

**Today**

Transesterification, Aminolysis of Esters  
Sections 15.4 -15.9

Reactions of Carboxylic Acids  
Section 15.10

Reactions of Amides  
Section 15.11 - 15.13

**Next Class**

Reactions of Amides  
Section 15.11 - 15.13

Acid Anhydrides and Comparing Chemical vs  
Biochemical Activation of Carboxylic Acids  
Sections 15.16, 15.18, 15.19

Aldehyde and Ketone Nomenclature  
Section 16.1

Relative Reactivities  
Section 16.2

**Second Class from Today**

Aldehyde and Ketone Nomenclature  
Section 16.1

Relative Reactivities  
Section 16.2

**Third Class from Today**

Relative Reactivities  
Section 16.2

How Aldehydes and Ketones React  
Section 16.3

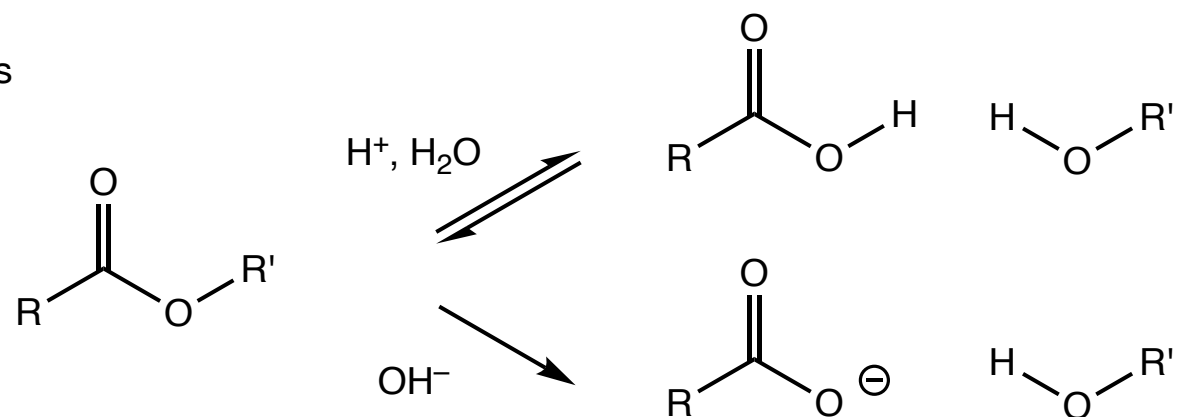
Reactions with Carbon Nucleophiles  
Section 16.4

