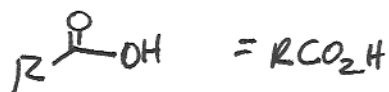


Chapter 17 - Carboxylic Acids

weeks 8-9

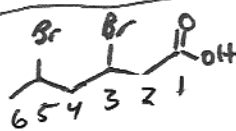
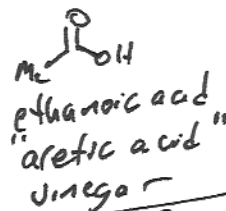
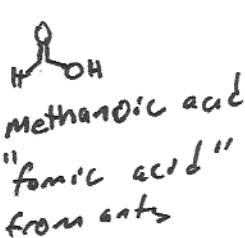
① Carboxylic Acids



- naming
- 1) drop 'e' from alkane
 - 2) add oic acid
 - 3) Acid takes priority
 - 4) cyclic "cycloalkane carboxylic acid"

note common names are still used
See table 17.1

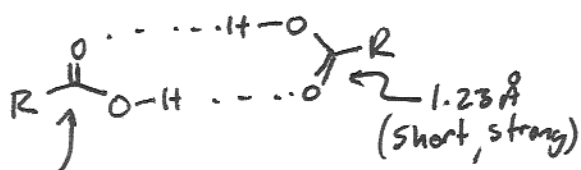
② ex



Cyclobutane Carboxylic acid

3,5-dibromohexanoic acid

③ Structure



sp² dimer in solution because of hydrogen bonding
∴ high B.P.'s

spectroscopy:

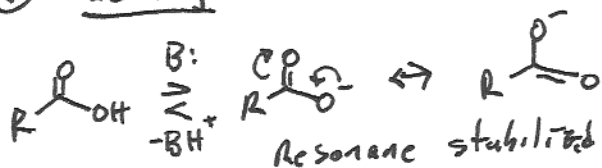
IR C=O strong ~1700cm⁻¹
O-H broad ~3100cm⁻¹

④ Spectroscopy cont

¹H NMR broad peak 10-13 ppm (OH)

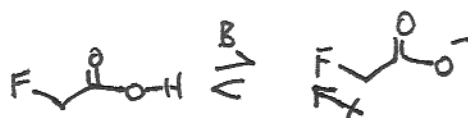
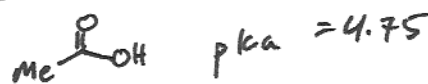
¹³C R-C(=O)-OH ~180 ppm
Cupfield compared to R-C(=O)-R

⑤ acidity



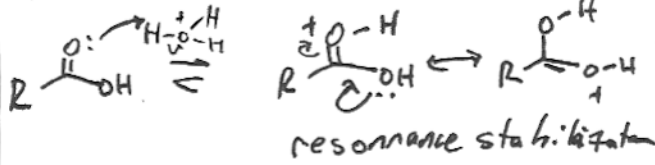
pKa ~0.3-6

⑥ Inductive effects



dipole stabilizes carboxylate anion

⑦ Lewis Basicity



⑧ Rxns

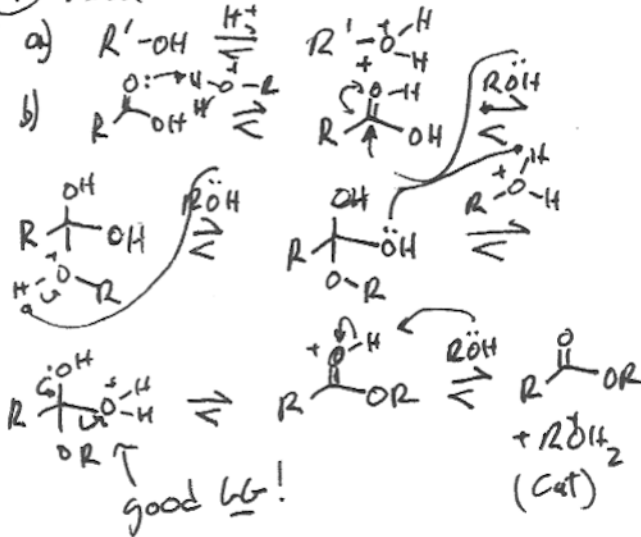
A) Formation of Esters
i) Fisher Esterification



