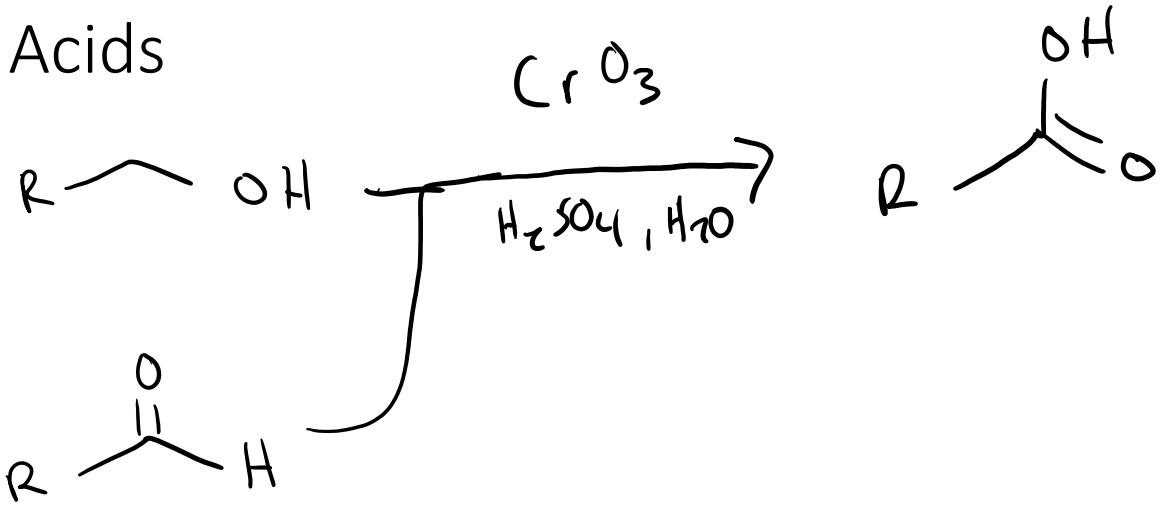
Carboxylic Acids

2/22/2023

Synthesis of Carboxylic Acids

oxidize aldehyde or ketone



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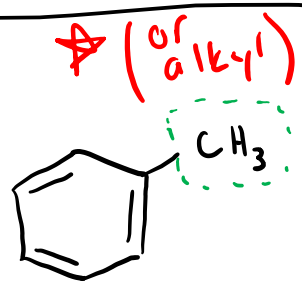
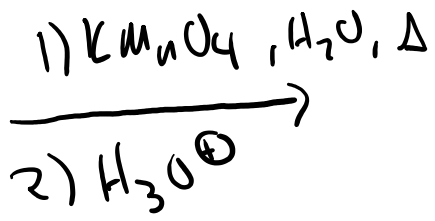
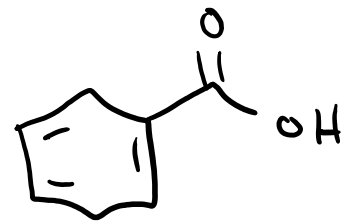
oxidize benzylic position

