

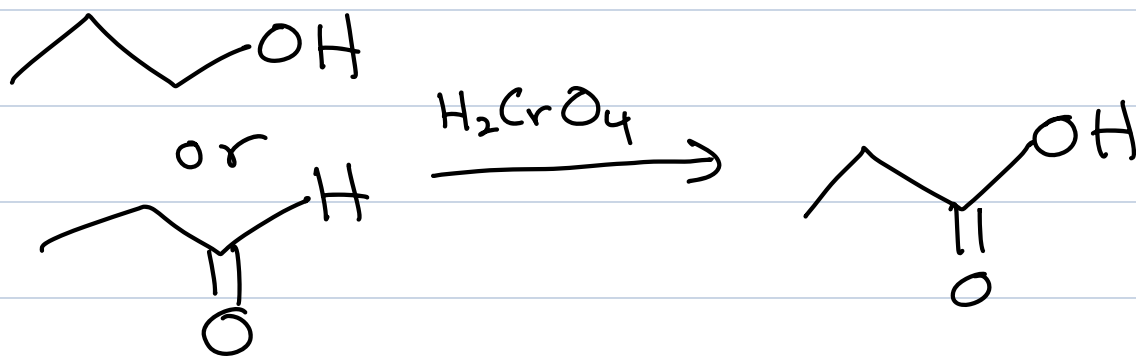
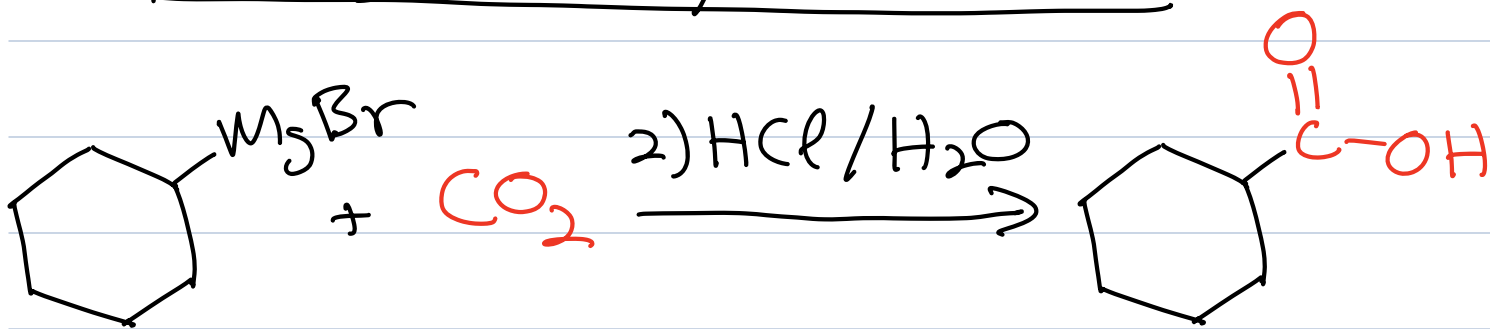




Exam Information:

Concepts	91 points
Mechanisms	70 points
Reactions ("Box Problems")	77 points
Synthesis	41 points
MCAT Question	16 points
	<hr/>
	295 points

