Carboxylic Acids & Derivatives
February 21, 2020

- The general addition-elimination mechanism and factors influencing reactivity.
- Nitrile hydrolysis under basic and acidic conditions.
- Preparation and reactions of acid chlorides.
- Reactions of acid anhydrides.
- The chemistry of esters and lactones.

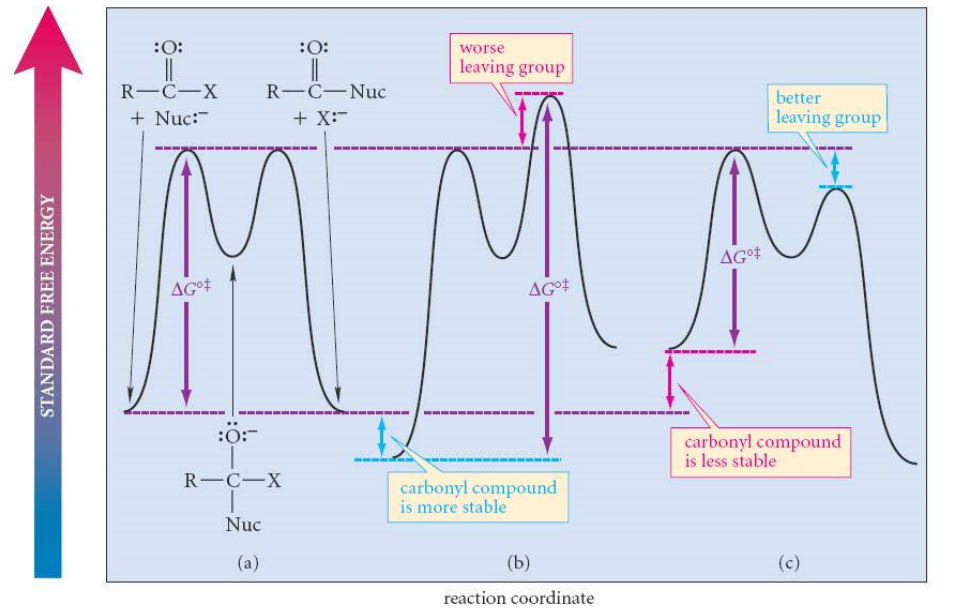
110b Teaching Fellows: Felipe Becerril, Christina Beck, Isabelle Cheng, Junha Gu, Nathalie Hong, Shy Lavasani, Allison Liu, Casey Morrison, Jerusalem Nerayo, Eric Tang, Baili Zhong, Martín Acosta Parra.

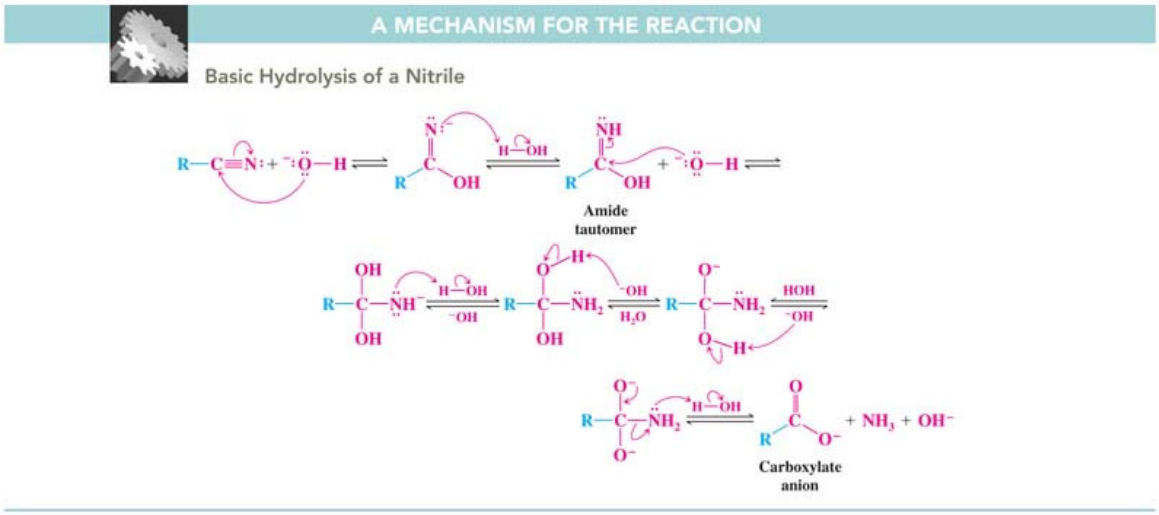
O'Leary office hours: T/Th 9:30-10:00 am, SN 208.

Robbins Lectures Next Week! Professor Geri Richmond, University of Oregon. Topic: "The Importance of Science in the Future of a Healthy Planet." Lectures: 8:00 PM Monday (public lecture), 11:00 AM Tuesday (Environmentally Important Processes at Water Surfaces), 4:30 PM Wednesday (Oil on Water: Calming the Seas but Not the Science), 4:30 PM Thursday (Nanoemulsions). All lectures in SN Auditorium.

