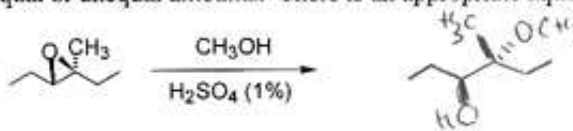


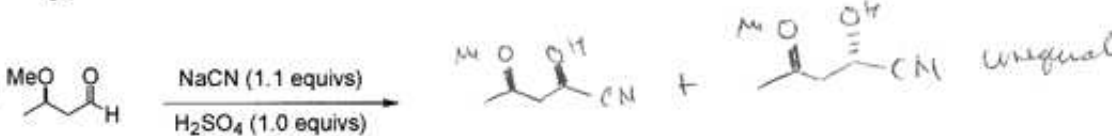
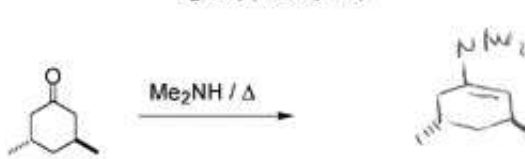
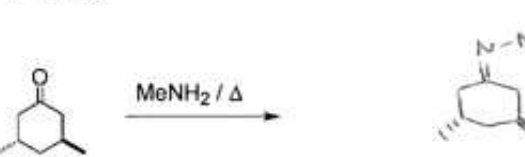
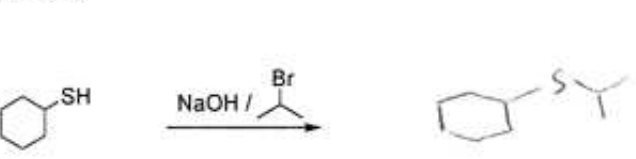
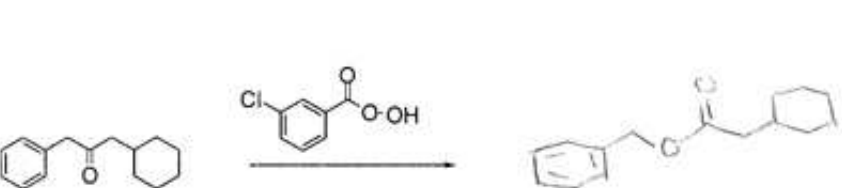
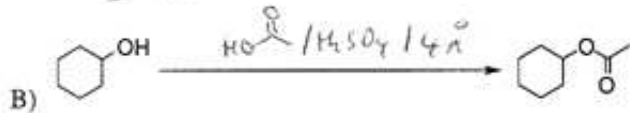
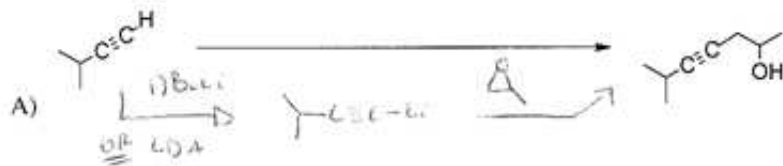


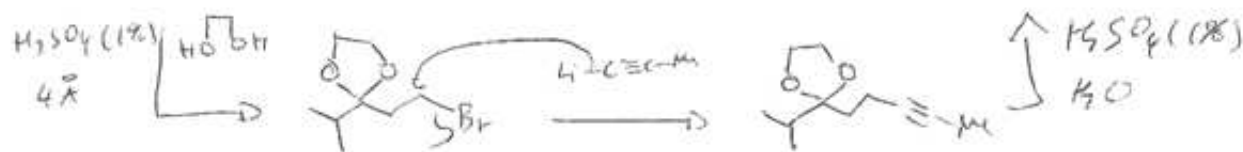
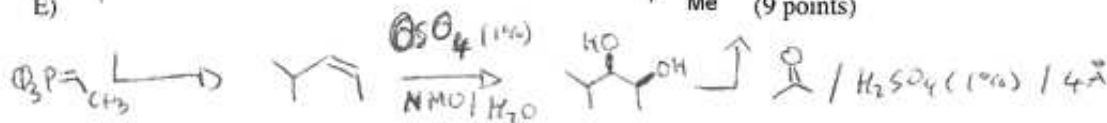
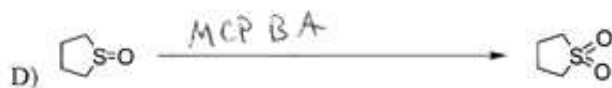
1) Provide the products of the following reactions. If no reaction would occur, then write NR. Draw all possible stereoisomers (i.e., draw dashed and bold lines as needed) and indicate if they would be produced in equal or unequal amounts. There is an appropriate aqueous work up for each reaction (3 points each).