Making Carboxylic Acids

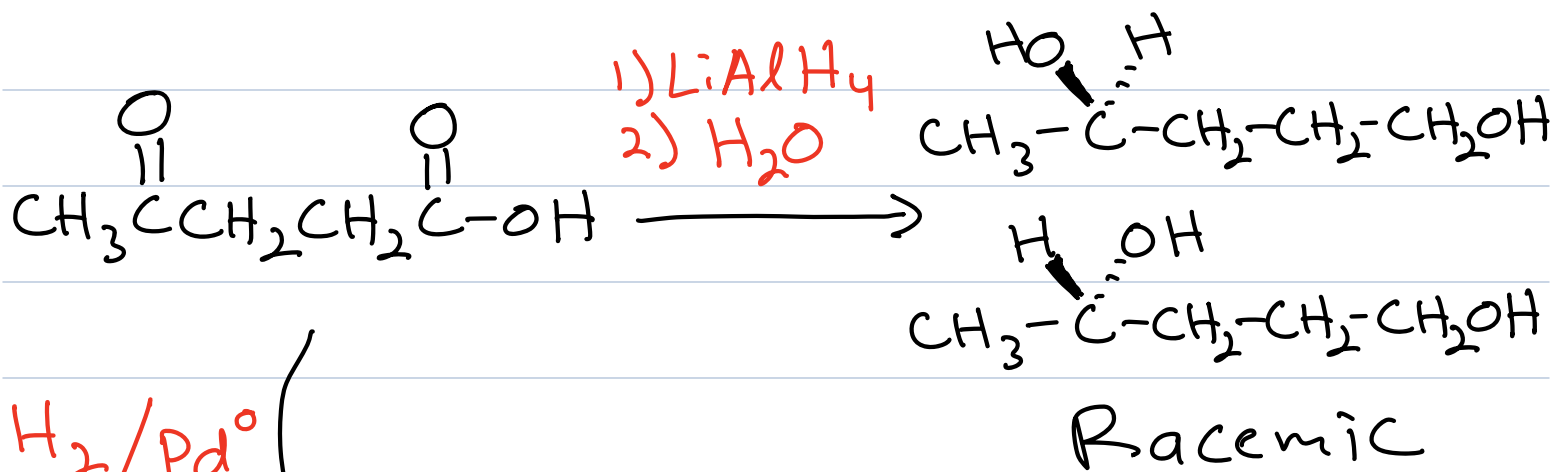


Reactions of Carboxylic Acids

Reduction $\rightarrow H_2/Pd^0$ or

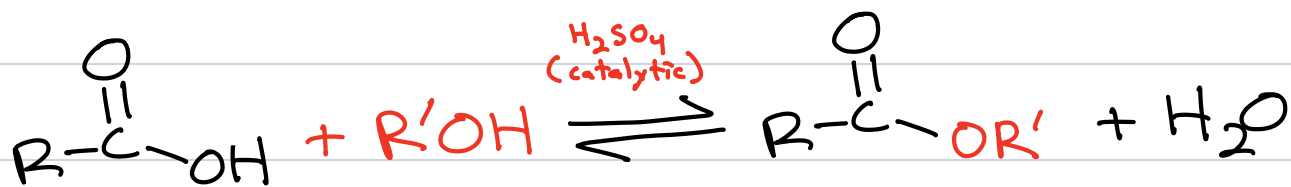
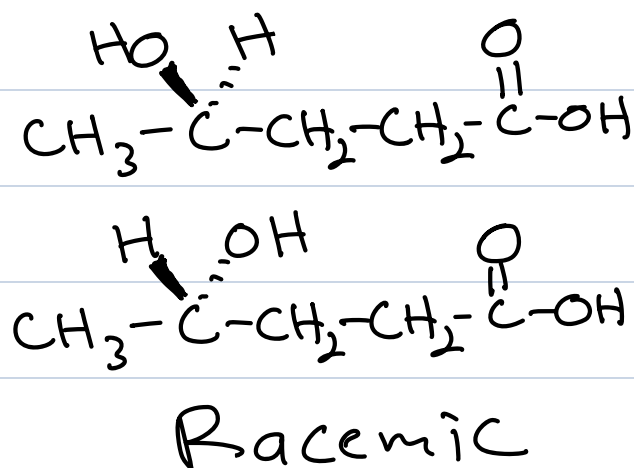
1) $NaBH_4$ 2) H_2O will
NOT reduce a carboxylic
acid

NOT responsible
for mechanism \rightarrow 1) $LiAlH_4$ 2) H_2O DOES
reduce a carboxylic acid to
a primary alcohol



