

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

CHEMISTRY 3311, Fall 1992

Professor Walba

Third Hour Exam

12/3/92

scores:

1)

2)

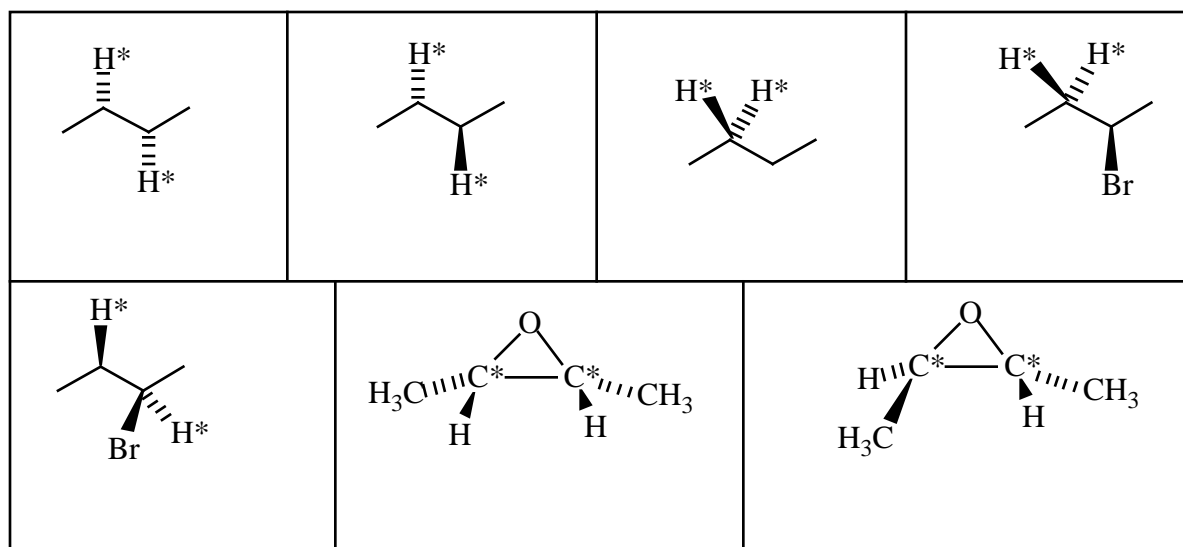
3)

4)

5)

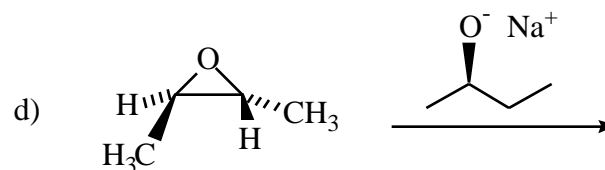
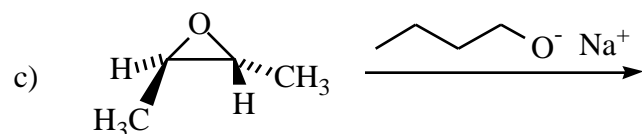
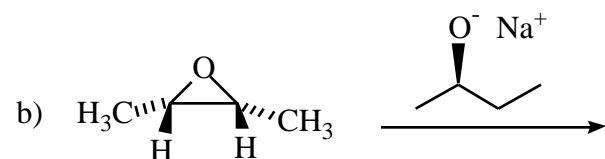
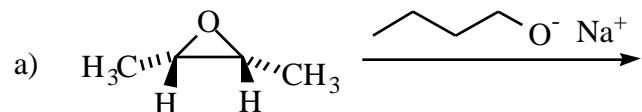
This is a closed-book "open model" exam. You may use models, but no notes or books. Please put all your answers on the test. Use the backs of the pages for scratch.

1) (25 pts) a) Indicate the topicity of each of the pairs of atoms marked by asterisks in the following structures (i.e. heterotopic, diastereotopic, enantiotopic or homotopic).

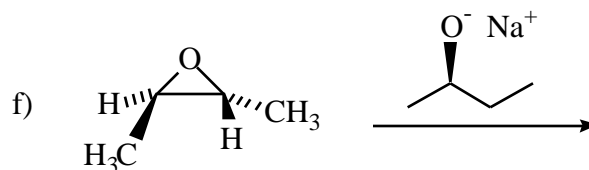
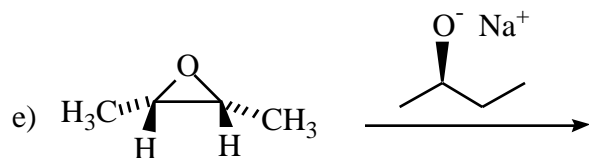


1) -continued-

b) Predict the major organic  $S_N2$  product or products of the following reactions (assume the intermediate alkoxides formed in the reaction are protonated—i.e. the organic products are not ions). Draw each isomeric product structure only once, carefully showing stereochemistry. If a racemate is formed, show only one of the enantiomers, and label it as racemic.

