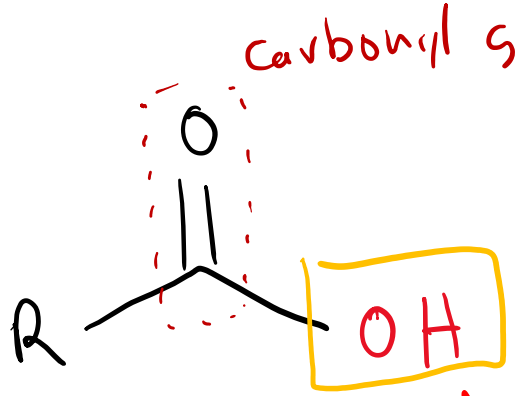
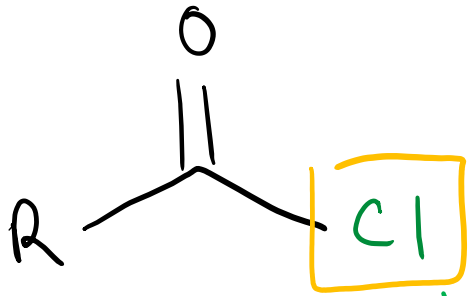
Carboxylic Acids & Their Derivatives

2/20/2023

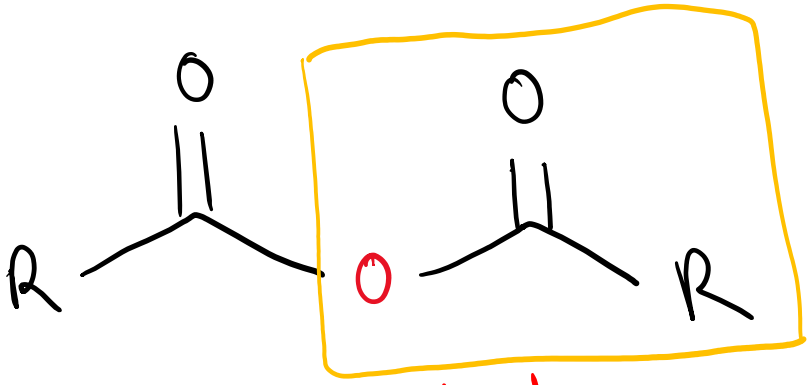
boxed group = leaving group (may require protonation)



