

Universidad Nacional Autónoma de México

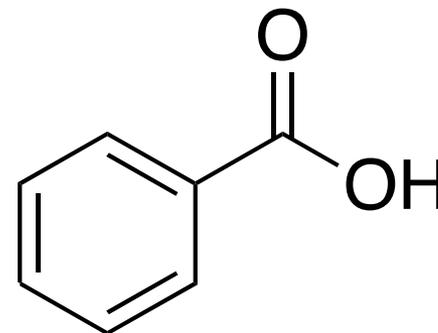


Química Orgánica IV (1606)

Laboratorio

Semestre 2025 - 2

M. en C. Arturo García Zavala



Práctica 1

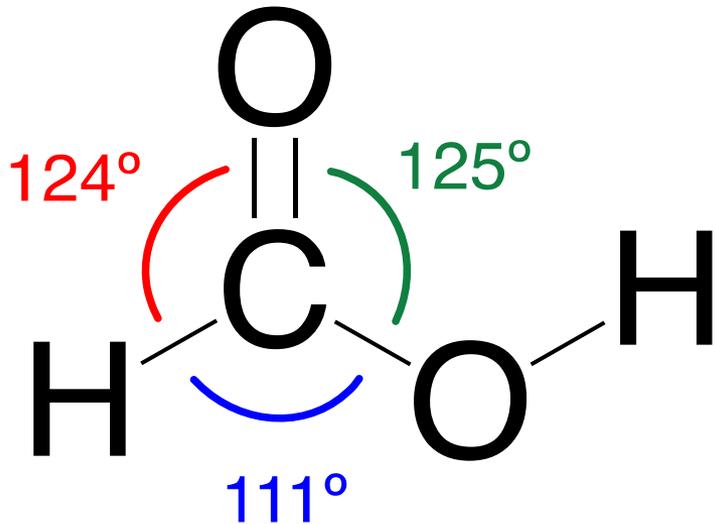
Ácidos carboxílicos I

Hidrólisis alcalina de benzonitrilo

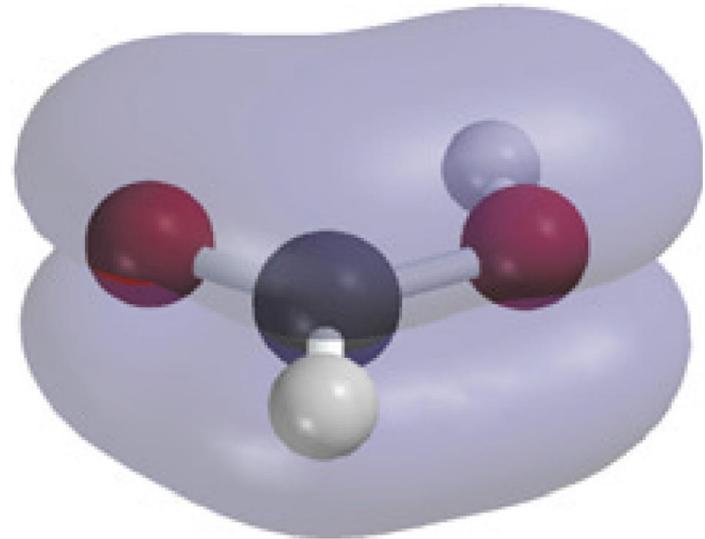
17/2/2025

Ácidos carboxílicos

Ángulos de enlace



Distribución de densidad electrónica



