Chemistry 218, Winter 2007 **Exam 2** **Name:**

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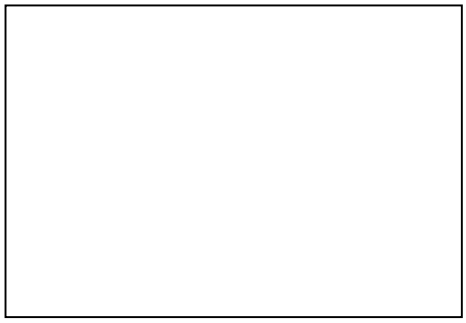
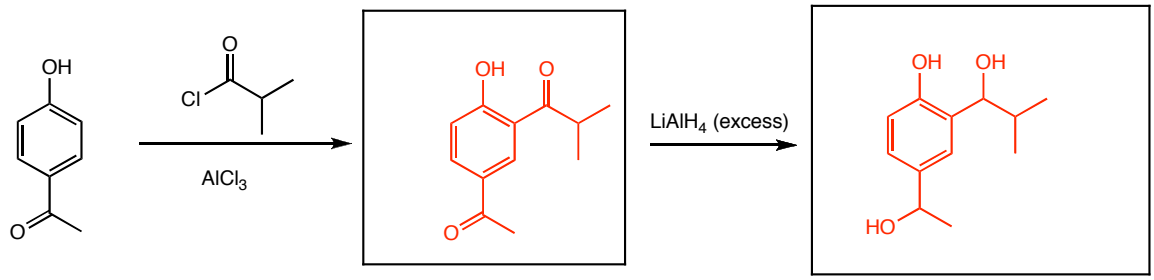
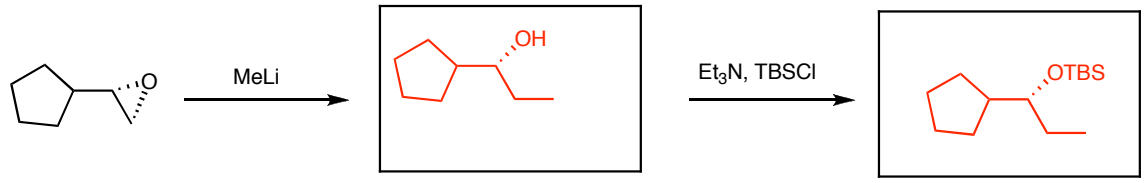


1. Fill in the blanks for the following reactions. Assume a single equivalent of reagent, unless otherwise noted, and that every reaction is quenched. (40 pts)

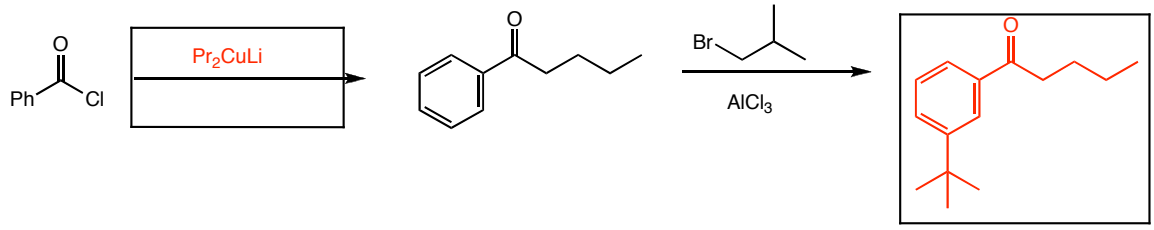
(a)



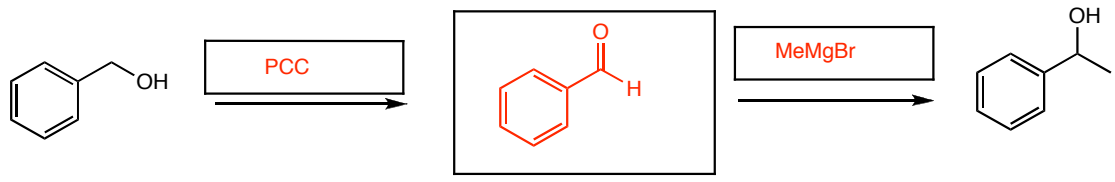
(b)