**On a separate piece of paper rework test 1 by Wednesday, March 22**

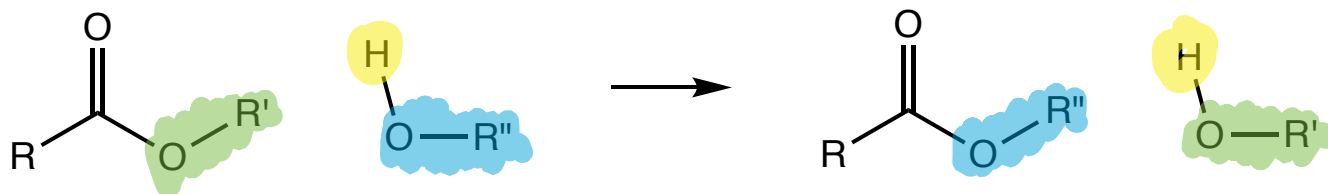
## Reactions of Esters

Section 15.7 – 15.9

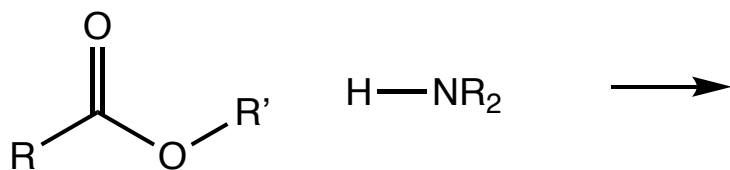
### Hydrolysis



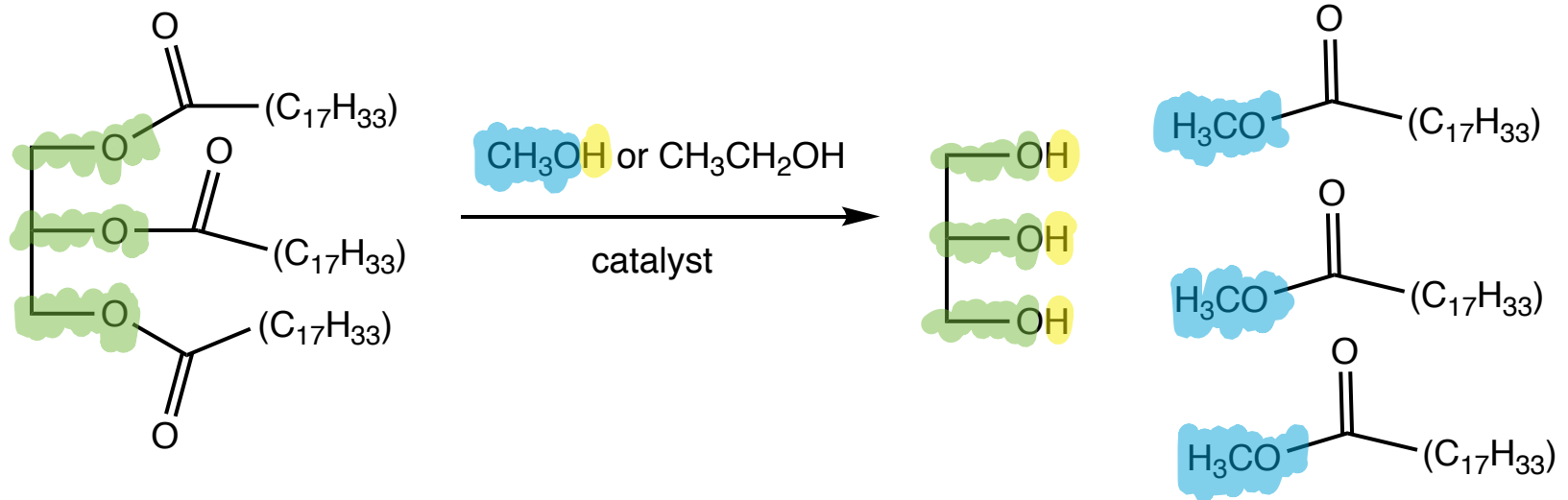
### Transesterification

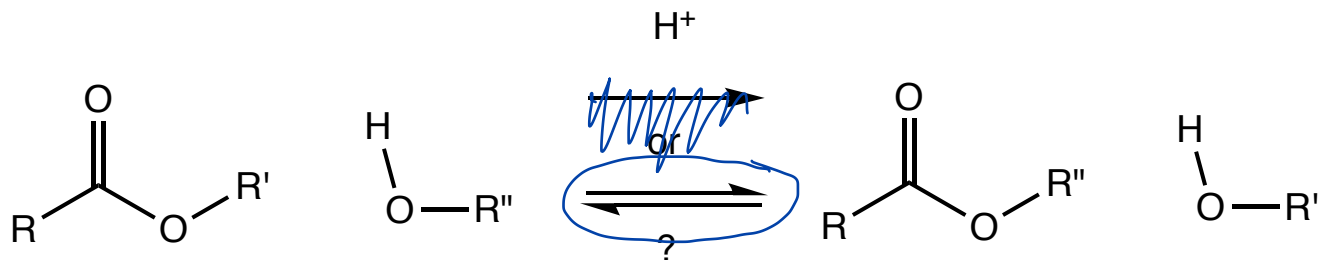