$\text{H}_2/\text{Pd}^\circ$
or

1) NaBH_4
2) H_2O



Time Capsule →
This is
Reversible

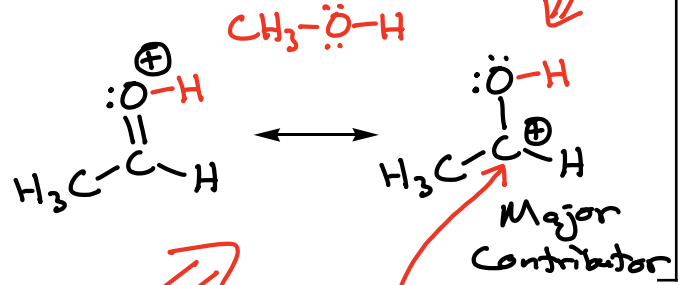
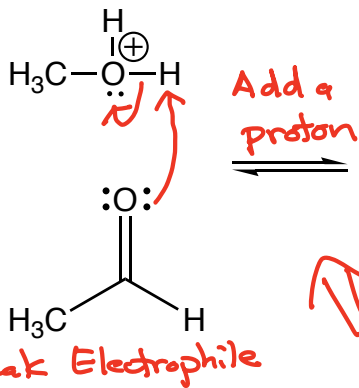
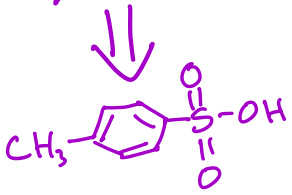


TsOH or H₂SO₄

Tosylic Acid

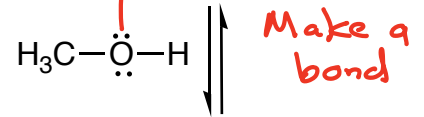
Acid Catalyzed Hemiacetal and Acetal Formation From an Aldehyde or Ketone

"Hey, does that thing have a hemi in it?" "SWEET!"

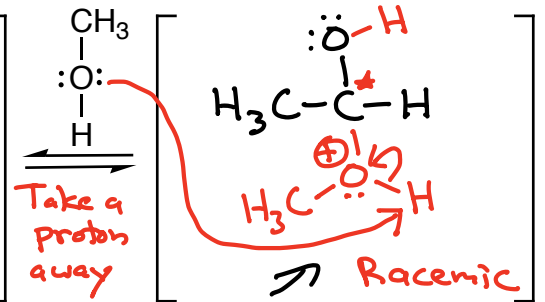
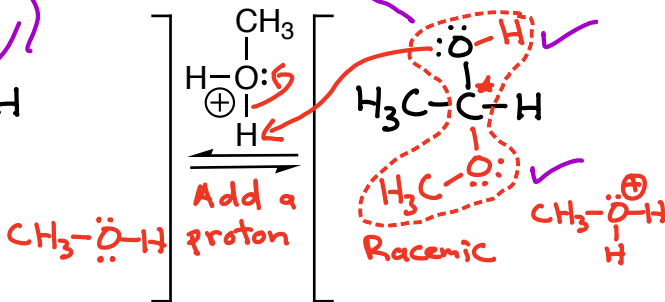
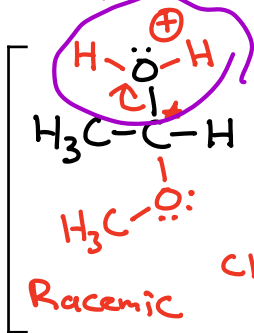