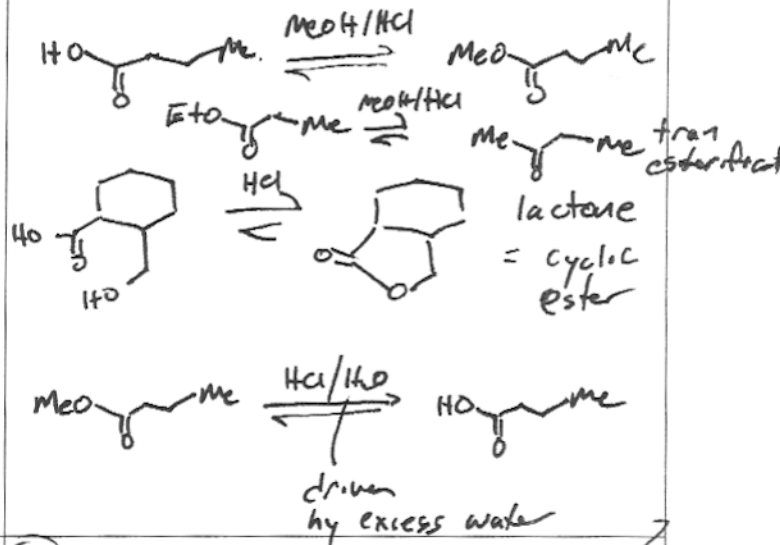
Note: • need acid cat.

• Rxn is reversible, driven by excess alcohol (forward) or water (backward)

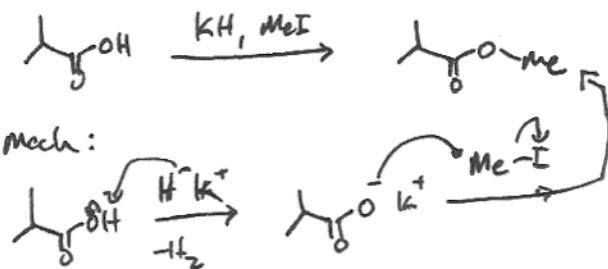
⑨ Mech



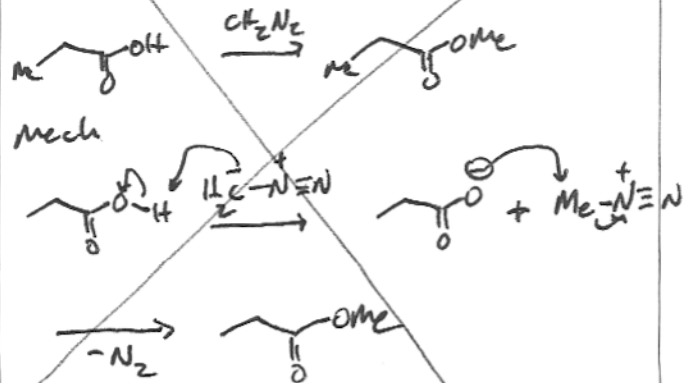
⑩ Ex



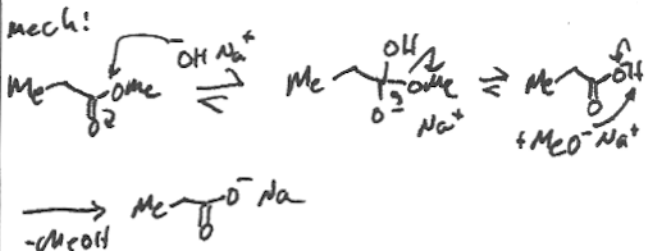
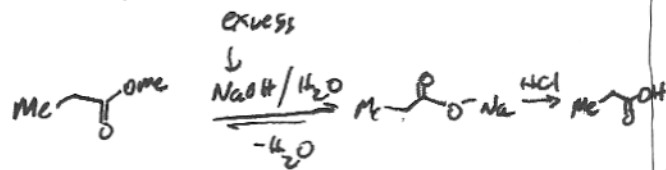
⑪ SN2- alkylation