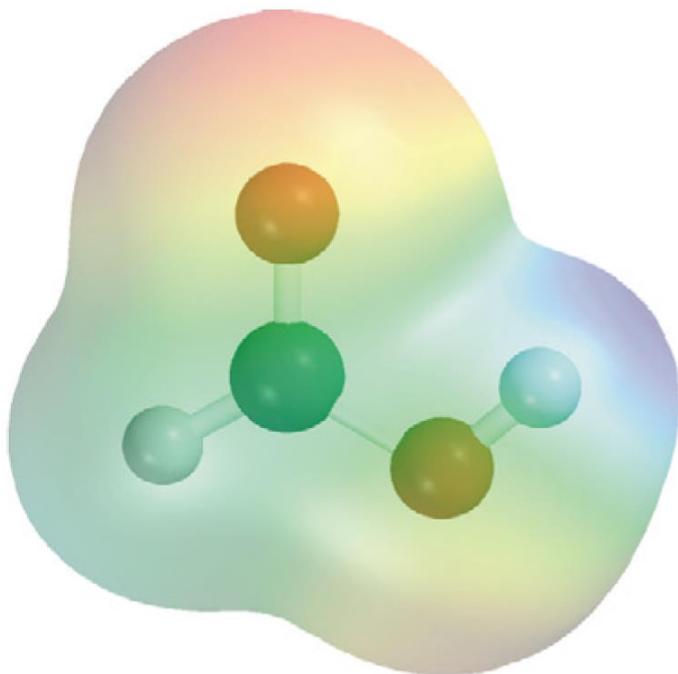
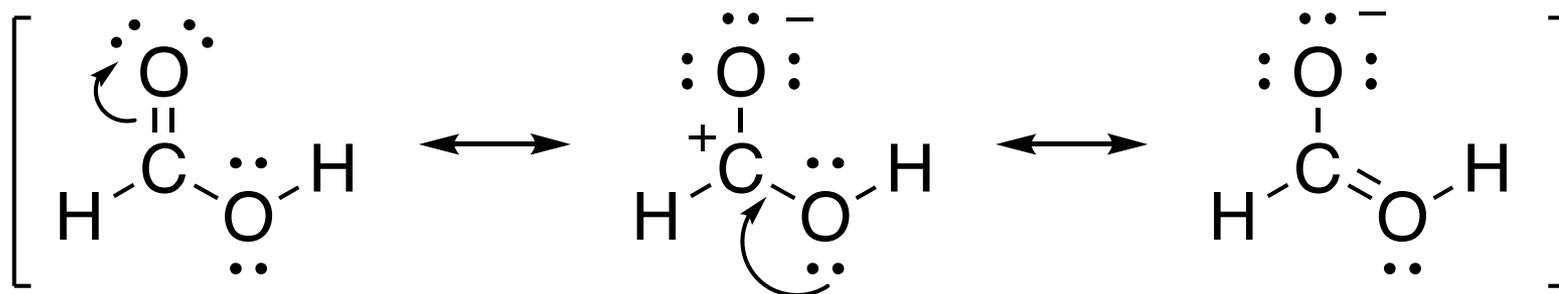
Distancias de enlace

C=O 1.20 Å

C-O 1.34 Å

Carey, F. A. *Organic chemistry*; McGraw-Hill, 2013.

Carbono poco electrofílico

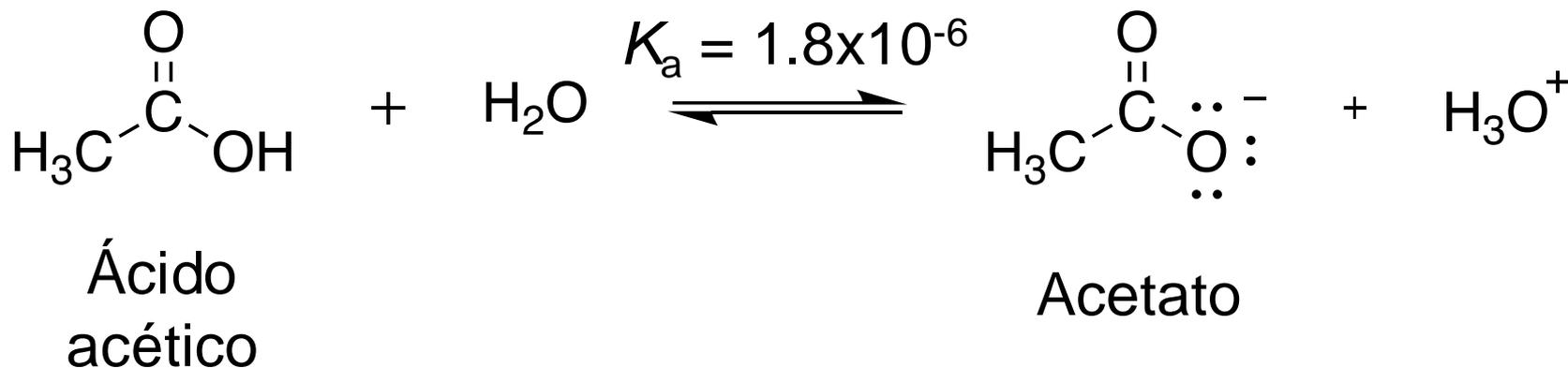
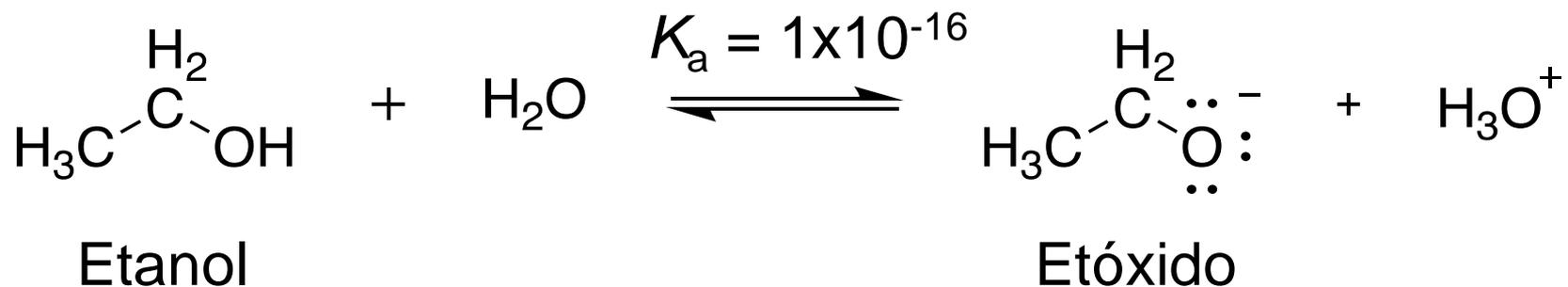


Mapa de potencial
electrostático
del ácido fórmico

Carey, F. A. *Organic chemistry*; McGraw-Hill, 2013.