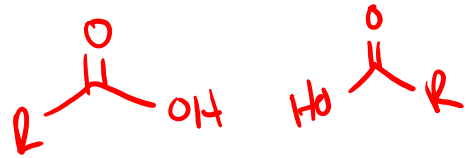
carboxylic acid

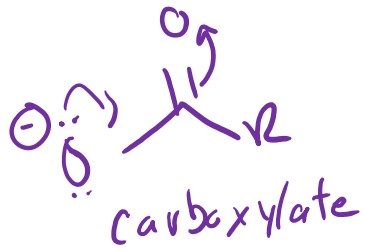


acid chloride

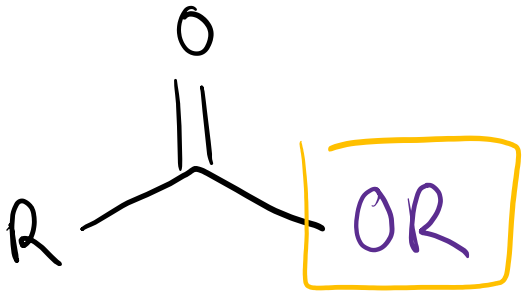


anhydride

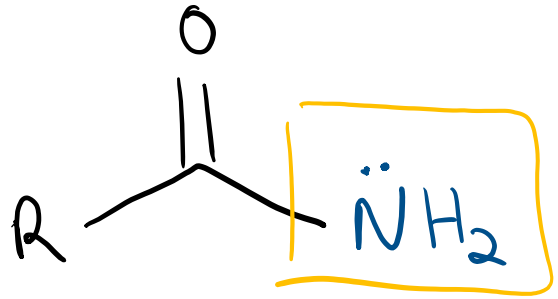




carboxylate



ester



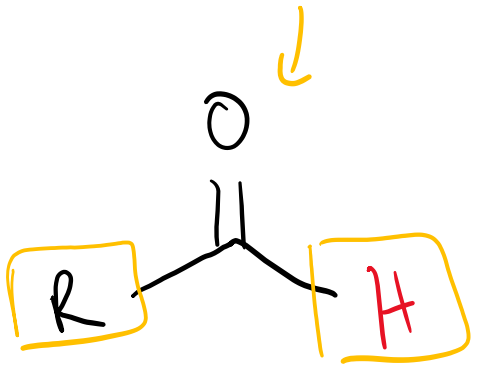
amide

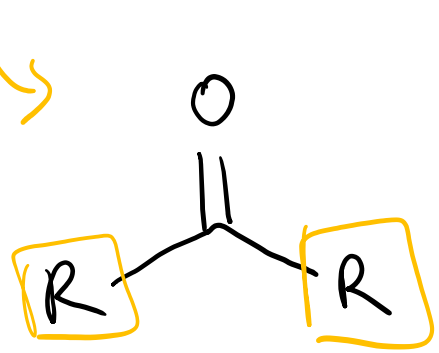
(a-mid)

Comparison with Aldehyde and Ketone Reactivity

$H:^{\ominus}$ bad LG!

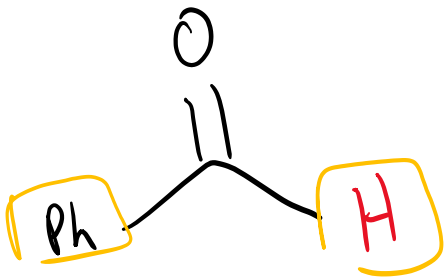
$pka_H\ (H_2) \sim 35$

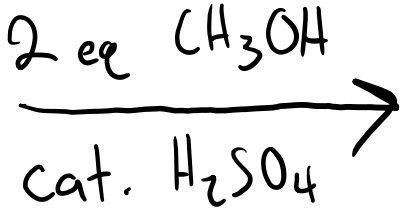


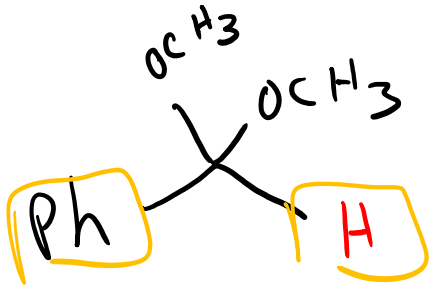


$R:^{\ominus}$ bad LG!

$pka\ H\ (alkane) = 50$

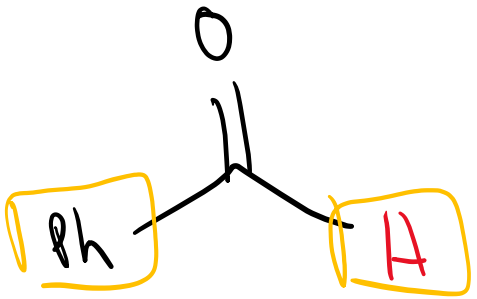


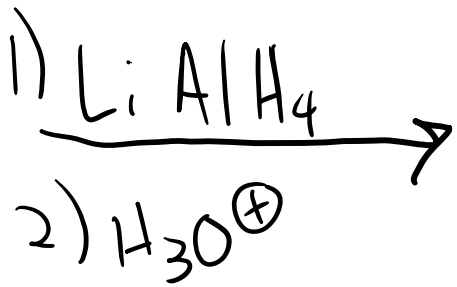


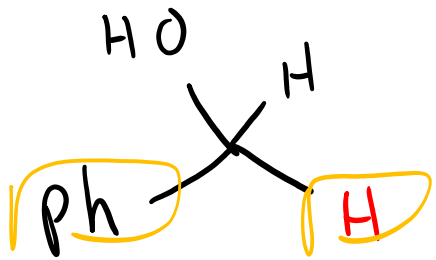


+ H_2O

stayed intact.
Did not leave!

