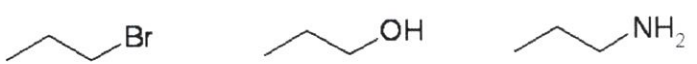
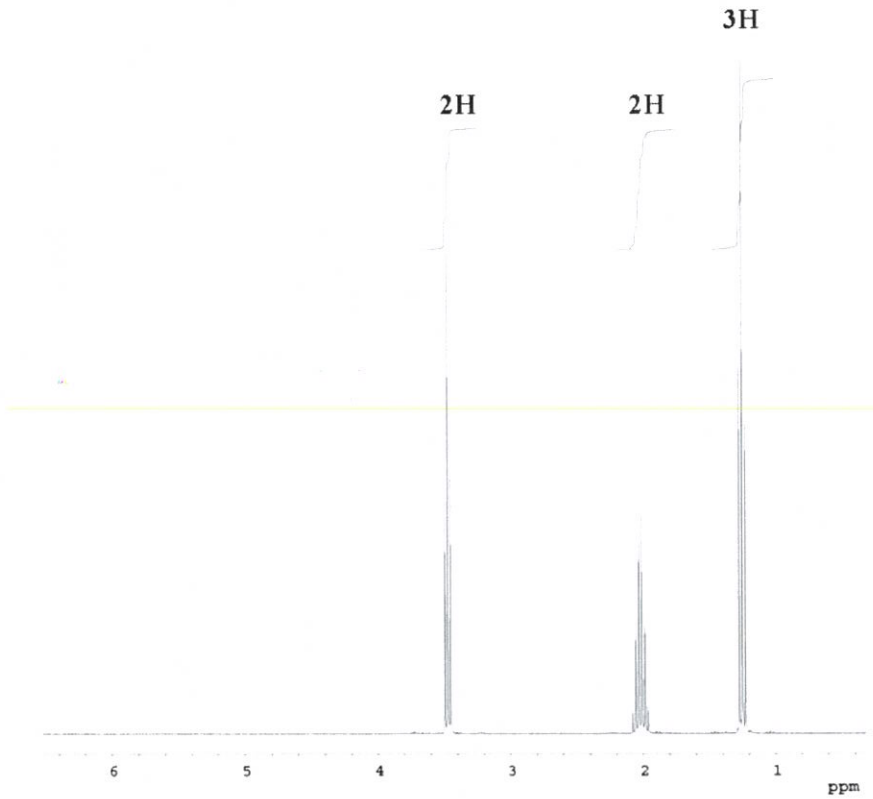
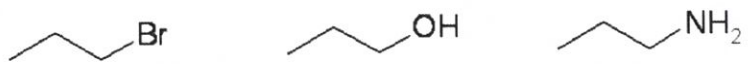
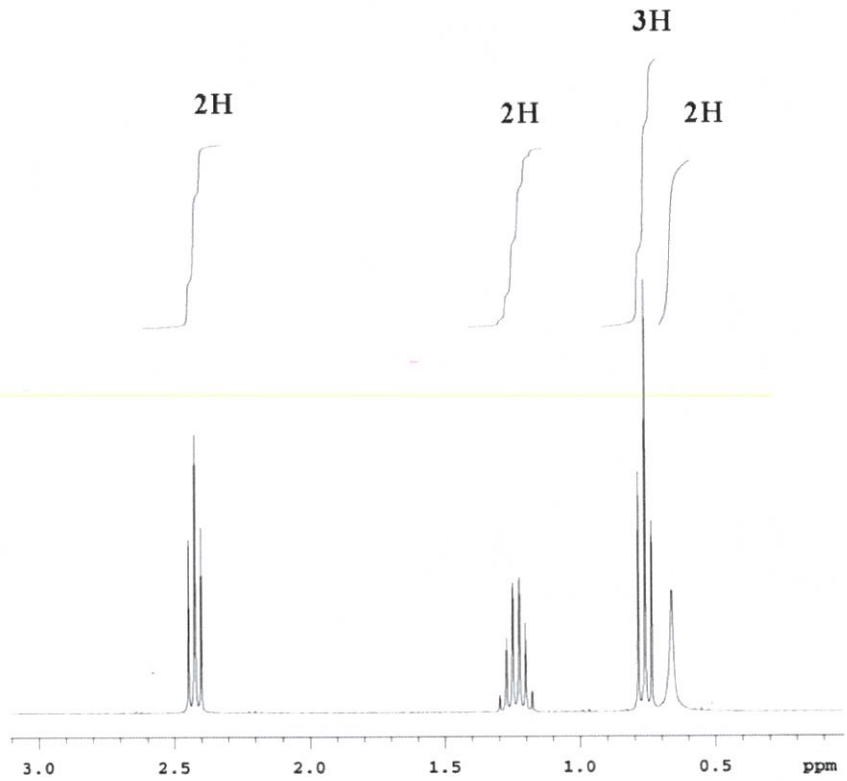
Circle the structure that corresponds to the following spectrum.