Red Hot Electrophile

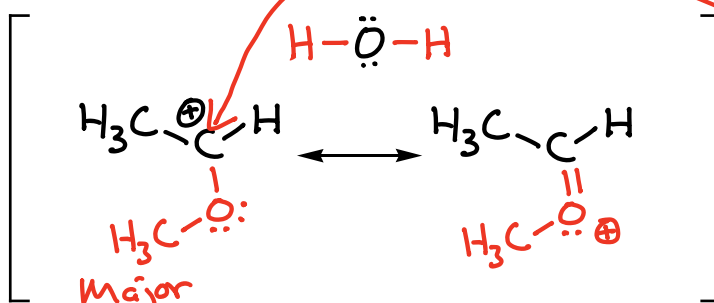
Mechanism



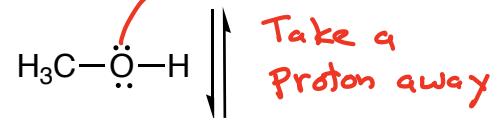
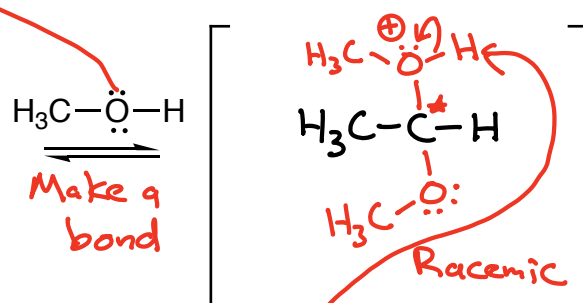
-OH and -OR on the same sp³ C atom



Break a bond



Not stable

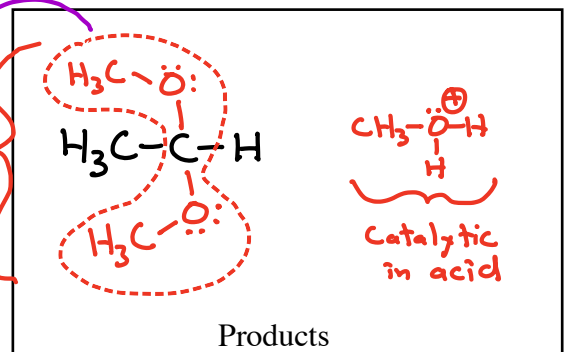


Key Recognition Element (KRE):