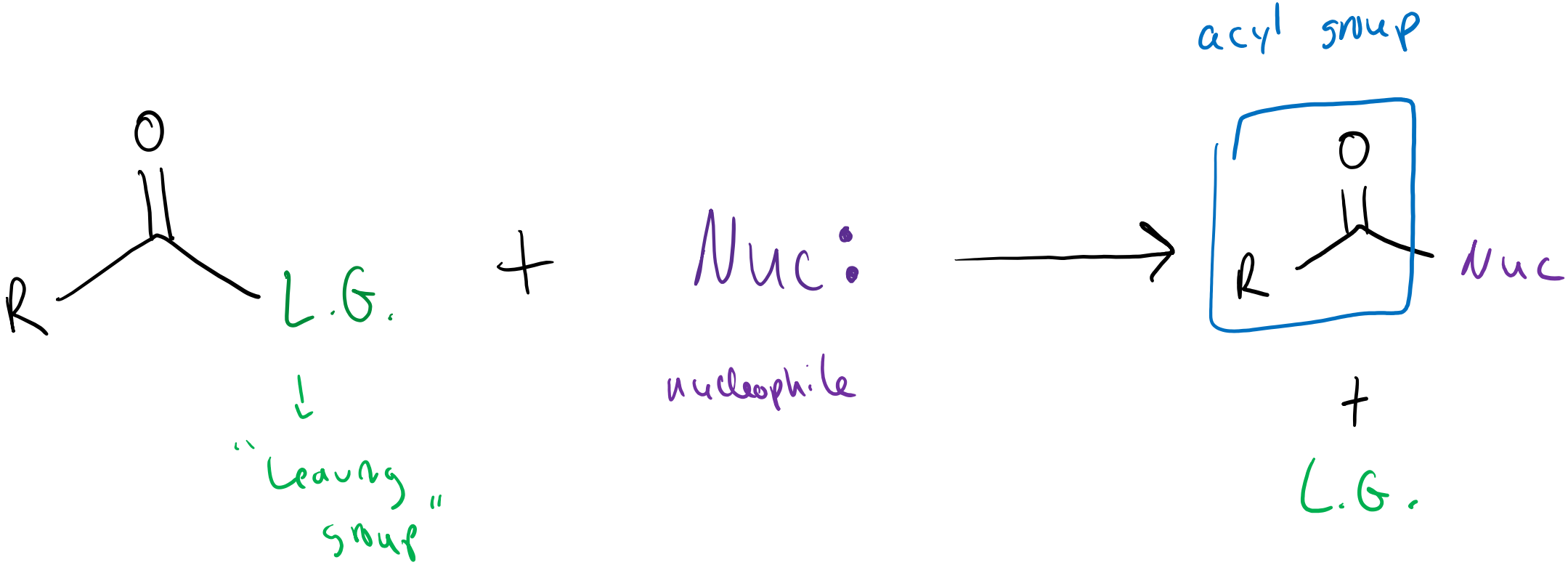






no C=O in product!

Acyl Transfer Reaction (general)



"looks like" S_N2, but technically not.

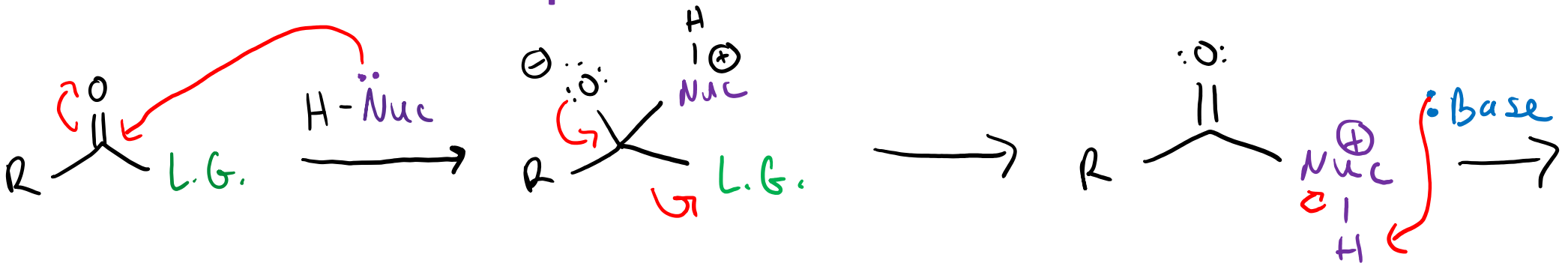
Bc goes through tetrahedral intermediate.