1. 

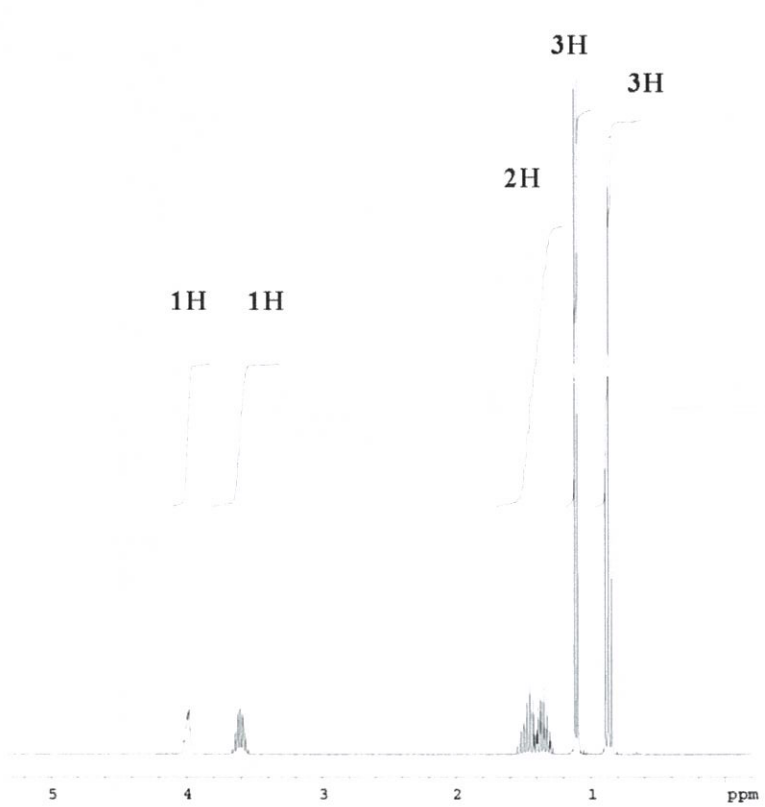


2. 

