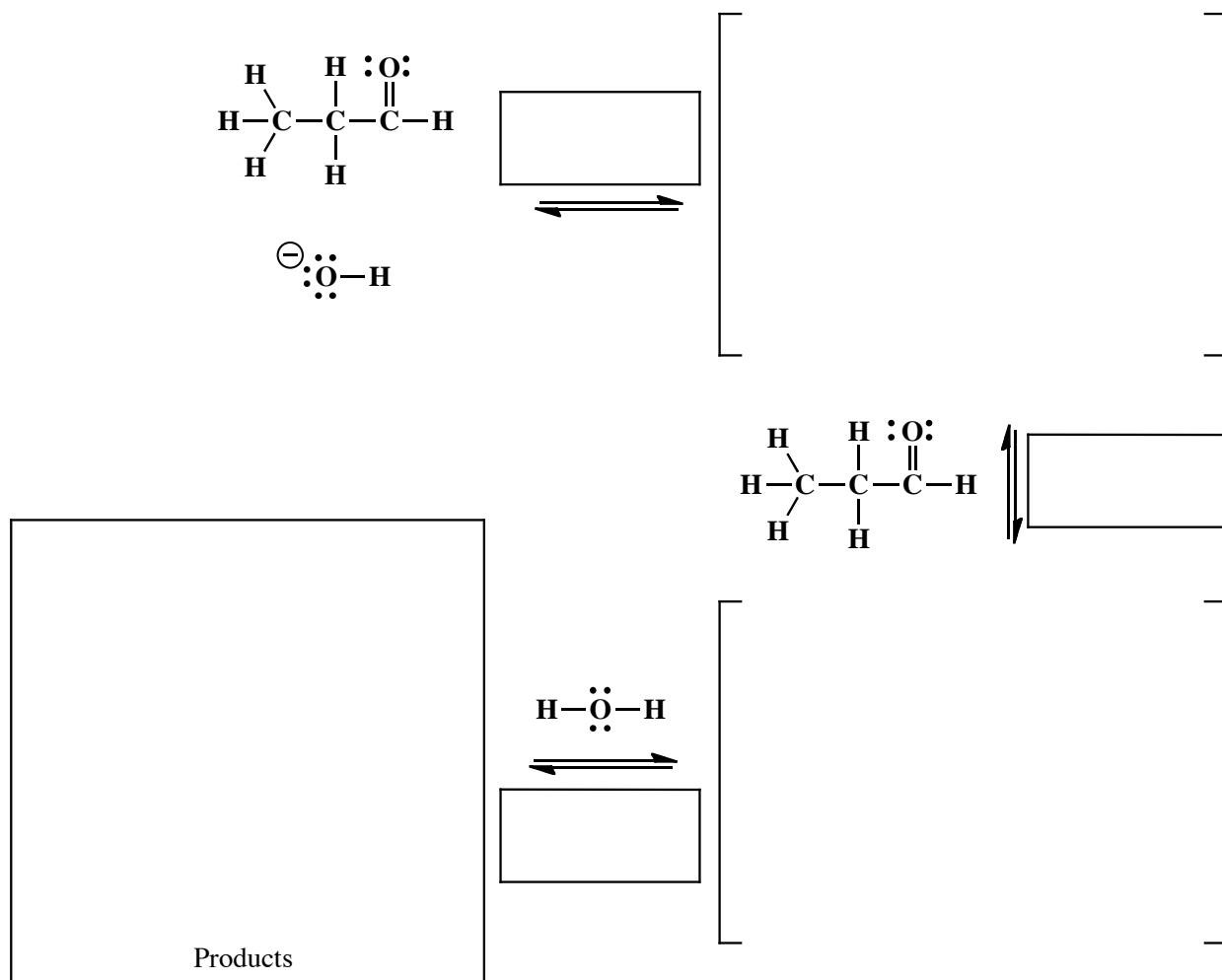
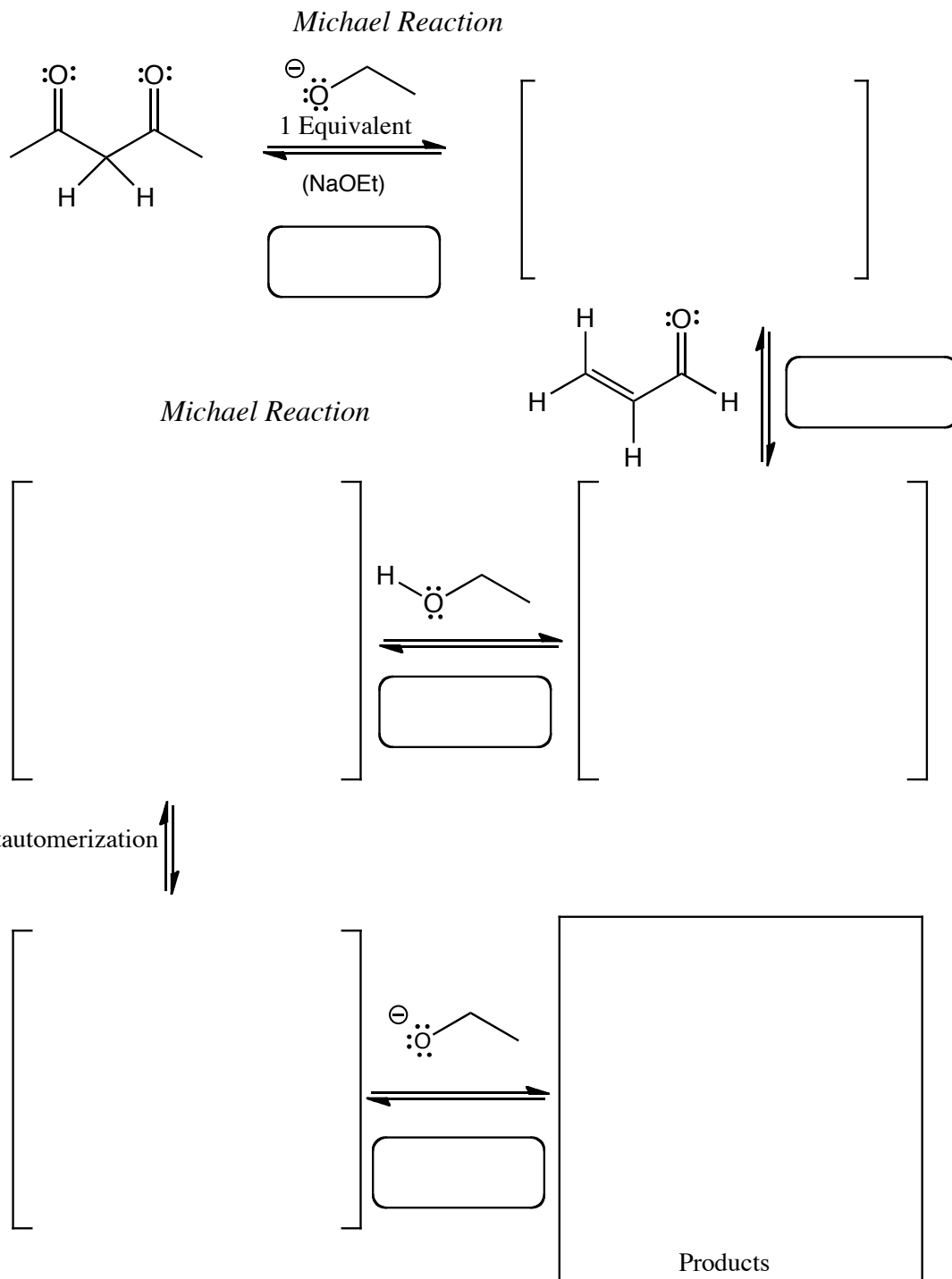


Homework 4
Organic Chemistry MCAT Review
Summer 2012
Brent Iverson

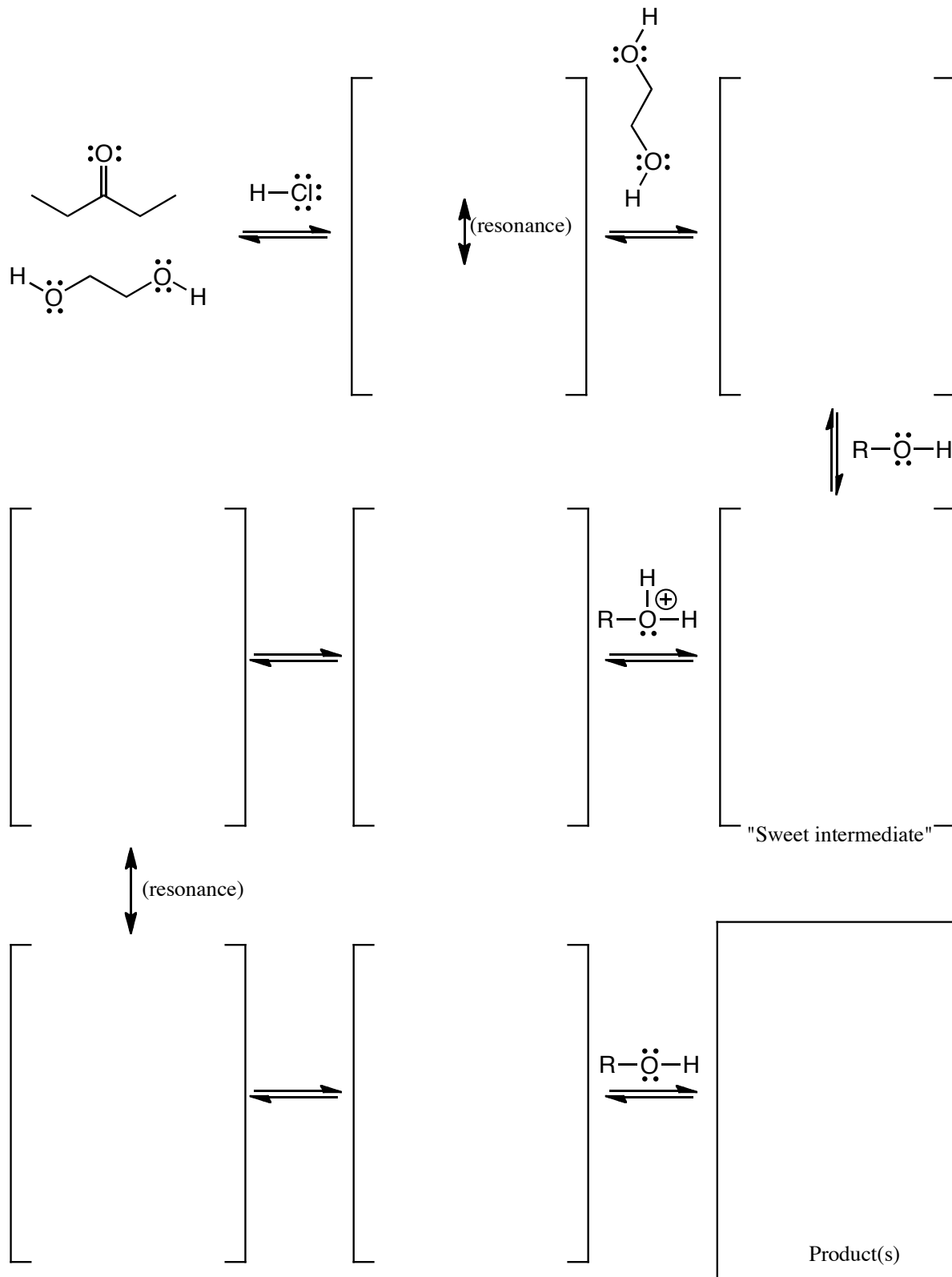
1. Complete the mechanism for the following aldol reaction. Be sure to show arrows to indicate movement of all electrons, write all lone pairs, all formal charges, and all the products for each step. Remember, I said all the products for each step. IF A NEW CHIRAL CENTER IS CREATED IN AN INTERMEDIATE OR THE PRODUCTS, MARK IT WITH AN ASTERISK and WRITE RACEMIC IF RELEVANT. 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.)