Acyl Transfer Mechanisms (General)

(20.7)

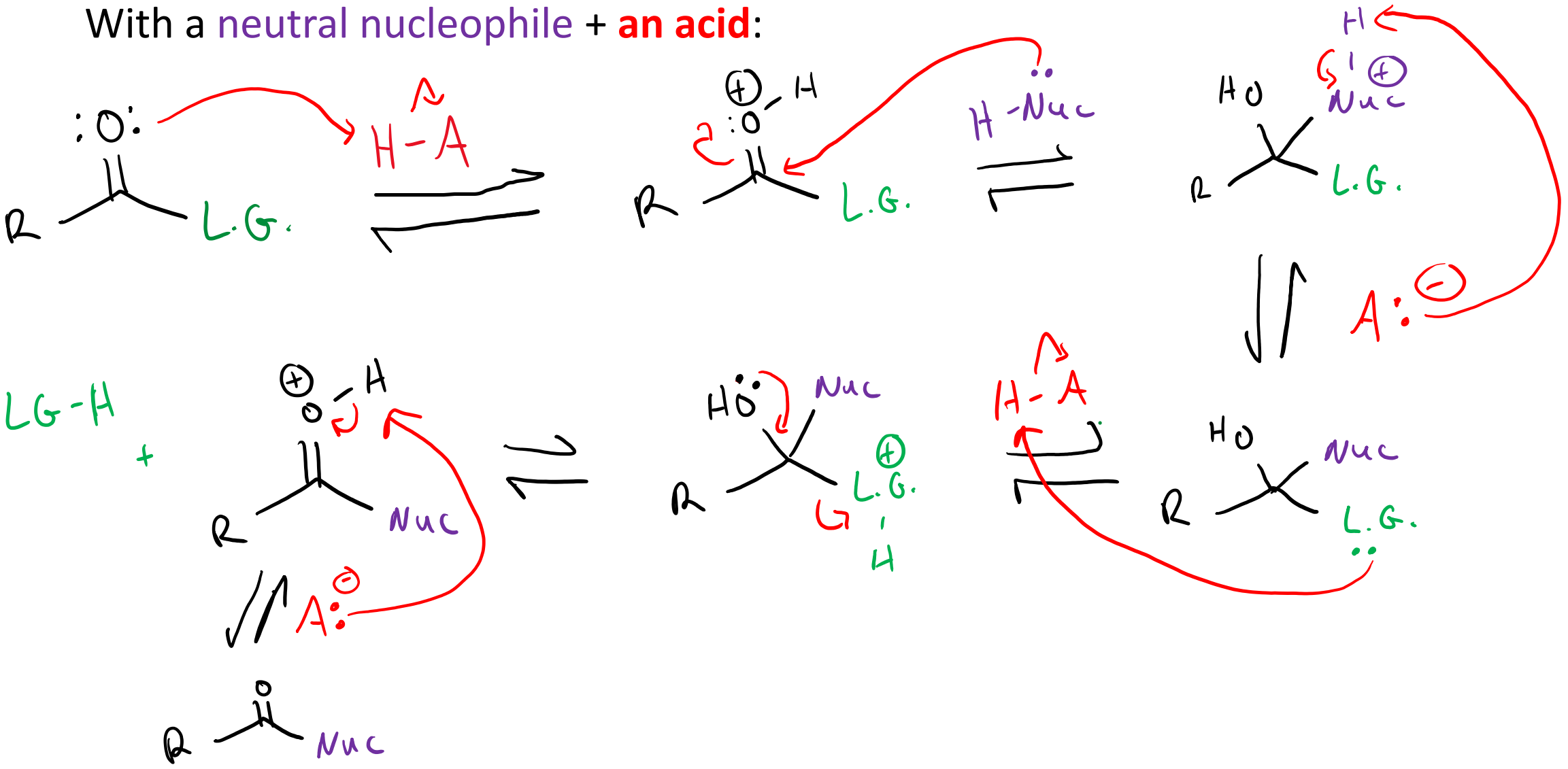
With an **anionic nucleophile**: (for derivatives w/ best leaving groups)

