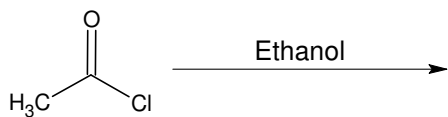
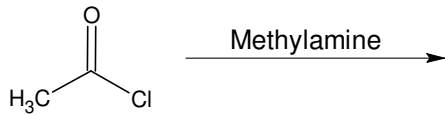
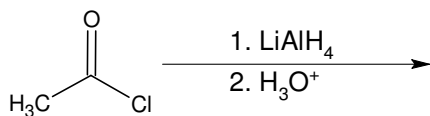
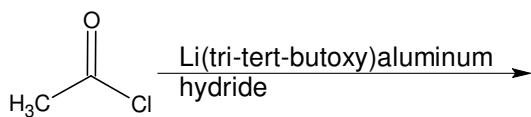
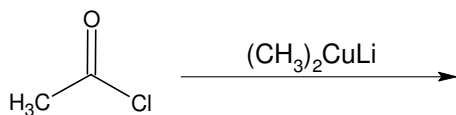
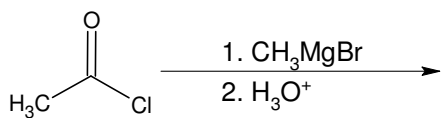
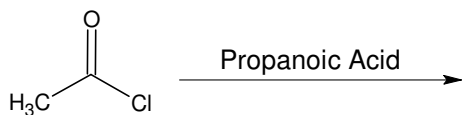
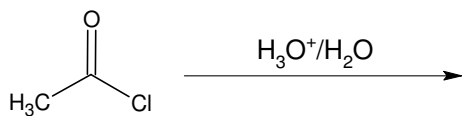
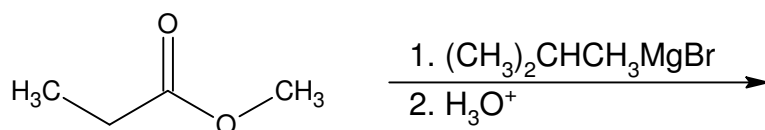
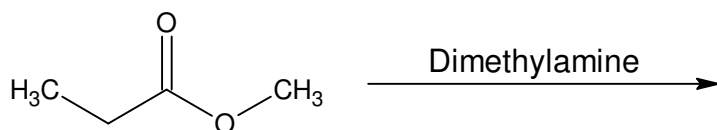
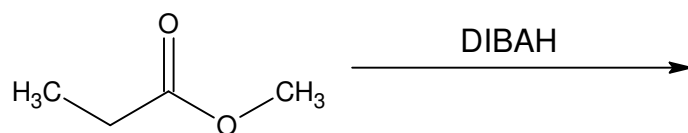
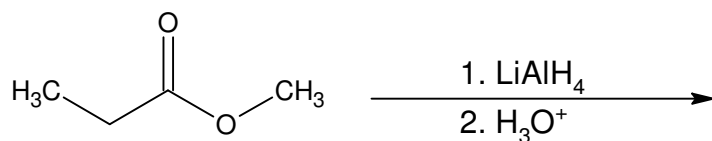
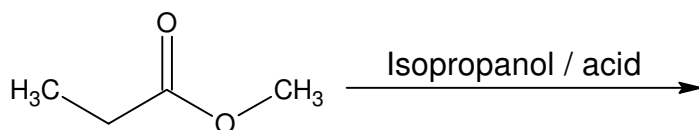
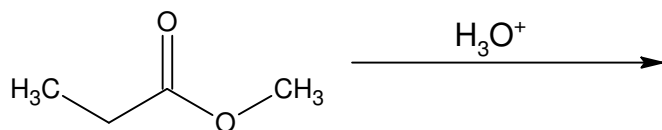
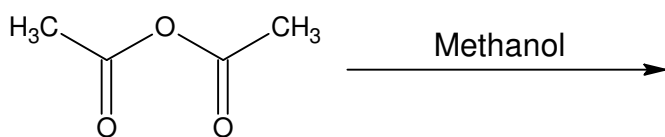
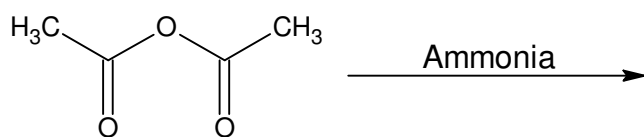
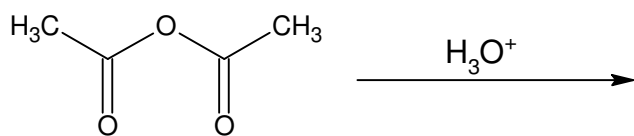