### Aminolysis



# Biodeisel : Transesterification Put to Work to Reduce CO<sub>2</sub> Emissions





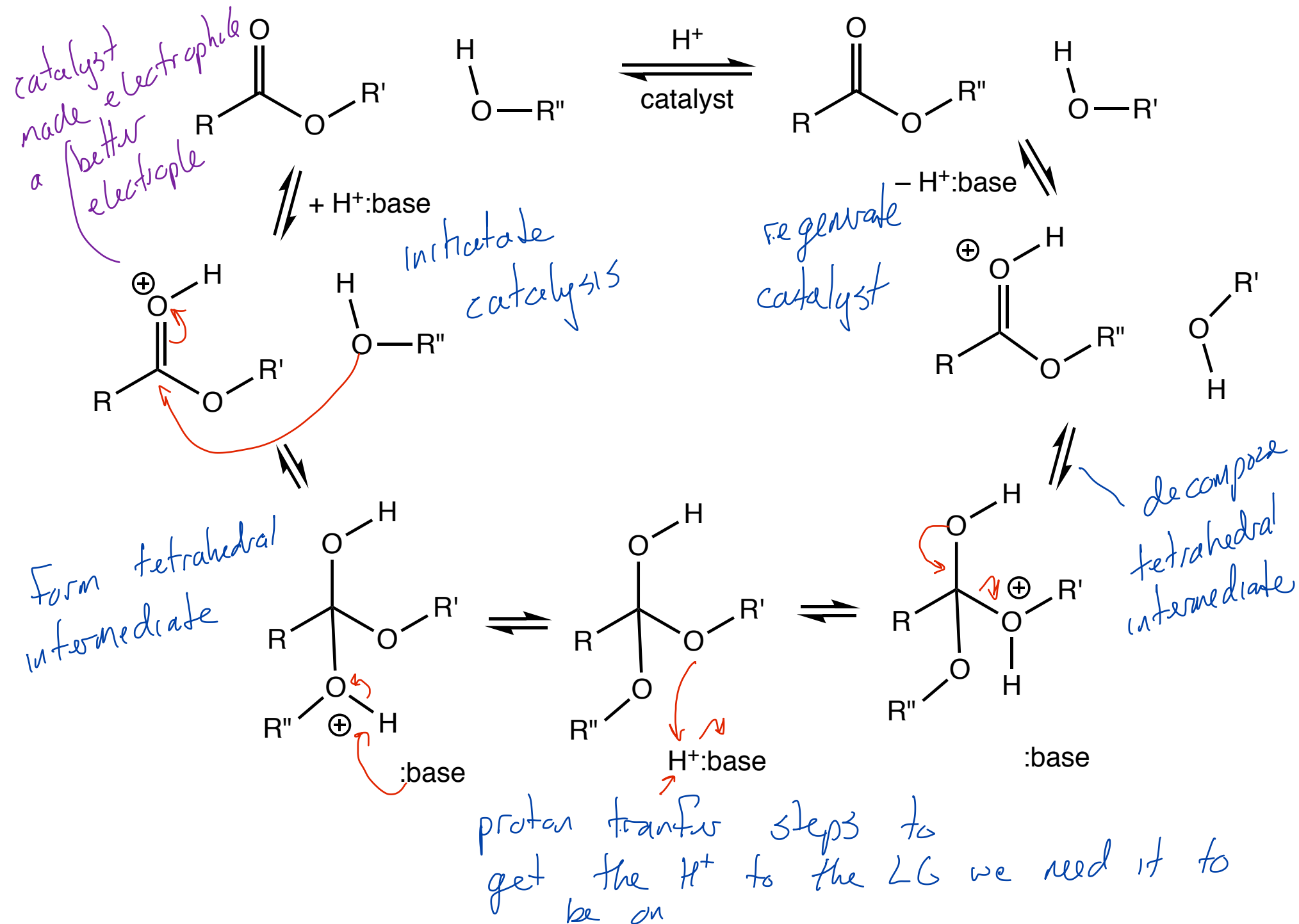
like ester hydrolysis rxn can be speed up with an  $\text{H}^+$  catalyst... but we still have an equilibrium reaction

