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CHEMISTRY 3311, Fall 1994 Name
Professor Walba
Second Hour Exam
November 3, 1994

scores:

1)

2)

3)

4)

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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. There are additional scratch sheets at the end of the exam.

PLEASE read the questions carefully!

Partial Periodic Table

1A	2A	3A	4A	5A	6A	7A	8A
		1 H					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	

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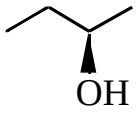
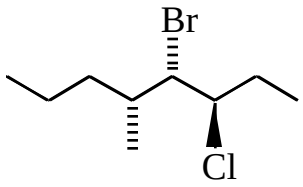
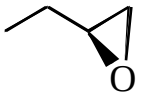
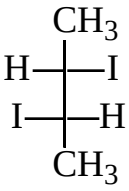
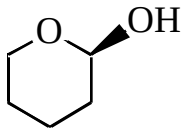
1) (25 pts) a) Label each stereocenter in the following structures using the CIP (R or S) system. Be careful to indicate which stereocenter goes with each descriptor.

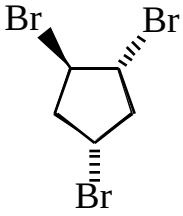




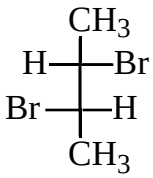




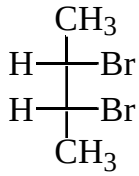




b) Label each of the following pairs of compounds as homomers, enantiomers, diastereomers, or constitutional isomers. Also, indicate whether each compound is chiral or achiral using the check boxes.



❑ Chiral
❑ Achiral



❑ Chiral
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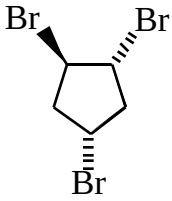

❑ Chiral
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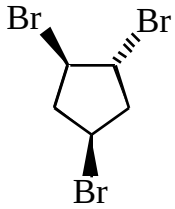

❑ Chiral
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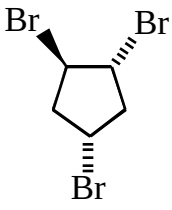

❑ Chiral
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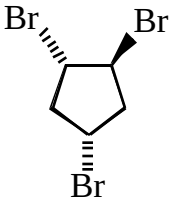

❑ Chiral
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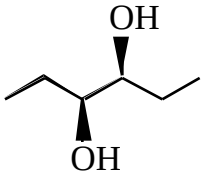

❑ Chiral
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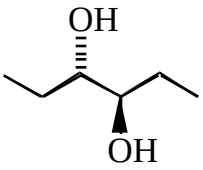
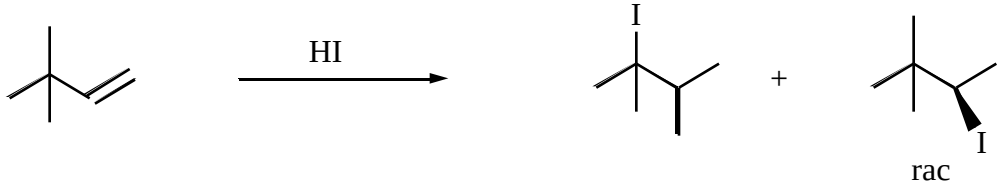
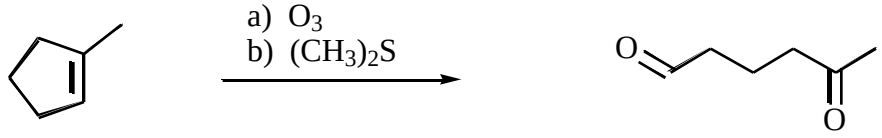
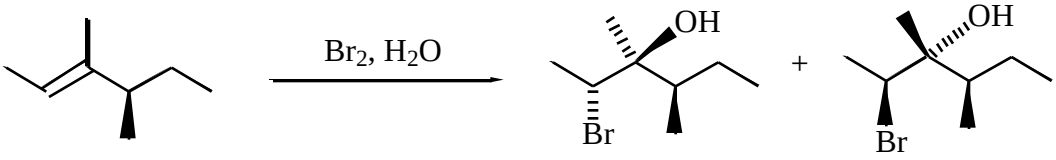


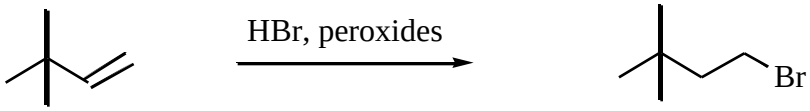
❑ Chiral
❑ Achiral

2) (25 pts) Give the single major organic product (or two products if more than one product is formed) for each of the following reactions. If a racemate is formed, consider this to be one product, show only one of the enantiomers, and label the structure racemic (rac). Carefully show the stereochemistry of the product(s) using wedges and dashes if appropriate.