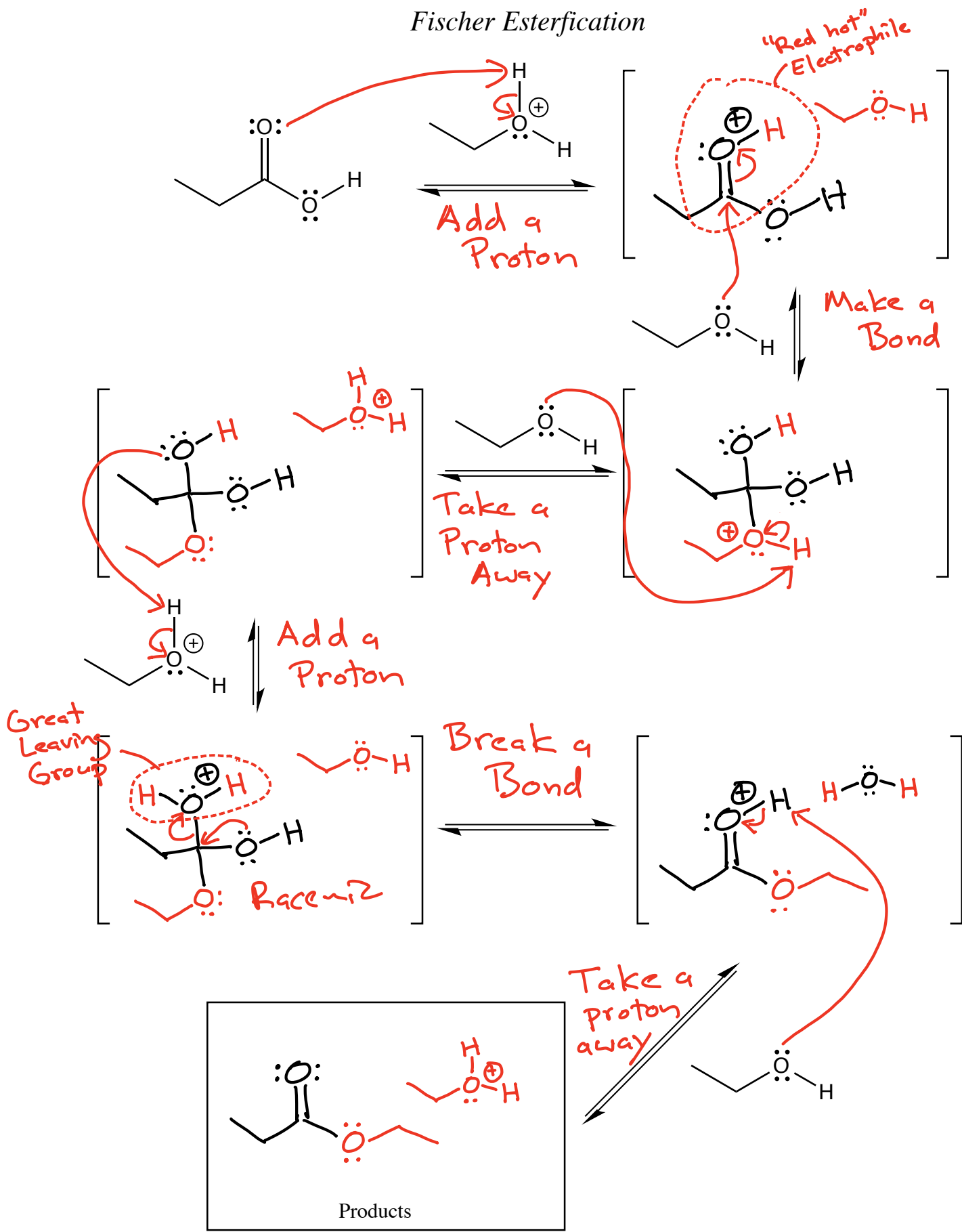
Two -OR on the same sp³ C atom

Two bonds to ether O atoms to an sp³ C atom

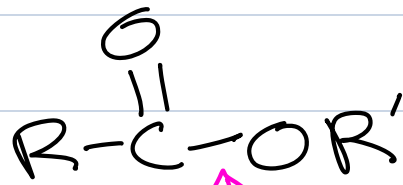
An acetal



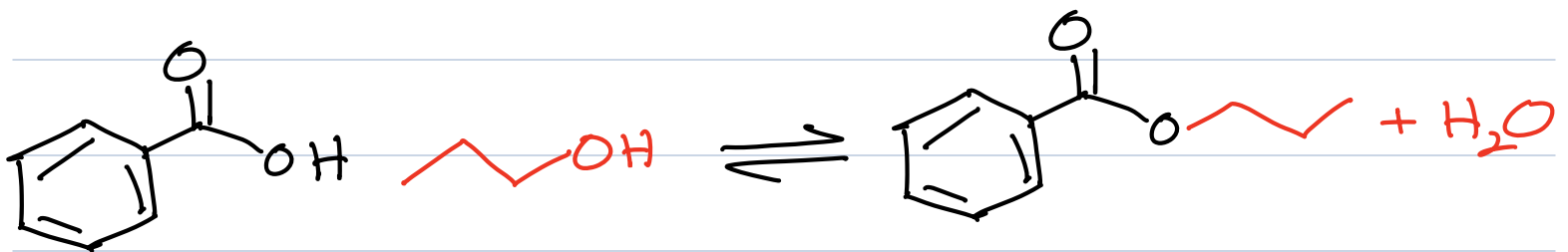
