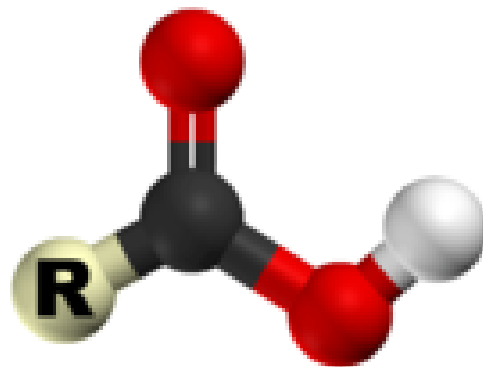


Carboxylic and Derivatives – Nucleophilic Substitution-2



Instructor: Asst. Prof. Dr. Tanatorn Khotavivattana
E-mail: tanatorn.k@chula.ac.th

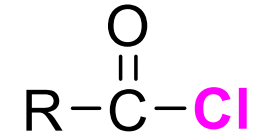
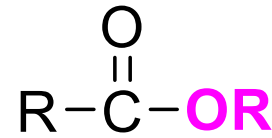
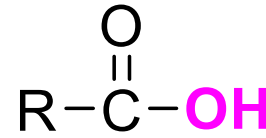
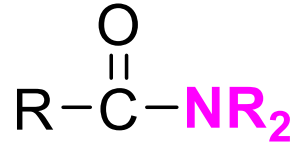
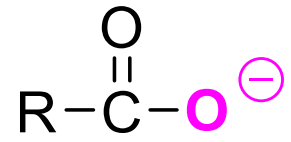
Recommended Textbook:

Chapter 20 in *Organic Chemistry*, 8th Edition, L. G. Wade, Jr., **2010**, Prentice Hall (Pearson Education)

Nucleophilic Substitution – Reaction with Strong Nucleophiles

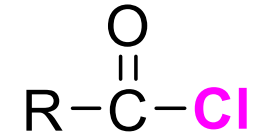
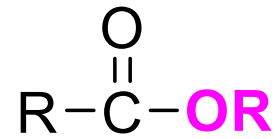
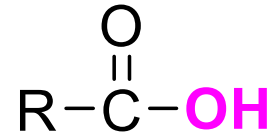
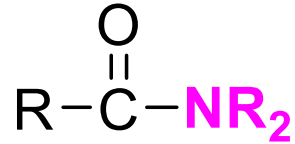
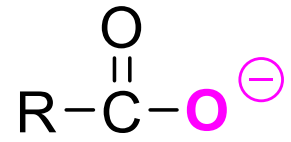
1

1) Reduction with Hydride sources: **Sodium borohydride (NaBH₄)**



Nucleophilic Substitution – Reaction with Strong Nucleophiles

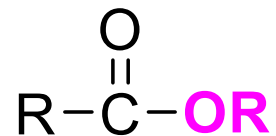
1) Reduction with Hydride sources: **Lithium aluminum hydride (LiAlH₄)**



Nucleophilic Substitution – Reaction with Strong Nucleophiles

1) Reduction with Hydride sources: **Lithium aluminum hydride (LiAlH₄)**

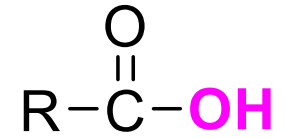
Esters to alcohols



Nucleophilic Substitution – Reaction with Strong Nucleophiles

1) Reduction with Hydride sources: **Lithium aluminum hydride (LiAlH₄)**

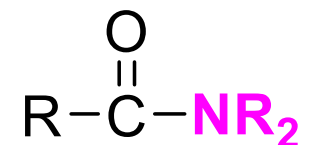
Carboxylic acids to alcohols



Nucleophilic Substitution – Reaction with Strong Nucleophiles

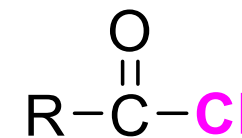
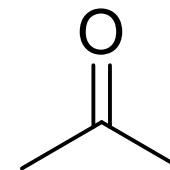
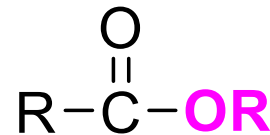
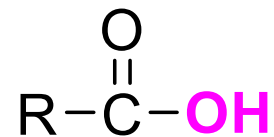
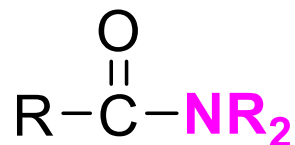
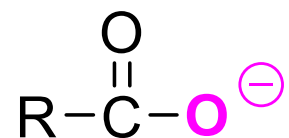
1) Reduction with Hydride sources: **Lithium aluminum hydride (LiAlH₄)**

