

CHEM 3331, Spring 2011
Professor Walba
Second Hour Exam
March 10, 2011

scores:

- 1)
 - 2)
 - 3)
 - 4)
 - 5)
- _____

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

Name (printed): _____

Signature: _____

Recitation TA Name: _____

Recitation day and time: _____

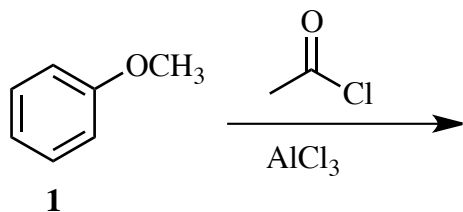
This is a closed-book exam. The use of notes, calculators, scratch paper, or cell phones will not be allowed during the exam. You may use models brought in a clear ziplock bag. Please put all you answers on the test. Use the backs of the pages for scratch.

PLEASE read the questions very carefully!

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

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1. (20 pts) a) Anisole (**1**) reacts with acetyl chloride and aluminum trichloride to give **two** major products. Give the structure of the two major products.

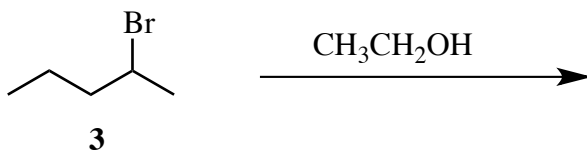
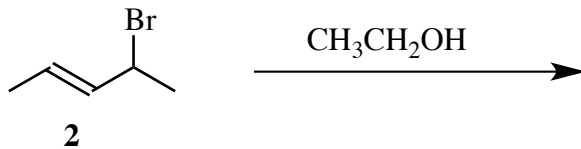


b) The reactions above involve formation of reactive intermediate cations with molecular formula C₉H₁₂O₂⁺. For **ONE** of your products (you pick which one), draw **all** of the important resonance contributors to the structure of the cation intermediate.

c) Are the reactions in part 1b FASTER or SLOWER than the acylation of benzene?

1. -continued-

d) Give the structure of the product obtained when bromide **2** is dissolved in ethanol. Also give the structure of the product obtained when bromide **3** is dissolved in ethanol. For this question (1d), ignore stereochemistry.



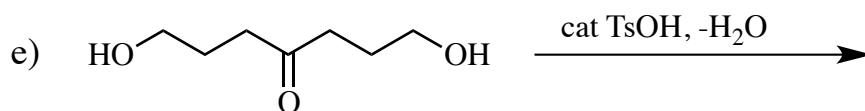
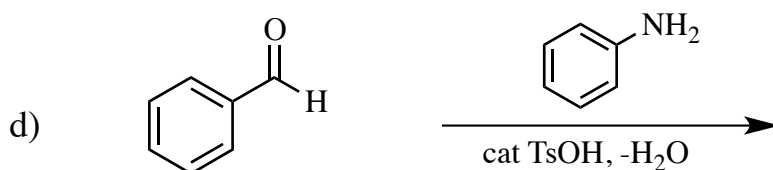
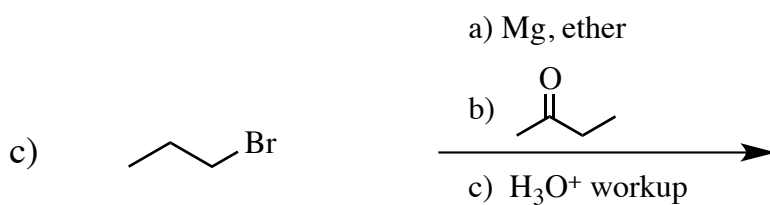
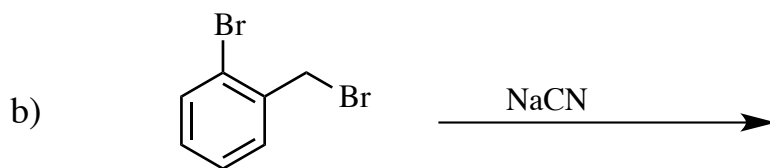
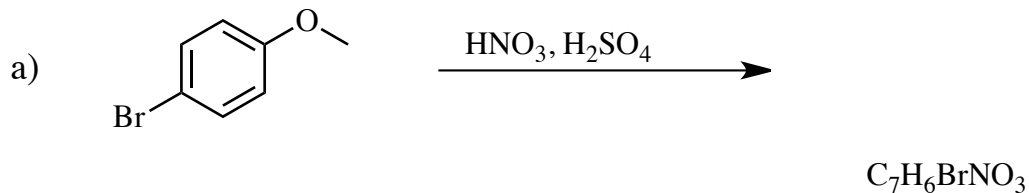
e) Give the name of the mechanism of the reactions in part 1d.

f) Under the same conditions, one of the reactions in part 1d proceeds to give product much faster than the other. **Circle the faster reaction.**