excess  $\text{R}''-\text{OH}$  is required to drive the reaction

product alcohol must be removed from the reaction

Reactions of Esters: Acid Catalyzed

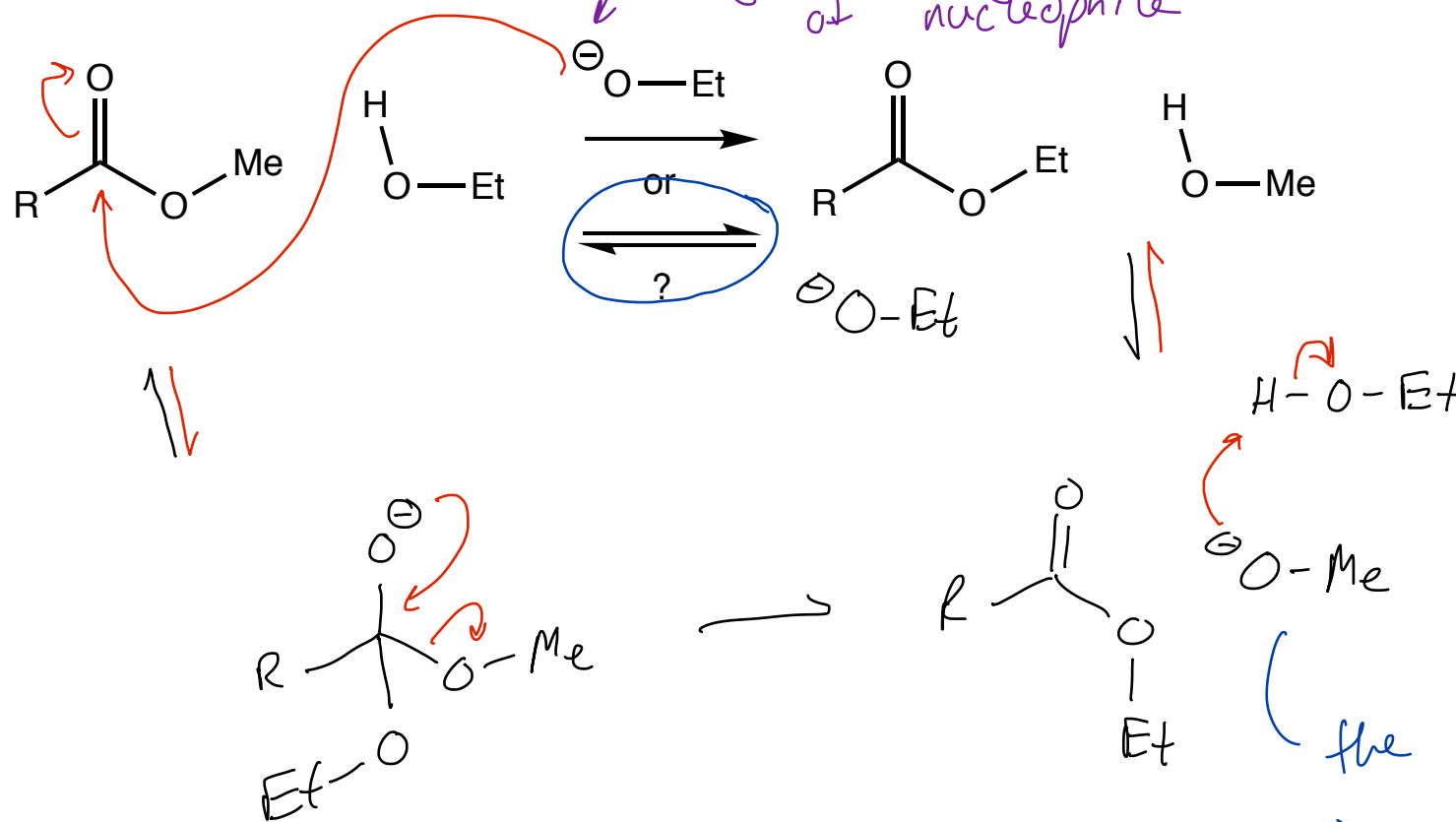
Section 15.7 – 15.9



Reactions of Esters: Base Promoted

Section 15.8 – 15.9

increase reaction rate  
by increasing nucleophilicity  
of nucleophile

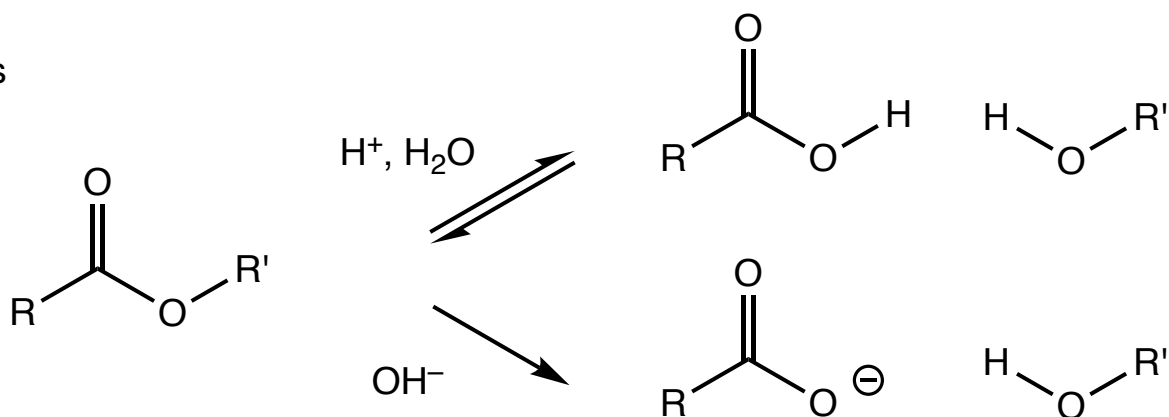