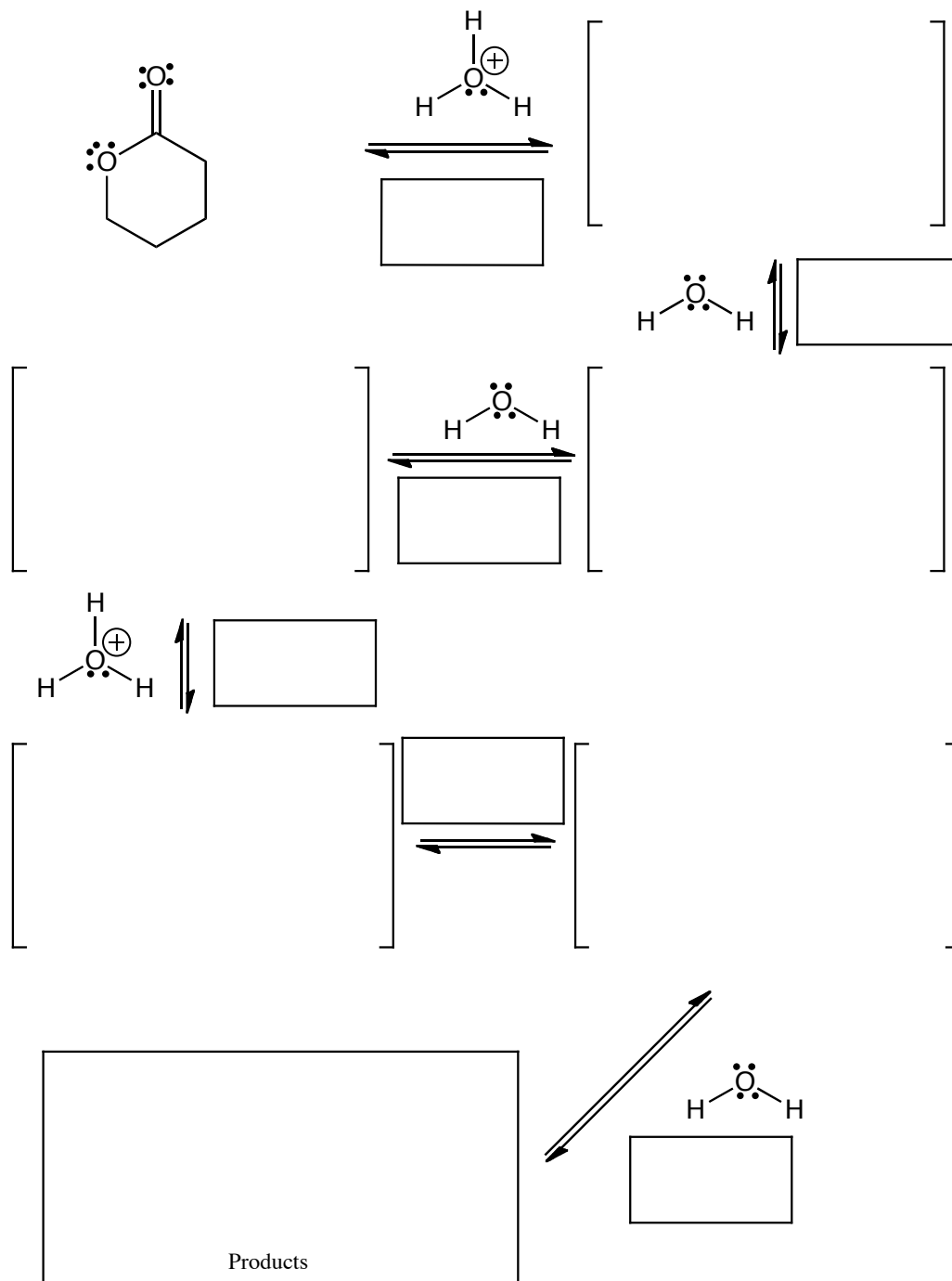
2. Complete the following mechanism for the Michael reaction. Make sure to show all lone pairs, all formal charges and use arrows to indicate the flow of all electrons. You must draw all products that are made in each step. This should look familiar, as it is identical to the mechanism sheet handed out in class.