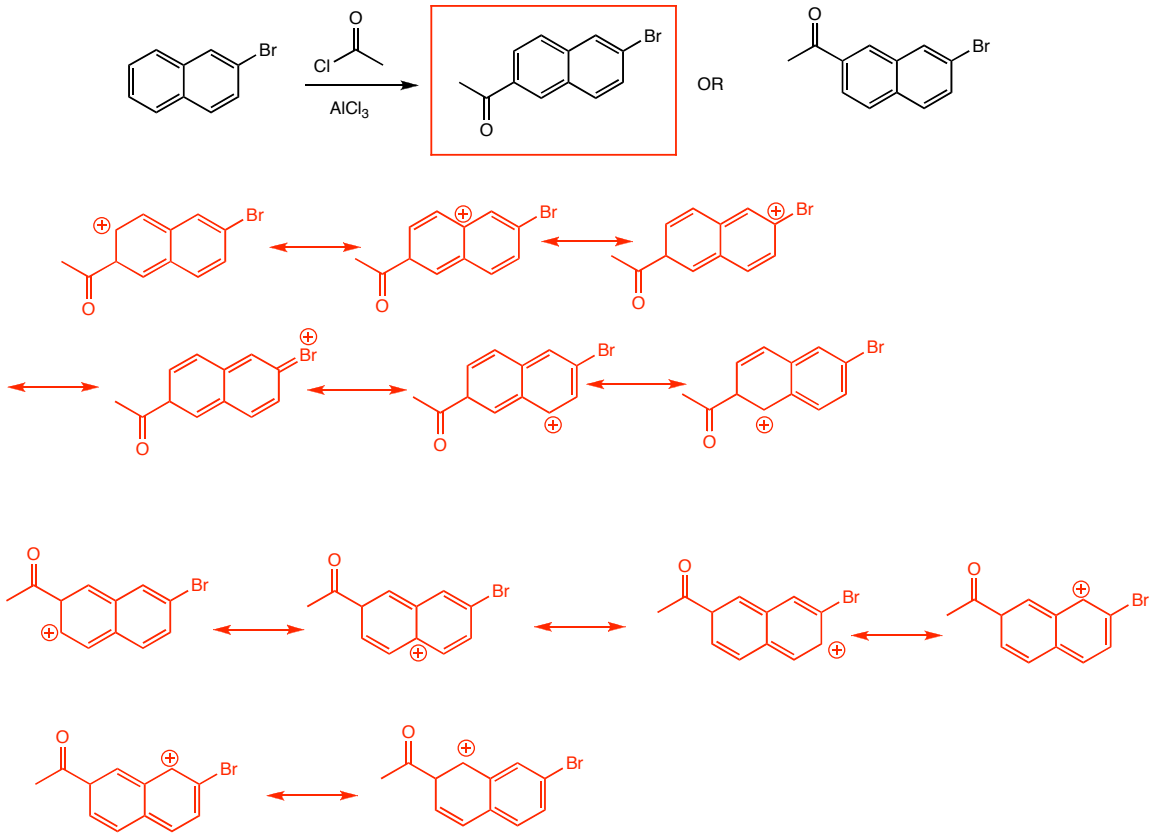
(c)



(d)

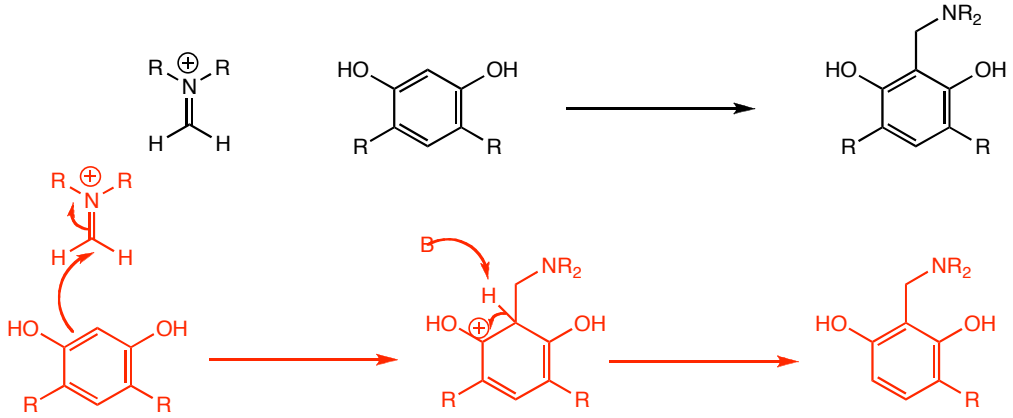


2. In the following reaction, one of the products is formed preferentially over the other one. Circle the product that is more likely to be formed, and explain why using resonance forms. (10 pts)

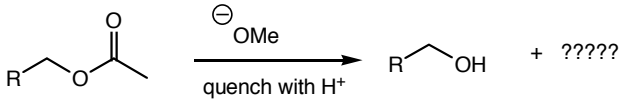


When the first compound is formed, there is a resonance form in which the positive charge resides on the carbon adjacent to the bromine, allowing for an additional resonance form. This resonance form is not possible if the second compound is formed.

