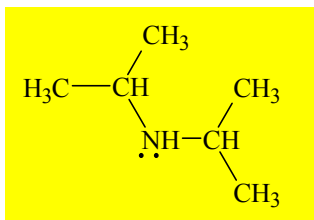
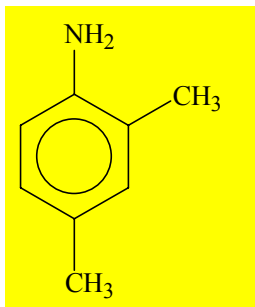


**Organic Chemistry II**  
**CHM 2211**  
**Sample Exam 4 Answer Key**

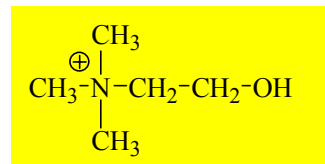
I. Write structures for the compounds named below:



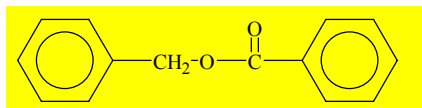
diisopropylamine



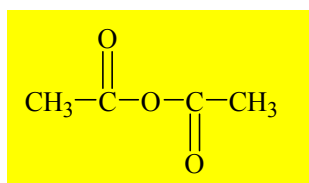
2,4 - dimethylaniline



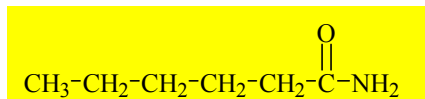
N,N,N - trimethyl-2-ethanolamine



benzylbenzoate

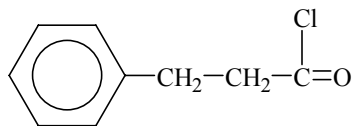


acetic anhydride

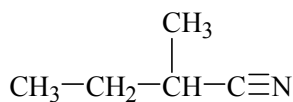


hexanamide

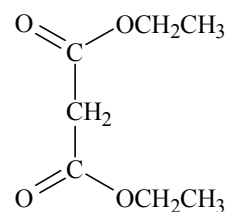
II. Name the compounds whose structures are shown below:



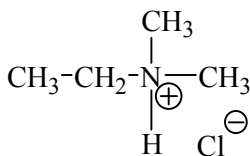
2-phenylpropanoyl chloride



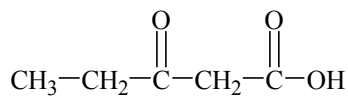
2-methylbutanenitrile



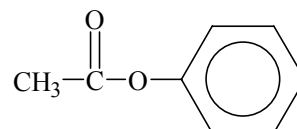
diethylmalonate or malonic ester



ethyldimethylammonium chloride



$\beta$ -keto-pentanoic acid  
3-oxopentanoic acid

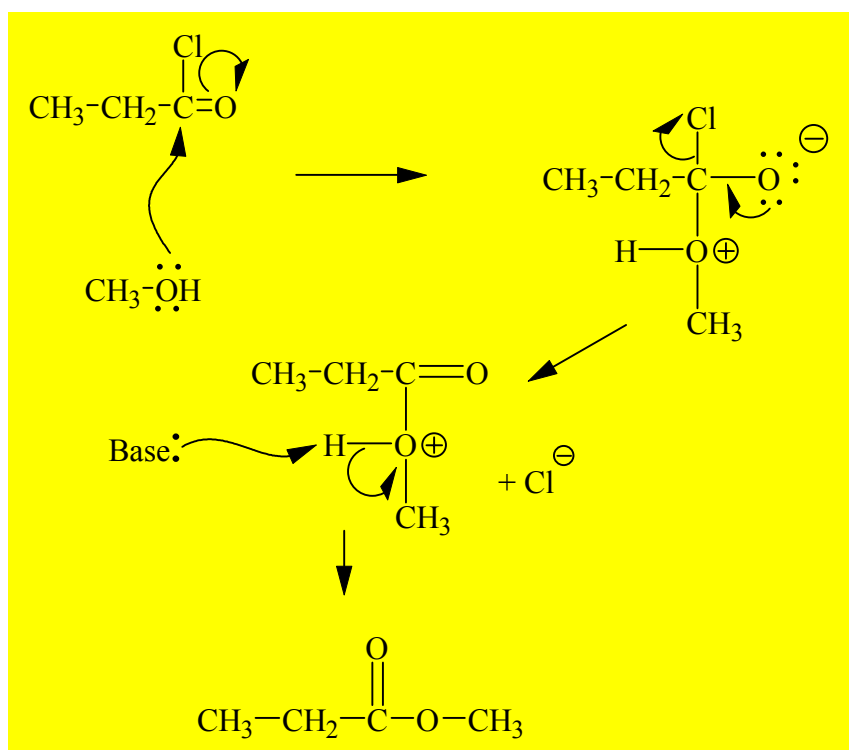


phenyl acetate

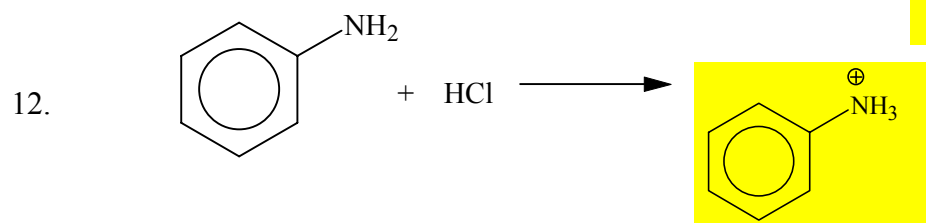
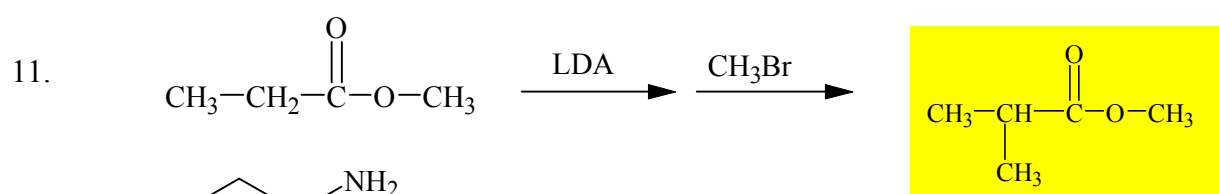