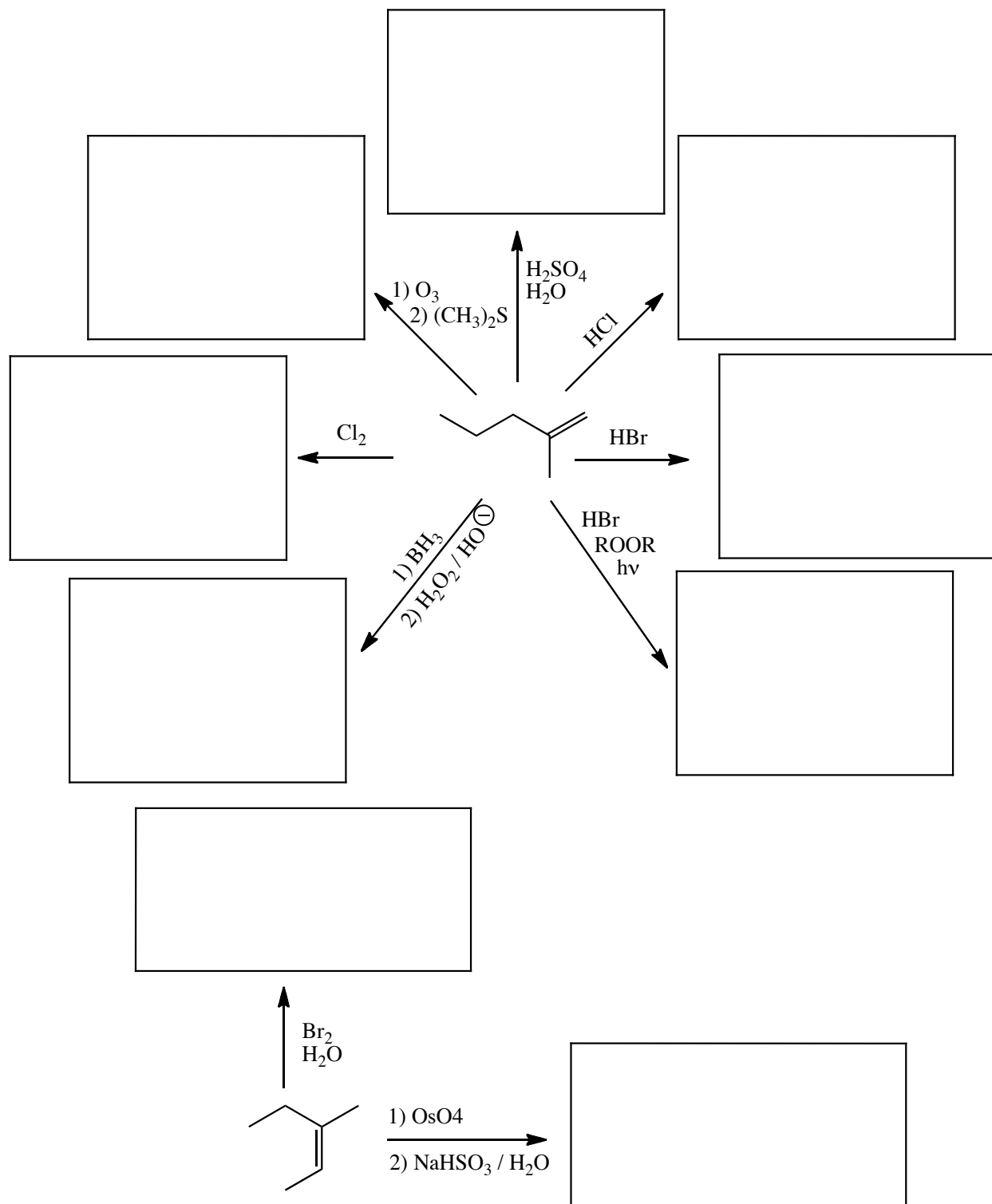
3. Complete the mechanism for the following cyclic acetal formation reaction. Be sure to show arrows to indicate movement of all electrons, write all lone pairs, all formal charges, and all the products for each step.



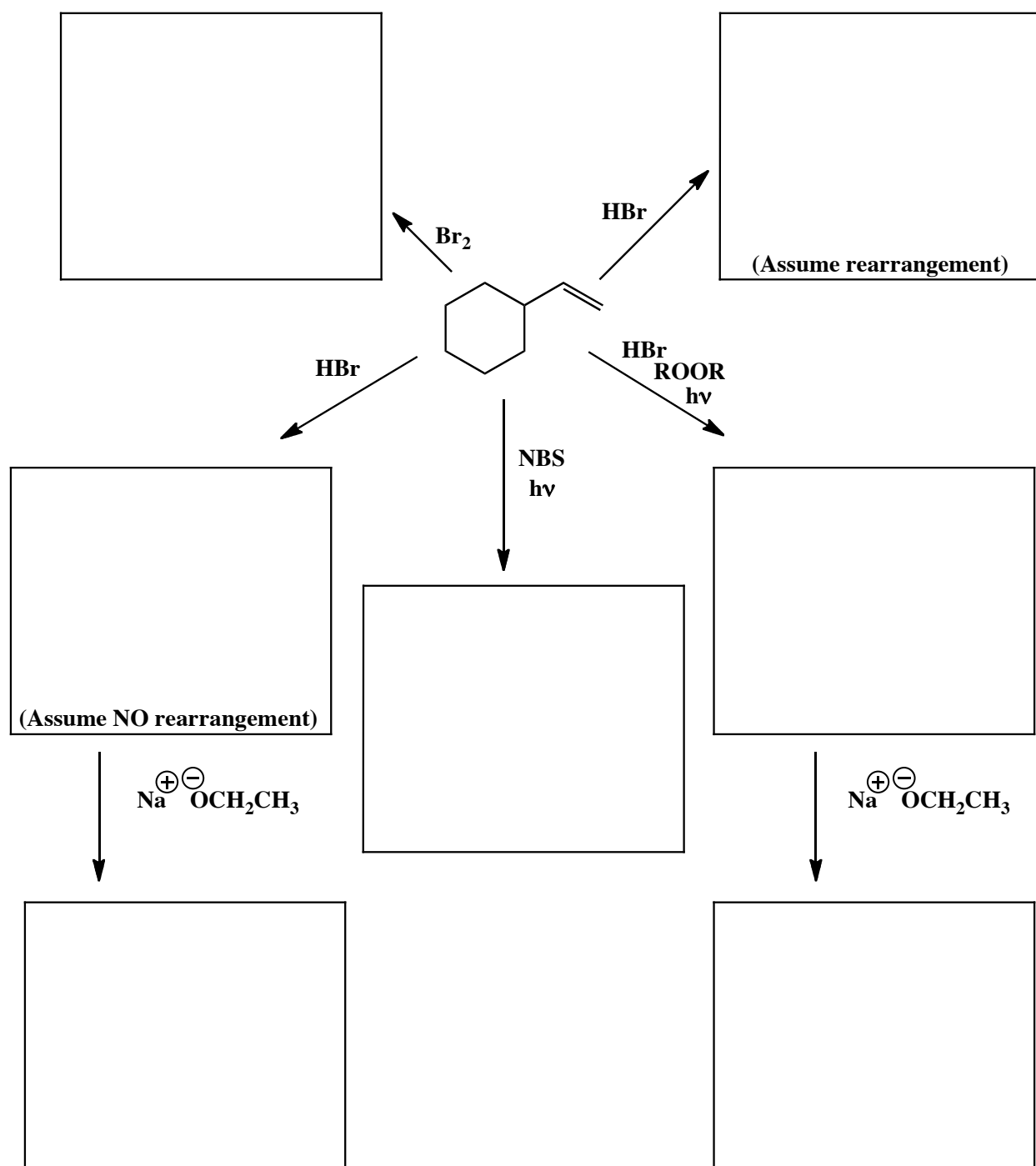
4. Complete the mechanism for the following acid catalyzed hydrolysis reaction. **Be sure to show arrows to indicate