Acidez: Estabilidad de la base conjugada

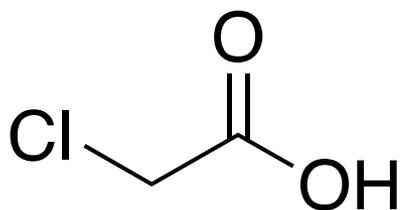
¿Cuántos átomos distribuyen la carga?



Acidez: Estabilidad de la base conjugada

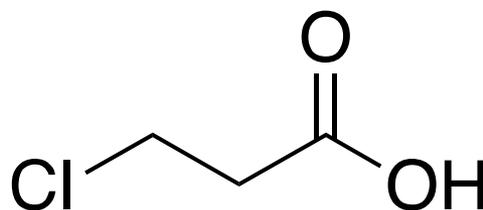
¿Cómo modifico la carga del carboxilato?

Efecto inductivo



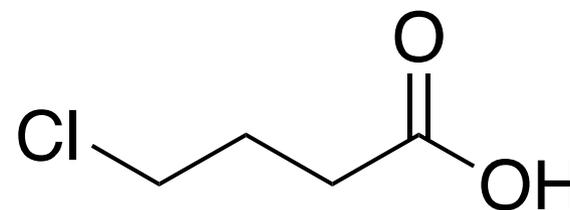
Ácido
cloroacético

$$pK_a = 2.9$$



Ácido
3-cloropropanoico

$$pK_a = 4.0$$



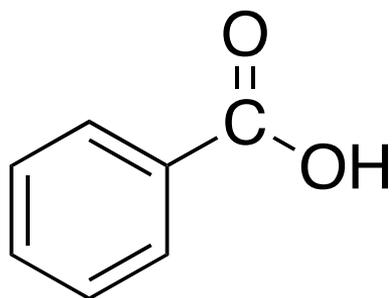
Ácido
4-clorobutanoico

$$pK_a = 4.5$$

Acidez: Estabilidad de la base conjugada

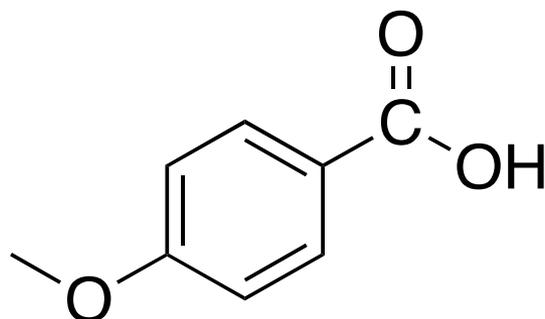
¿Cómo modifico la carga del carboxilato?

Efecto resonante



Ácido
benzoico

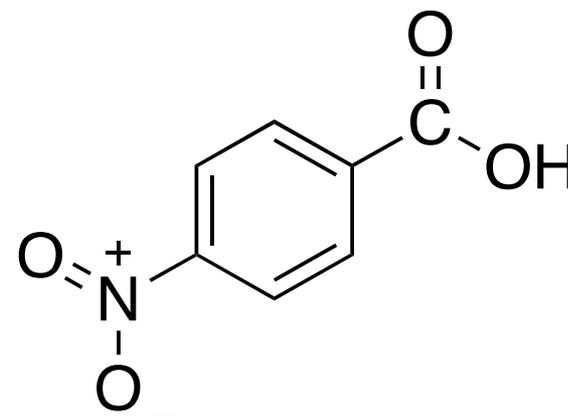
$pK_a = 4.2$



Ácido
p-metoxibenzoico

$pK_a = 4.5$

(Destesabiliza carboxilato)

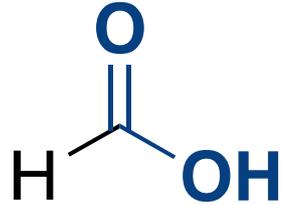


Ácido
p-nitrobenzoico

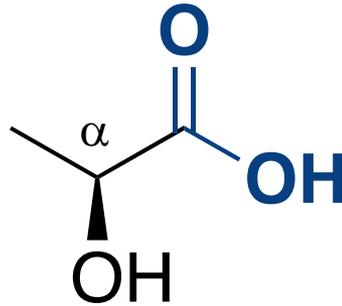
$pK_a = 3.4$

(Estabiliza
carboxilato)