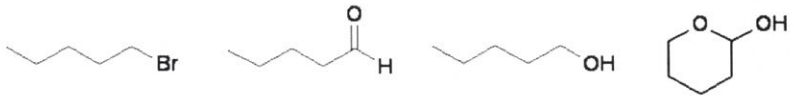


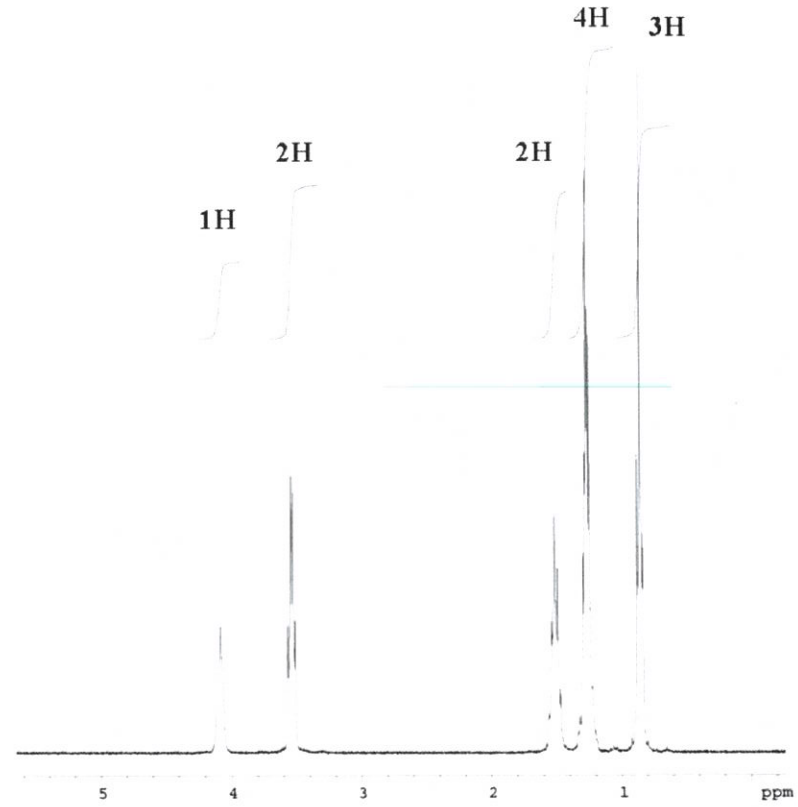
Circle the structure that corresponds to the following spectrum.

3.



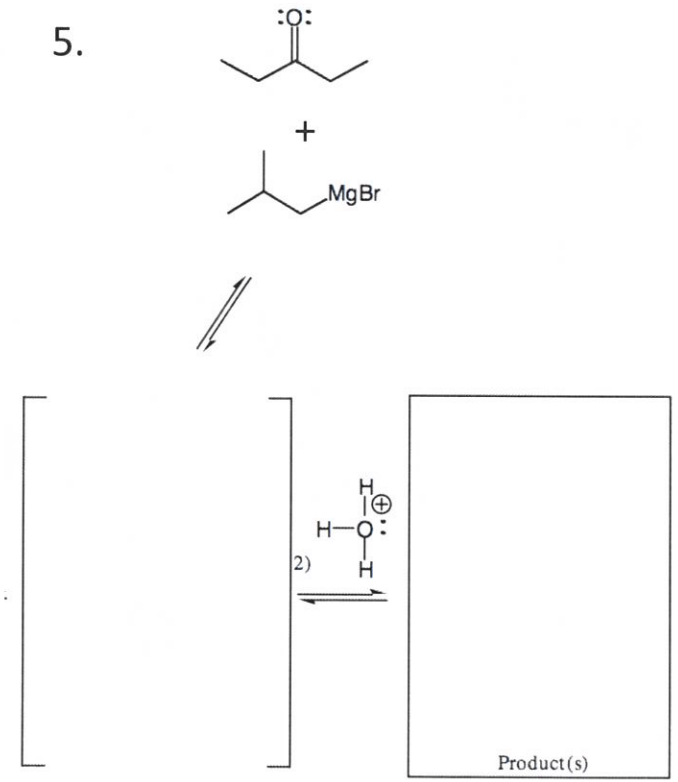
4.



