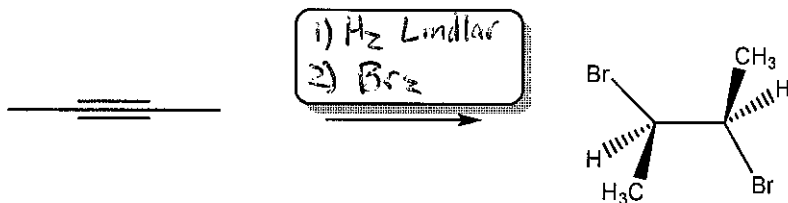
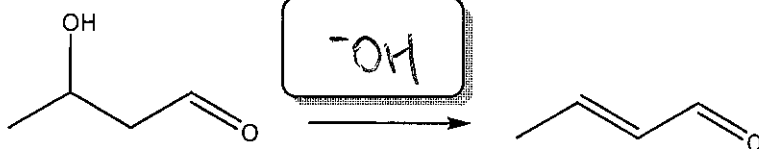


1. Provide the missing starting materials or reagents for 4 of the following 5 problems. Clearly mark the one that you do not want graded or the first five will be graded.

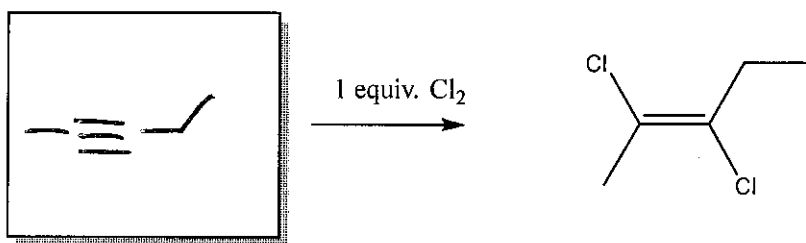
A.



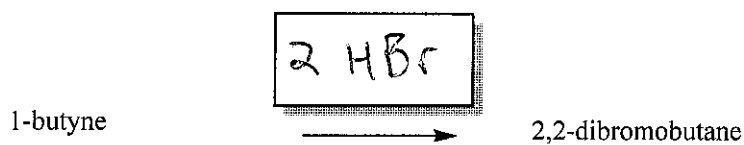
B.



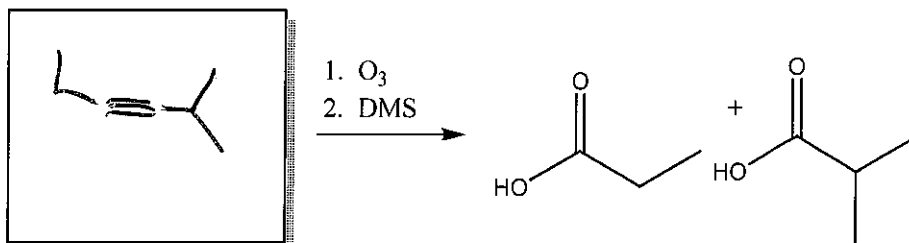
C.