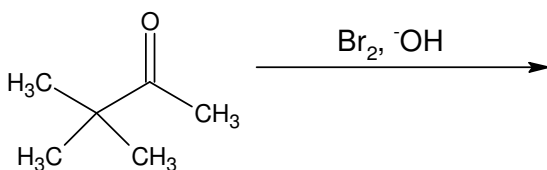
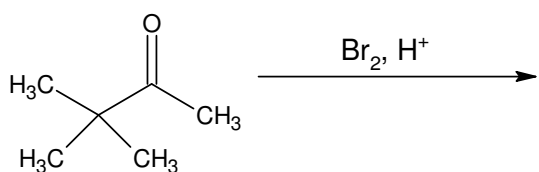
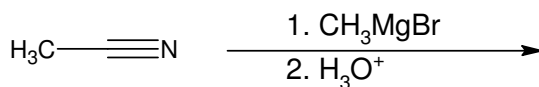
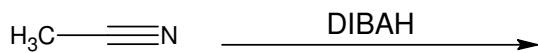
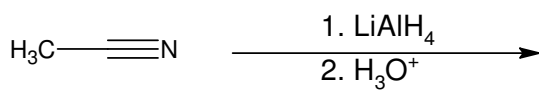
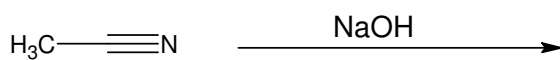
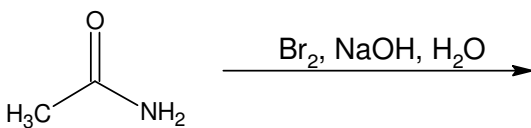
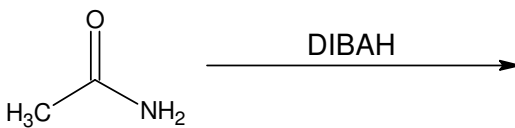
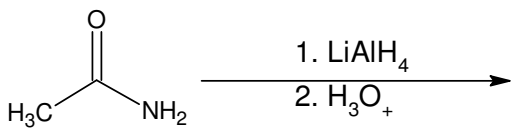
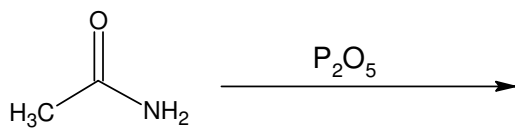
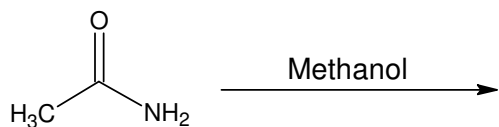
Second Exam Practice Test