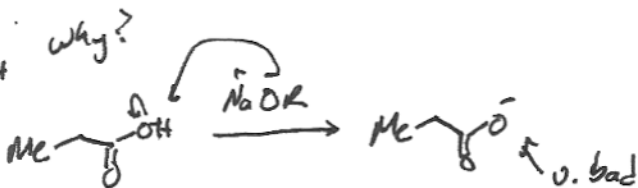
⑫ Diazomethane Methyl Esterification
(CH₂N₂) explosive, but v. clean rxn



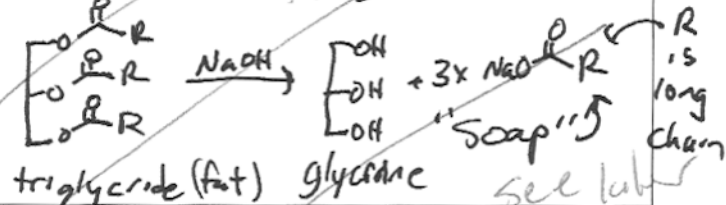
13 Saponification Ester $\xrightarrow{\text{NaOH}}$ acid



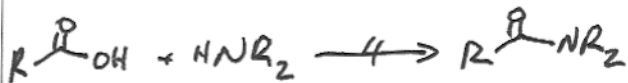
14 Note: Acid $\xrightarrow{\text{NaOH}}$ Ester



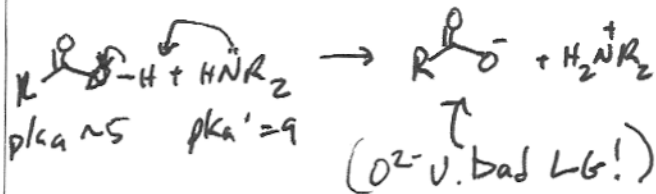
Note #2: This is why NaOH feels slippery



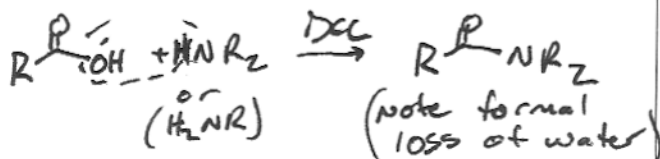
15 Amide formation $\text{R}-\text{C}(=\text{O})-\text{NR}_2$ "amide"



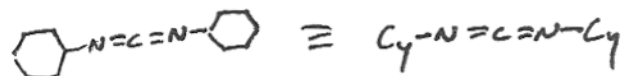
Why?