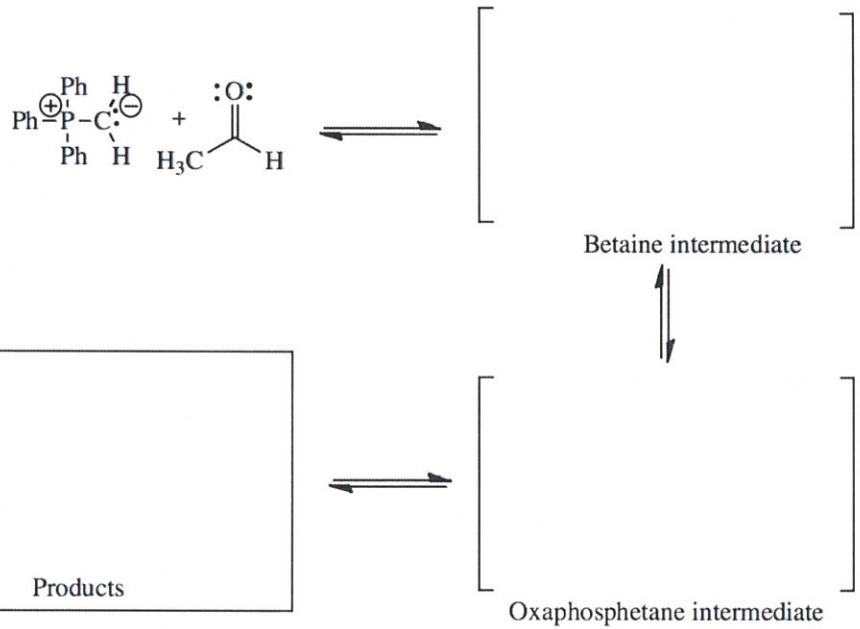


Complete the mechanism for the following reaction. **Be sure to show arrows to indicate movement of <u>all</u> electrons, write <u>all</u> lone pairs, <u>all</u> formal charges, and <u>all</u> the products for each step.** Remember, I said <u>all</u> the products for each step.

5.

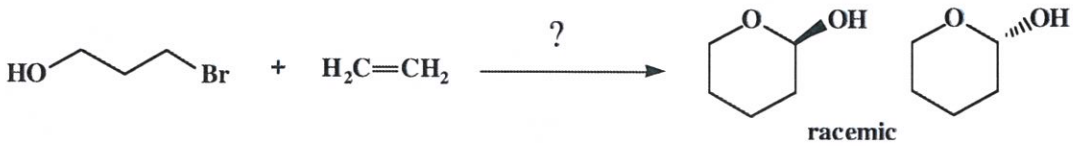


6.



These are synthesis questions. You need to show how the starting material can be converted into the product(s) shown. You may use any reactions we have learned. Show all the reagents you need. Show each molecule synthesized along the way and be sure to pay attention to the regiochemistry. If a racemic mixture is made, draw both enantiomers using wedges and dashes and make sure to write "racemic".

All of the carbon atoms of the products must come from the starting materials for this one!

7. 

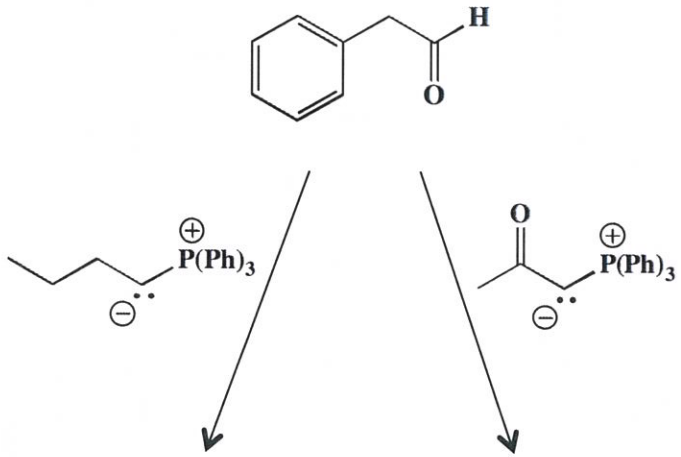
racemic

What is this functional group?