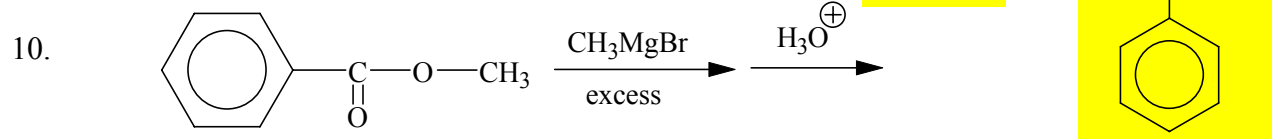
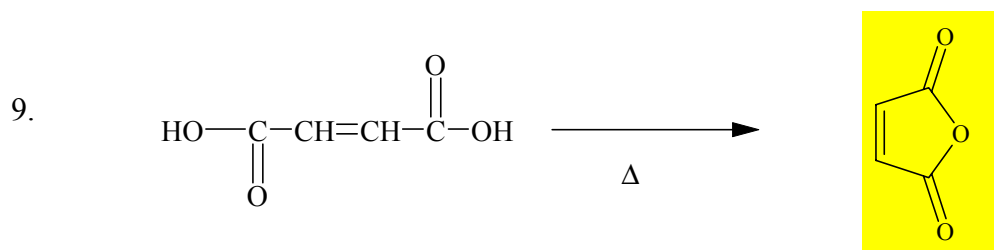
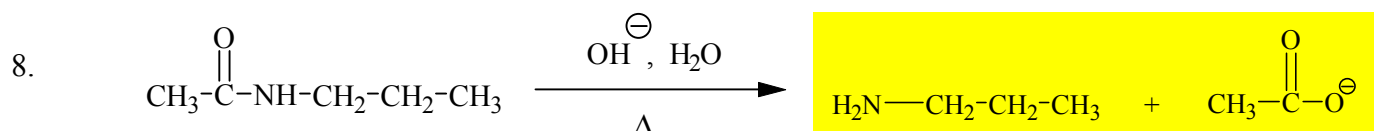
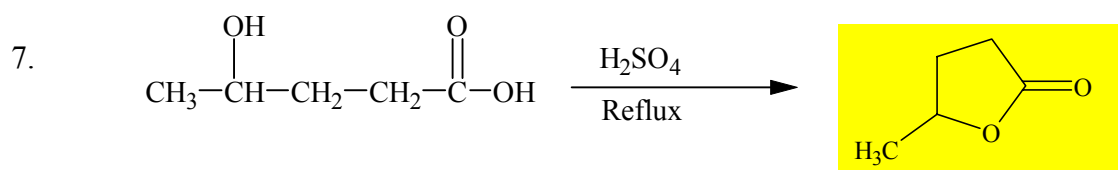
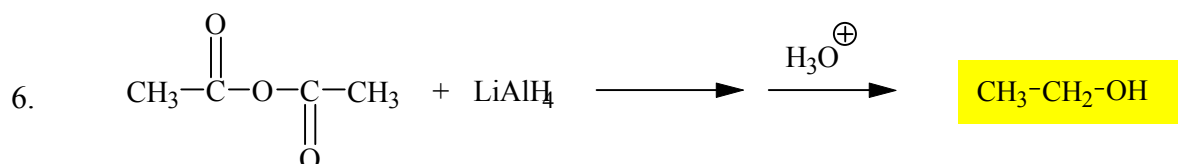
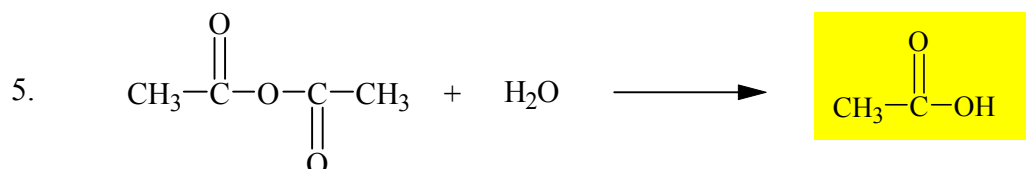
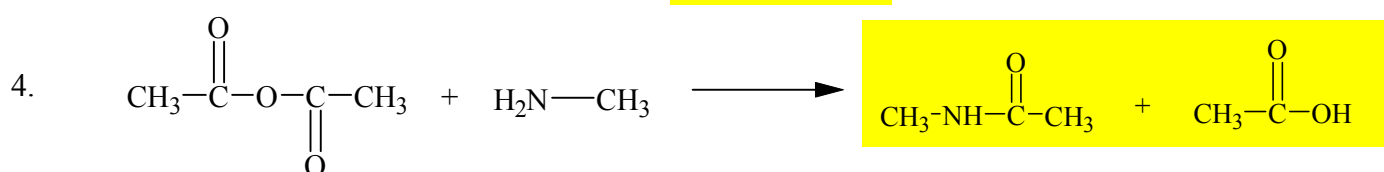
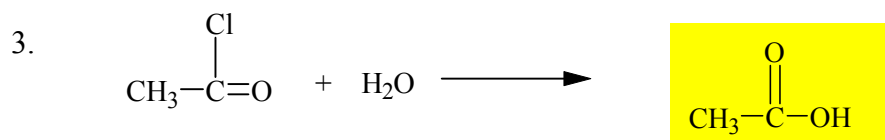
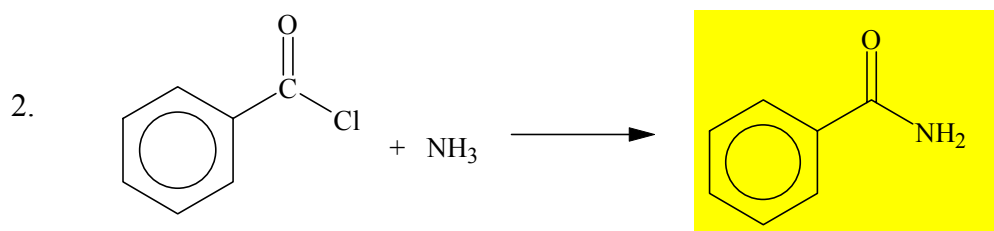
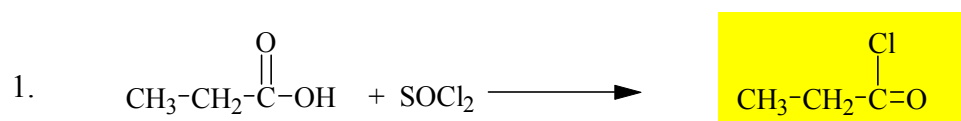
III. Fill in the Blanks