movement of all electrons, write all lone pairs, all formal charges, and all the products for each step.** Remember, I said all the products for each step. **IF A NEW CHIRAL CENTER IS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



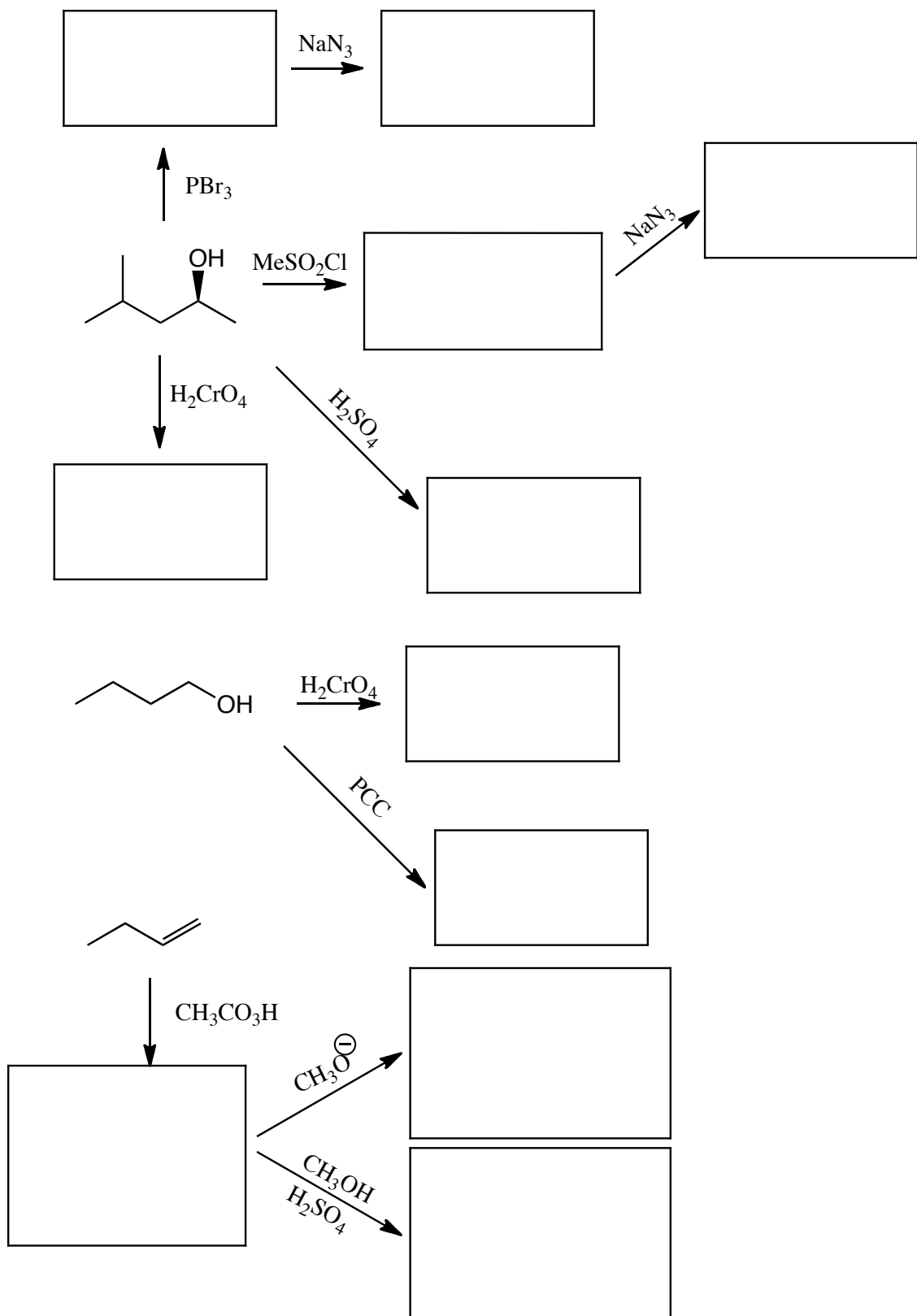
5. Fill in the boxes with the structures that complete the reactions. Use wedges and dashes to indicate stereochemistry when appropriate.