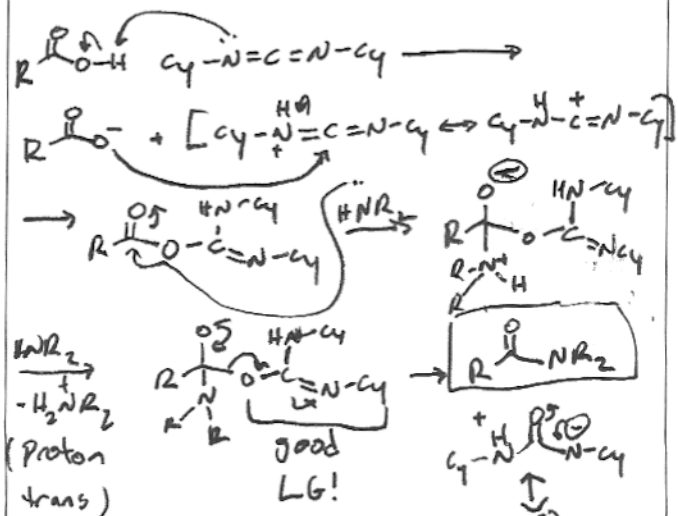
16 DCC coupling to form Amides



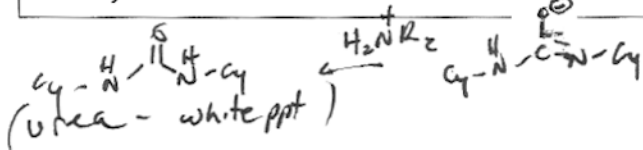
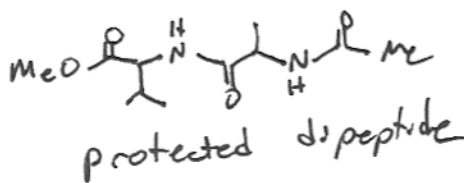
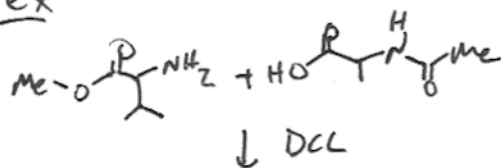
DCC = dicyclohexylcarbodiimide



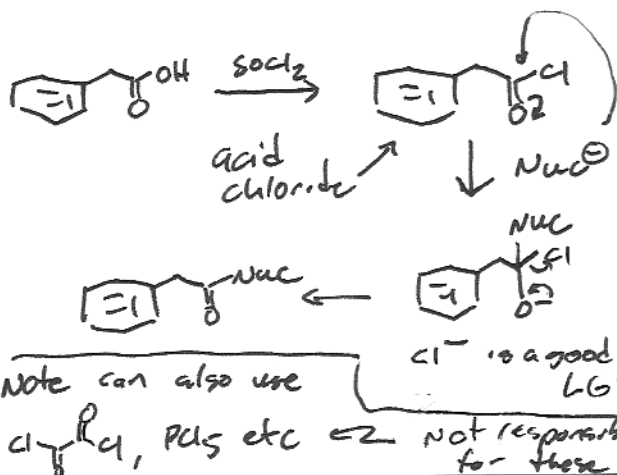
17 Mech



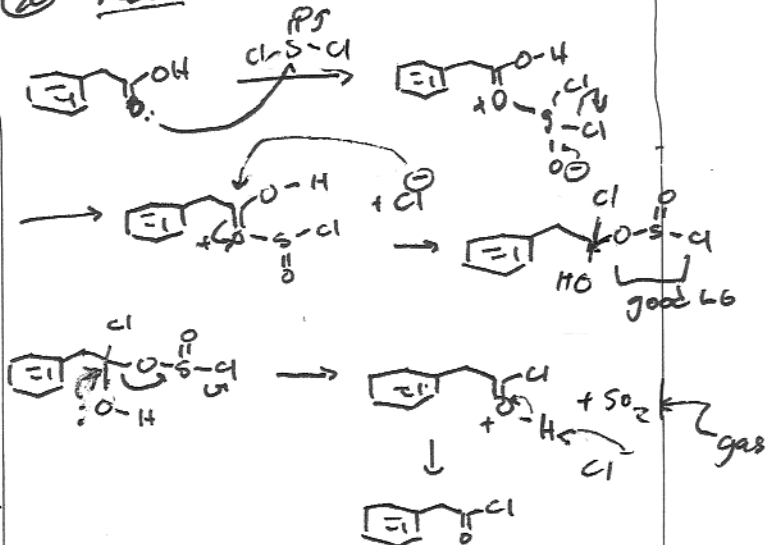
18 ex



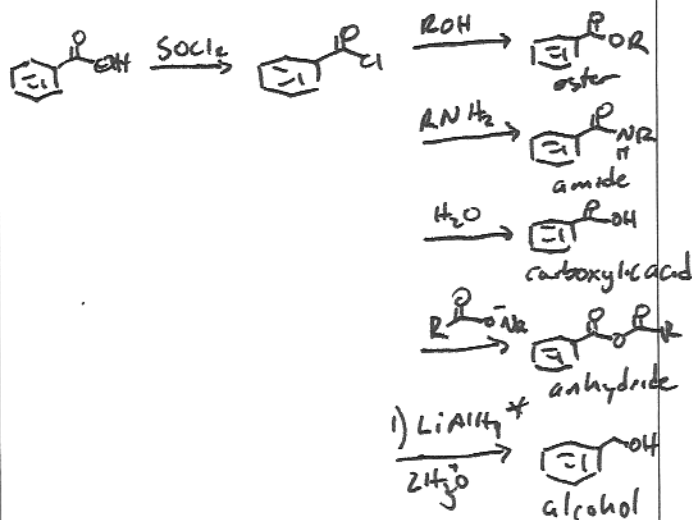
19) Formation of Acid chloride (Aka acyl chloride)



