

CHEM 3311-100, Fall 2013  
 Professor Walba  
 Second Hour Exam  
 October 22, 2013

scores:

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

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 100

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

Signature: Key

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.


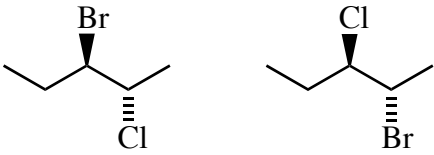
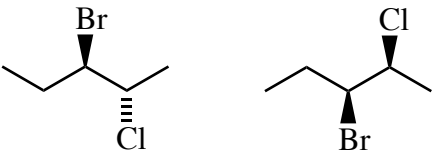
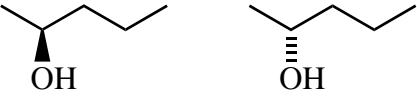
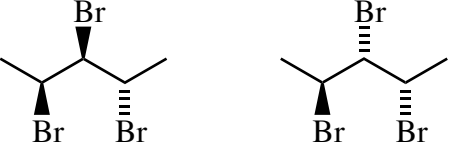
*PLEASE read the questions very carefully!*

*PLEASE legibly print your name on each page of the exam.*

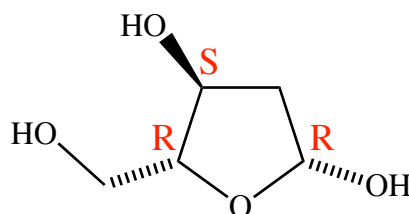
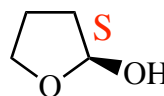
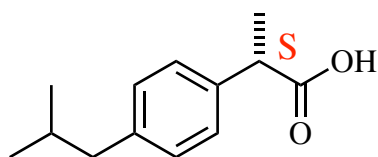
Partial Periodic Table									
1A							8A		
1 H							2 He		
	2A	3A	4A	5A	6A	7A			
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne		
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar		
						35 Br			
						53 I			

Printed Name: \_\_\_\_\_

1 (20 pts) a) Describe the relationship between the following pairs of isomeric structures (constitutional isomers, enantiomers, diastereomers, or homomers).

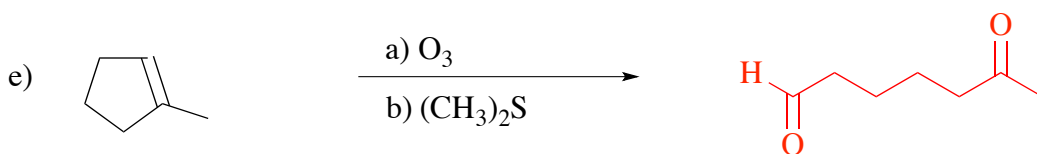
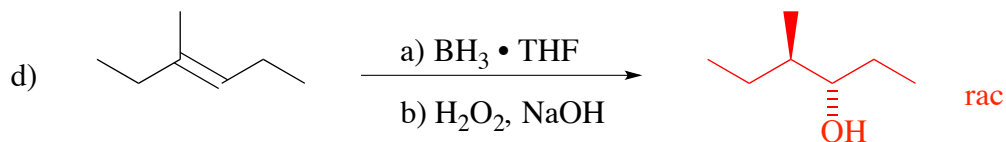
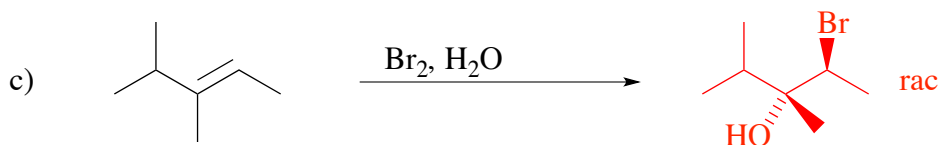
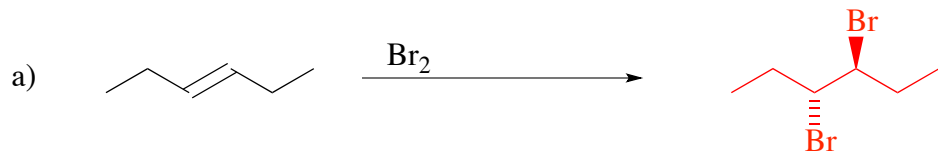
 <p>homomers</p>	 <p>constitutional isomers</p>
 <p>diastereomers</p>	 <p>enantiomers</p>
 <p>homomers</p>	Left blank intentionally

b) Carefully label each asymmetric carbon in the following molecules using the R / S stereochemical configuration descriptors.