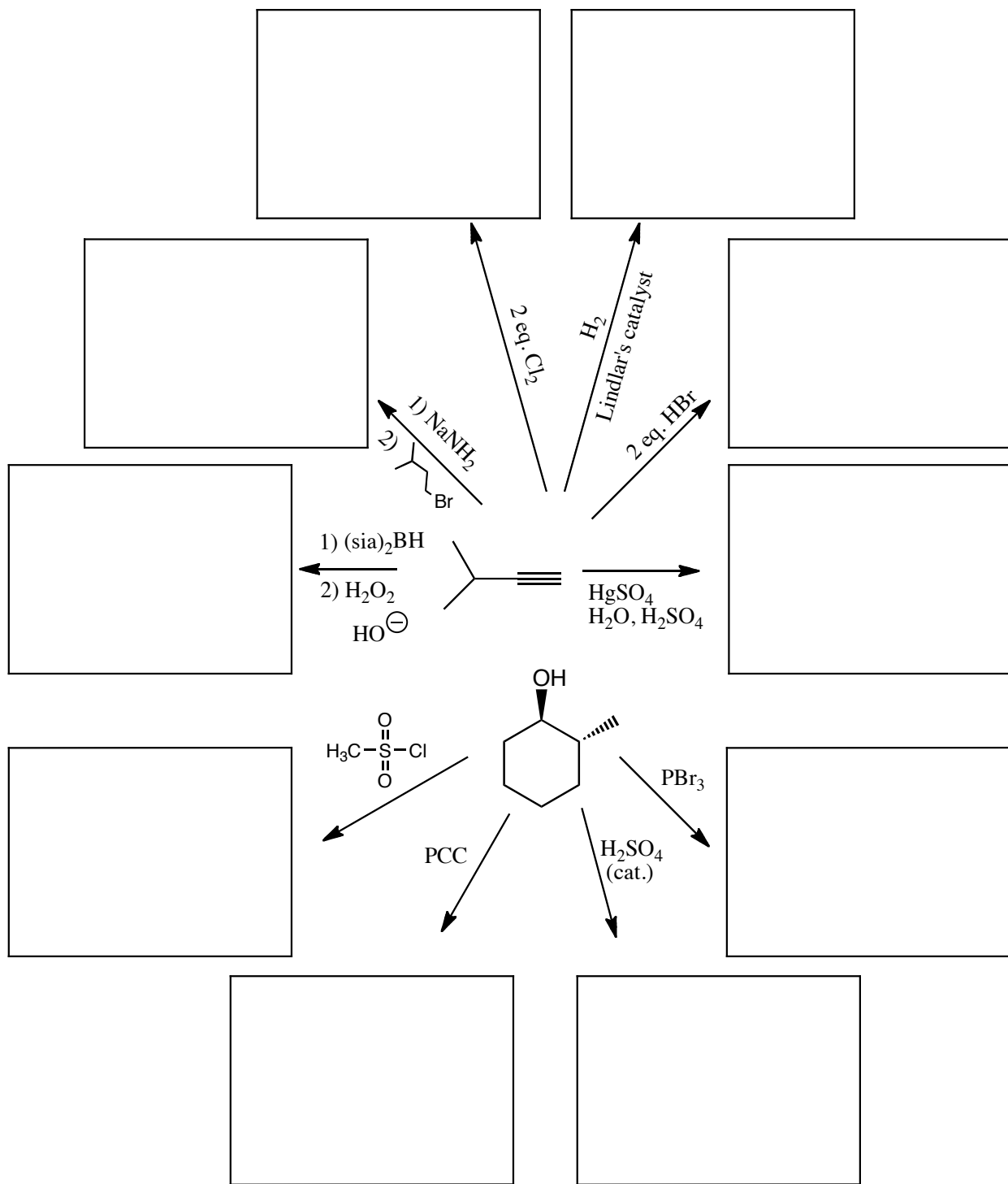
6. Fill in the boxes with the structures that complete the reactions. Use wedges and dashes to indicate stereochemistry when appropriate.



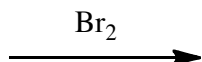
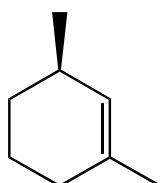
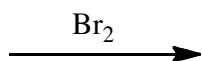
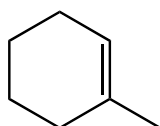
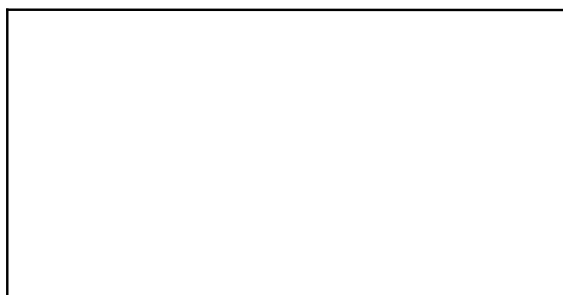
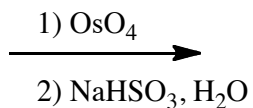
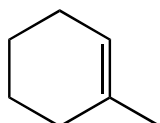
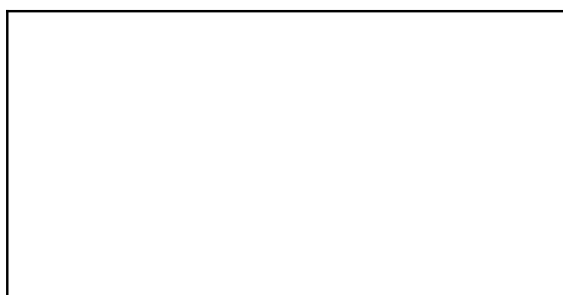
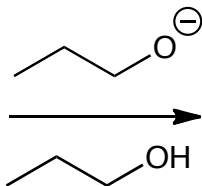
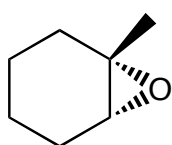
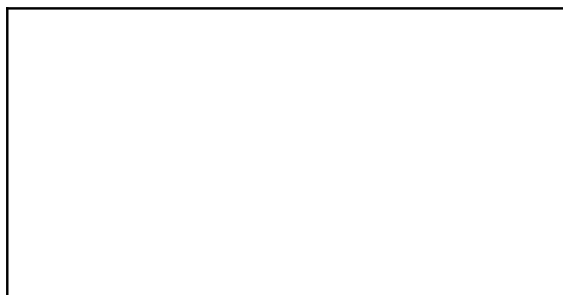
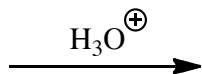
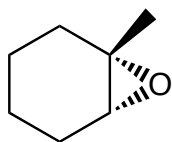
7. Fill in the boxes with the structures that complete the reactions. Use wedges and dashes to indicate stereochemistry when appropriate.