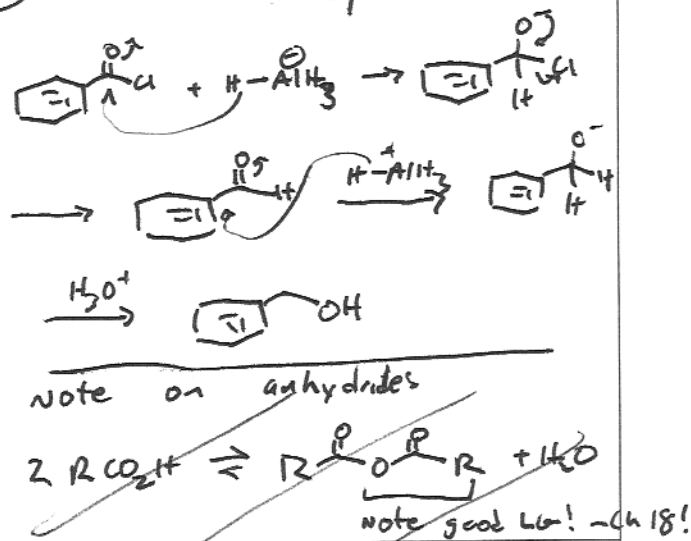
20) Mech



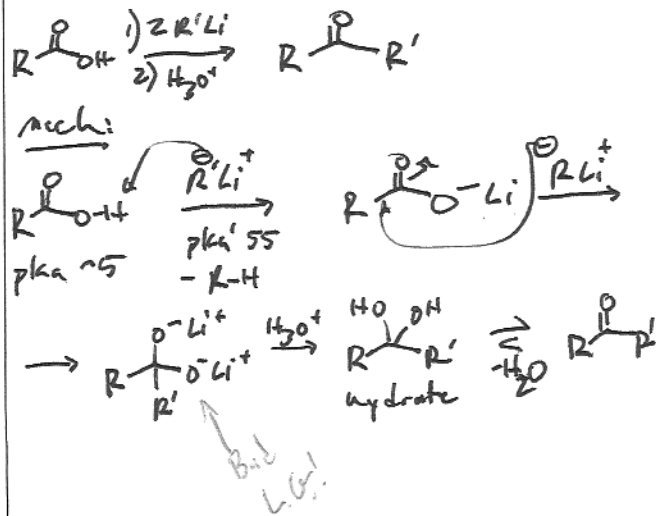
21) Rxns of Acid chloride (halides)



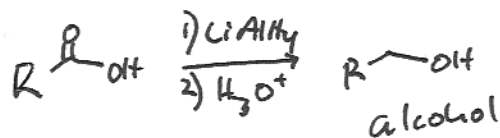
22) Mech of LiAlH4 Rxn



23) Rxn of carboxylic acids w/ RLi



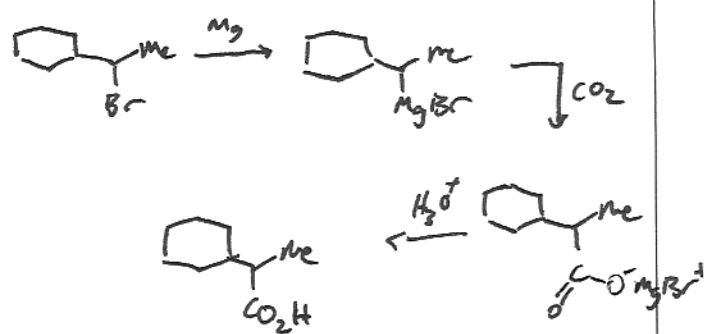
24) Rxn of carboxylic acids w/ LiAlH4



Similar to rxns w/ RLi, but mech not fully known see p 858 for best guess. Not responsible for mech for this rxn.