Et = ethyl group    EtOH = ethanol    Me = methyl group    MeOH = methanol

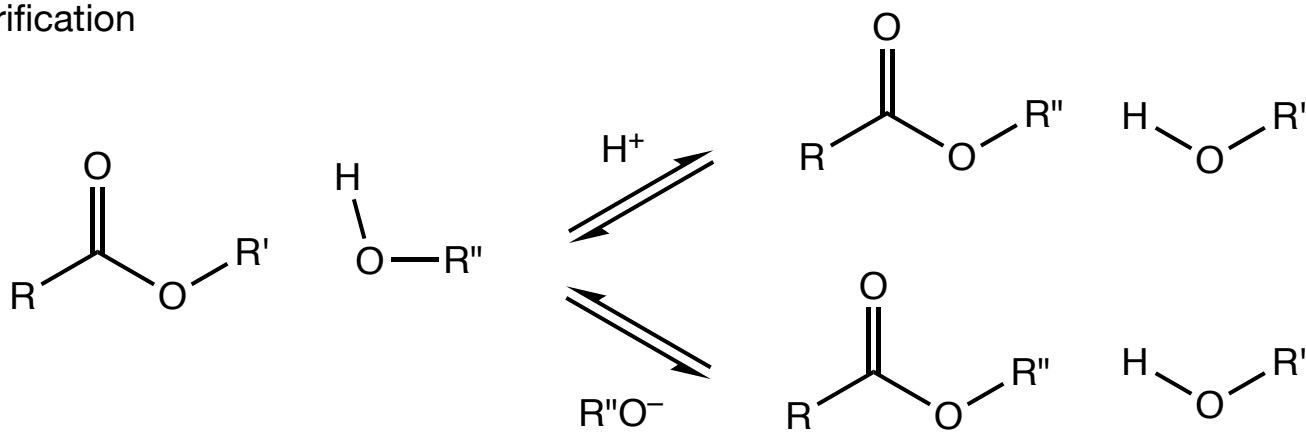
# Reactions of Esters

## Section 15.7 – 15.9

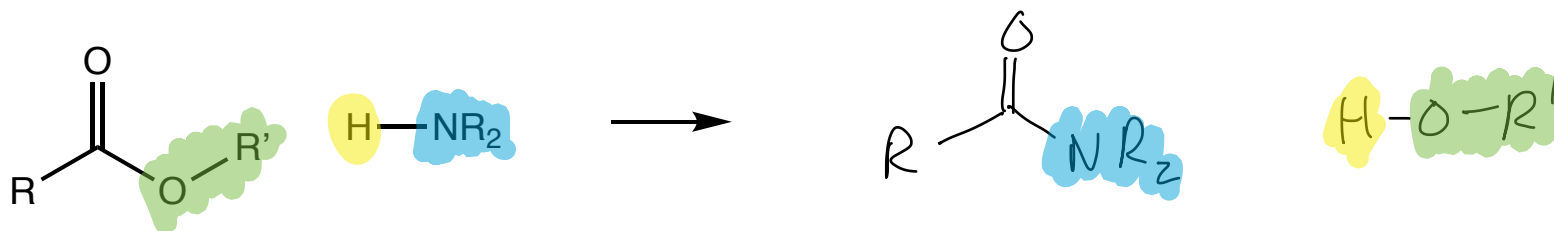
### Hydrolysis



### Transesterification



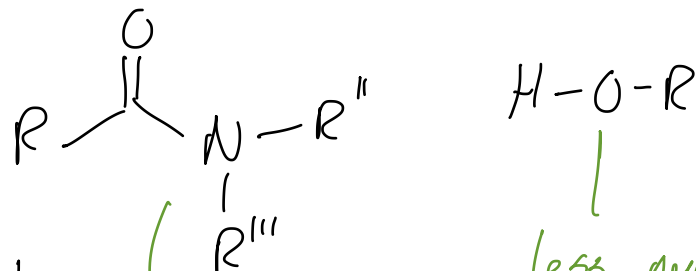
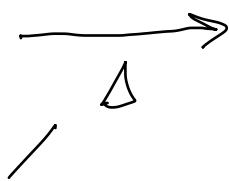
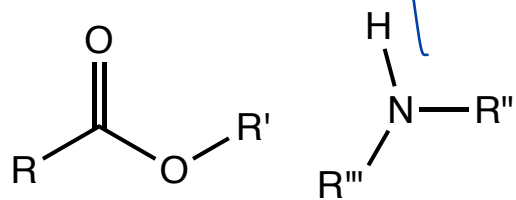
### Aminolysis