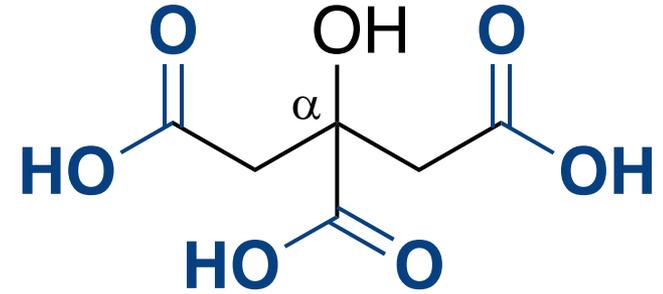
Ácidos carboxílicos presentes en el día a día



Ácido fórmico



Ácido láctico

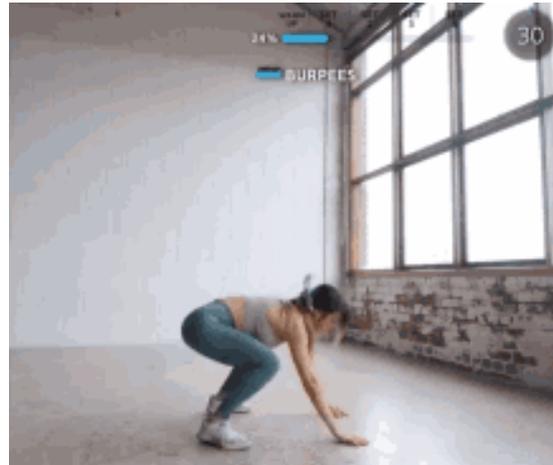


Ácido cítrico

α -hidroxiácidos



Hormigas