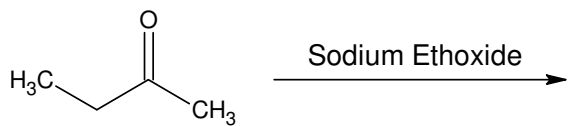
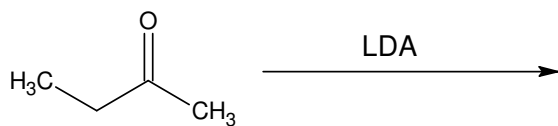
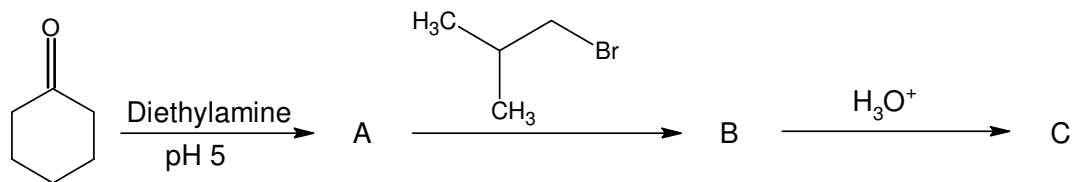
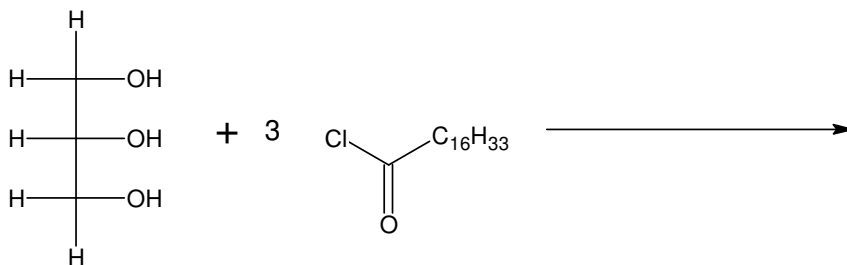
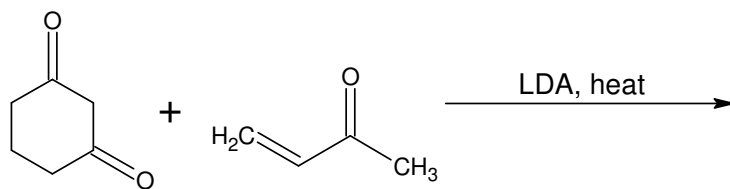
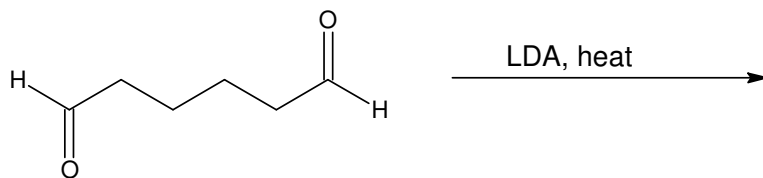
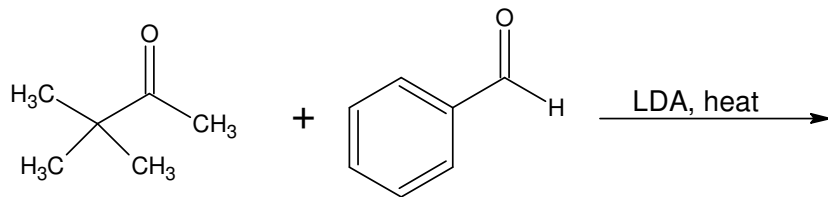
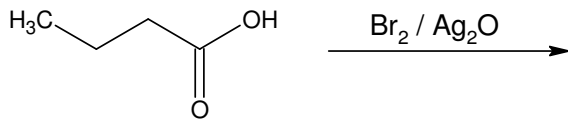
*This is meant to provide you with a comprehensive review of the exam material. It is in no way an exhaustive list of the material and there is no correlation between this document and the actual exam. This stresses chapters 19 and 20. For Chapter 18 please refer to the chapter 18 review sheet.