Ester Aminolysis

amines are more nucleophilic than ROH's

this is a better base than H<sub>2</sub>O

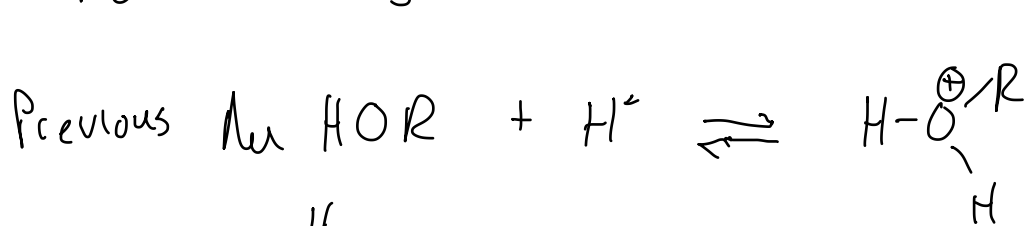
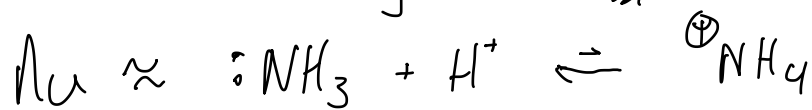


increase rate by heating the reaction

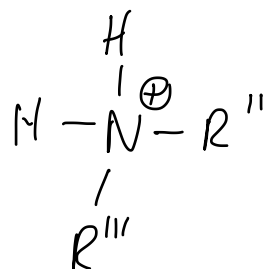
less reactive due to stronger C-N bond & less effective LG

Add H<sup>+</sup> catalyst? ~~No~~

weak acid not strong enough to protonate C=O, O



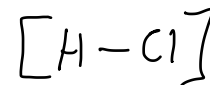
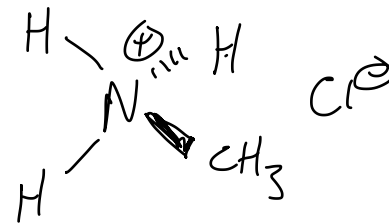
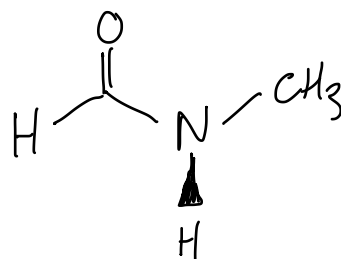
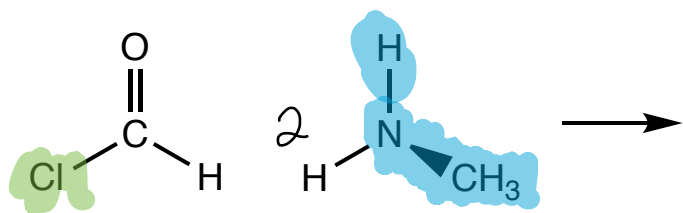
still a strong acid can still protonate C=O O atom



amine would soak up H<sup>+</sup>, so no H<sup>+</sup> to react with C=O O atom and amine would no longer be nucleophilic if protonated.



# Practice: Acid Chloride and Ester Reactions

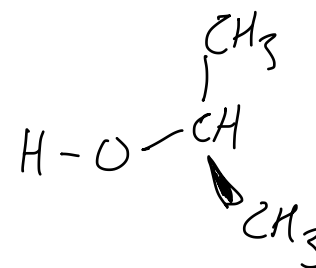
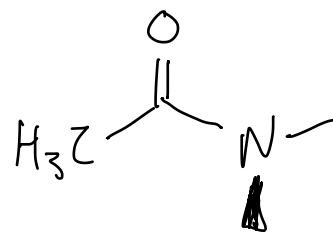
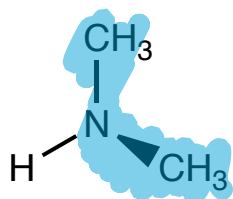
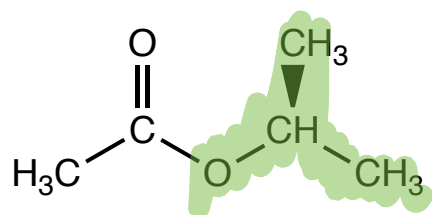


Find LG

Find Nu

check products for acid

base reaction



strong acid?  
no

so, no extra amine is needed.