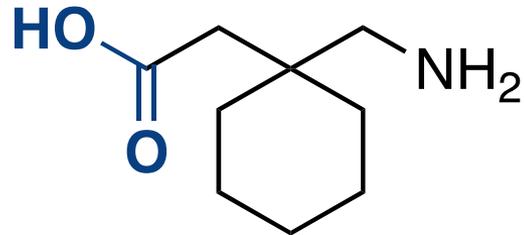
Tejidos



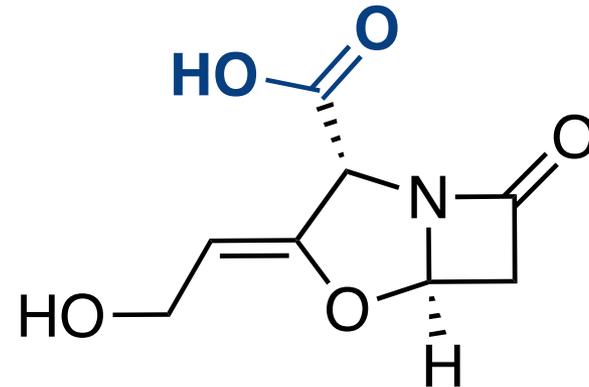
Cítricos

Ácidos carboxílicos presentes en el día a día

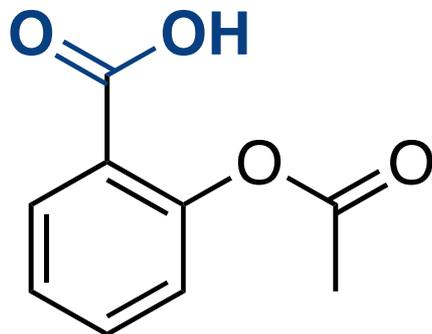
Fármacos