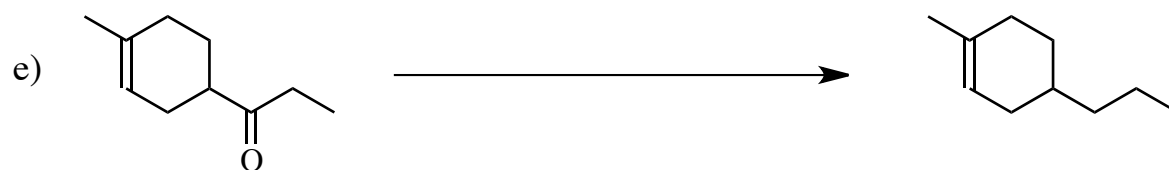
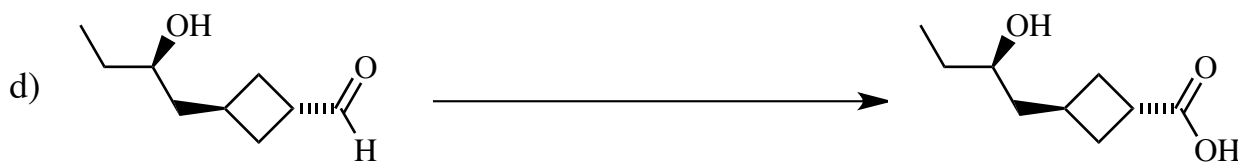
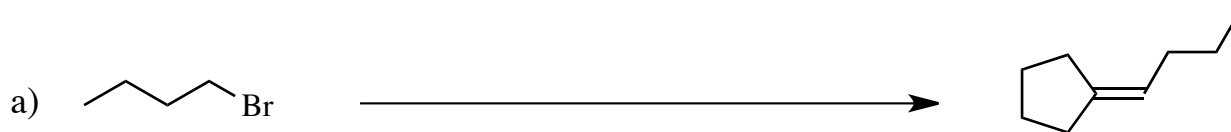
g) Briefly explain the reasoning behind your solution to part 1d. That is, why is the reaction you circled faster?

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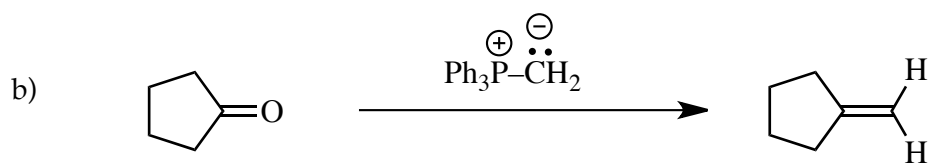
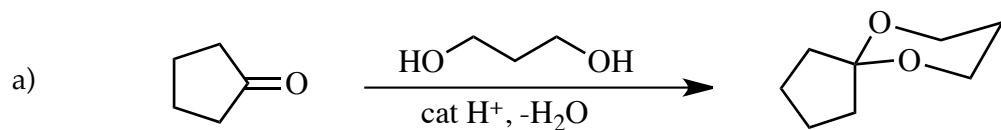
2) (20 pts) Give the single major product of each of the following reactions, carefully showing stereochemistry if appropriate. If a racemate is formed, show only one enantiomer, and label it "rac."



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.

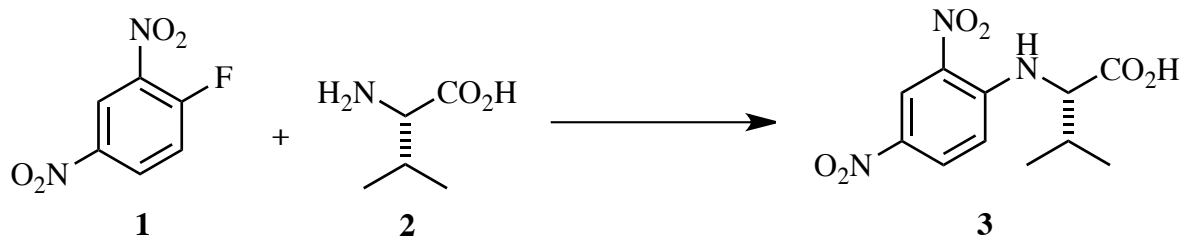


4) (20 pts) Propose arrow-pushing mechanisms for the following transformations.

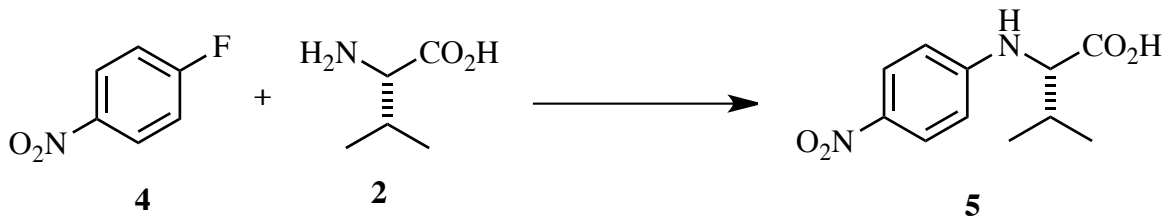


4. -continued-

c) 1-fluoro-2,4-dinitrobenzene (**1**) reacts cleanly with the amino acid valine to give the benzene derivative **3**. Propose an arrow-pushing mechanism for this transformation.



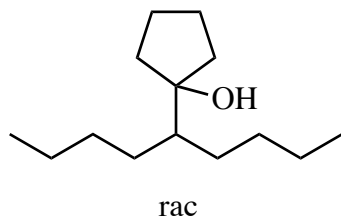
d) p-Nitrofluorobenzene (**4**) reacts with valine to give **5**. Which reaction is faster – 4c or 4d?



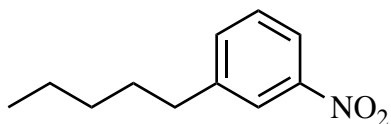
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5) (20 pts) Propose a synthesis of each of the following targets. Allowed starting materials include benzene, triphenylphosphine, and/or any other organic molecules containing **five (5) carbons or less**. You may use any necessary inorganic reagents. Try to make your syntheses efficient (i.e. the target should be produced in the highest possible yield). More than one step may be required.

a)



b)



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5) – Continued

c)