★ needs at least 1 H on benzylic position

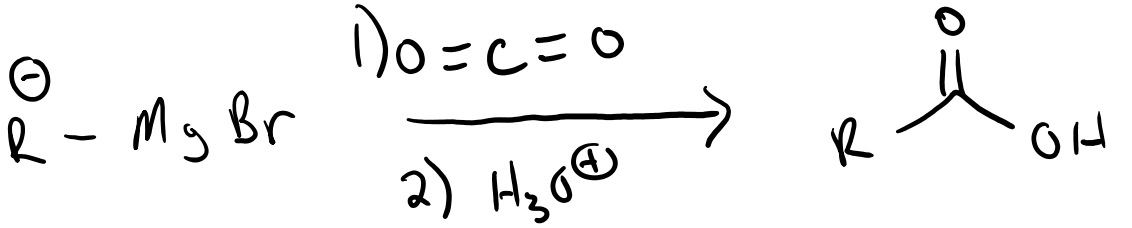




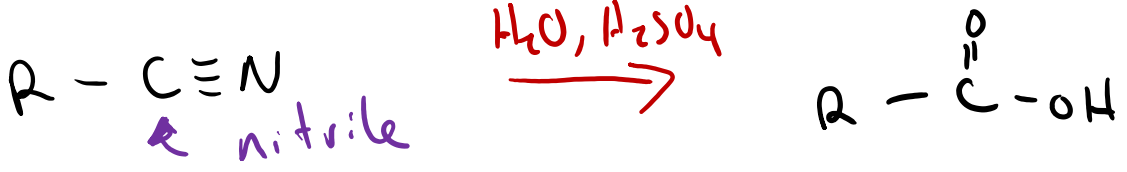


benzoic acid (regardless of alkyl length)

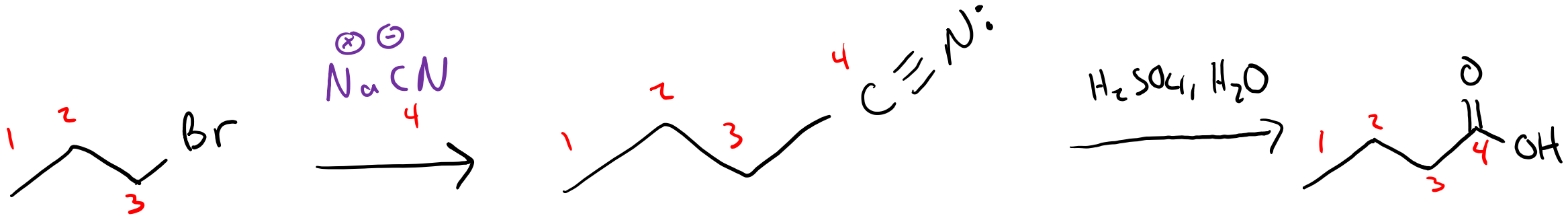
Grignard (or alkyllithium) + CO_2

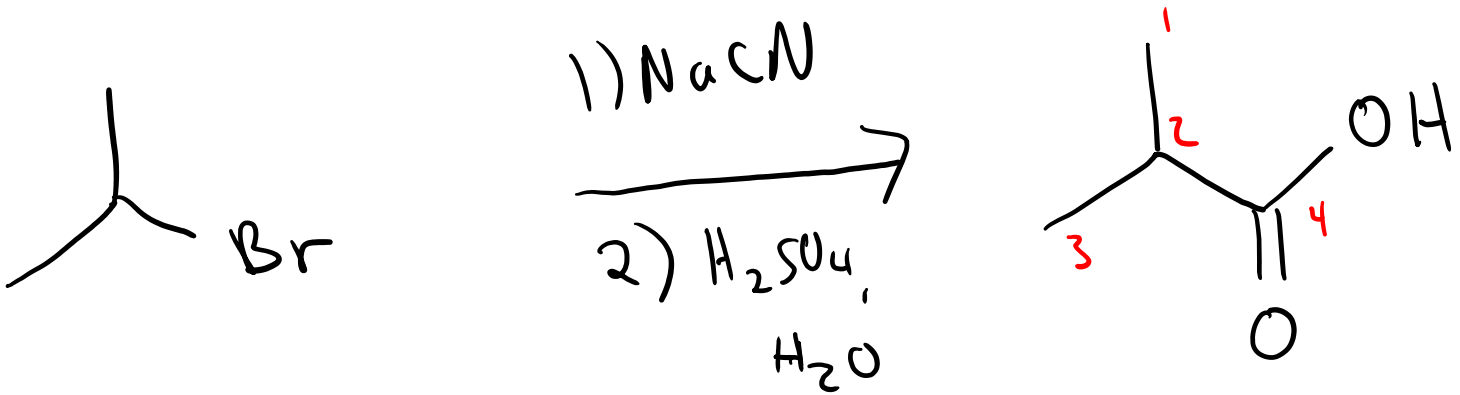


★ only new one ★ hydrolysis of nitriles!