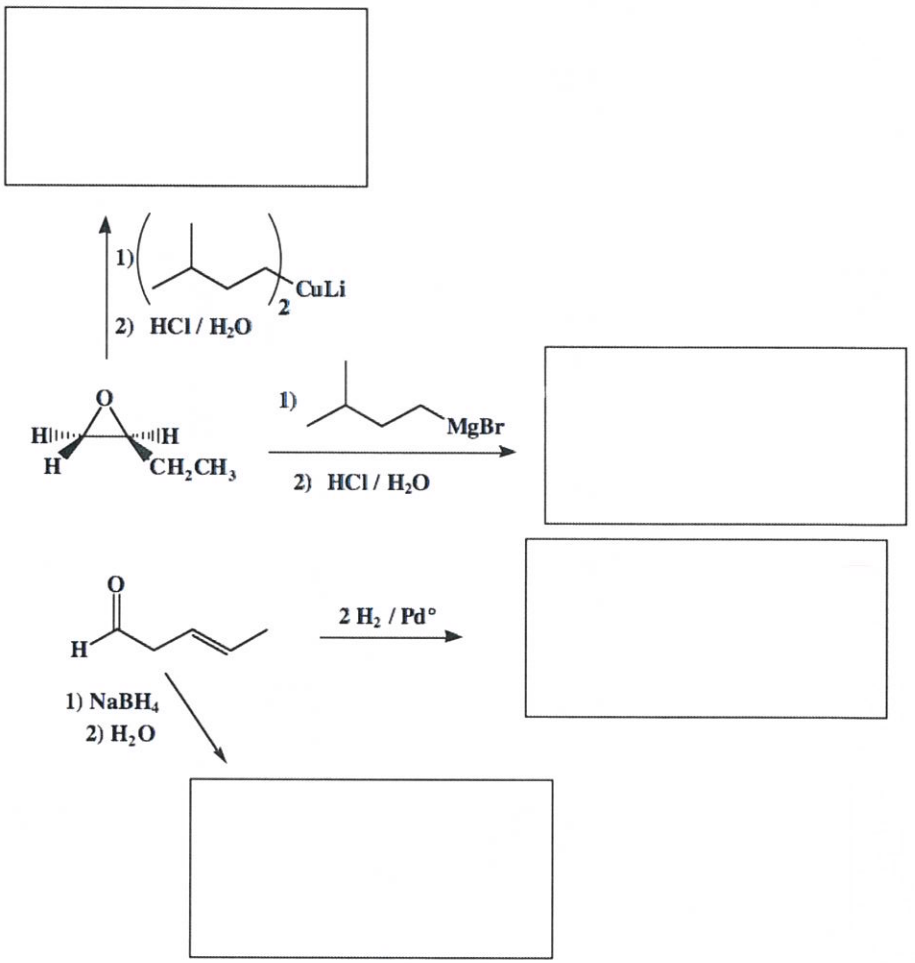
_____

Write the predominant product or products that will occur for each transformation. **If a new chiral center is created and a racemic mixture is formed, you must draw both enantiomers and write "racemic" under the structure. Use wedges (◄) and dashes (····ıı) to indicate stereochemistry. To get full credit, you only need to write the the major organic product for these. You do not have to worry about the other products.**

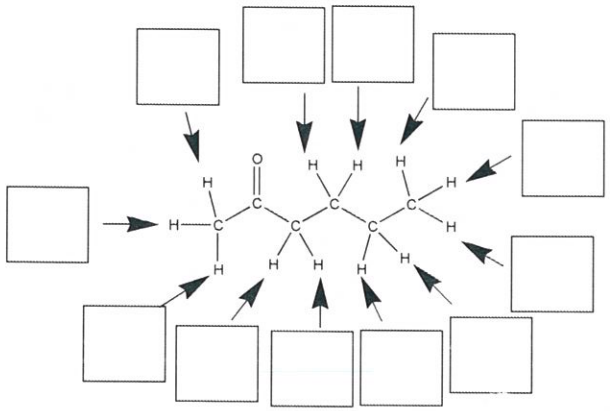
8.