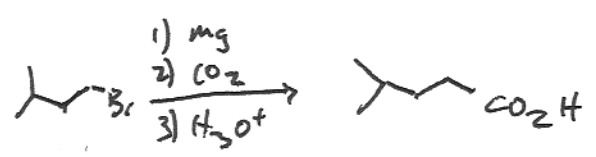
25 Prep of RCO₂H

① Grignard or Lithium Reagents



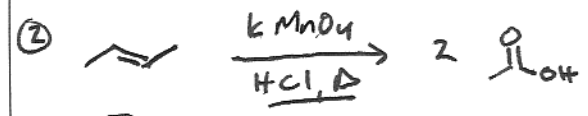
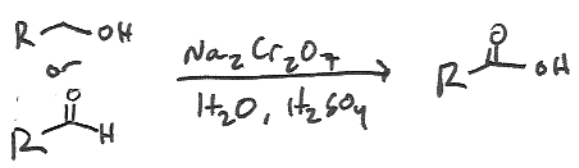
also works for RLi reagents

26 EX

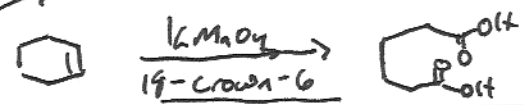


27 Review of other methods

① Oxidation

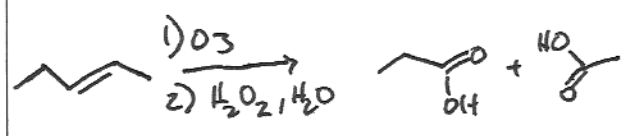


needs to vary conditions

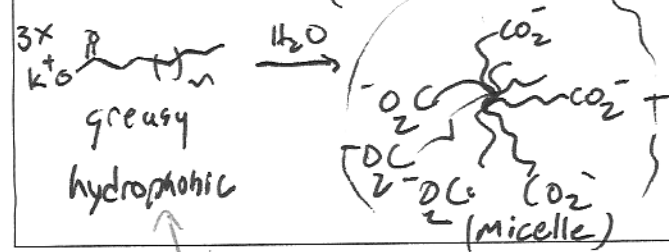
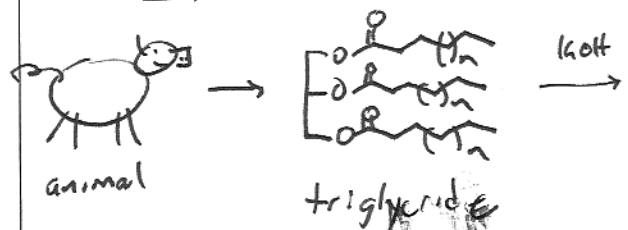


28

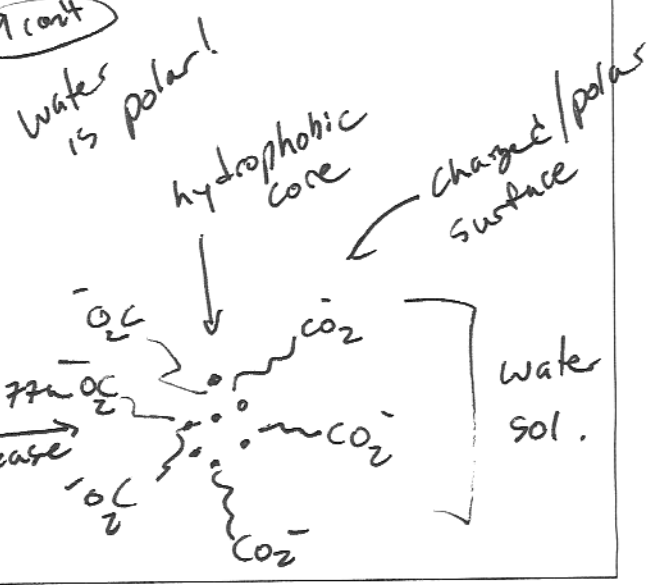
③ Ozonolysis w/ oxidative workup



29 Soaps



29 cont



add note about soap melt on fingers