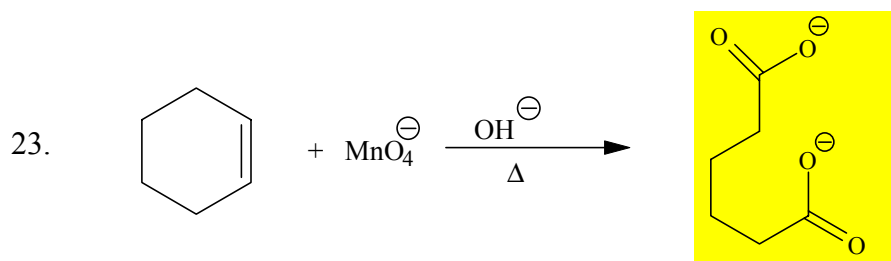
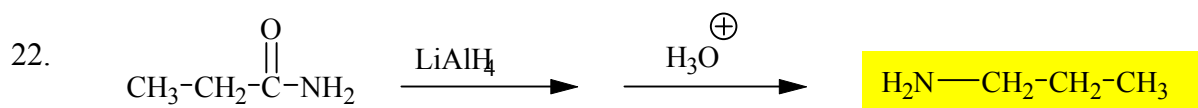
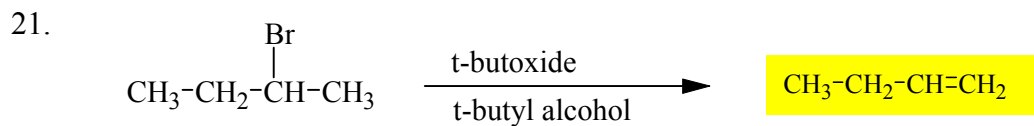
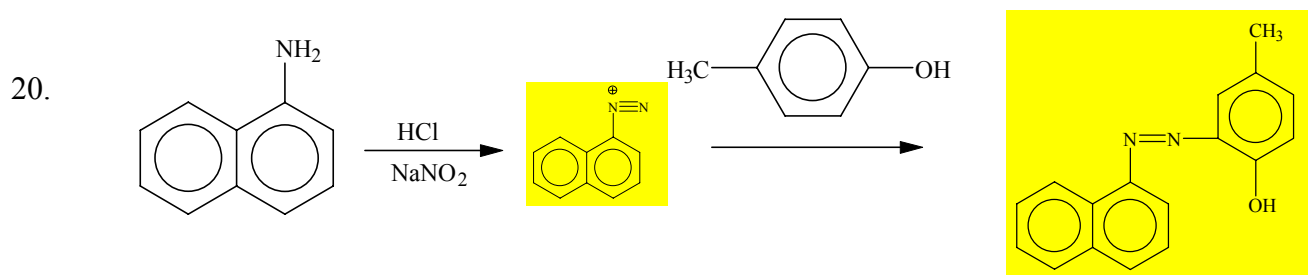
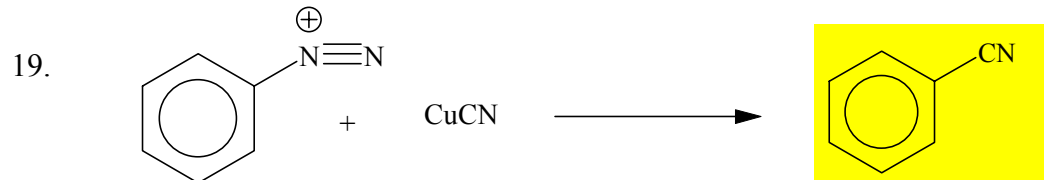
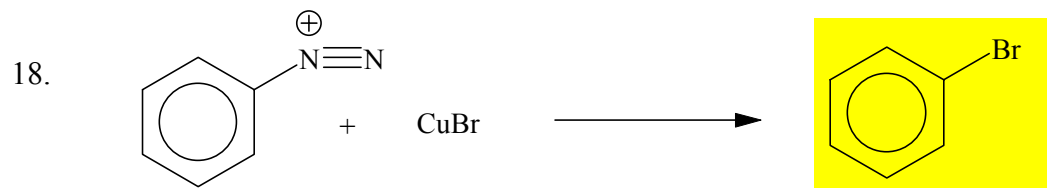
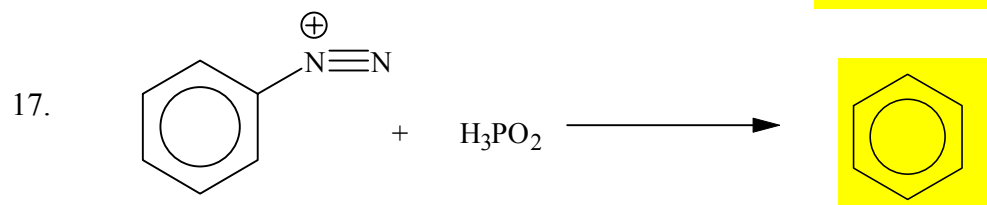
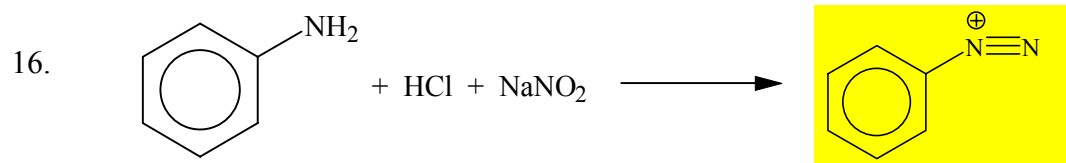
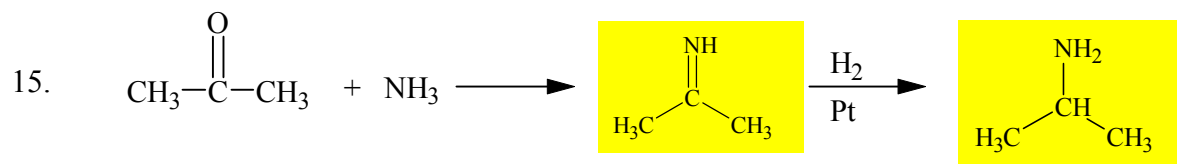
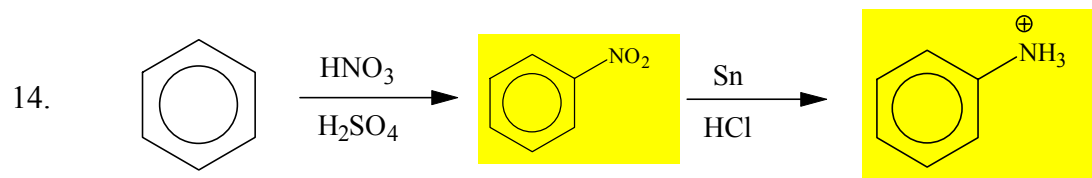
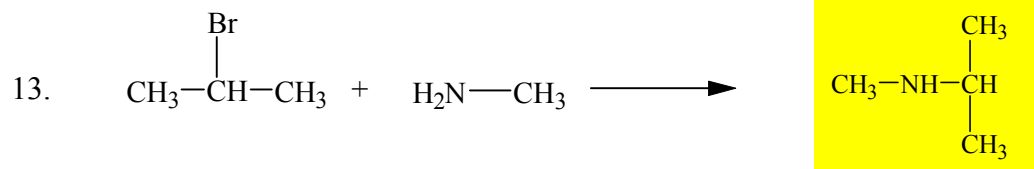
1. Which of the carboxylic acid derivatives is the most reactive? **acid chlorides**
2. Carcinogenic compounds that arise from the oxidation of 2° amines are called **nitrosoamines**.
3. Malonic ester synthesis can be used to produce **substituted acetic acids** (general type of compound).
4. Acetoacetic ester synthesis can be used to make **substituted acetones** (general type of compound).
5. Direct alkylation of ketones, esters and nitriles can be carried by first reacting the compound with the strong base called **lithium diisopropylamide (LDA)**, and then reacting the resulting alpha anion with an alkyl halide.
6. What predominate feature would you see in the IR spectrum of a primary amine? R-NH<sub>2</sub>  
**Two minima on a broad peak around 3400 cm<sup>-1</sup>**
7. The pK<sub>a</sub> of an aliphatic amine is about **9-10**.
8. Nitrites react with amines in acidic solution to yield **nitrosoamines** that may be carcinogenic.
9. Arenediazonium salts are highly reactive and useful in synthesis via a series of reactions called **Sandmeyer reactions** (name the reactions).
10. One of the first synthetic dyes was Orange II which was made using a **diazo-coupling** reaction.

