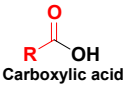
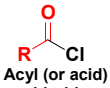
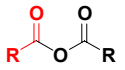
Lecture 30 – Chapter 20 : Carboxylic Acid Derivatives

- Nucleophilic Acyl Substitution
- Mechanism
- Acid anhydrides, synthesis and uses
- Esters – properties and reactions

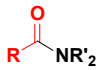
Chapter 20 – Carboxylic Acid Derivatives


Carboxylic acid


Acyl (or acid) chloride


Acid anhydride


Ester


Carboxamide

- All closely related and made from carboxylic acids
- most are interconvertable

Carboxylic Acid Derivatives - nomenclature

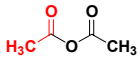
Acyl Chlorides

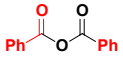

acetyl chloride


benzoyl chloride


propenoyl chloride

Acid Anhydrides


acetic anhydride

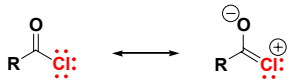

benzoic anhydride

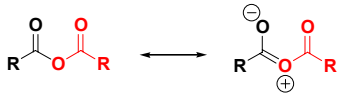
Carboxylic Acid Derivatives - Structure

Extended π system

Figure 20.2

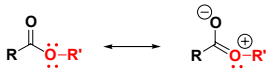
Resonance possibilities - acid chlorides and anhydrides

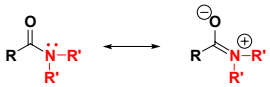




Acid chlorides and acid anhydrides are not stabilized significantly by resonance – quite reactive towards nucleophiles

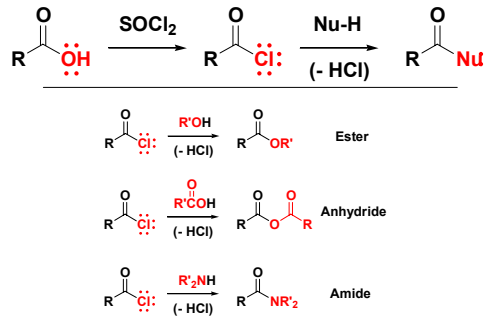
Resonance possibilities – esters, amides, carboxylates



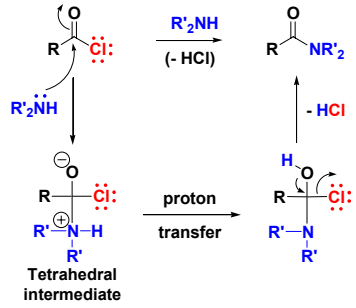


Increasing delocalization leads to increasing stability and decreasing reactivity

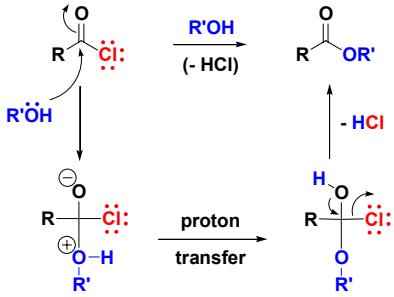
Reaction of Acid Chlorides with Nucleophiles



Mechanism – Nucleophilic Acyl Substitution

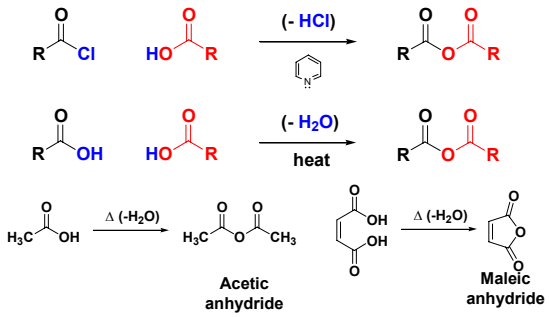


Mechanism – Nucleophilic Acyl Substitution



Similar mechanisms for formation of anhydrides and other derivatives

Carboxylic Acid Anhydrides - Preparation



Friday

- Exam 3