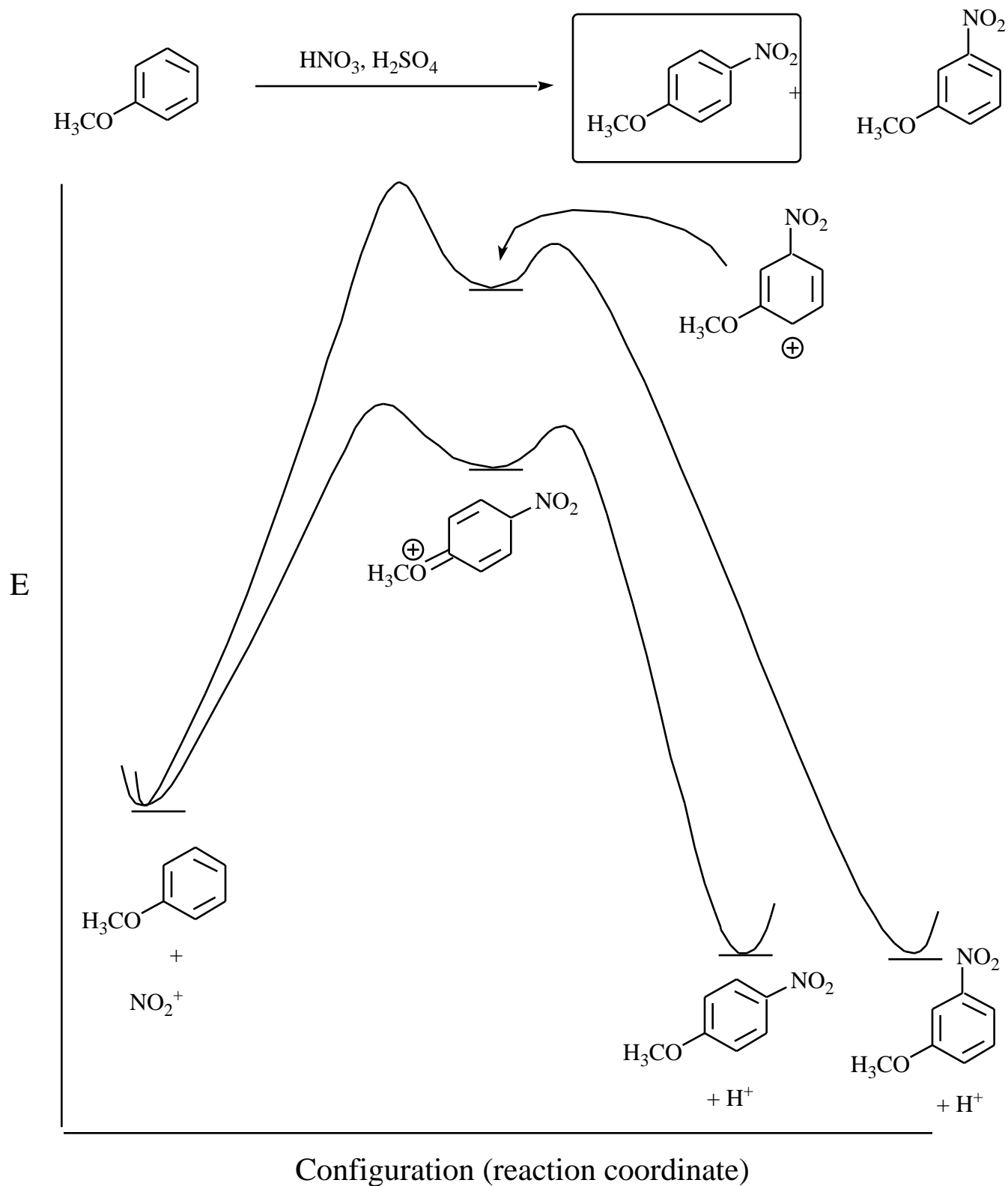
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4) (20 pts) a) Propose an arrow pushing mechanism for the following transformation. Be sure to show all intermediates in the pathway from starting material to product, but do not show transition states. Make all structures in your mechanism proper valence bond structures with correct formal charges and all lone pairs or unshared electrons shown.



