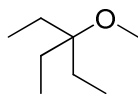


- 1) **Show what reagents** you would use to synthesize this ether by each of the following methods, and **show the mechanism** by which the ether forms in each reaction. (8 pts each)

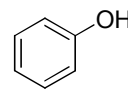


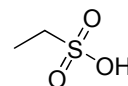
a. Williamson ether synthesis

b. Alkoxymercuration-reduction (do not show mechanism for reduction step)

c. Acid-catalyzed ether formation from alcohols

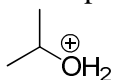
2) Write the names of the following functional groups. (1 pt each)



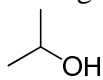


3) Acids and bases (16 pts)

a. For each pair of compounds shown below, select the more acidic of the two compounds and explain your reasoning in under ten words. (2 pts each)



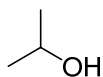
vs.



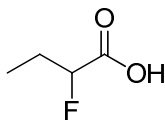
Reason:



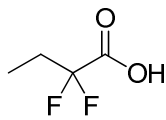
vs.



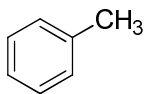
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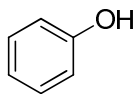
vs.



Reason:

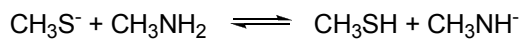
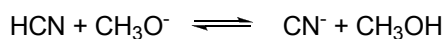
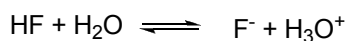
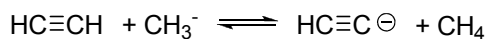


vs.

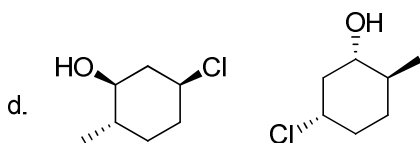
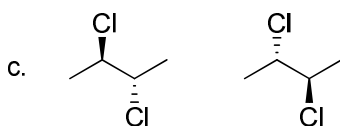
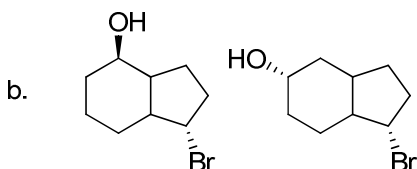
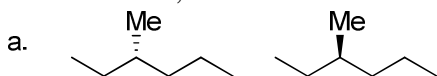


Reason:

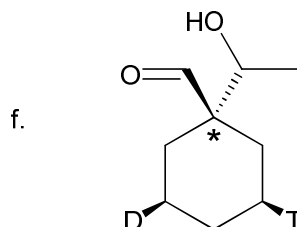
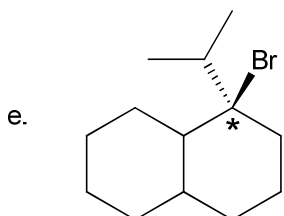
b. For each of the following reactions, does the equilibrium favor the reactants or products? (2 pts each)



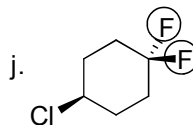
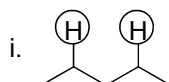
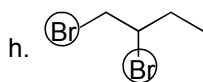
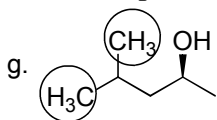
4) **Parts a – d:** Describe each of the following pairs of molecules as identical, enantiomers, diastereomers, or constitutional isomers. (2 pts each)



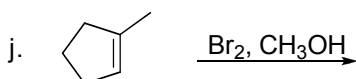
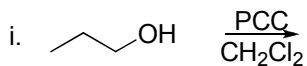
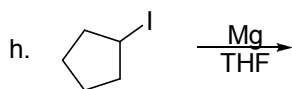
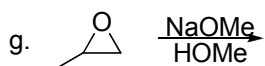
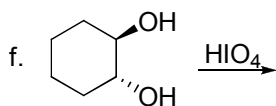
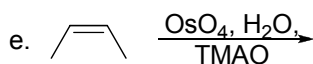
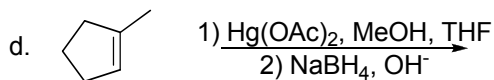
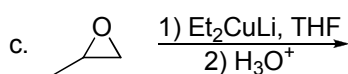
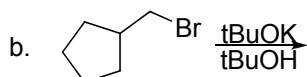
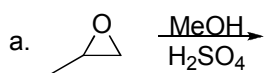
Parts e-f: Describe each molecule as R or S at the stereocenter labeled with a *. (2 pts each)



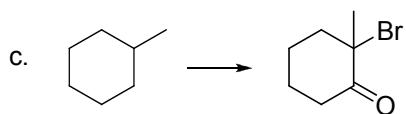
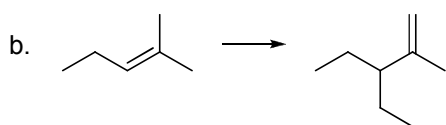
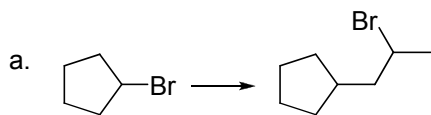
Parts g – j: Describe each of the following groups as homotopic, enantiotopic, diastereotopic, or constitutionally nonequivalent. (2 pts each)



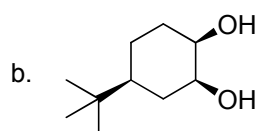
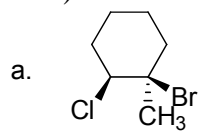
5) **Predict the product** of the following reactions, and **choose the appropriate descriptor** (reduction, oxidation, or neither) for what happens to the organic molecule during each reaction. (4 pts each)



- 6) Synthesize the desired product from the given starting material. If more than one step is necessary, show the product of each step. Do not show mechanisms. (10 pts each)



7) Draw the following molecules in **both** chair conformations, and circle the most stable. (5 pts each)



8) Extra credit! Write the mechanism for the following reaction. (10 pts extra credit)