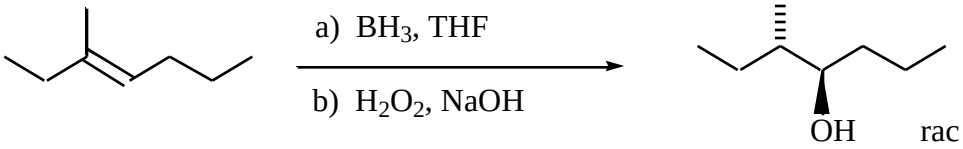
a) 

b) 

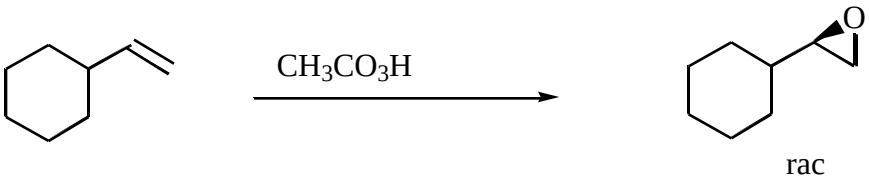
c) 

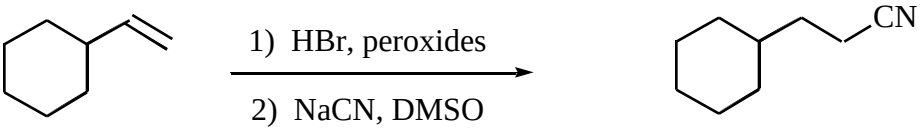
d) 

3) (24 pts) Propose reagents for accomplishing the following transformations.
NOTE: more than one step may be required!

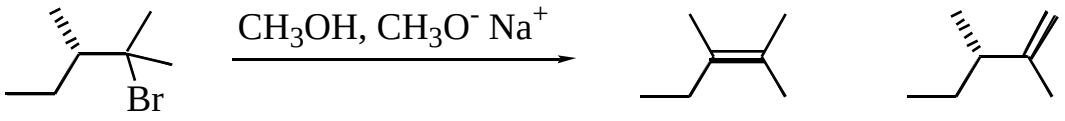
a) 

b) 

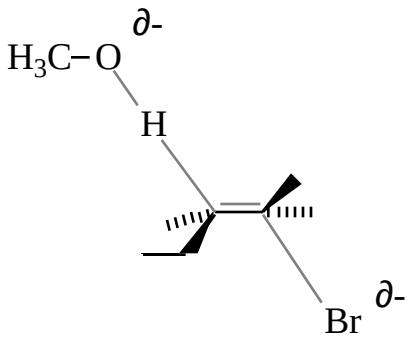
c) 

d) 

4) (26 pts) Give the structures of all the products from the following reaction. Draw each product only once, and be sure to show stereochemistry where appropriate. Circle the major product.



b) Carefully draw a wedges and dashes picture of the transition state for the reaction in part a) leading to the major product (which you circled). Your picture should show the "conformation" of the transition state.

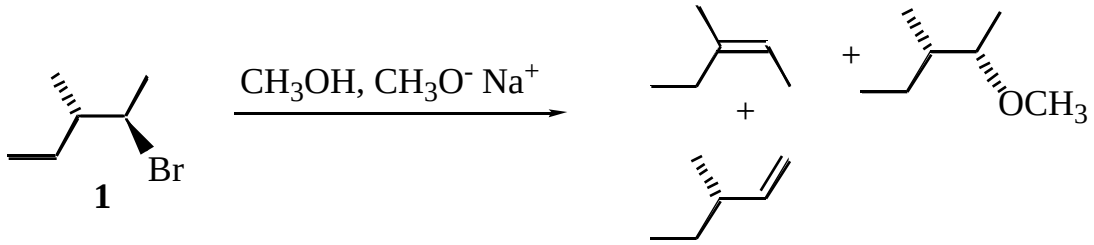


c) Given that the reaction in part a) is irreversible, explain briefly in a few sentences why you think the major product is the major product.

The more substituted alkene is more stable. The reaction proceeds in a single step so that step is rate deterimining. There is partial double bond character in the transition state, so the transition state leading to the more stable alkene is more stable. Therefore, the more substituted alkene is formed fastest.

d) The reaction of stereoisomers **1** and **2** with methoxide in methanol is more complex than the reaction shown in part a). CAREFULLY predict all of the products for each reaction. Draw each product only once, and show stereochemistry.

i)



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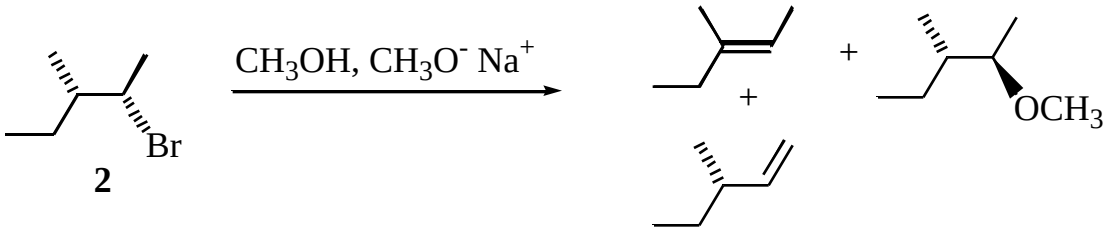
ii)



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e) Predict all of the products expected for the following reaction.