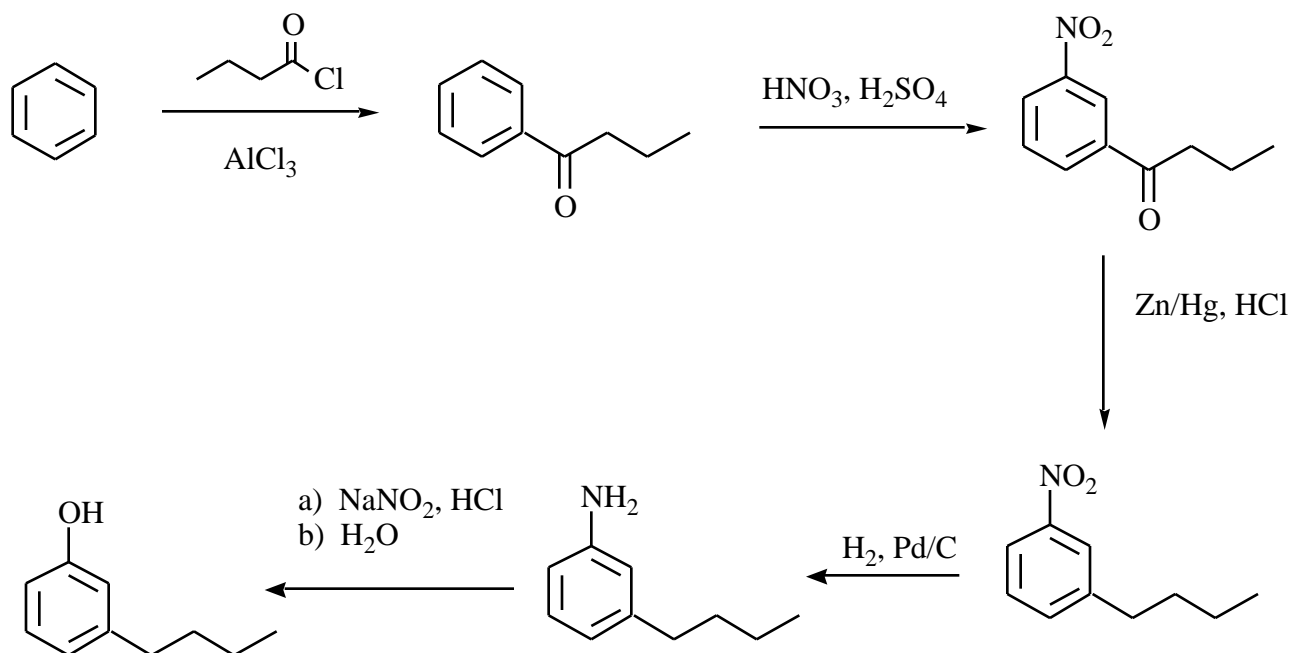
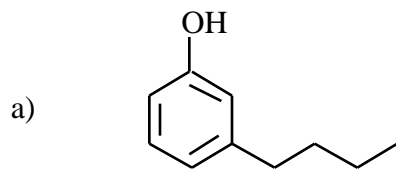
4 – Continued-

b) Circle the major product of the following reaction. c) Finish the energy diagram, showing the structure and relative energy for BOTH cation intermediates. Give only the single major resonance contributor for the structure of each cation.



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5) (20 pts) Propose a synthesis for the following targets from benzene, any organic starting materials with FIVE carbons or less, and any inorganic reagents you need. Try to make your synthesis efficient (that is, the desired target in each step should be a major product). For these questions, put down as much as you can - do NOT leave the page blank. There will be partial credit. CONTINUED ON NEXT PAGE!



5 - contined-