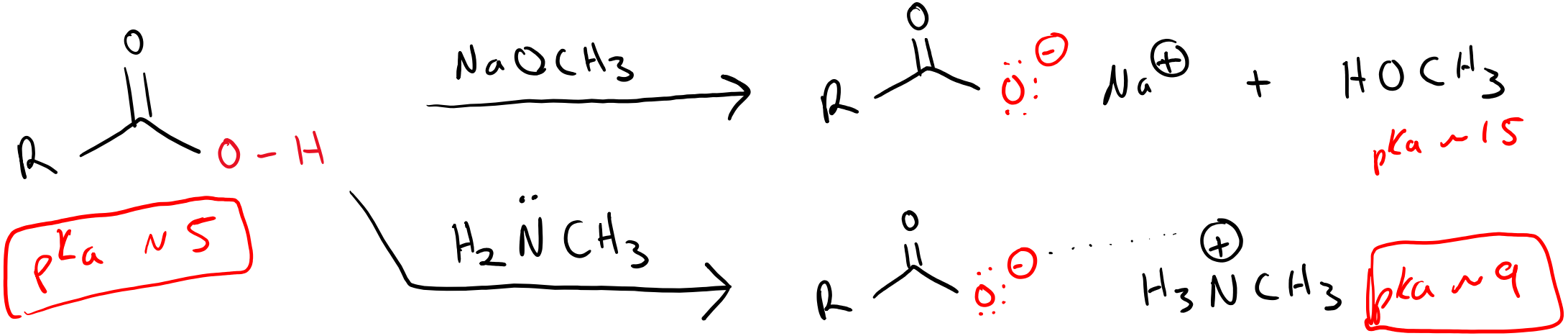
Synthesis of Carboxylic Acids via Nitriles





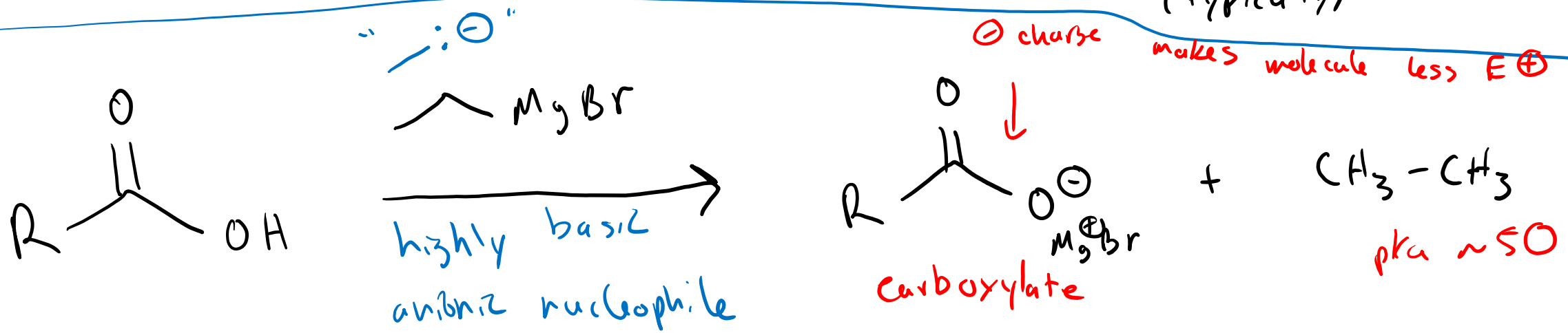
Reactivity of Carboxylic Acids: Acid-Base

(20.5)

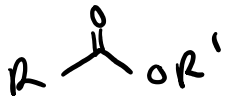


Any base w/ conj acid pka > 5 will deprotonate carboxylic acid.