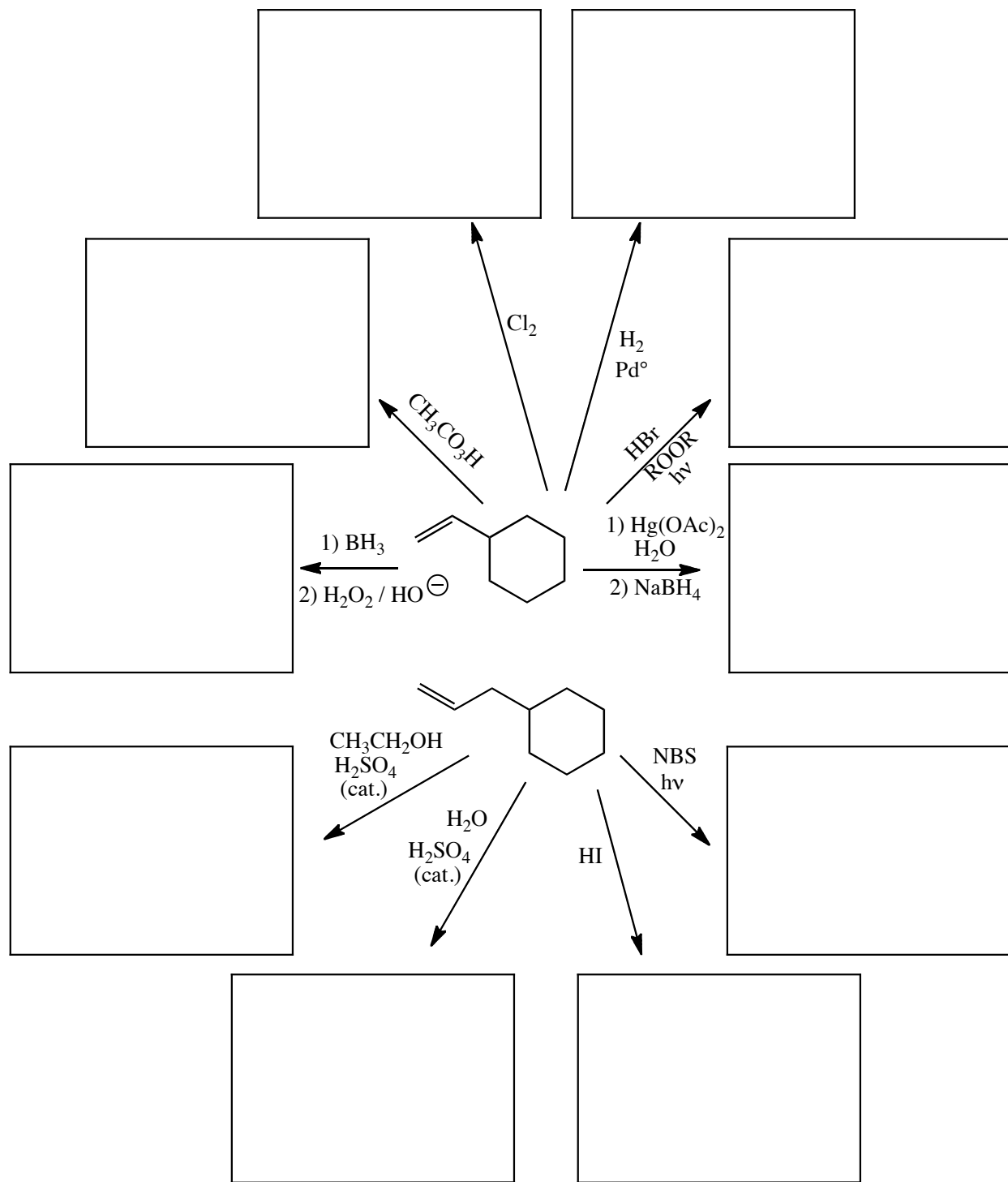
8. For the following, complete the reactions with the predominant product or products. You must indicate stereochemistry with wedges and dashes. You must draw all stereoisomers produced as predominant products and write "racemic" under the structures when appropriate. Assume no rearrangements take place.