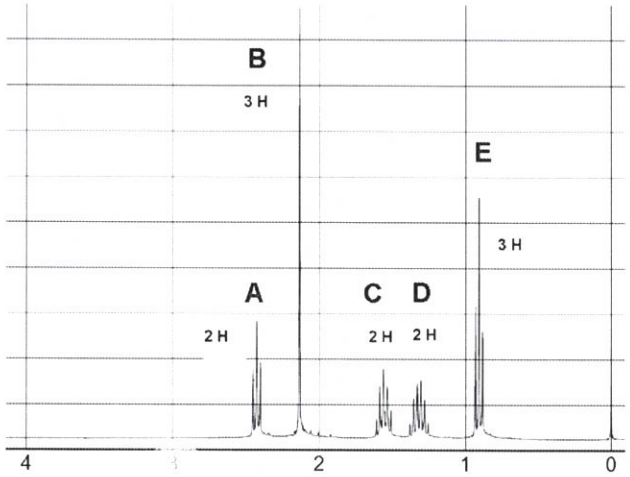


9.

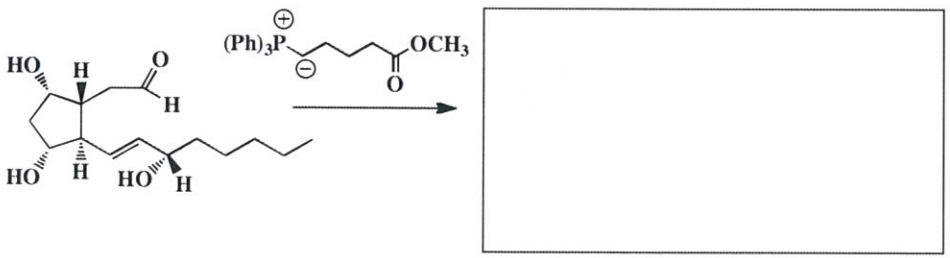


10. The following ^{1}H-NMR spectrum of 2-hexanone has signals labeled with letters. In the boxes provided on the structure, place the letter of the signal that corresponds to the H atoms indicated by the arrows. Because of equivalence, more than one box can get the same letter!





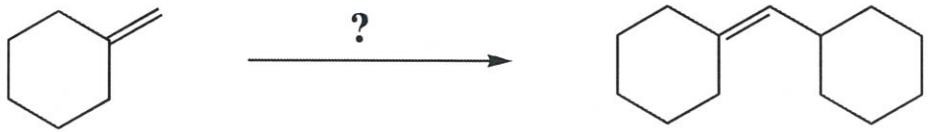
11. It is important that you are able to recognize reactive functional groups even in the context of complex molecules. You understand the chemistry important for the following reaction. In the space provided, draw the predominant product (including stereochemistry) of the following reaction (that was used in the actual synthesis of an important natural molecule, a prostaglandin).