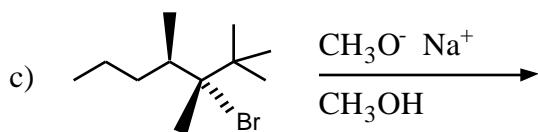
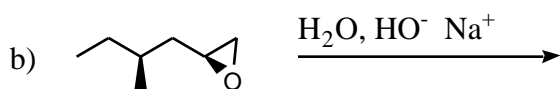


c) For reactions b) and d) above, E2 elimination occurs to a large extent. Give the major E2 products of these reactions. If a racemate is formed, show only one of the enantiomers and label it as racemic. But, if two enantiomers are formed in unequal amounts (that's a hint), show both enantiomers and indicate that they are formed in unequal amounts (there is no way for you to know which enantiomer will predominate). To solve this problem, think about the topicity of the H atoms involved in the reaction.

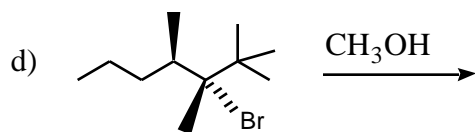


Name: \_\_\_\_\_

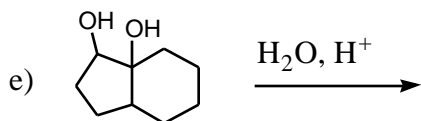
2) (20 pts) Give the single major organic product of each of the following reactions unless the questions specifically asks for more products. Show the stereochemistry of the product (or products) if there is the possibility of stereoisomerism. If a racemate is formed, show only one of the enantiomers, and label it as racemic.



give all products



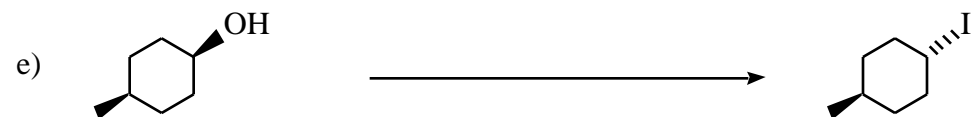
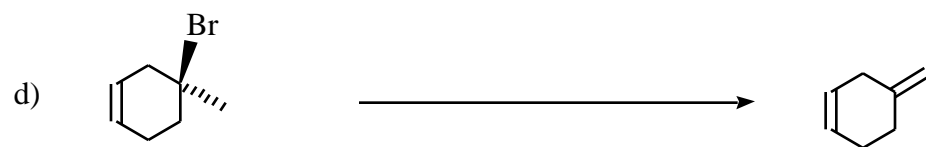
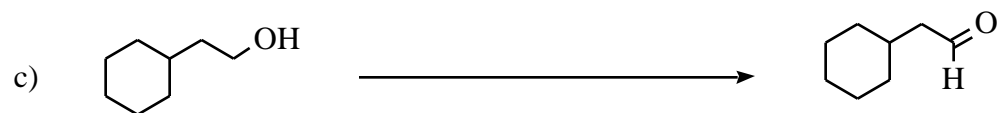
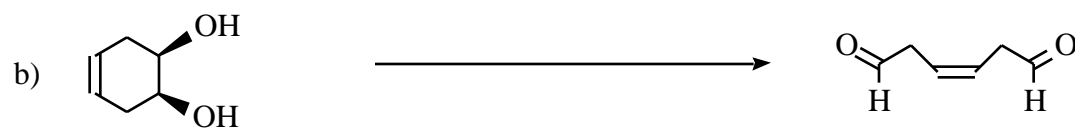
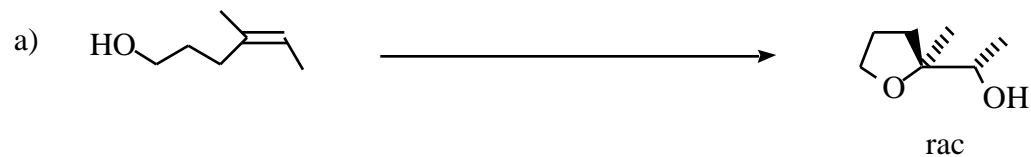
give all products



ignore stereochemistry on this one

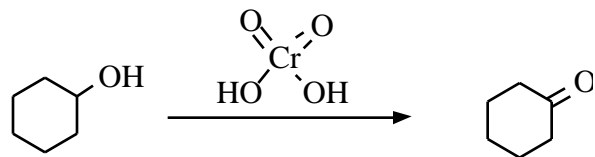
Name: \_\_\_\_\_

3) (20 pts) Give reagents for accomplishing the following transformations. Try to make your reaction efficient (i.e. the desired product should be the single major product if possible).

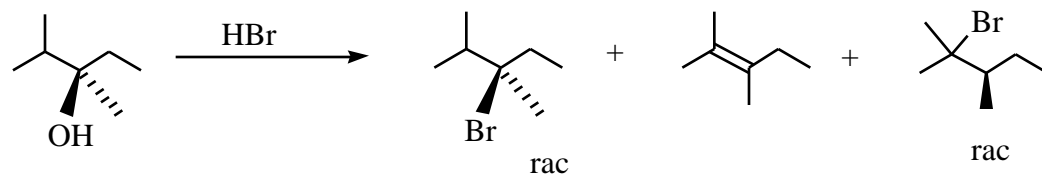


Name: \_\_\_\_\_

4) (20 pts) a) Give the structure of all the intermediate in the following reaction, and give an arrow-pushing mechanism for the step forming the C=O bond.



b) Propose an arrow-pushing mechanism for formation of all of the indicated products of the following reaction.



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

5) (15 pts) Propose a synthesis of the following target starting with alcohols containing five carbons or less plus any inorganic reagents you need. Try to make your synthesis efficient. Be sure to carefully show the starting materials and reagents for each step, but don't show any mechanisms.

