

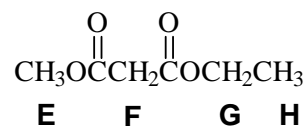
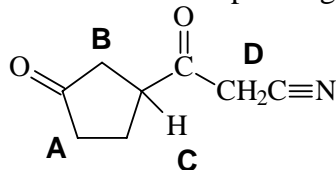
1. (6) Write the letter corresponding to the correct name on the line next to each structure.

A. ethyl acetate	_____	$\begin{array}{c} \text{O} \\ \parallel \\ \text{HCOH} \end{array}$	_____	$\begin{array}{c} \text{O} \quad \text{O} \\ \parallel \quad \parallel \\ \text{CH}_3\text{COCCH}_3 \end{array}$
B. acetic anhydride	_____	$\begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_3\text{CNHCH}_3 \end{array}$	_____	$\begin{array}{c} \text{O} \\ \parallel \\ \text{CH}_3\text{COCH}_2\text{CH}_3 \end{array}$
C. formic acid	_____	$\begin{array}{c} \text{OO} \\ \parallel \quad \parallel \\ \text{HOCCOH} \end{array}$	_____	$\begin{array}{c} \text{O} \quad \text{O} \\ \parallel \quad \parallel \\ \text{HOCCH}_2\text{COH} \end{array}$
D. N,N-dimethylformamide				
E. malonic acid				
F. methyl acetate				
G. oxalic acid				
H. none of the above				

2. (2) Circle the least reactive derivative of carboxylic acids; underline the most reactive.

anhydride acid chloride ester thioester amide

3. (2) Circle the LETTER corresponding to the most acidic proton(s) in each structure:

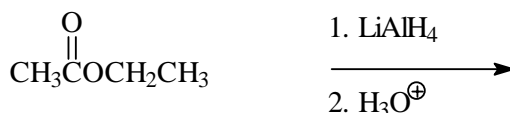


4. (3) Draw two resonance forms for the acetate ion (the conjugate base of acetic acid) **and** comment on the relative length of the two carbon-oxygen bonds.

5. (2) Circle the more acidic compound in each pair:

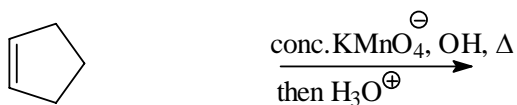
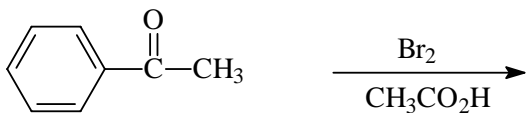
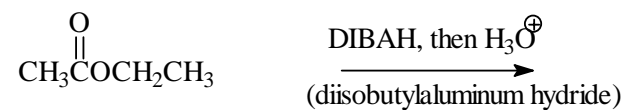
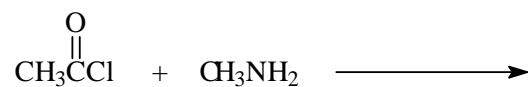
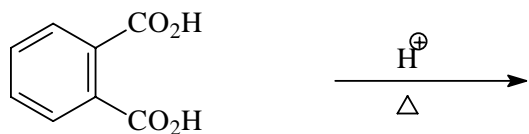


6. (30) Draw the structure of the major organic product(s) of each of the following. Where two organic products are formed in equal amounts, you must show both products.



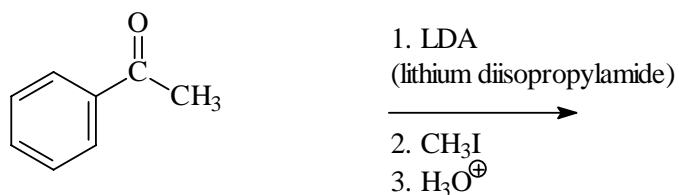
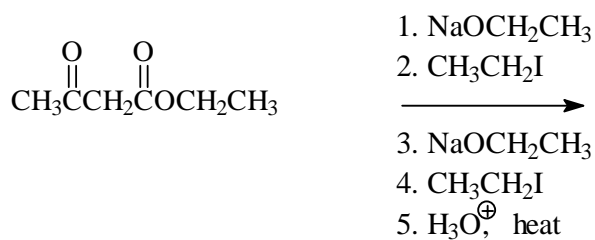
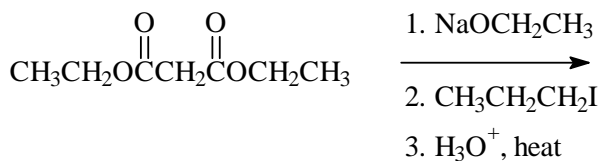
Test 3

6. (continued)

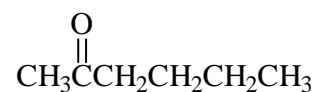
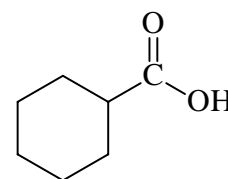


7. (2) Acid catalyzed hydrolysis of any derivative of a carboxylic acid leads to the corresponding _____.

8. (6) Draw the structure of the major organic product of each of the following:



9. (4) Outline a step-by-step synthesis of each of the following, starting with either ethyl acetoacetate (acetoacetic ester) or diethyl malonate (malonic ester). Be sure to write the correct structure of the reactant ester and show all reagents and conditions needed for each step. You need NOT show intermediates. You may show a numbered sequence of steps above and below one arrow.



10. (3) Write the step-by-step mechanism for the base-promoted hydrolysis of methyl formate. Be sure to show charges, arrows indicating electron flow and the structures of any intermediates and each product. (products are not shown, but YOU must draw their structures).