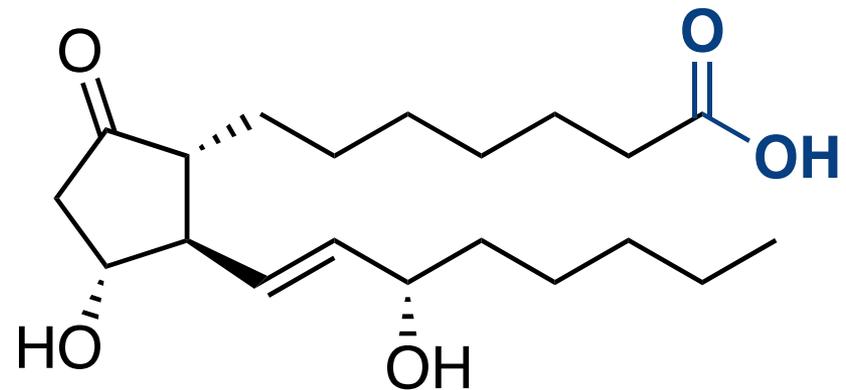
Gabapentina



Ácido clavulánico

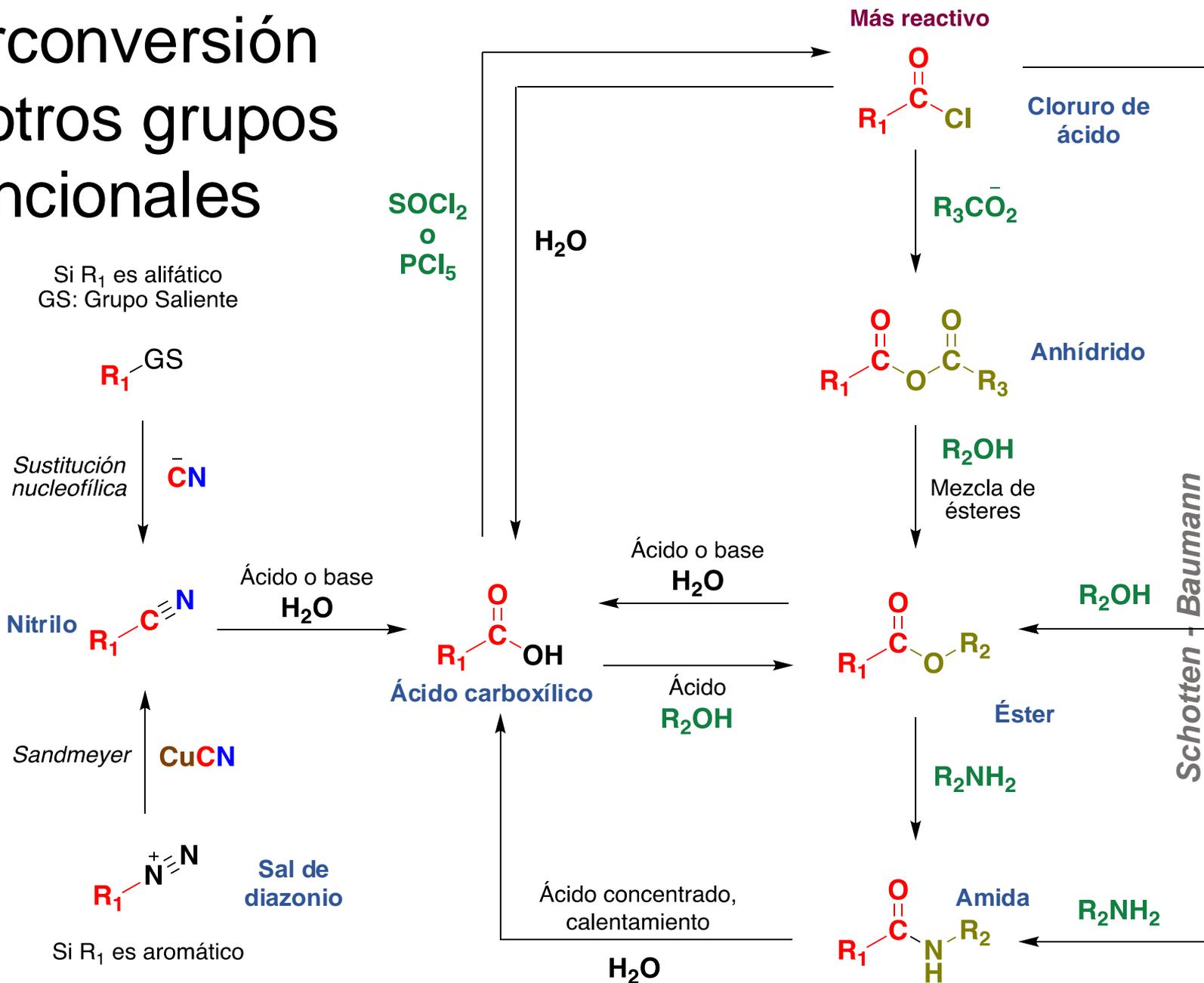


Aspirina

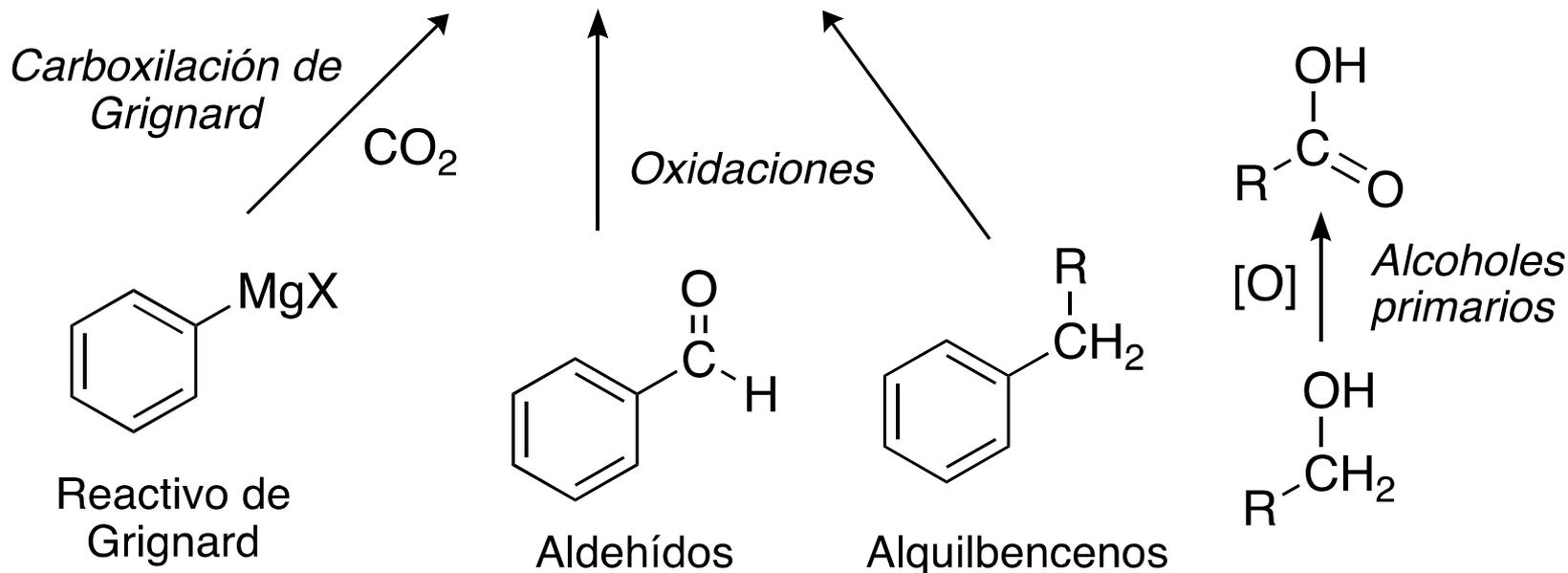
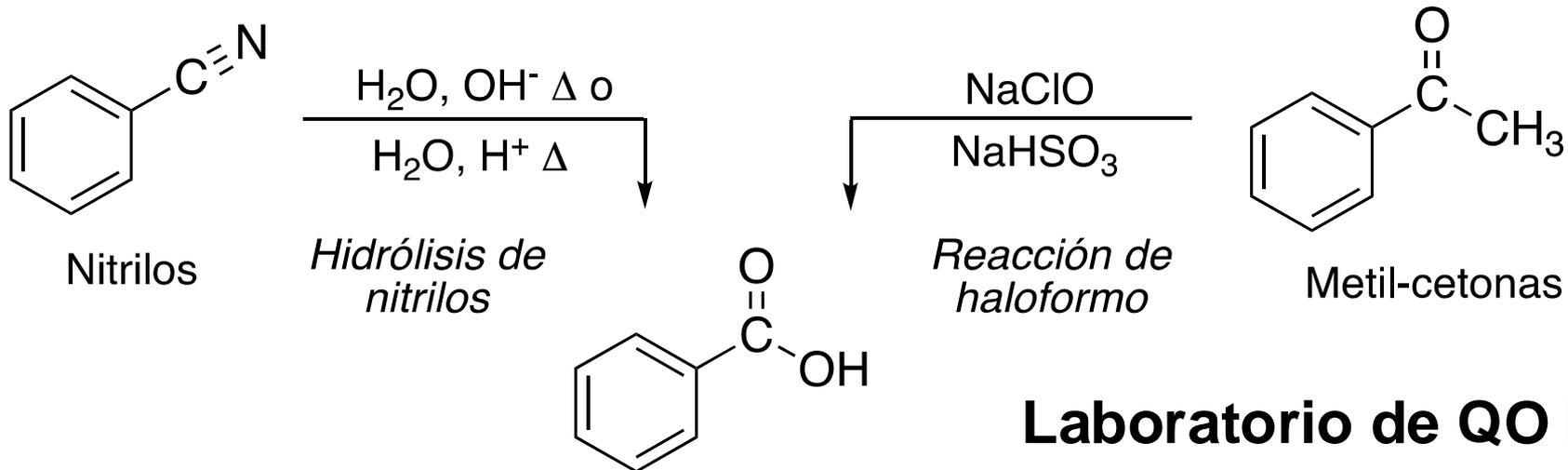