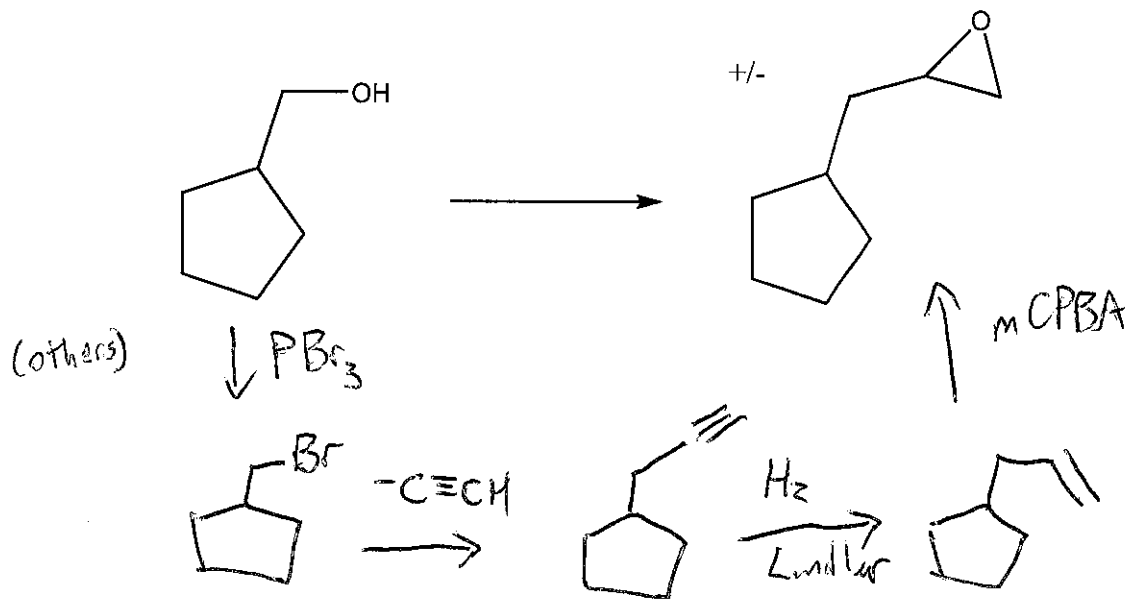
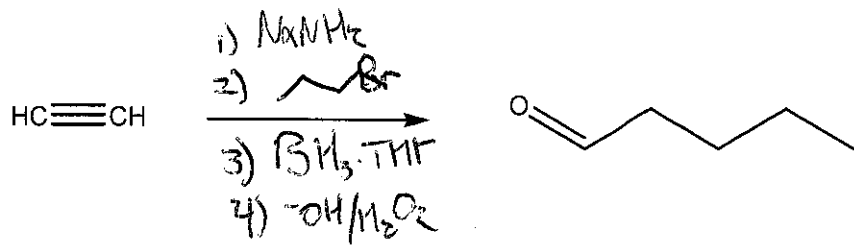
D.



E.

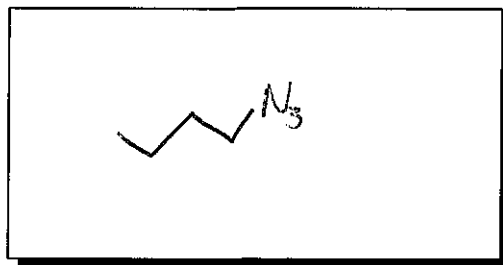
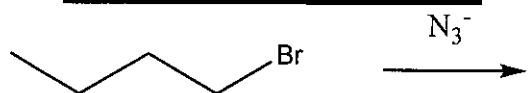


2. Provide all the reagents necessary for these multistep reactions.



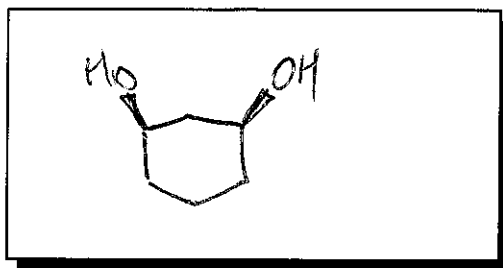
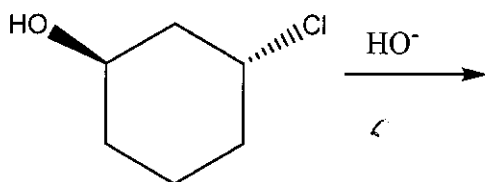
3. For these reactions, predict whether the reaction will go through an S_N1 or S_N2 mechanism. Draw the structures of the major substitution product(s) in the box and list the product of the reaction as optically active or optically inactive.

A. Type of mechanism: S_N2



optically active or inactive: inactive

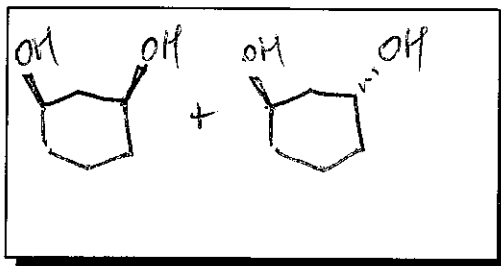
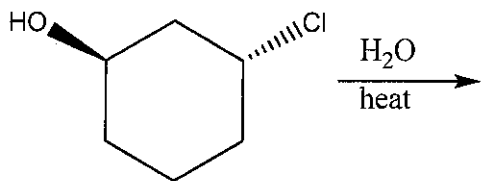
B. Type of mechanism: S_N2