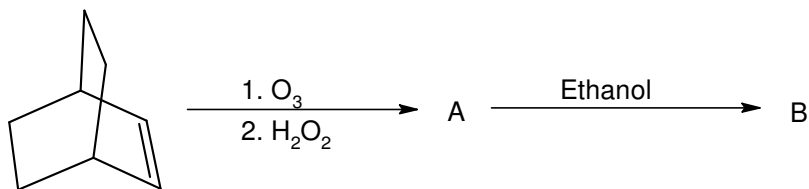
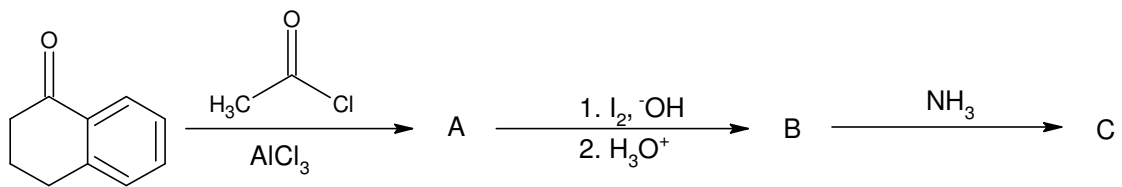
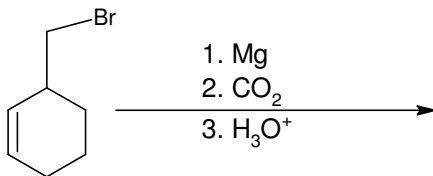
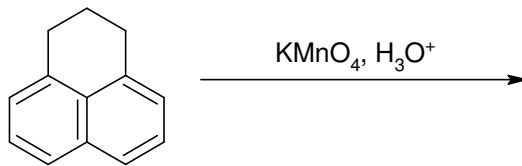
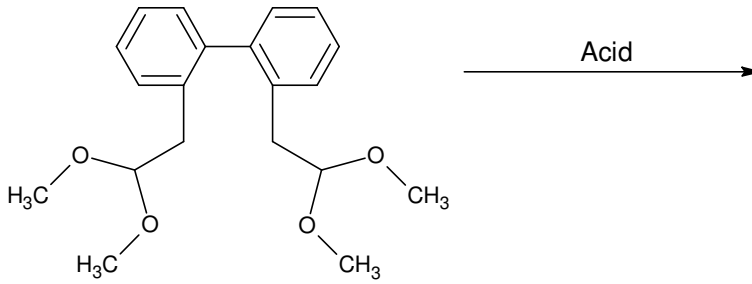
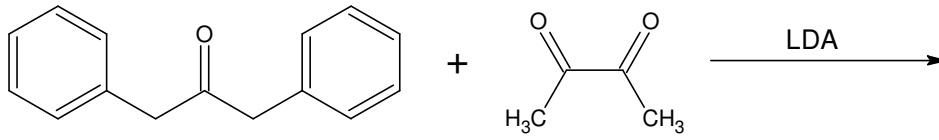
I. Predict the Products

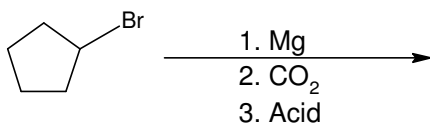
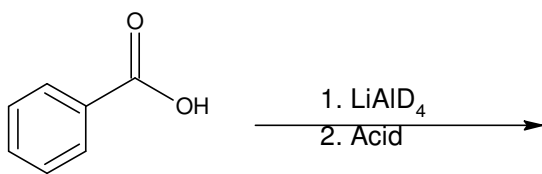
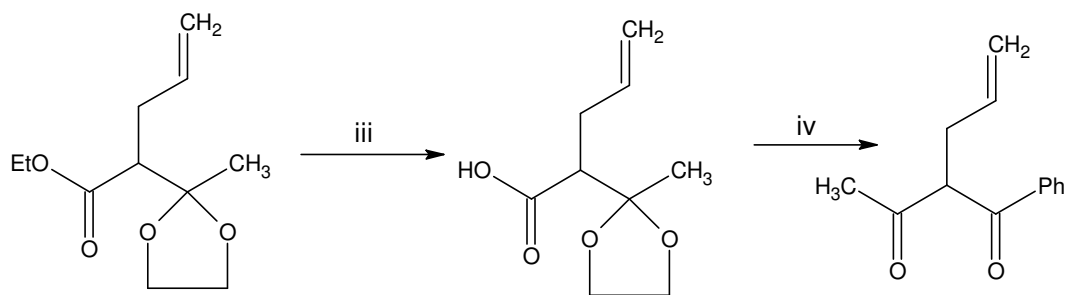
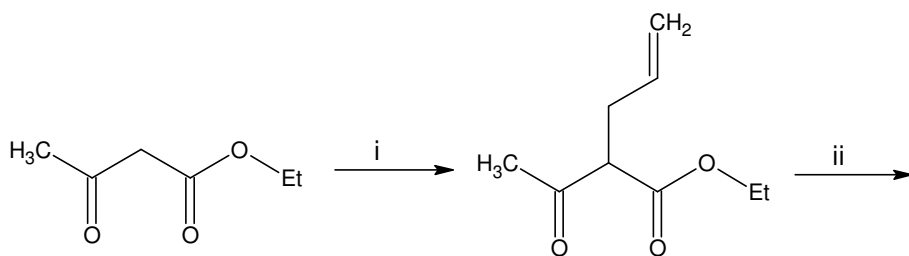
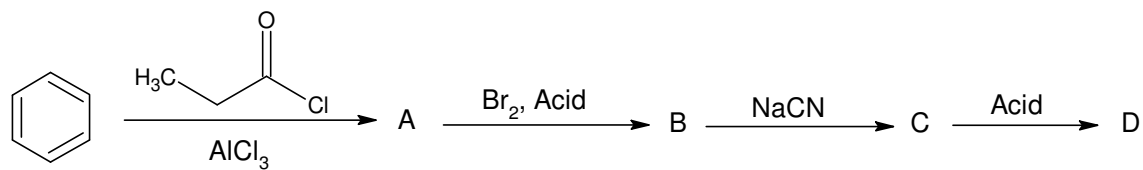
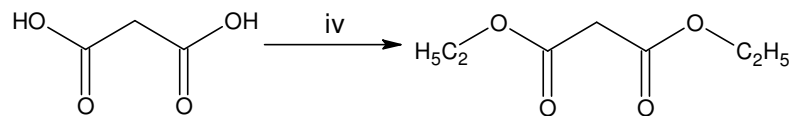
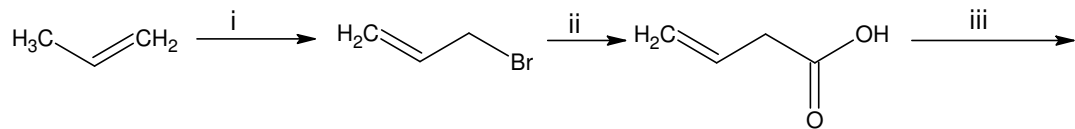