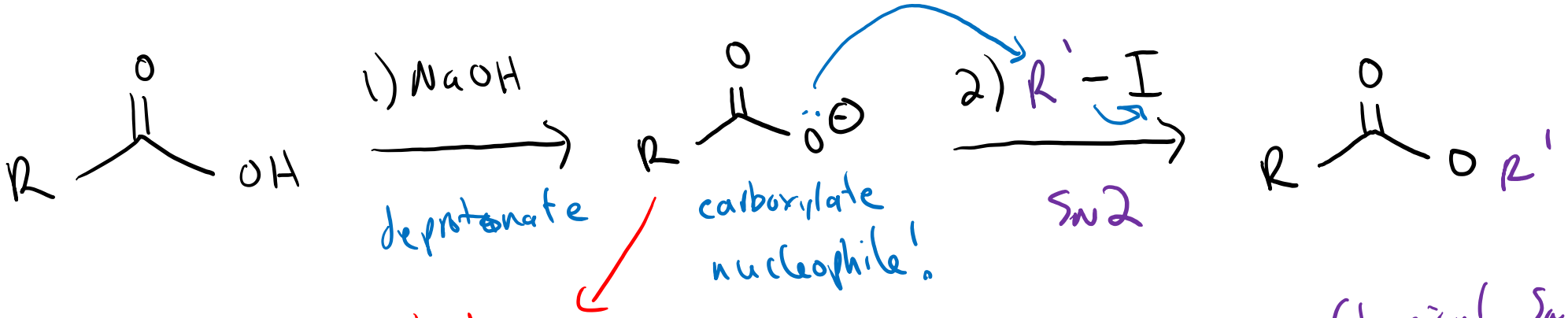
Acyl transfer reactions w/ carboxylic acid require acidic conditions (typically)

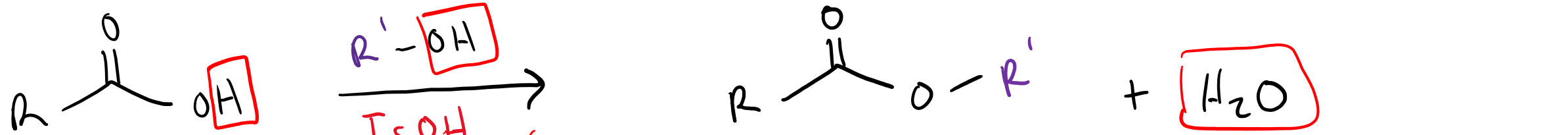


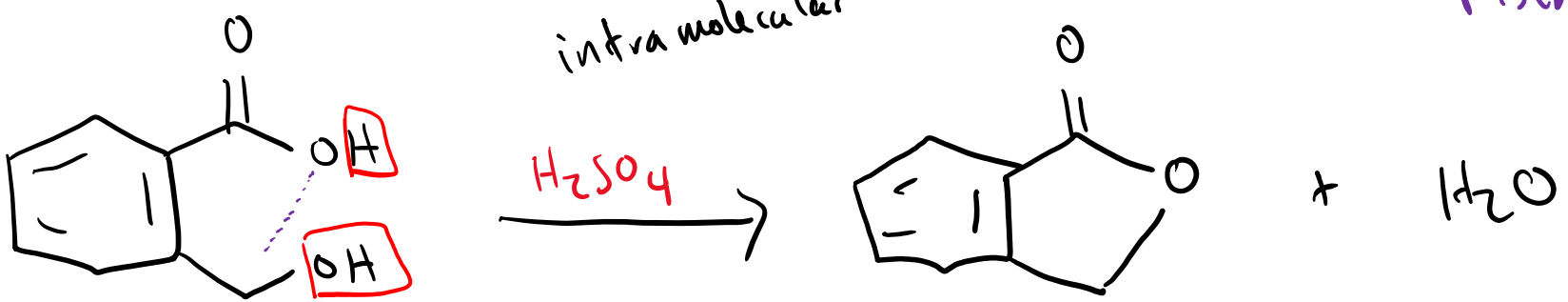
Reactivity of Carboxylic Acids: Forming Esters



(20.10)