optically active or inactive: inactive

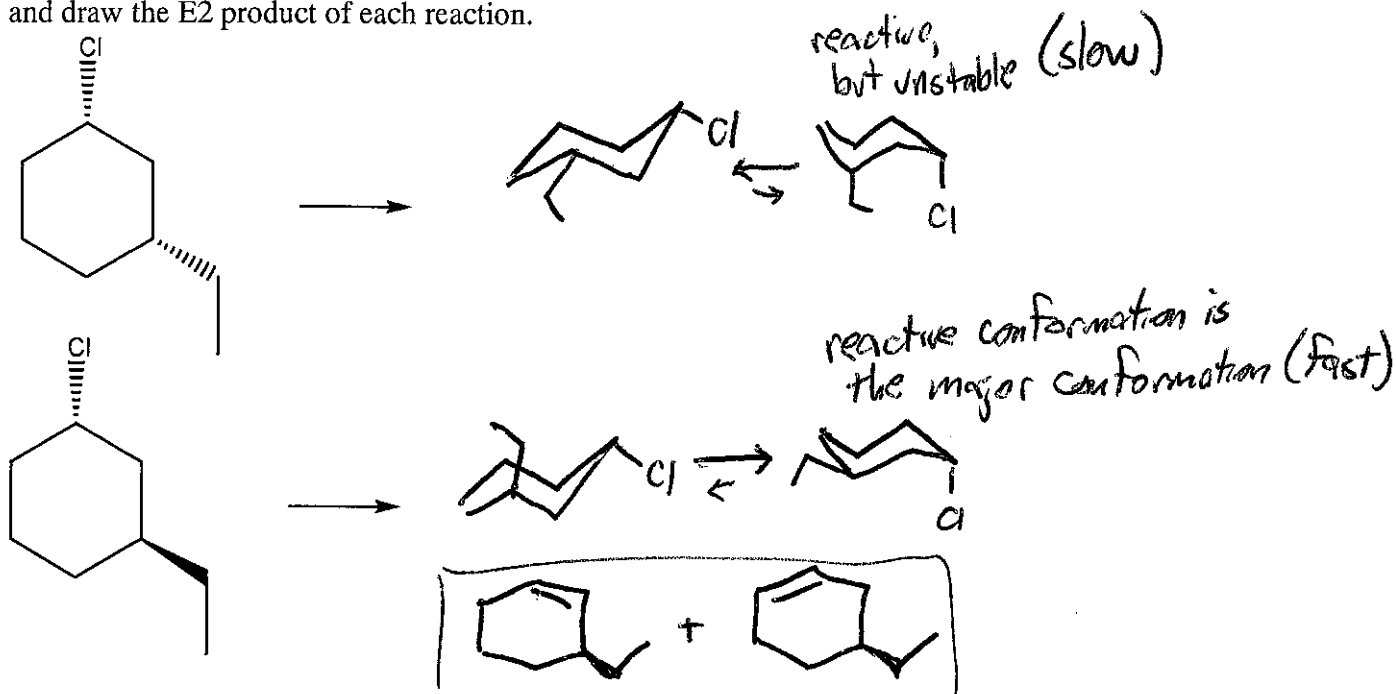
(meso)