- IV. Write the mechanism for the reaction of methyl alcohol with propanoyl chloride to produce an ester. Make sure you use curved arrow notation and indicate the removal of hydrogen ions from any protonated species that may be formed during the reaction. Show ALL products of the reactions.



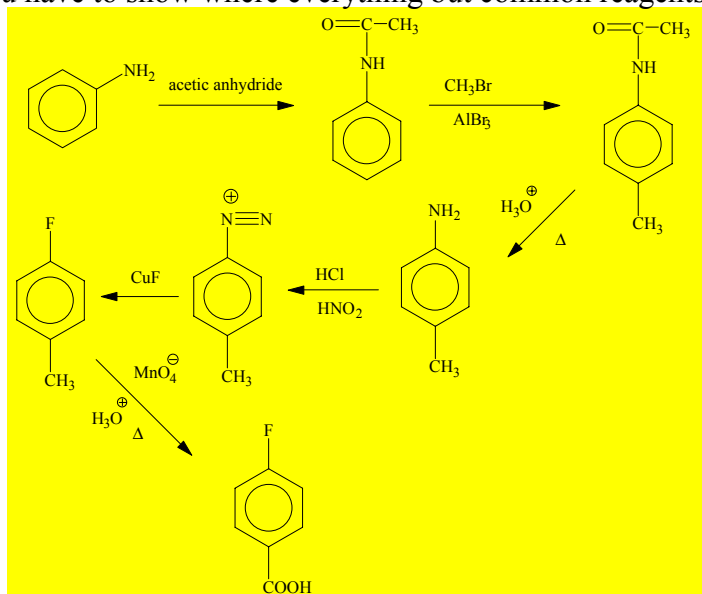
V. Complete the following reaction equations by filling in the missing information:



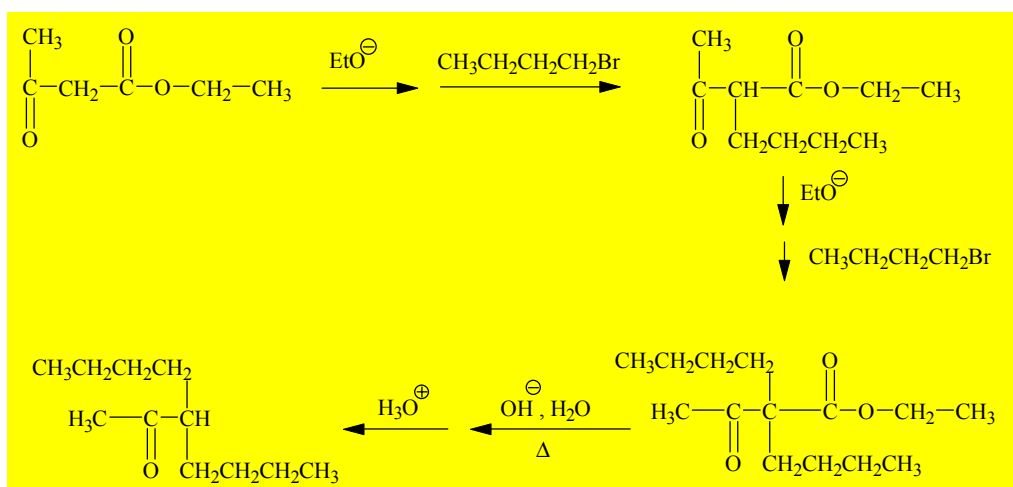


VI. Synthesis. Complete ANY TWO of the following. (If you do more than two I'll grade the first two I come to.) You know the rules, you have to show where everything but common reagents come from.

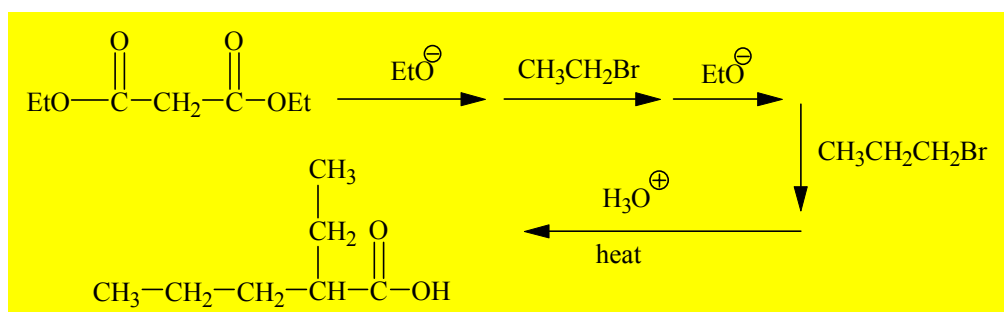
1. para-fluorobenzoic acid from aniline



2. 3-Butyl-2-heptanone using acetoacetic ester synthesis



3. 2-Ethylpentanoic acid using malonic ester synthesis



4. Ethyl benzoate from benzene and ethane