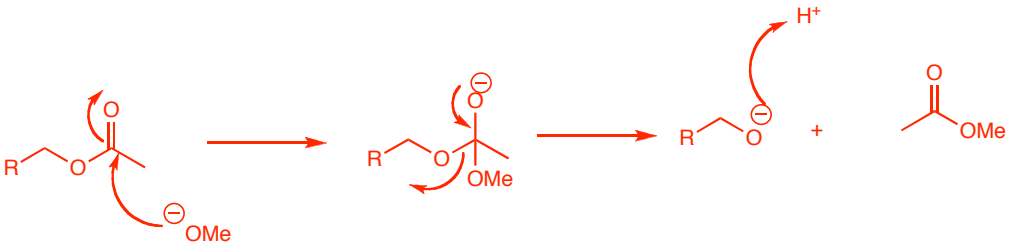
3. The following reaction is a key step in a current Bates student's senior thesis. Draw the mechanism for this reaction (the solvent for the reaction is water). (8 pts)



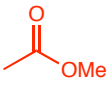
4. Esters are commonly used as protecting groups for alcohols. One way to deprotect an ester protecting group is to treat it with sodium methoxide (followed by an acidic quench). (14 pts)



(a) Propose a mechanism for the deprotection.



(b) What is the other organic compound that is formed in the reaction?

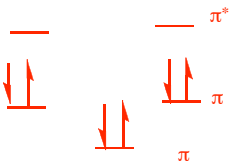


(c) As we discussed in class, it is important that a protecting group be stable to all reaction conditions. Circle the conditions below that could not be used if there were an ester protecting group elsewhere in the molecule.

$NaBH_4$ $LiAlH_4$ MeLi Me_2CuLi

5. Draw an energy diagram of the molecular orbitals of oxazole (you do not need to draw the molecular orbitals, just their relative energies). From your diagram, determine if the molecule is aromatic or anti-aromatic. (8 pts.)

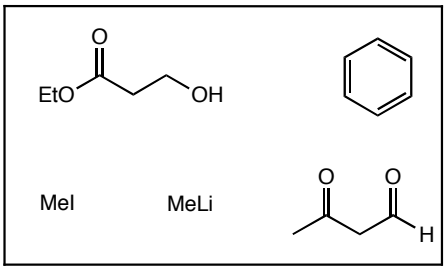
oxazole

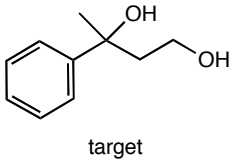


One of the lone pairs on oxygen also contributes to the conjugation, so there are 6 π-electrons. There is a closed shell of orbitals, so the compound is aromatic.

6. Sketch a ddd (doublet of doublet of doublets), in which all three coupling constants are different. (8 pts)

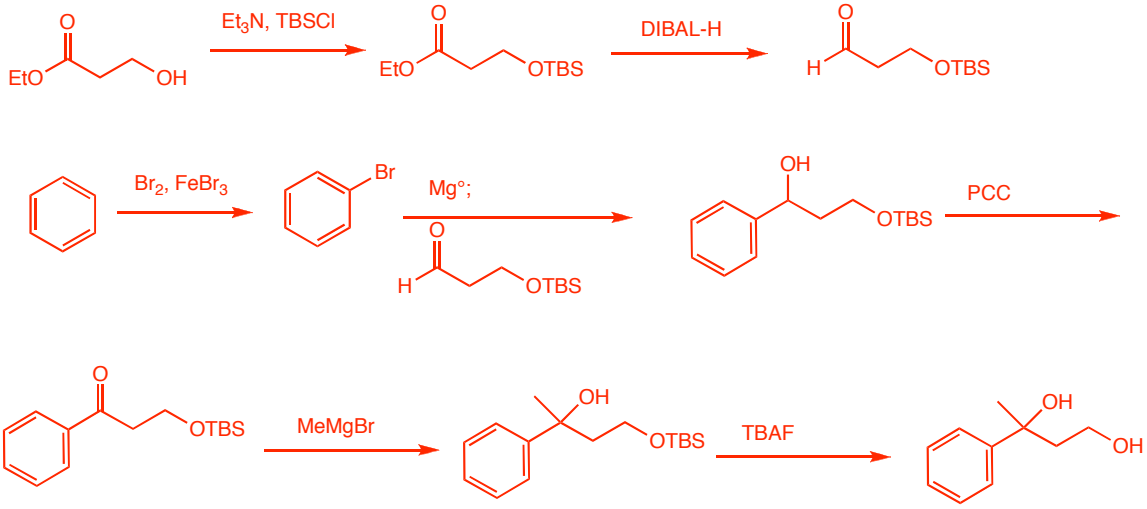
7. Propose a synthesis of the target molecule below. You may only use the compounds in the box as sources of carbon, but you may use any other reagent necessary. (12 pts)





target

Several possibilities. Here's one:



Extra Credit: My Netflix queue is empty. Suggest up to three movies to fill it up.