With a **neutral nucleophile** + **a weak base**

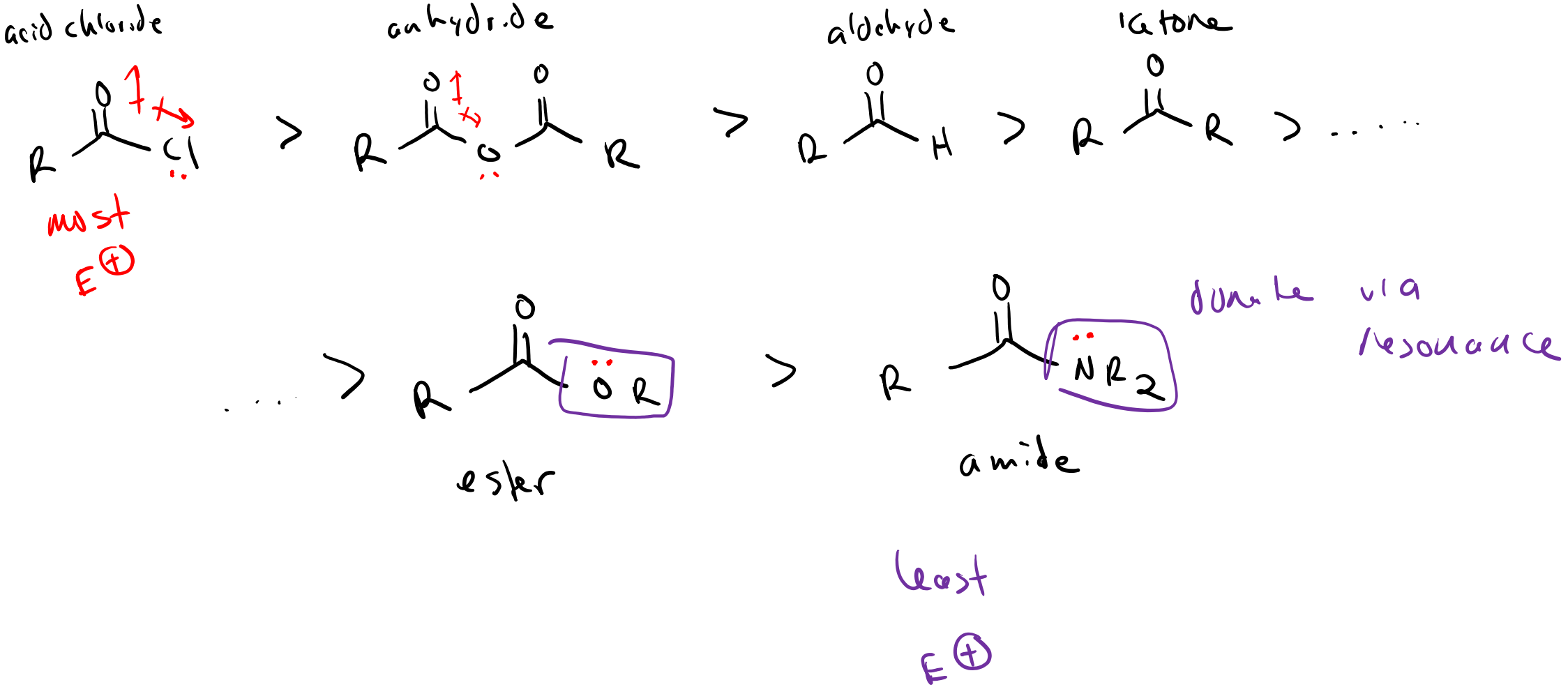


Acyl Transfer Mechanisms (General)