Prostaglandina E1

Interconversión con otros grupos funcionales

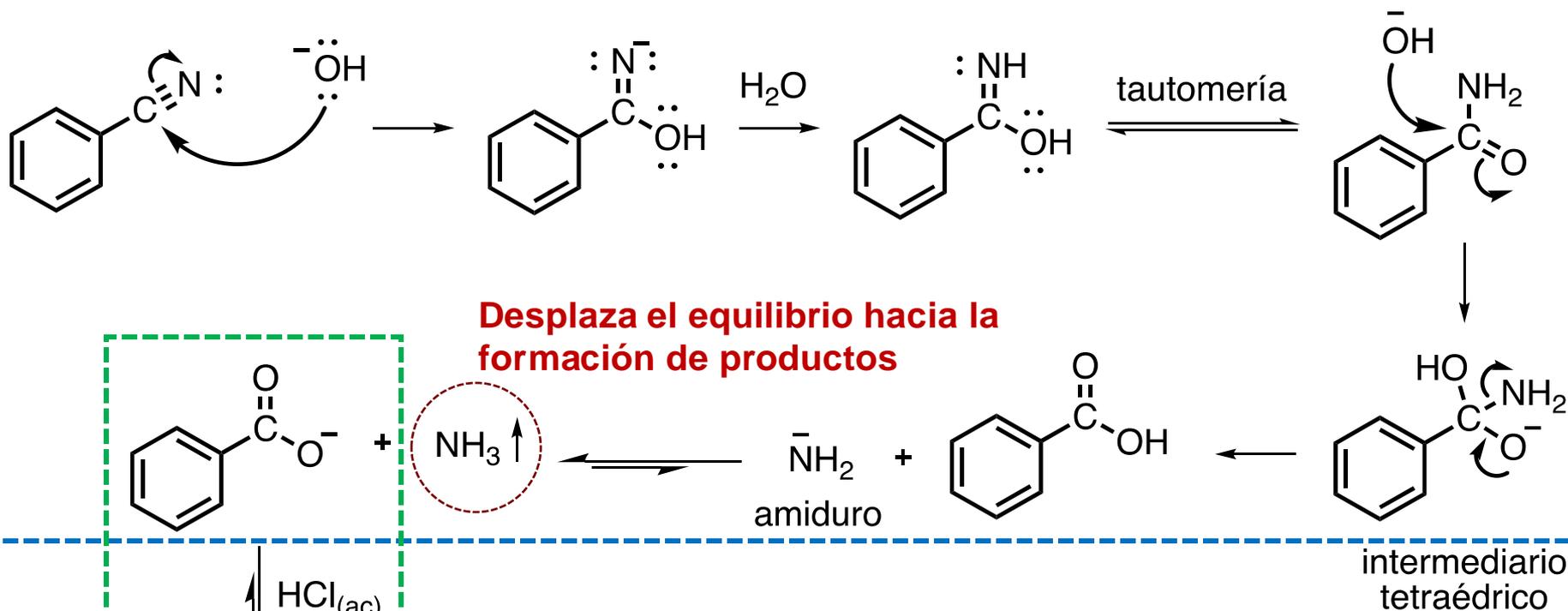


Síntesis de ácidos carboxílicos

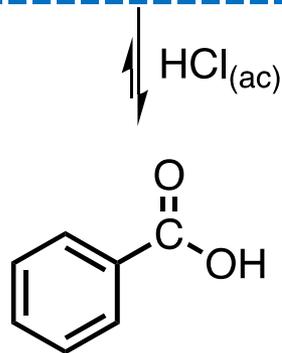


Mecanismo: Hidrólisis alcalina de nitrilos

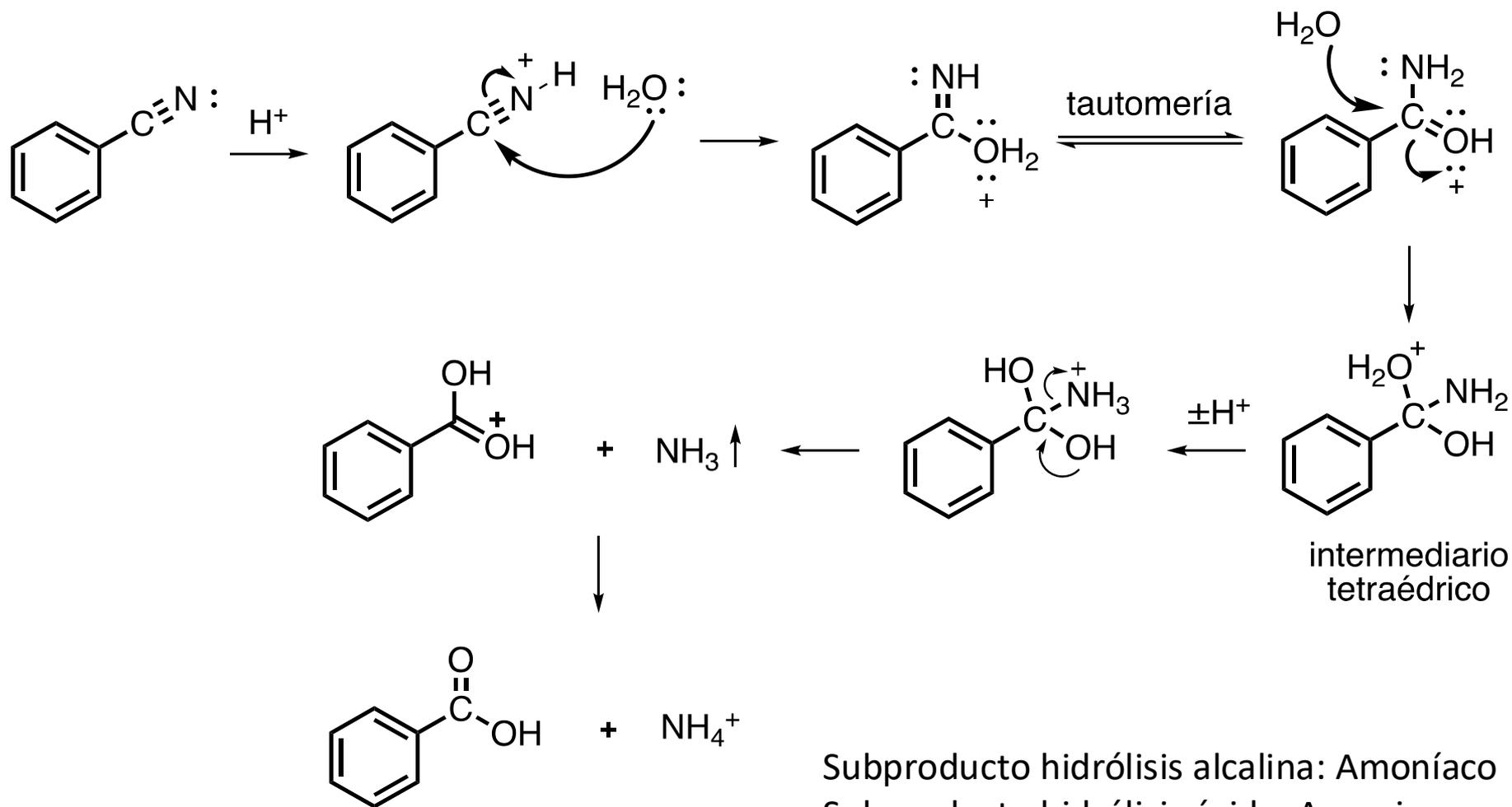
Paso 1



Paso 2

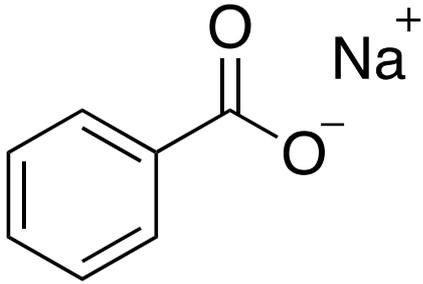


Mecanismo: Hidrólisis ácida de nitrilos

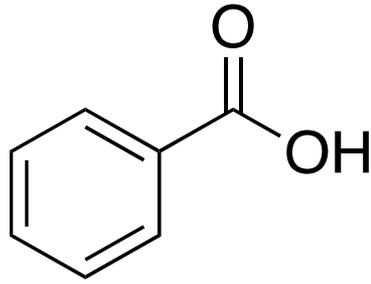