Fischer Esterification



KRE \rightarrow An ester is formed



New Bond \nearrow



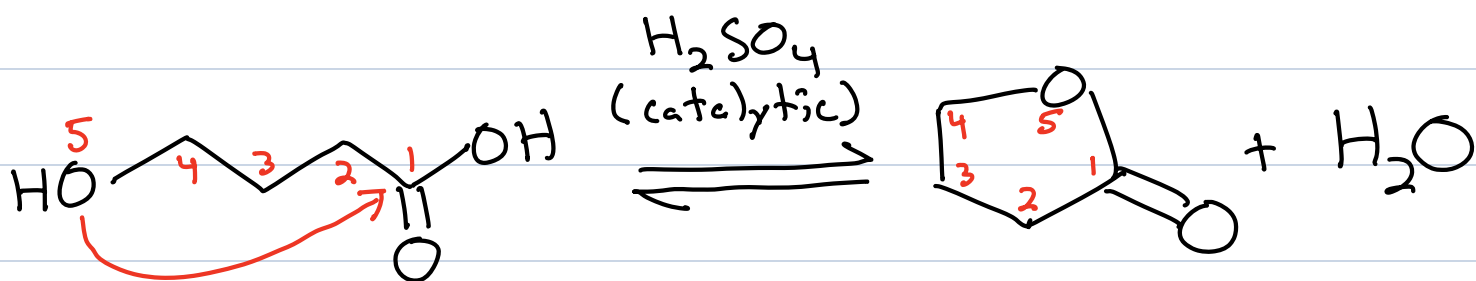
Time Capsule \rightarrow

This is reversible

\rightarrow The position of equilibrium depends on the ratio of alcohol to water