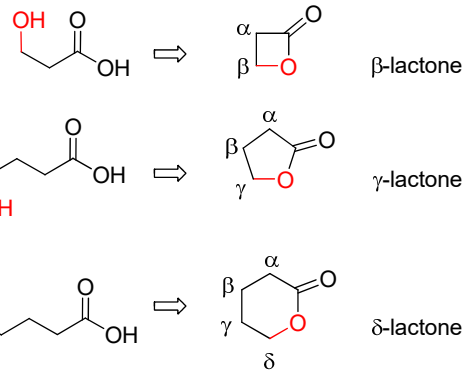
O'Leary's evening review session: Wednesdays 7:00 PM, SN Aud. **Course website**: http://pages.pomona.edu/~djo04747/110/

Suggested Problems for Exam 2. 10e: 16.20, 24, 30, 33, 35, 41, 44, 45, 47. 11e: 16.23, 27, 33, 36, 38, 44, 47, 48, 50. 10e/11e: 17.20, 17.28, 17.31, 17.33, 17.35, 17.38, 17.41, 17.42, 17.47.

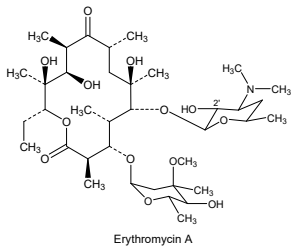

STANDARD FREE ENERGY
:O:
R—C—X
+ Nuc:⁻
:O:
R—C—Nuc
+ X:⁻
worse leaving group
better leaving group
ΔG°‡
ΔG°‡
ΔG°‡
:O:⁻
R—C—X
Nuc
carbonyl compound is more stable
carbonyl compound is less stable
(a)
(b)
(c)
reaction coordinate


A MECHANISM FOR THE REACTION
Basic Hydrolysis of a Nitrile
Amide tautomer
Carboxylate anion
+ NH₃ + OH⁻

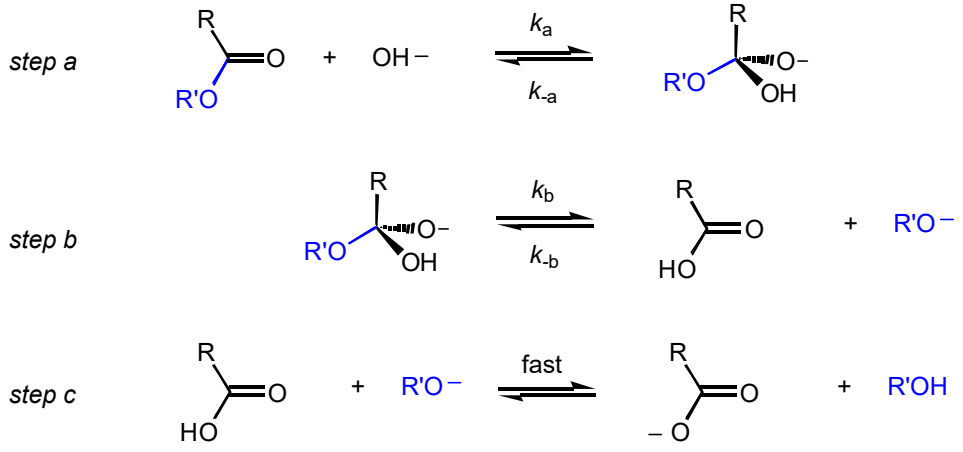
lactones are cyclic esters



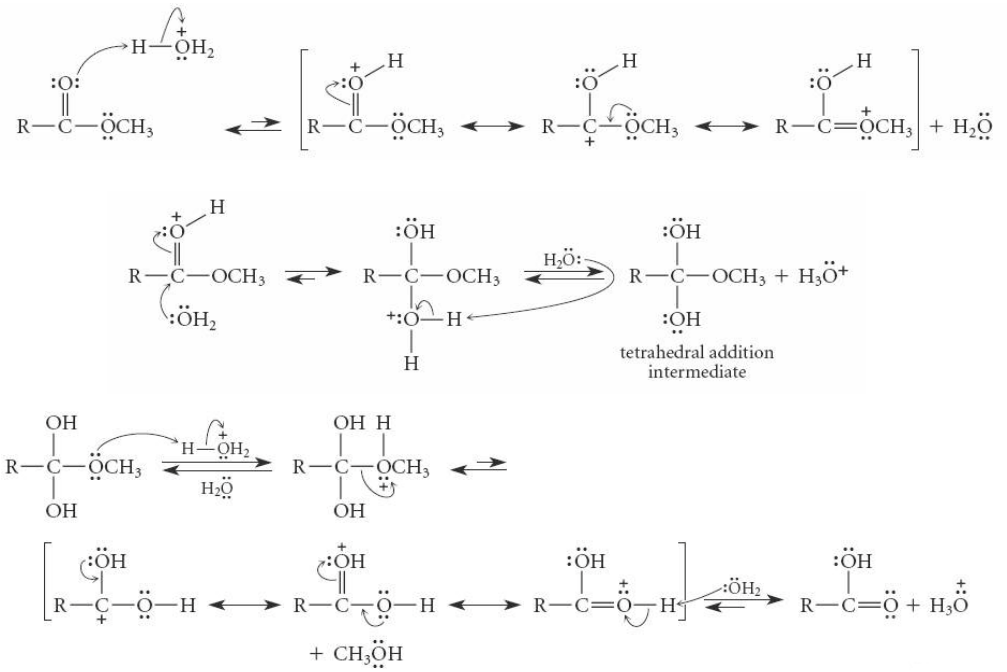
a macrocyclic lactone



Base-Promoted Hydrolysis of Esters



If RO- is a better leaving group than HO-, then the k_b step is fast, k_a is rate determining.



Acid-Catalyzed Ester Hydrolysis