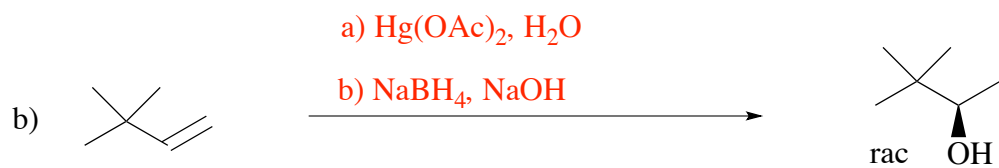
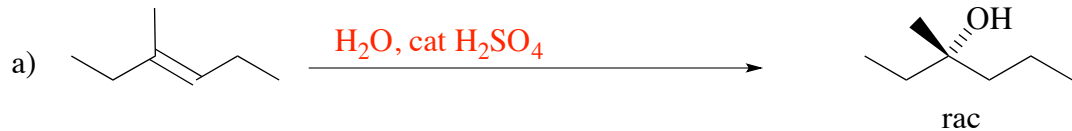


one form of 2-deoxyribose

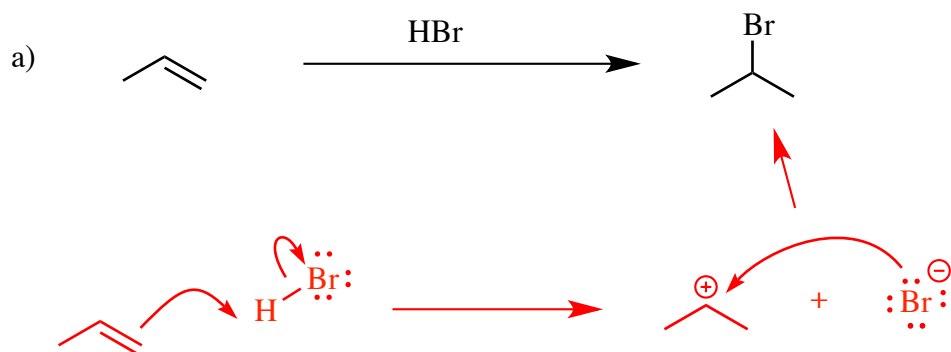
2) (20 pts) Give the single major product (or two major products if two are formed) for each of the following reactions, carefully showing stereochemistry using wedges and dashes. If a racemate is formed, show only one enantiomer and label it "rac." Assume chiral starting materials are single pure enantiomers unless they are labeled "rac."



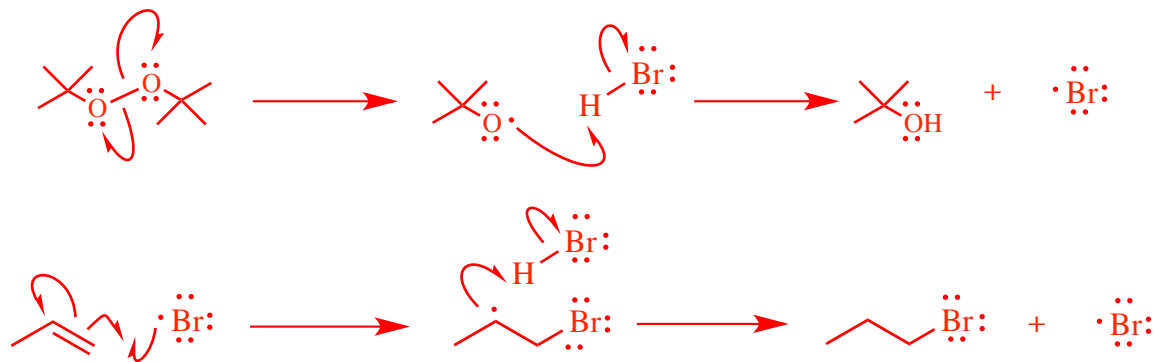
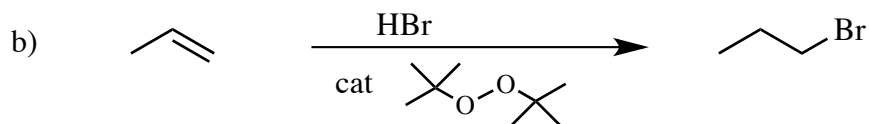
3) 20 pts) Propose reagents for accomplishing each of the following reactions. Make your reaction efficient (i.e. the target product should be the major product). Assume chiral starting materials and products are single pure enantiomers unless they are labeled "rac." For question 3b, please give the required starting material.



