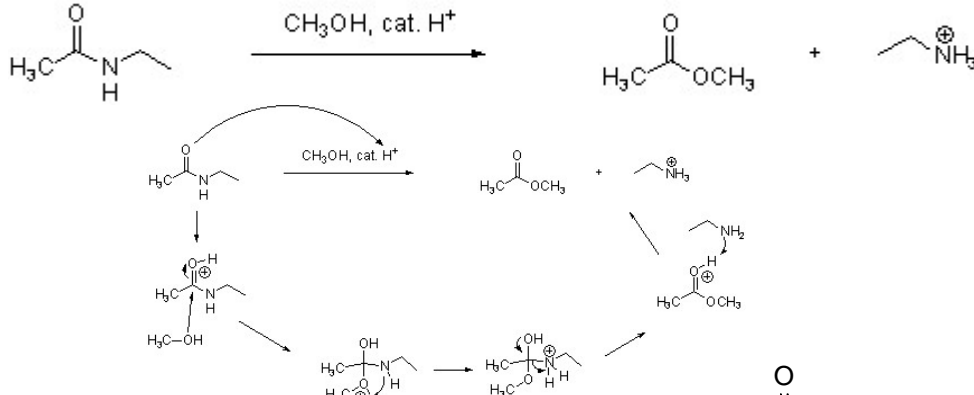
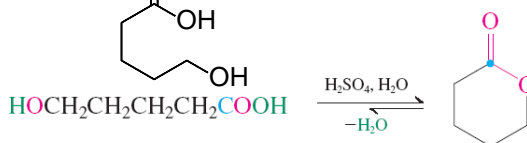


Provide an arrow pushing mechanism for the following reaction.

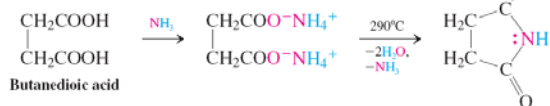


**Intramolecular esterification = lactone**

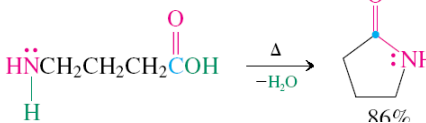
Hydroxy carboxylic acids may form 5-/6-membered cyclic esters



**Dicarboxylic acids + amines → imides**

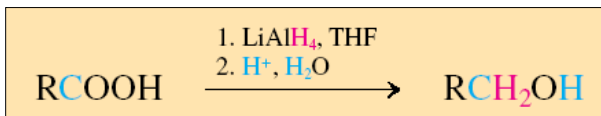


**amino acids intramolecular cyclization → lactam**

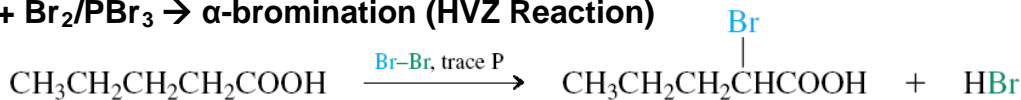


**Carboxylic Acids Reactions**

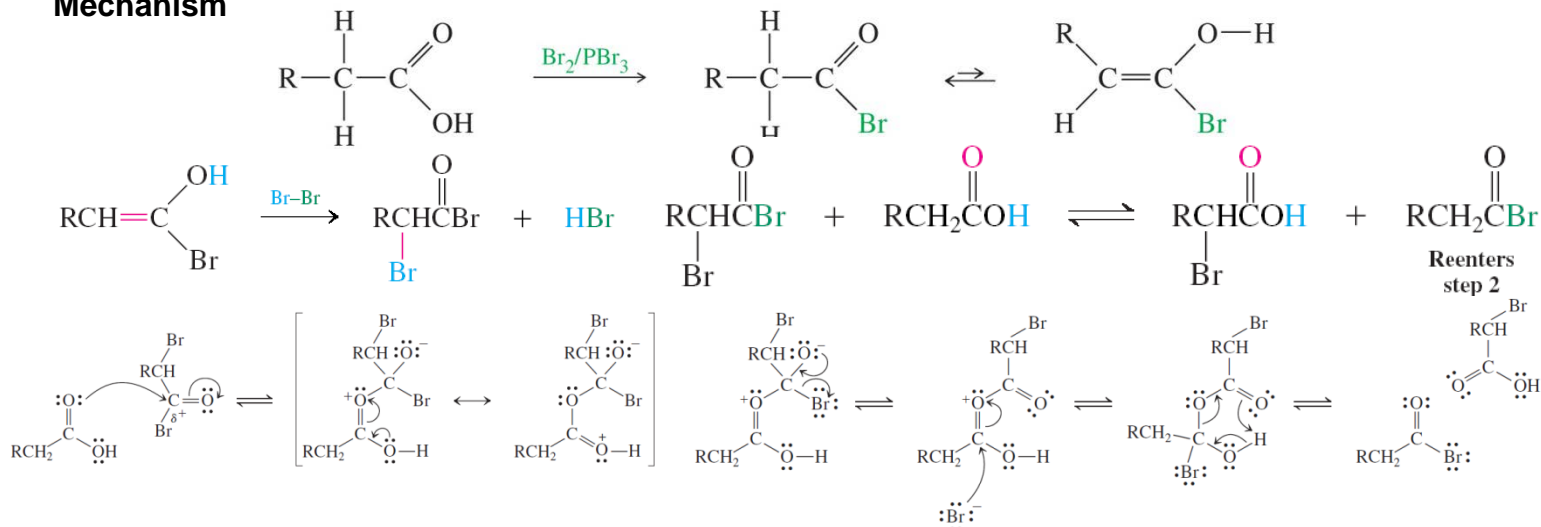
Carboxylic acids + LiAlH<sub>4</sub> → 1° alcohols