Amides to amines



Nucleophilic Substitution – Reaction with Strong Nucleophiles

2) Alkylation with alkyl lithium

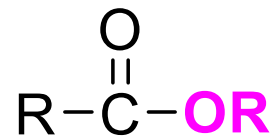


Nucleophilic Substitution – Reaction with Strong Nucleophiles

7

2) Alkylation with alkyl lithium

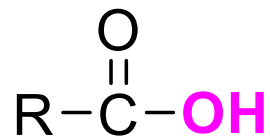
Acid chlorides / Esters to alcohols



Nucleophilic Substitution – Reaction with Strong Nucleophiles

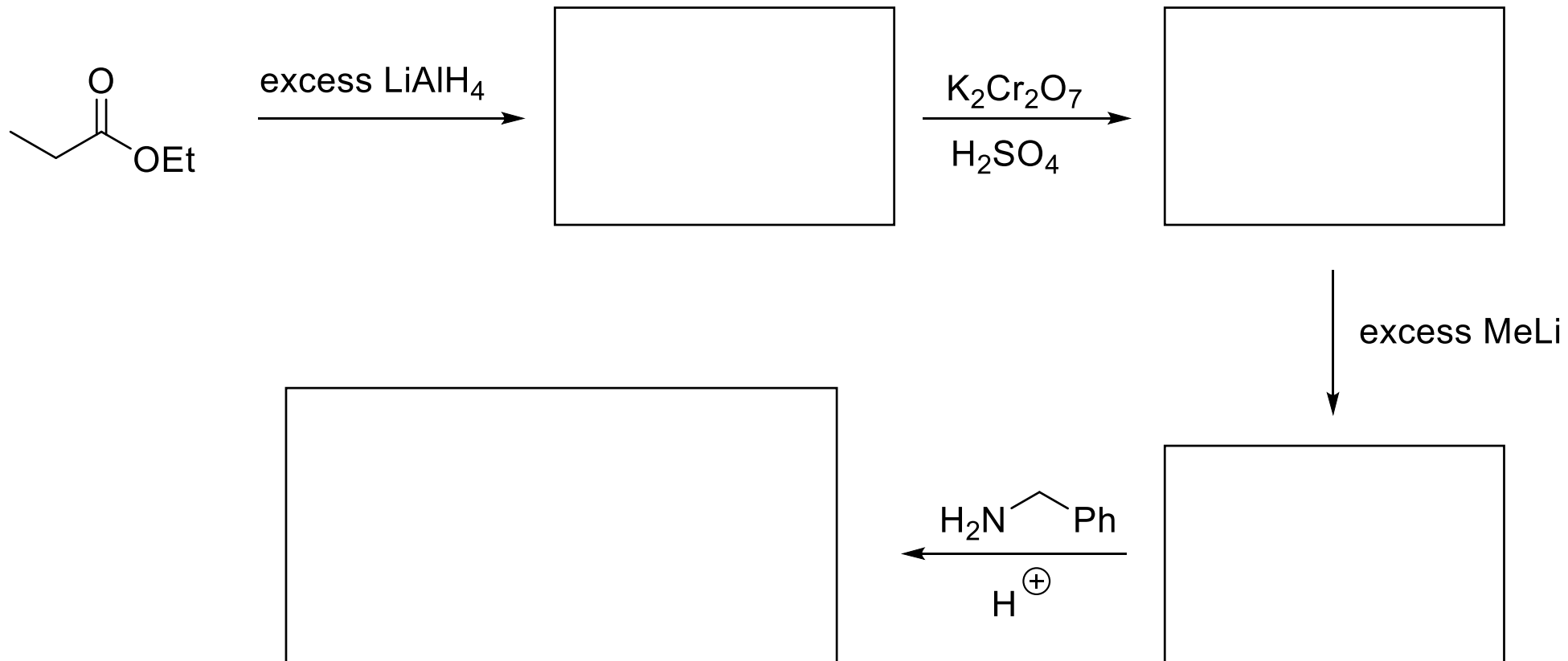
2) Alkylation with alkyl lithium

Carboxylic acids to ketones



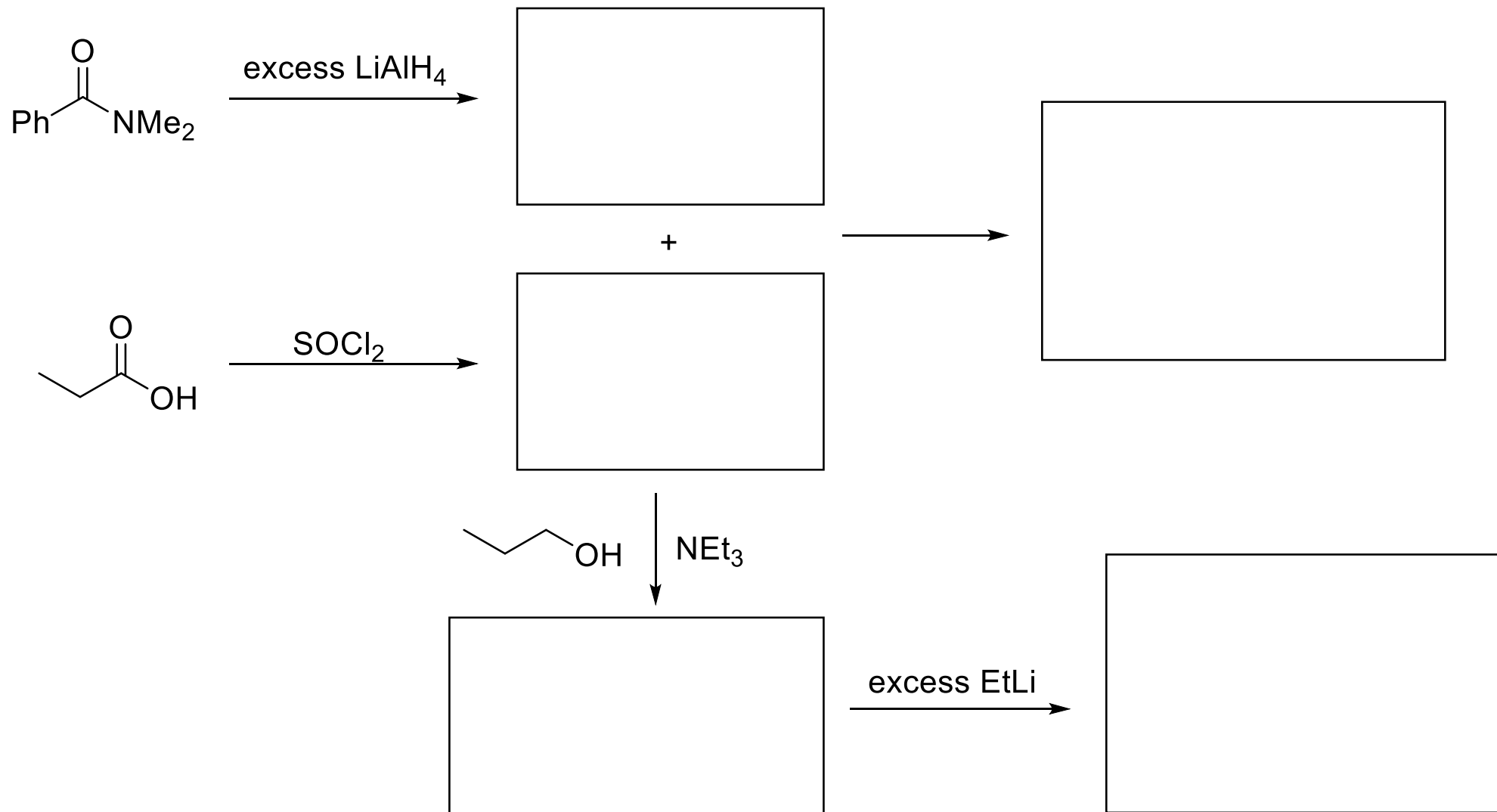
Nucleophilic Substitution – Reaction with Strong Nucleophiles