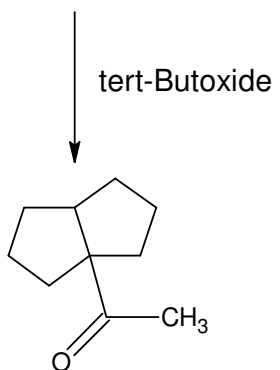
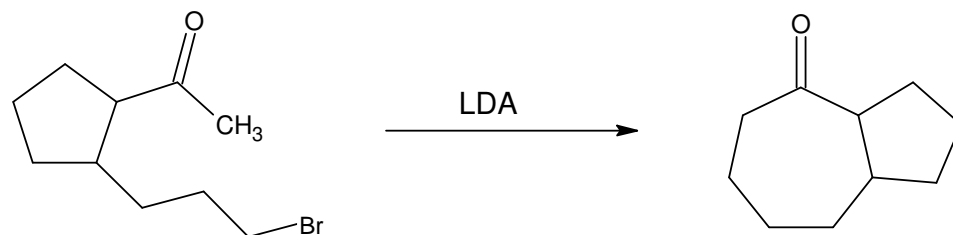
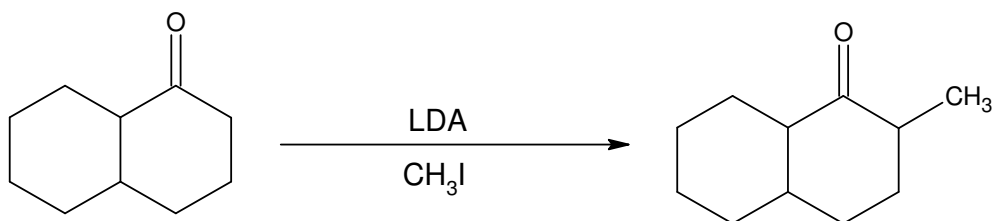
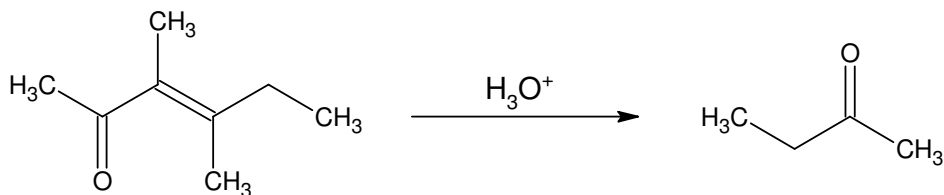
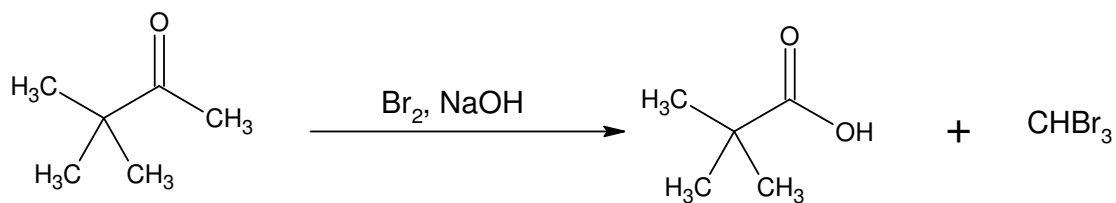