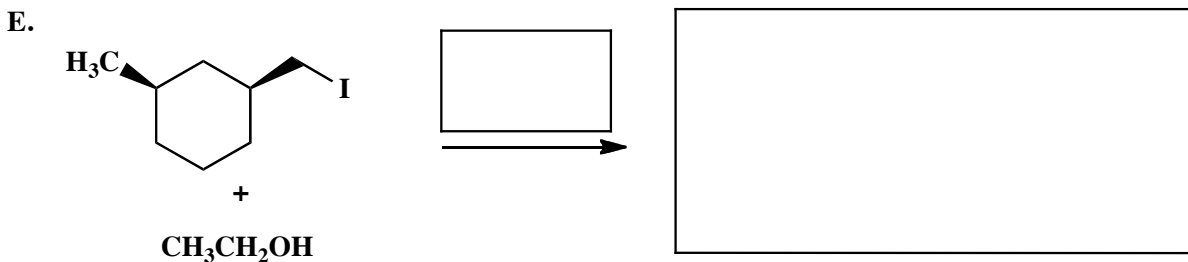
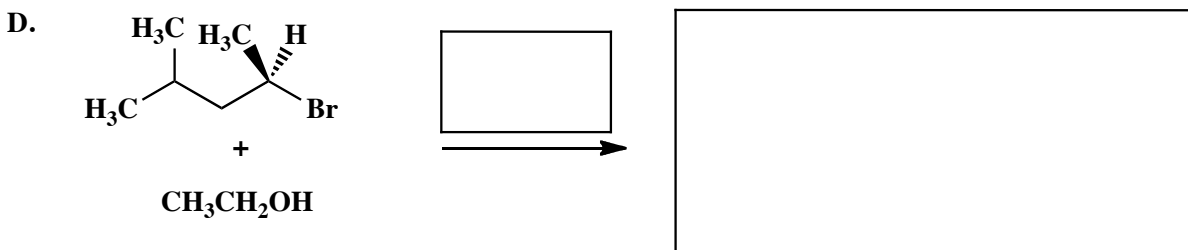
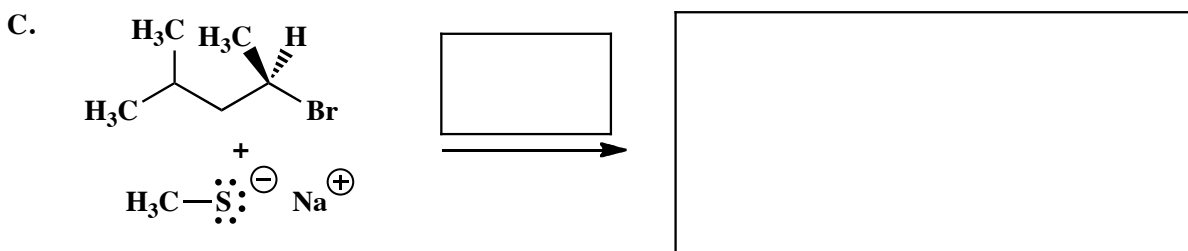
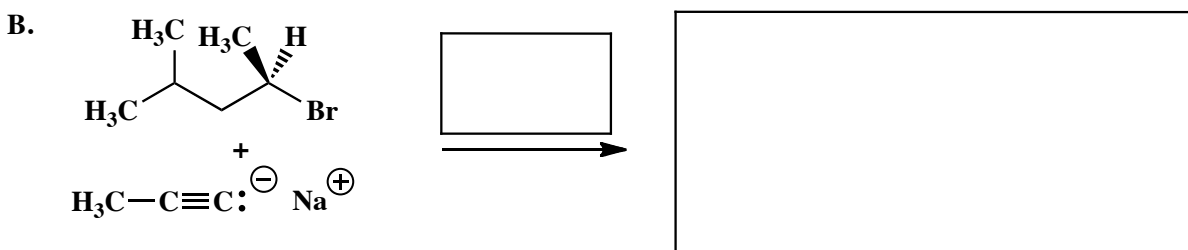
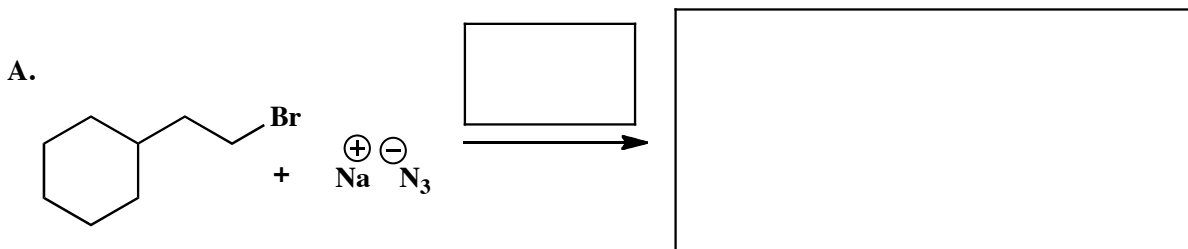
9. For the following, complete the reactions with the predominant product or products. You must indicate stereochemistry with wedges and dashes. You must draw all stereoisomers produced as predominant products and write "racemic" under the structures when appropriate. Assume no rearrangements take place.



10. For the following, complete the reactions with the predominant product or products. You must indicate stereochemistry with wedges and dashes. You must draw all stereoisomers produced as predominant products and write "racemic" under the structures when appropriate. Assume no rearrangements take place.



11. The following reactions all involve chemistry of alkyl halides. Fill in the box above the arrow with the mechanism that will be followed (S_N2 , E2, etc.). Then draw only the predominant product or products and please remember that you must draw the correct stereoisomers. For $S_N1/E1$ reactions you must draw all significant products (including all stereoisomers).



12. Many of the reactions we have learned this semester involve steps with nucleophiles reacting with electrophiles. For the following examples of steps in mechanisms we have seen this semester, 1) Draw the intermediate that will be formed when the two molecules react. 2) Draw all formal charges and lone pairs on the intermediates. 3) Draw arrows on the starting materials to indicate the flow of electrons that leads to the intermediate. 4) Finally, draw a box around the nucleophile and a circle around the electrophile in each case. There is no need to draw products or any further steps of the mechanisms. You might want to read these directions again so you know what we want.