Example: Fill the gap in the following scheme



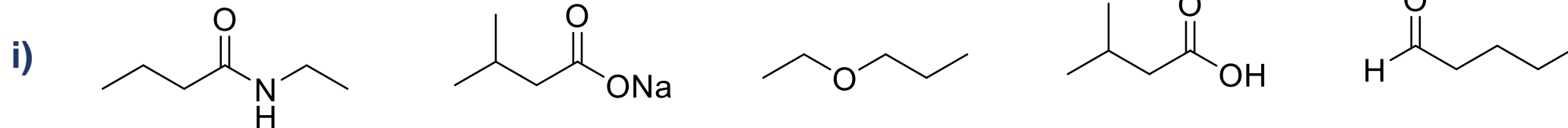
Nucleophilic Substitution – Reaction with Strong Nucleophiles

Example: Fill the gap in the following scheme

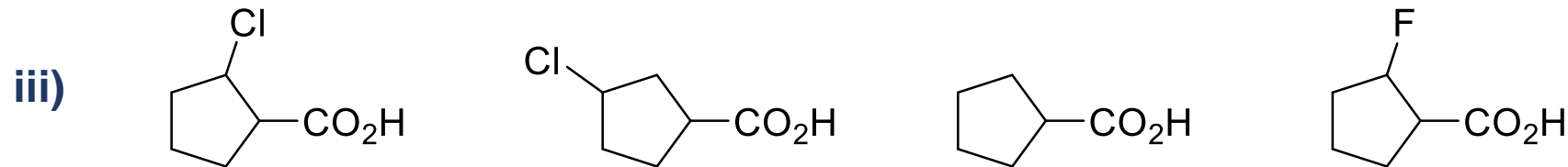
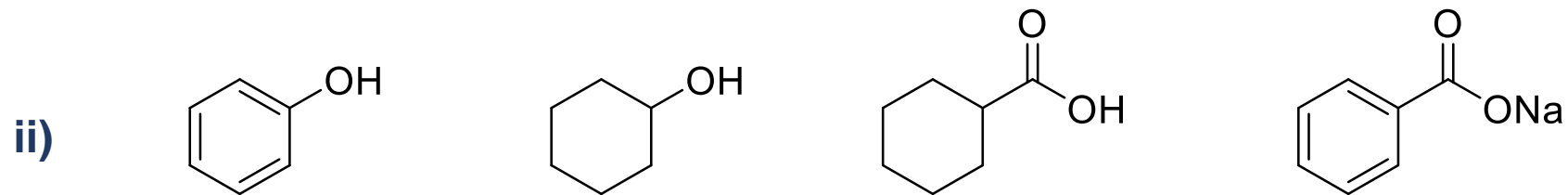


Homework – 1

Arrange each group of compounds in order of increasing boiling point

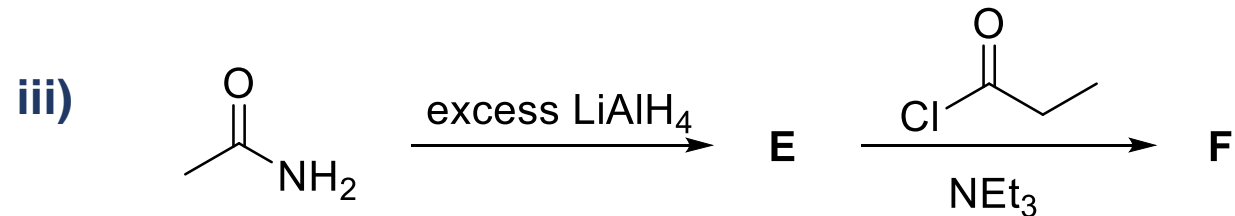
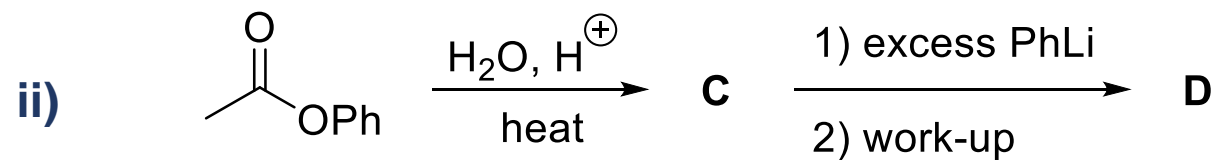
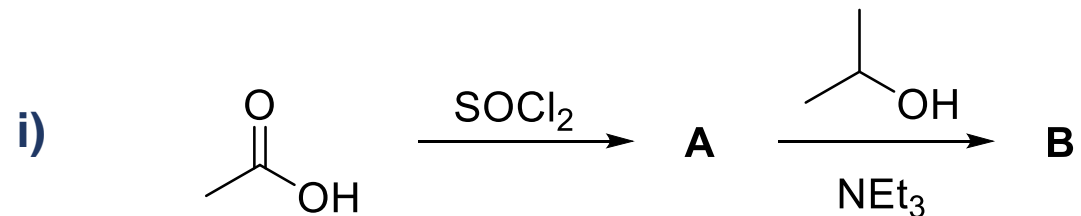