C. Type of mechanism: S_N1

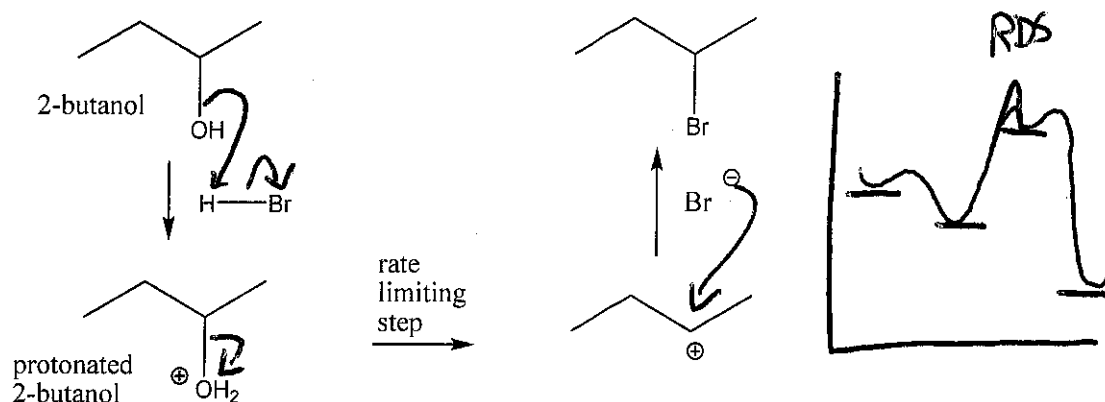


optically active or inactive: active

4. (15 pts) Which of these compounds would undergo an E2 type elimination faster? Explain, and draw the E2 product of each reaction.



5. When 2-butanol is treated with HBr, 2-bromobutane is produced. The mechanism is shown below, and is an acid/base reaction followed by an S_N1 mechanism. Answer the questions below based on this mechanism.



A. Fill in the appropriate arrows in the scheme above.

B. Draw an energy diagram for this three-step mechanism with appropriate relative energies.

(Assume the reaction is exothermic overall.)

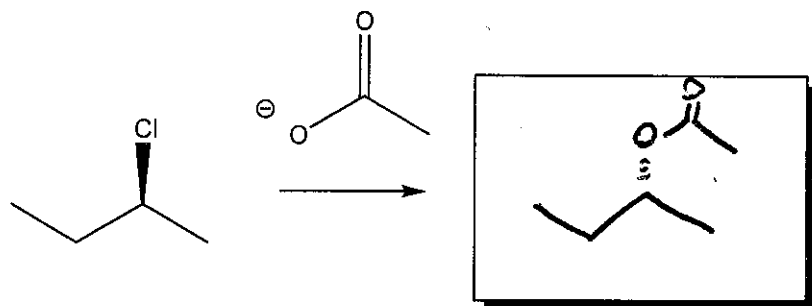
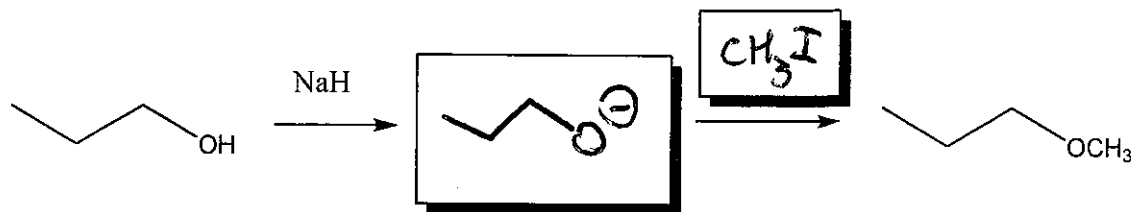
C. Based on the mechanism, would the rate go up, down, or remain the same if more Br^- were added to the reaction? Explain.

* unchanged
AFTER RDS

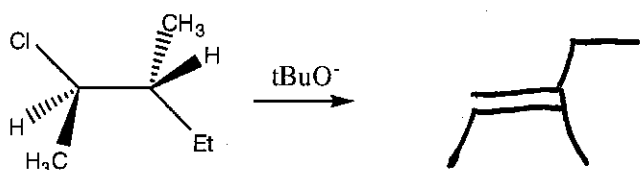
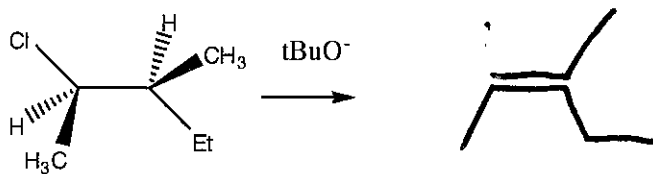
D. Based on the mechanism, if the reaction were to start with (S)-2-butanol, would the bromide product be (R), (S), or a racemic mixture? Explain.

Racemic - carbocation forms
- planar carbocation is attack from top and bottom face

6. Fill in the missing reactants, reagents, and products of these substitution reactions. (Assume an S_N2 mechanism.)



7. Predict the products of the following E2 eliminations across the C2-C3 bond. What is the stereochemical relationship of the products?



diastereomers

8. (12pts) Provide the reagent(s) needed to cause these transformations.