- A) 
- B) 
- C) 
- D) 
- E) 
- F) 
- G) 
- H) 

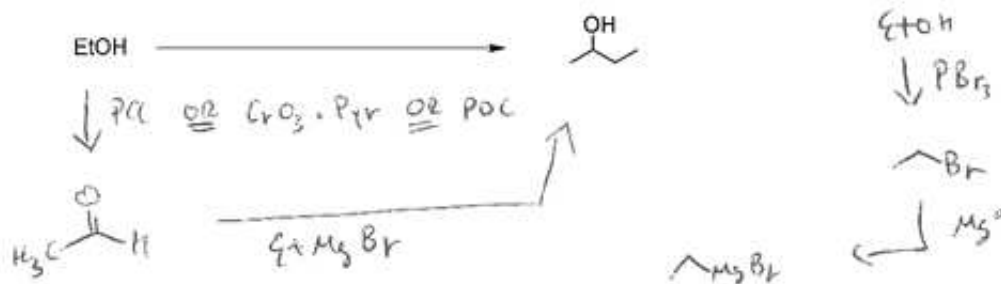
2) Complete the following syntheses using any inorganic reagents you need and organic reagents of 20 carbons or less. **If your synthesis requires more than one step, you must write the product of each step.** Show the number of equivalents of a reagent whenever more than one equivalent is used. All chiral products are racemic mixtures. (3 or 9 pts each)



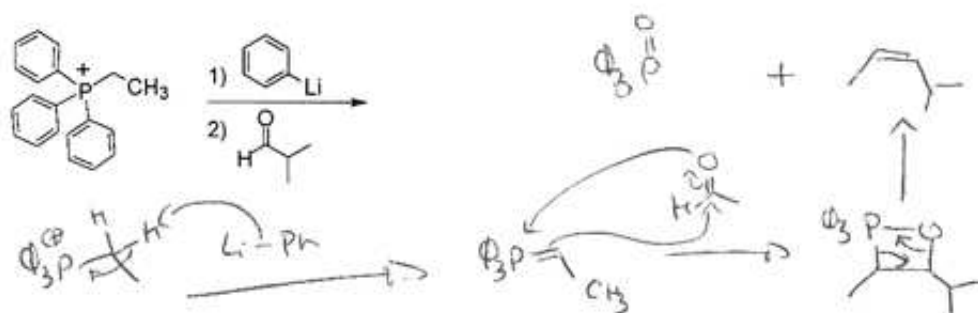
Do this using different reagents than you used in part B



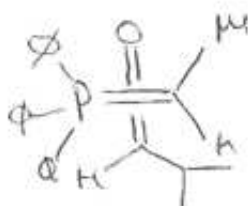
3) Using ethanol as the only source of carbon and any inorganic reagents you need, prepare the molecule below (9 pts):



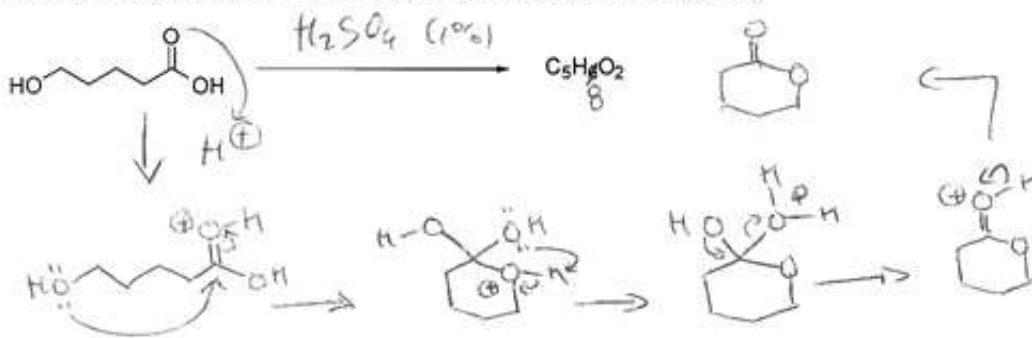
4) Provide the product and mechanism for the reaction shown below. This reaction provides a certain stereoisomer in the product, be sure to draw it correctly. Be sure to show all intermediates, arrows and charges required for each step of your mechanism (12 pts).



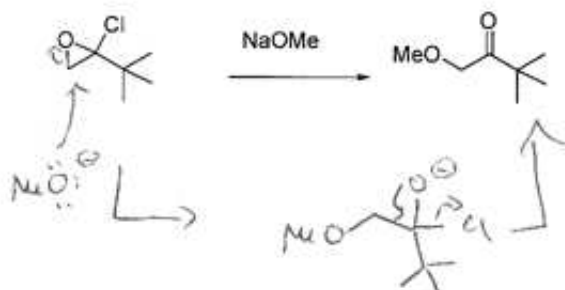
Draw a picture of the transition state which explains the stereochemistry of the product (4 pts)



5) Provide the product and mechanism for the reaction shown below. Be sure to show all intermediates, arrows and charges required for each step of your mechanism (12 points).



6) Provide the mechanism for the reaction shown below. Be sure to show all intermediates, arrows and charges required for each step of your mechanism (6 points).



7) Which of the pictures shown below best represents hydrogen bonding (the dashed line represents the hydrogen bonding interaction, 3 pts)?