Arrange each group of compounds in order of increasing acidity



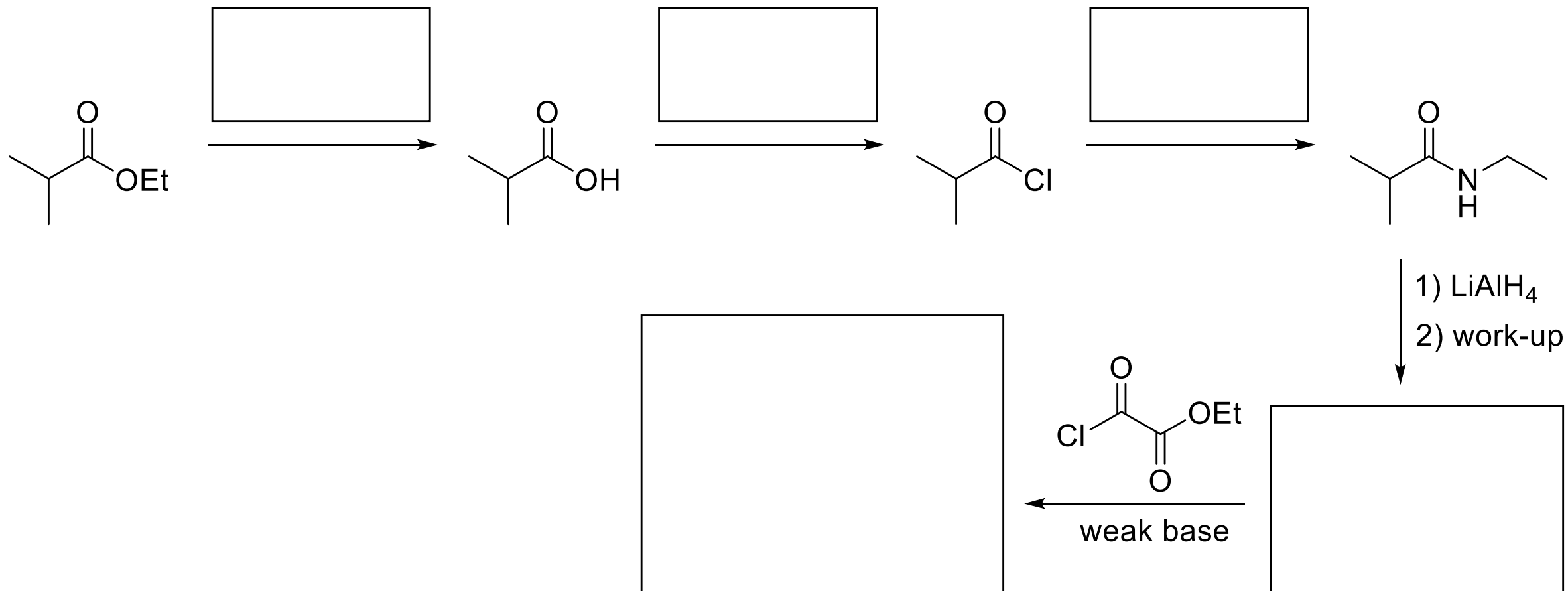
Homework – 2

Predict the product and draw the mechanism of the following reactions



Homework – 3

Fill the gap in the following scheme



Homework – 4

Fill the gap in the following scheme