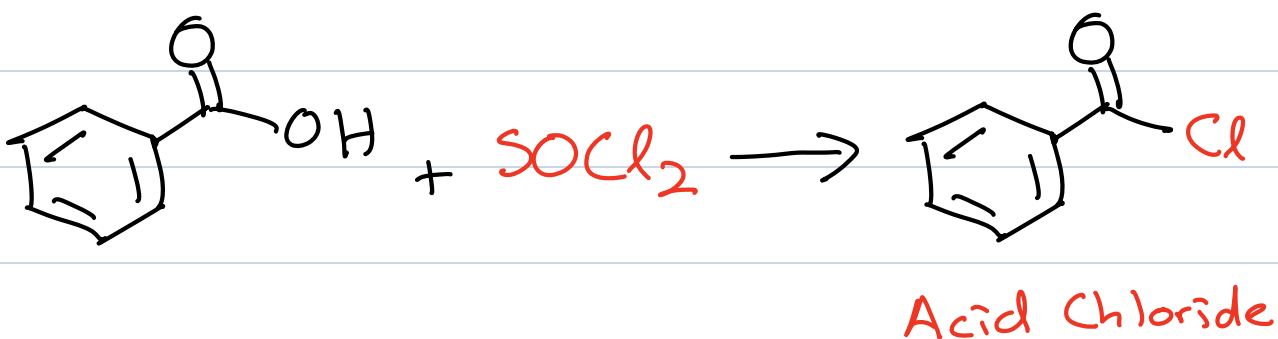


You can make cyclic esters called Lactones



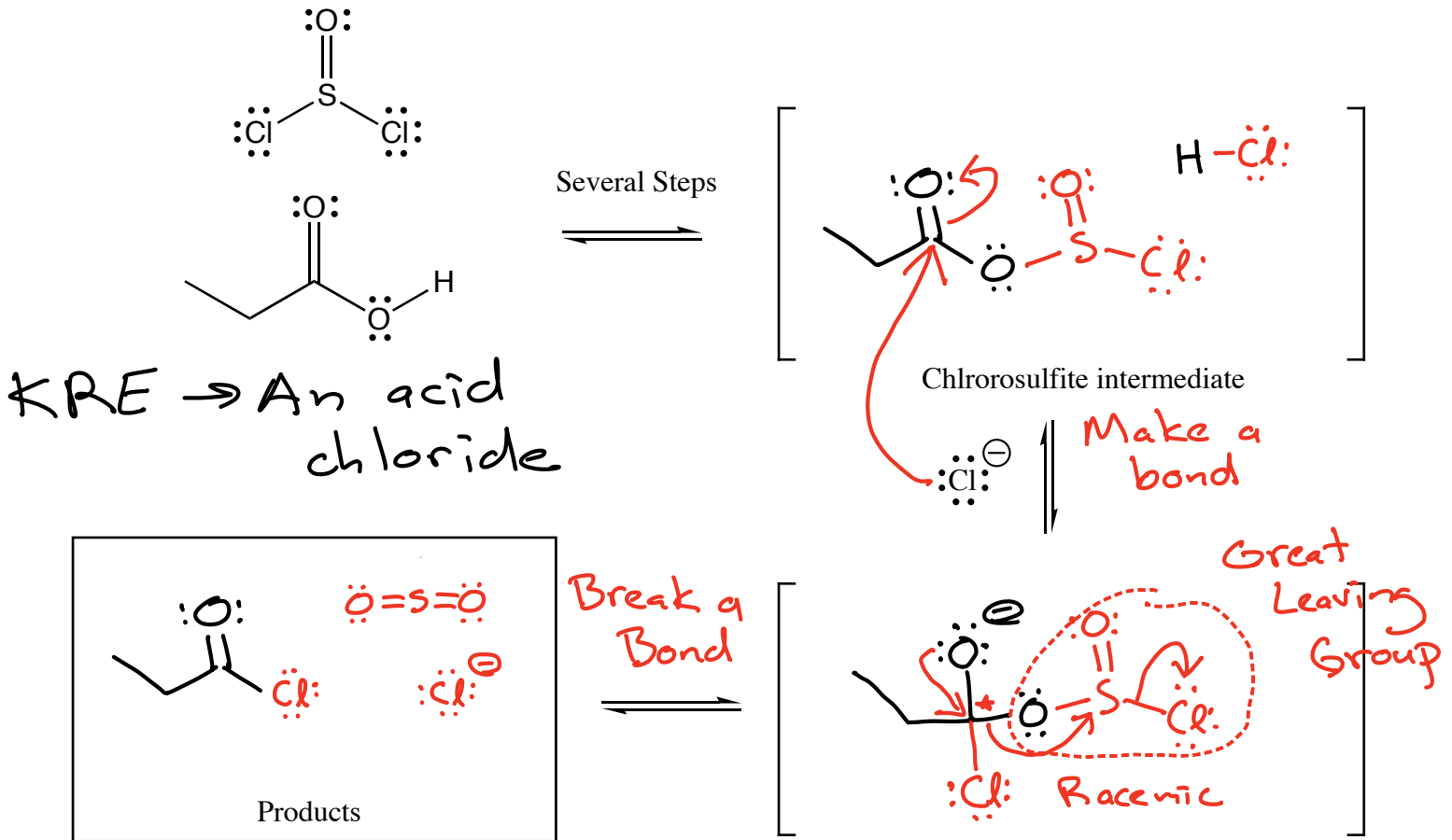
Pro tip: Always put numbers on the atoms when a ring is involved