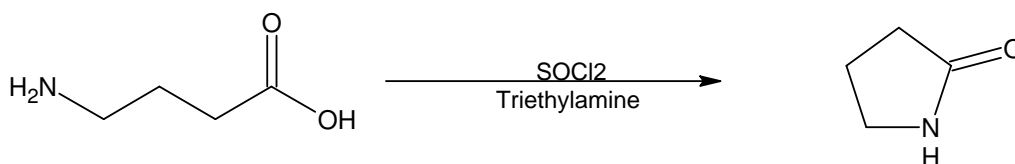
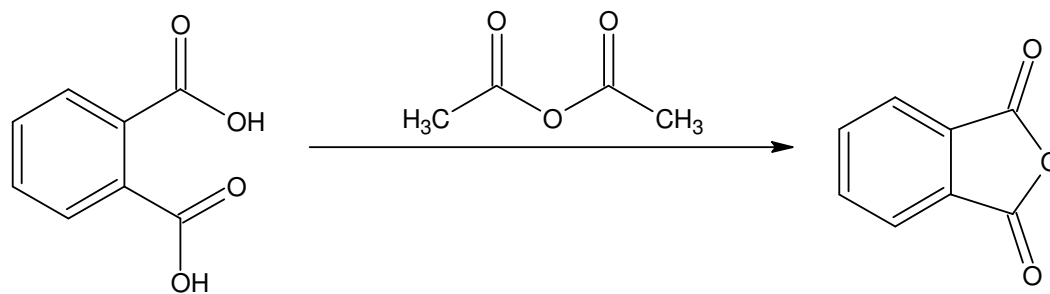






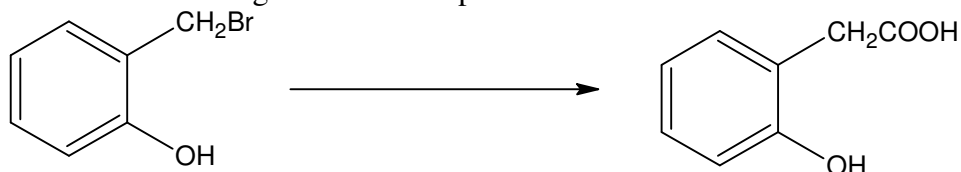
II. Mechanisms

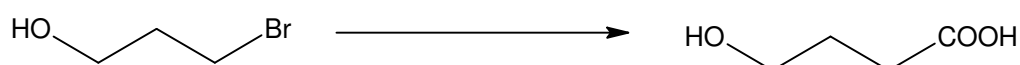




III. Supplemental Problems

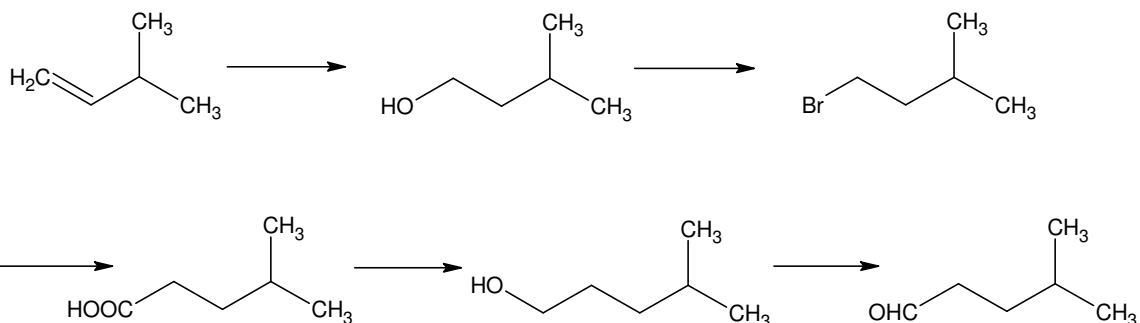
- Acetic Acid boils at 118°C , but its ethyl ester boils at 77°C . Why is the boiling point of the acid so much higher even though it has the lower molecular weight?
- Using $^{13}\text{CO}_2$ as your only source of labeled carbon, along with any other compounds needed, how would you synthesize the following compounds?
 a) $\text{CH}_3\text{CH}_2^{13}\text{COOH}$ b) $\text{CH}_3^{13}\text{CH}_2\text{COOH}$
- Which method-Grignard carboxylation or nitrile hydrolysis-would you use for each of the following reactions? Explain.