**Carboxylic acid + Br<sub>2</sub>/PBr<sub>3</sub> → α-bromination (HVZ Reaction)**

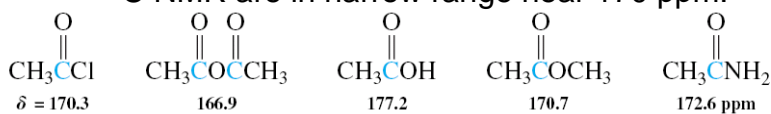


**Mechanism**

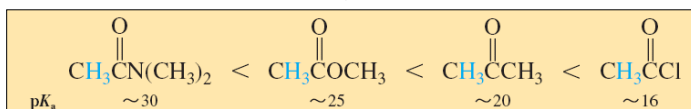


## Carboxylic Acid Derivatives

<sup>13</sup>C NMR are in narrow range near 170 ppm.

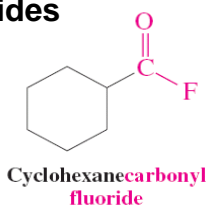


acidity of  $\alpha$ -hydrogens also increases :

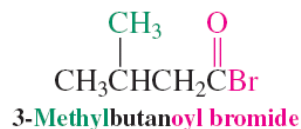


## Alkanoyl Halides

-ic acids  $\rightarrow$  oyl halides or yl halides



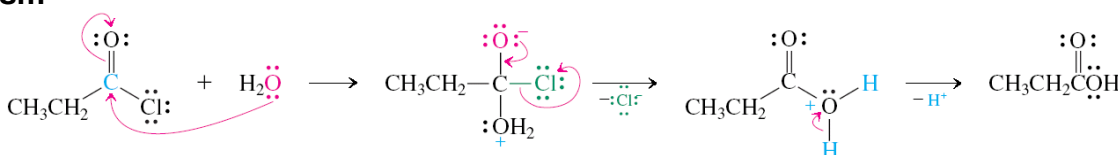
carboxylic acid  $\rightarrow$  carbonyl halide



Water + alkanoyl chlorides  $\rightarrow$  carboxylic acids

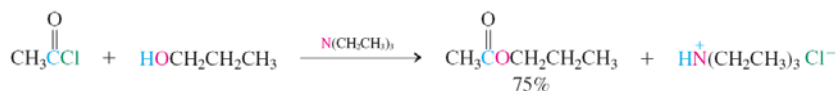
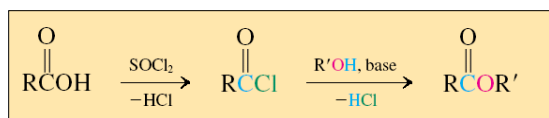


## Mechanism

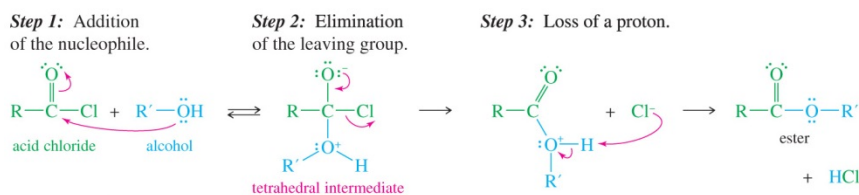


Alcohols + alkanoyl chlorides  $\rightarrow$  esters

Hydroxide, pyridine or a 3° amine is added to neutralize HCl

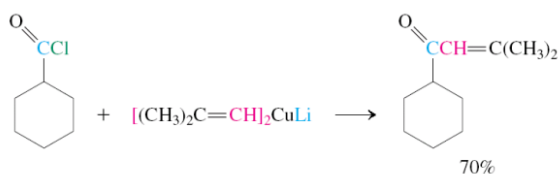


## Mechanism

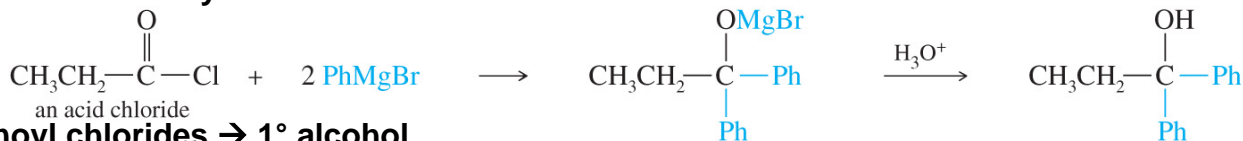


## Reductions

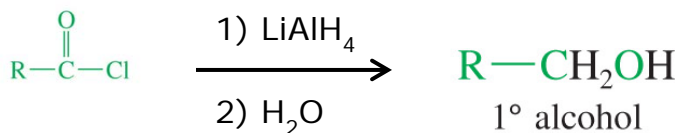
Organocuprates + alkanoyl chlorides  $\rightarrow$  ketones



Lithium/Grignard + alkanoyl chlorides  $\rightarrow$  3° alcohol



$\text{LiAlH}_4$  + alkanoyl chlorides  $\rightarrow$  1° alcohol



$\text{LiAl}[\text{OC}(\text{CH}_3)_3]_3$  + alkanoyl chlorides  $\rightarrow$  aldehyde