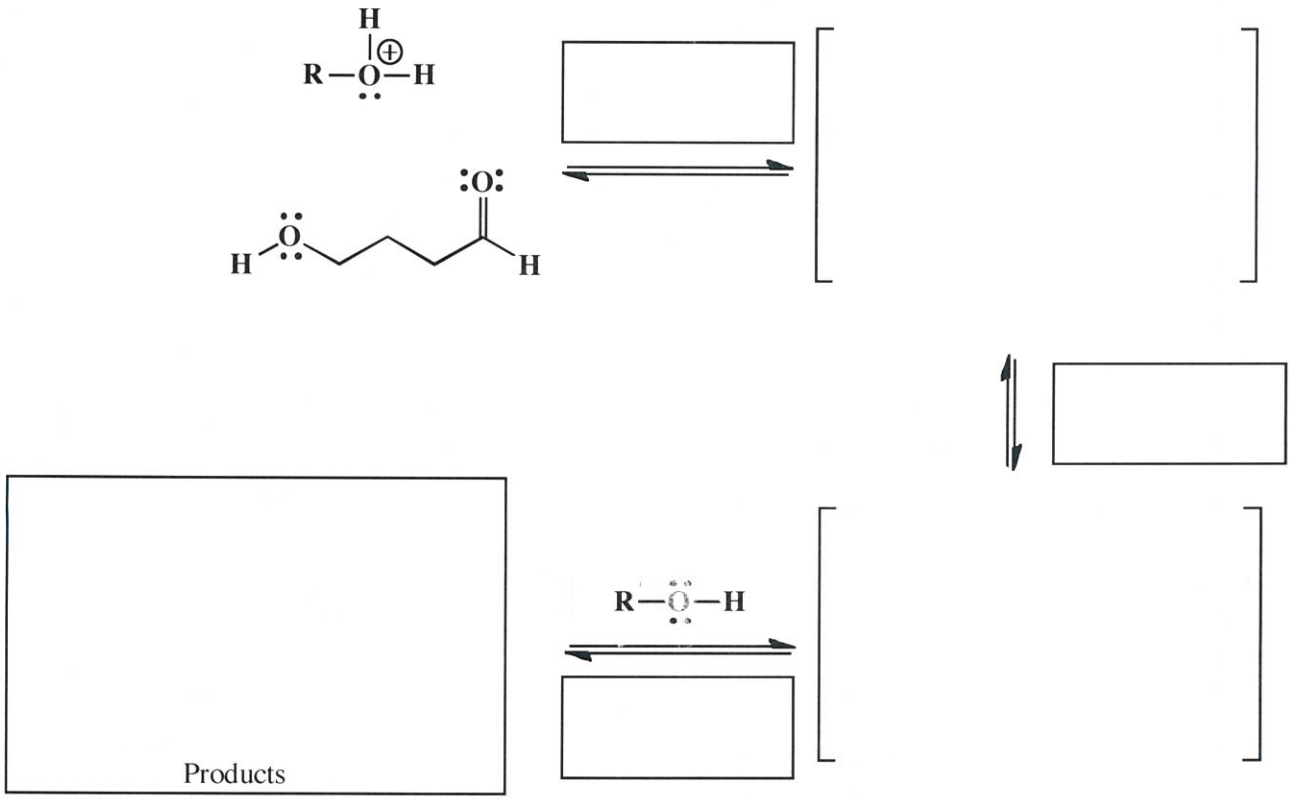
These are synthesis questions. You need to show how the starting material can be converted into the product(s) shown. You may use any reactions we have learned. Show all the reagents you need. Show each molecule synthesized along the way and be sure to pay attention to the regiochemistry. If a racemic mixture is made, draw both enantiomers using wedges and dashes and make sure to write "racemic".

All of the carbon atoms of the products must come from the starting materials for this one!

12.



12. (17 pts.) Complete the mechanism for the following reaction. **Be sure to show arrows to indicate movement of all electrons, write all lone pairs, all formal charges, and all the products for each step.** Remember, I said all the products for each step. **IF A NEW CHIRAL CENTER IS CREATED IN AN INTERMEDIATE, MARK IT WITH AN ASTERISK. IF A CHIRAL CENTER IS CREATED IN THE PRODUCTS YOU NEED TO DRAW BOTH ENANTIONMERS, AND LABEL THE PRODUCT MIXTURE AS RACEMIC IF RELEVANT.** I realize these directions are complex, so please read them again to make sure you know what we want.



(3 pts) **In the boxes provided adjacent to the first two sets of arrows, write which of the four basic mechanistic elements are involved (i.e. "Make a bond", "Add a proton", etc.**

NOTICE THIS **NOTICE THIS** **NOTICE THIS** **NOTICE THIS**

(4 pts) **In one sentence, state whether the pH changes during this reaction, and why or why not that is the case.**