With a neutral nucleophile + **an acid**:

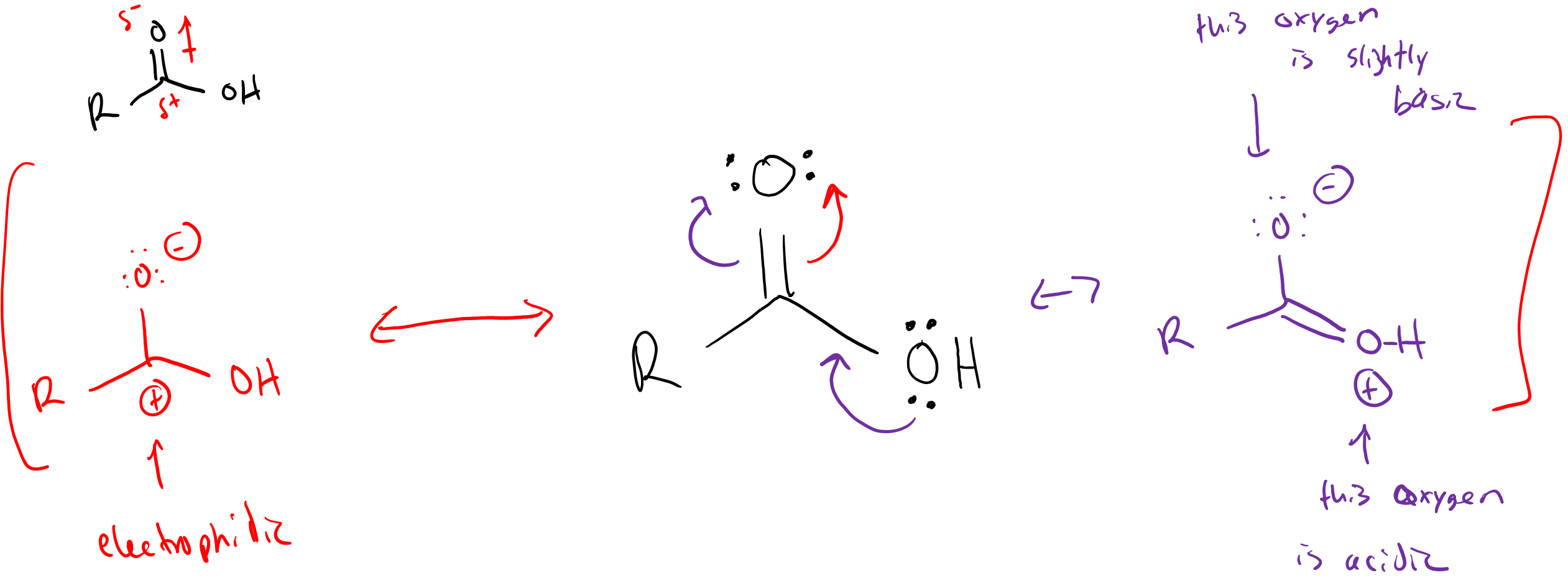


Ranking Electrophilicity of Carbonyl Functional Groups (20.7)

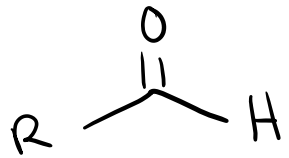


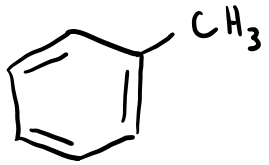
Carboxylic Acids

(20.3)



Synthesis of Carboxylic Acids





R – MgBr

★ only new one ★
hydrolysis of nitriles!

R – C≡N
nitrile

H_2O, H_2SO_4 →