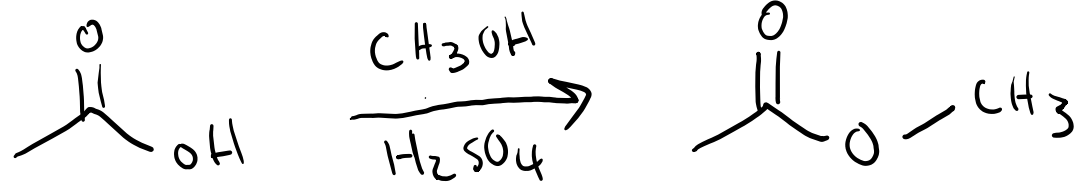


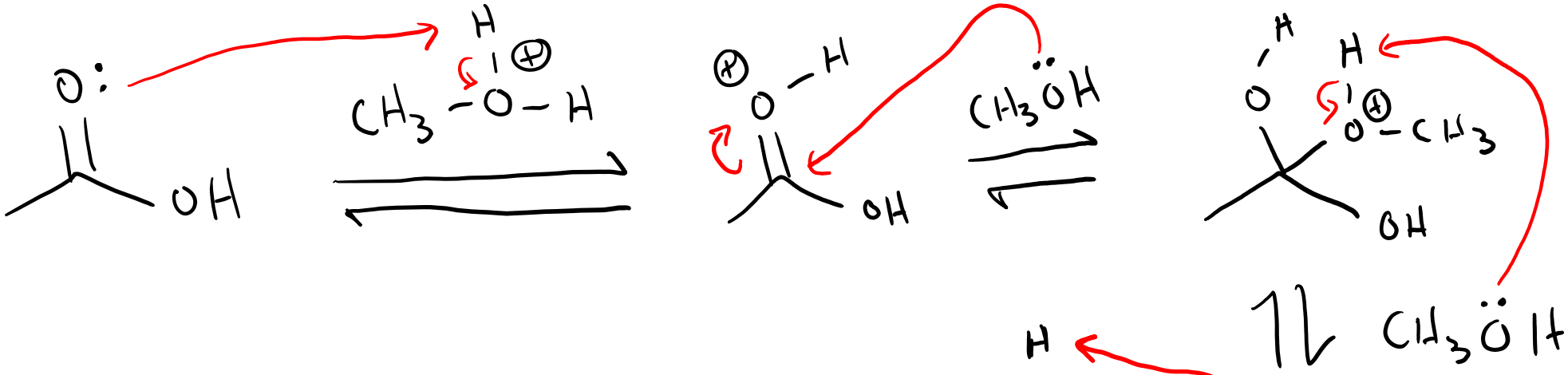


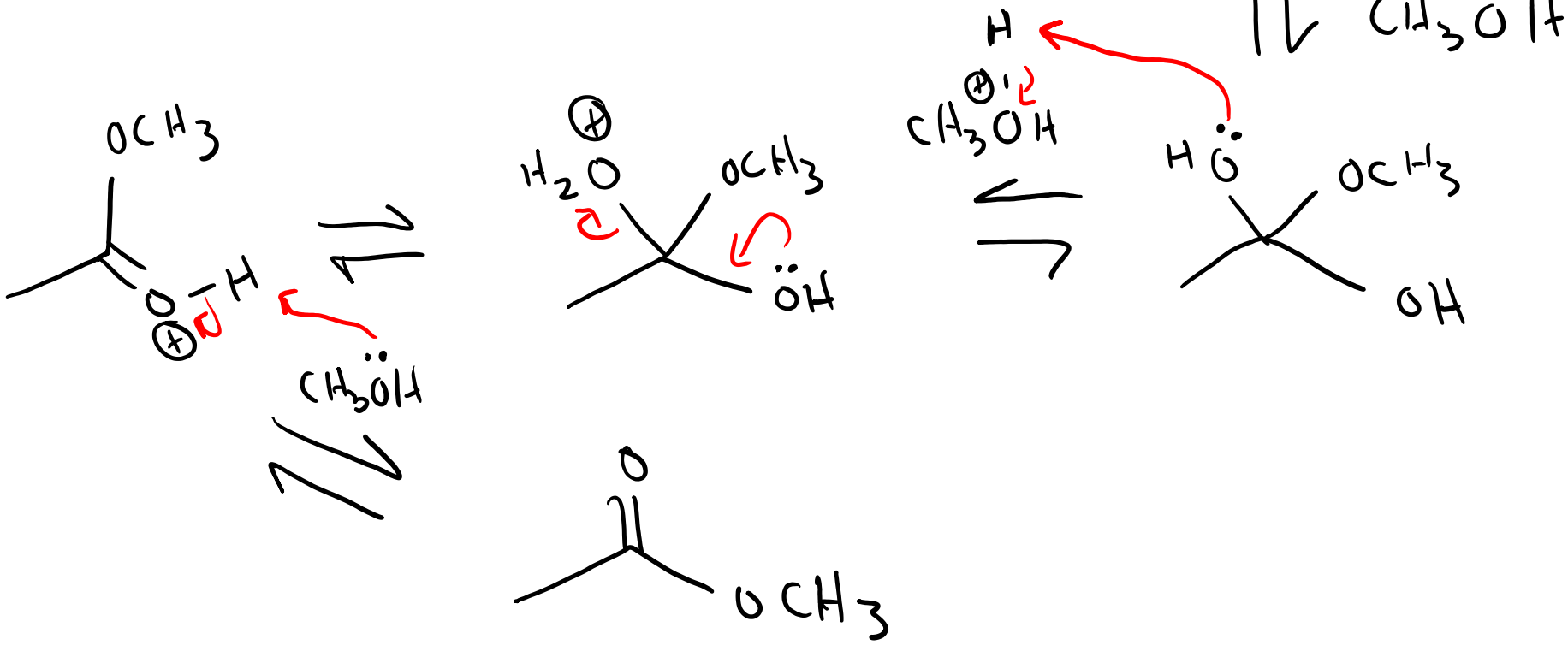


Fischer Esterification: Mechanism

Acyl transfer: acidic

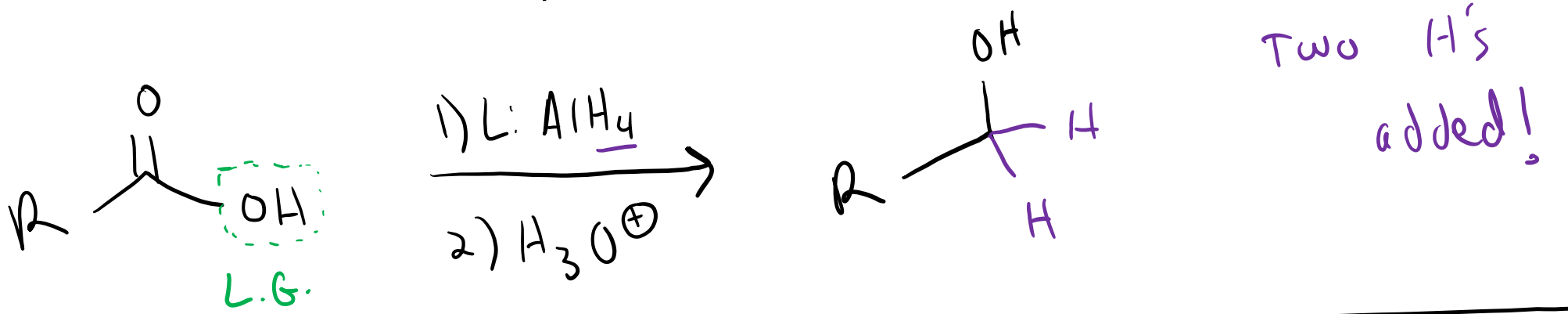






Reduction of Carboxylic Acids

(20.5)



Two H's added!

Mechanism:

Selective Reduction of Carboxylic Acids

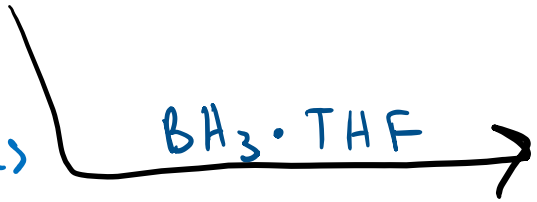
(20.5)

will reduce virtually any carbonyl (C=O)

no reaction w/ carboxylic acids

(weaker $H^{\ominus}$ donor than $LiAlH_4$)

★ $BH_3 \cdot THF$ selectivity reduces carboxylic acid over other carbonyl



(undergoes entirely different mechanism. not $H^{\ominus}$ donor)