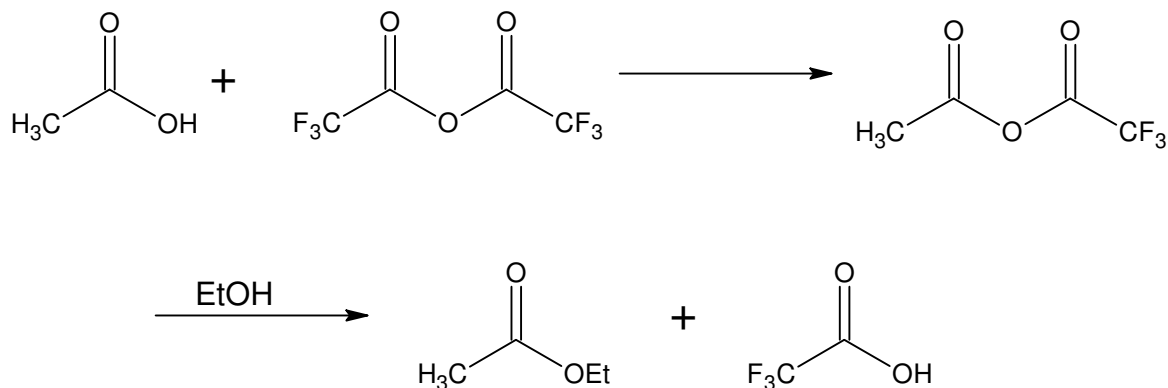


4. A chemist in need of 2,2-dimethylpentanoic acid decided to synthesize some by reaction of 2-chloro-2-methylpentane with NaCN, followed by hydrolysis of the product. After carrying out the reaction sequence, however, none of the desired product could be found. What do you suppose went wrong?

5. Identify the missing reagents a-e in the following scheme:

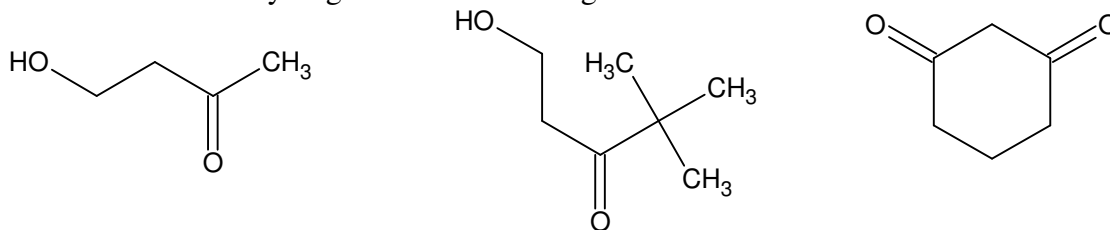


6. How can you account for the fact that, when a carboxylic acid is dissolved in isotopically labeled water, the label rapidly becomes incorporated into both the oxygen atoms of the carboxylic acid?
7. When ethyl benzoate is heated in methanol containing a small amount of HCl, methyl benzoate is formed. Propose a mechanism for the reaction.
8. Treatment of a carboxylic acid with trifluoroacetic anhydride leads to a mixed anhydride that rapidly reacts with alcohol to give an ester:



- Propose a mechanism for the formation of the mixed anhydride.
- Why is the mixed anhydride unusually reactive?
- Why does the mixed anhydride react as indicated, rather than giving trifluoroacetate esters plus carboxylic acid?

9. Indicate the acidic hydrogens in the following structures:



10. When optically active (R)-3-phenyl-2-butanone is exposed to aqueous acid, a loss of optical activity occurs and racemic 3-phenyl-2-butanone is produced. Explain.

11. In light of your answer to number 10, would you expect optically active (R)-3-methyl-3-phenyl-2-pentanone to be racemized by acid treatment? Explain.

IV. Syntheses

You may use any inorganic reagents of your choice plus any organic amines and given starting materials.