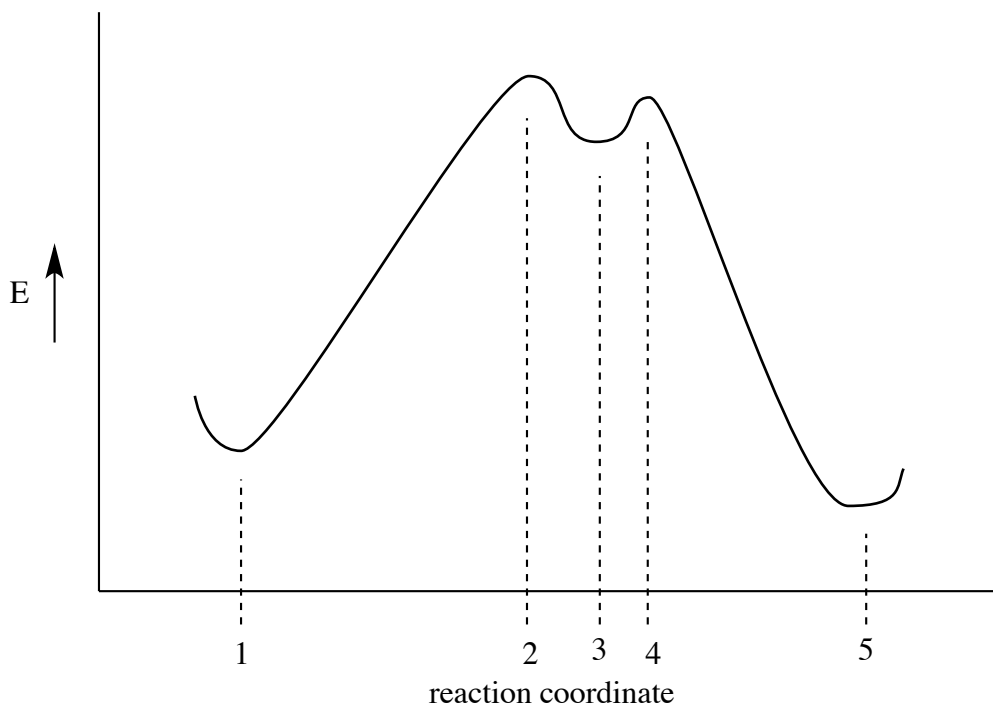
4) (20 pts) Propose arrow-pushing mechanisms for each of the following transformations. Show **all** intermediates in your mechanisms, but do not show transition states. Be sure structures are complete, including all lone pairs.



For part b below, DO NOT show termination steps!



5) (20 pts) a) Certain key points on the reaction energy diagram below are labeled using numbers 1 – 5.



Match the following terms with the points on the reaction coordinate using the numeric labels given on the diagram.

Starting material - 1

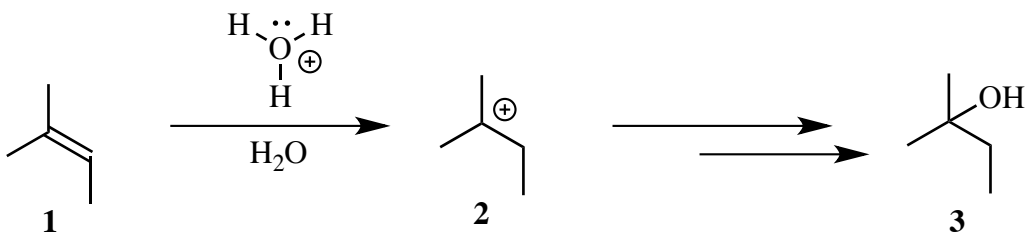
Product - 5

Intermediate - 3

Transition state (there are two of these) - 2, 4

Rate limiting transition state - 2

5) – continued

b) Acid-catalyzed hydration of 2-methyl-2-butene (**1**) gives 2-methyl-2-butanol (**3**), as shown below.

Carefully draw the structure of the **transition state** for the reaction leading from alkene **1** to cation **2**. Following the normal convention, put your transition state structure in the space below between the square brackets.

