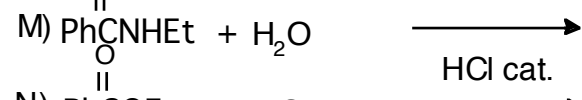
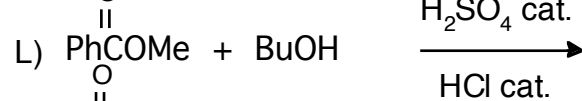
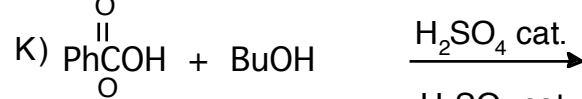
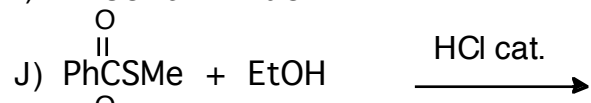
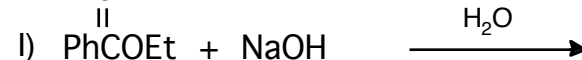
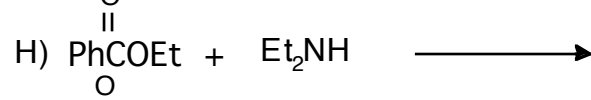
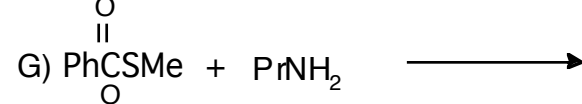
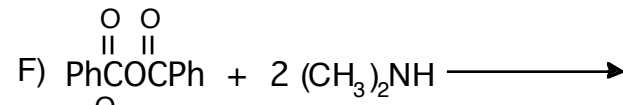
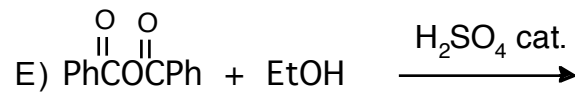
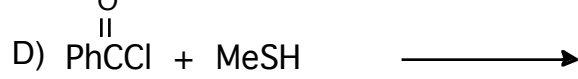
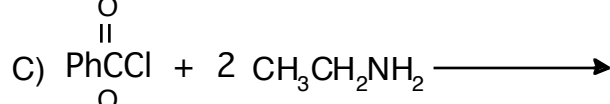
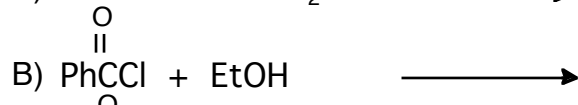
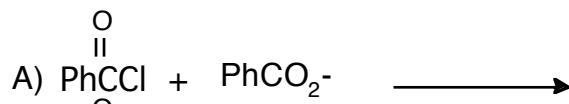


Names: _____

Chem 227/ Dr. Rusay

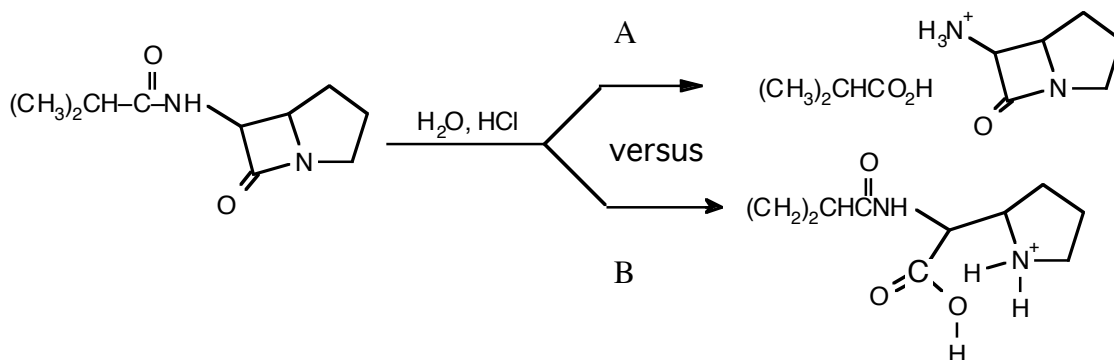
Carboxylic Acid Derivatives: Nucleophilic Acyl Substitutions

1. Each of the following reactions involves nucleophilic substitution at an acyl carbon (carbonyl of a carboxylic acid or derivative) by way of a tetrahedral addition intermediate. Complete the separate table, which follows the reactions, indicating the two products that are formed.

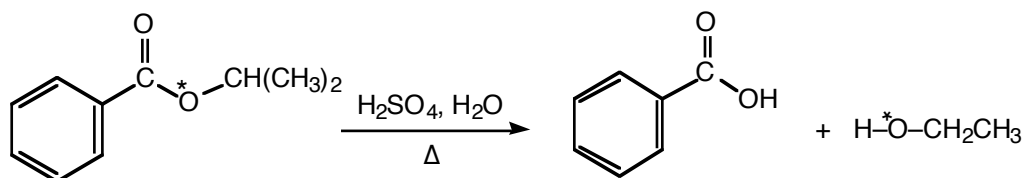


	Product 1	Product 2
A		
B		
C		
D		
E		
F		
G		
H		
I		
J		
K		
L		
M		
N		

2. In the following case, predict which of the two competing reactions will be faster? Briefly explain your choice.



3. The ester shown is labeled with oxygen-18 as indicated ($^*\text{O}=\text{O}^{18}$). Provide a mechanism consistent with the labeling results shown when the ester is hydrolyzed in unlabeled water at $\text{pH} = 2$. Use arrows to show electron movement and show all intermediates.

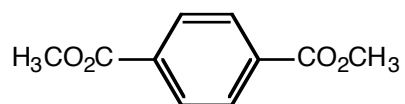


4. Compound **A**, $C_{12}H_{16}O_2$, exhibited a strong absorption in the IR spectrum at 1715 cm^{-1} . Treatment of **A** with $NaOH/H_2O$ gave a neutral compound **B** and a sodium salt that after acidification gave compound **C**. **B** exhibited strong broad absorption in the IR spectrum at 3333 cm^{-1} and could be oxidized with aqueous chromic acid ($Na_2Cr_2O_7/H_2SO_4/H_2O$) to 2-methylbutanoic acid. **C** exhibited absorption in the IR spectrum at 1681 cm^{-1} and a very broad band over the range $2500\text{--}3500\text{ cm}^{-1}$. The 1H NMR spectrum of **C** exhibited absorption at δ 7.1–8.5 (m, 5H) and 12.70 (s 1H). Provide structures for **A**, **B**, and **C**.

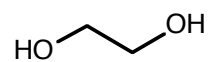
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5. BOC, Benzyloxycarbonylchloroformate (BO_2C-Cl), $PhCH_2O\overset{\overset{O}{\parallel}}{C}Cl$, is a very important and widely used reagent applied to the synthesis of peptides and proteins as a protective group for the amino groups of amino acids.
- Show how BO_2C-Cl could be synthesized from phosgene.
 - Give the structure of the product from the reaction of BO_2C-Cl with the amino acid glycine, $H_2NCH_2CO_2H$.

6. Dacron is a polyester formed by transesterification of dimethyl terephthalate with ethylene glycol to give a long-chain polymer molecule. Provide a partial structure of Dacron that shows two of the repeating units of the polymer (Use 2 molecules of each of the monomers below



dimethyl terephthalate



ethylene glycol