Subproducto hidrólisis alcalina: Amoníaco
Subproducto hidrólisis ácida: Amonio

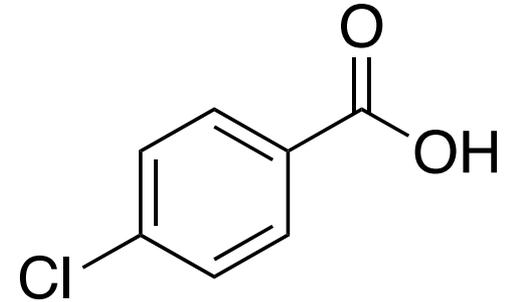
Solubilidad



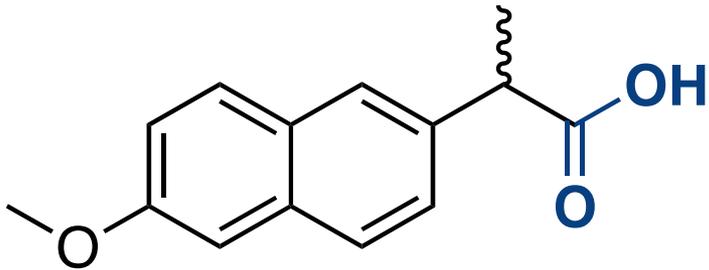
Benzoato de sodio
Soluble en agua



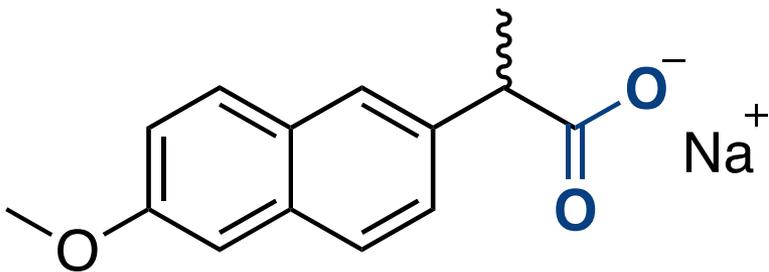
Ácido benzoico
Soluble en agua caliente



Ácido *p*-clorobenzoico
Insoluble en agua caliente



Naproxeno



Naproxeno
sódico