Carboxylic Acid and SOCl_2
Thionyl Chloride

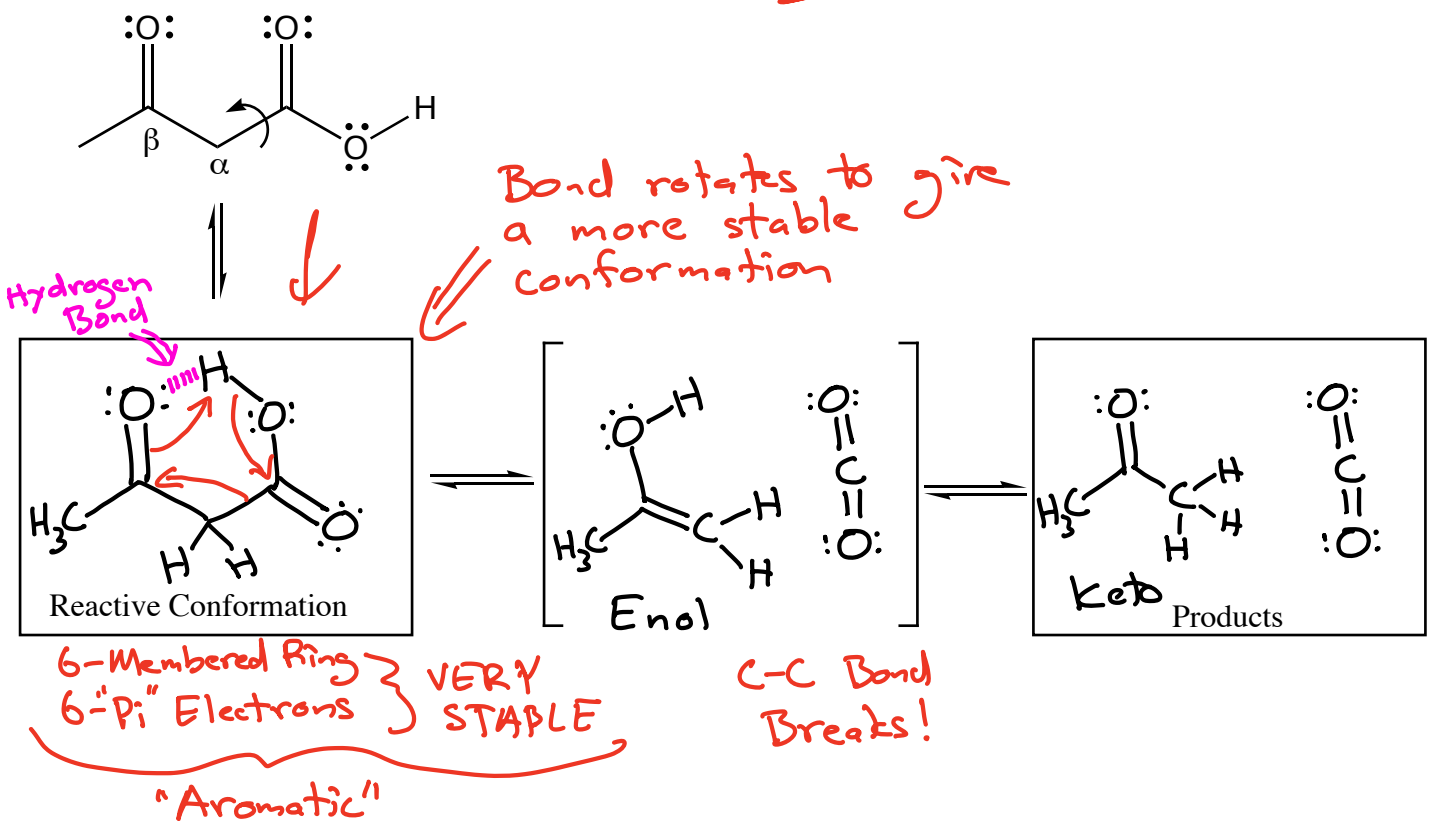


Time capsule →
You can make
all of the other
carboxylic acid
derivatives from
acid chlorides

Reaction with Thionyl Chloride



Decarboxylation of a β -Keto Acid

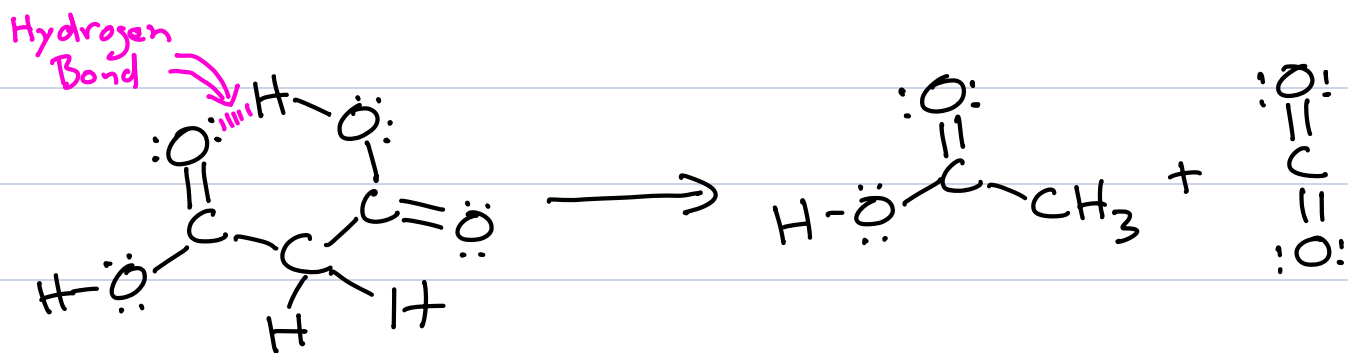


KRE \rightarrow Ketone and CO_2
Broke a C-C Bond!



Time capsule \rightarrow
Important for
products of Claisen
reaction!

This also works with β -diacids





Broke a C-C bond

Time Capsule:

This is important
for the Claisen
condensation
reaction.



diacids
react
the same