

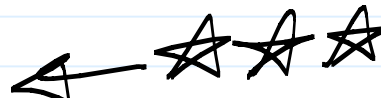
Carboxylic Acids + Derivatives

Note Title

4/22/2014

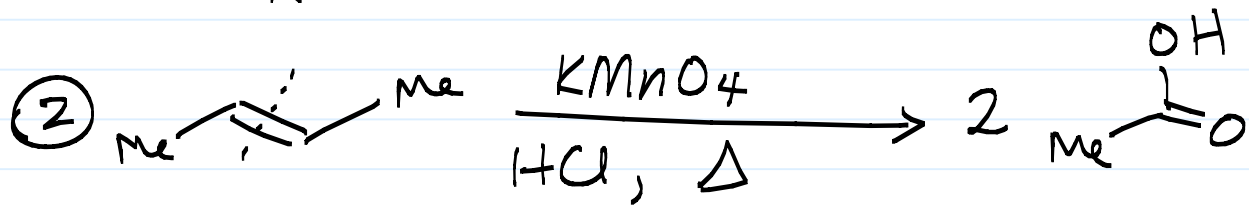
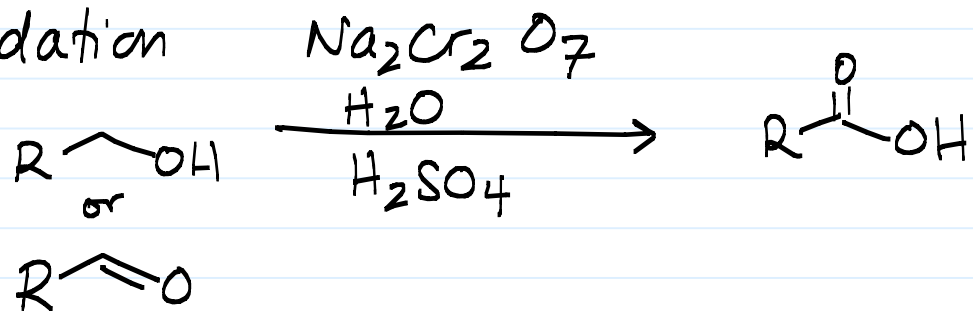
Announcements: (1) Midterm 2 will be passed back @ end of lecture.
- Regrade requests due by Thursday's lecture.
- Today is last day to switch status (Listener or Withdraw)

(2) Discussion sections this week:

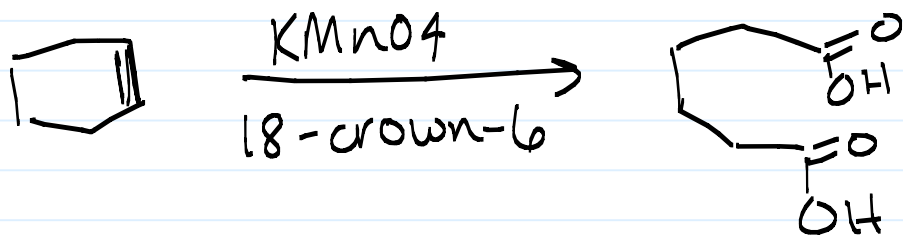
Arrow-pushing mechanisms!!! 

Prep of RCO₂H

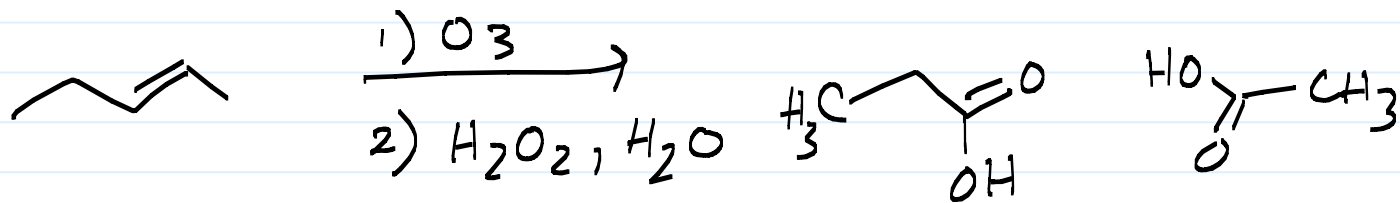
① Oxidation



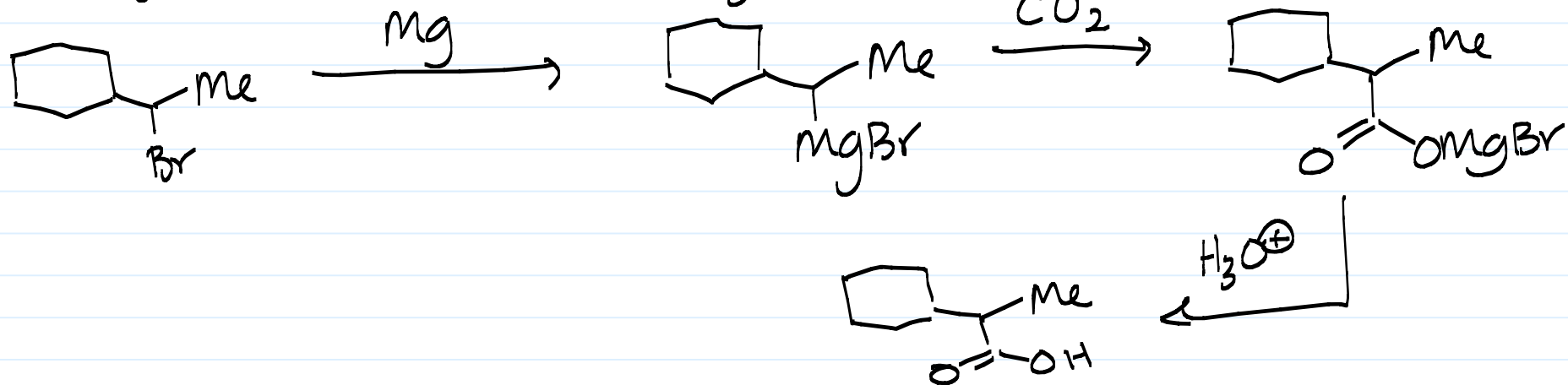
Needs forcing condition

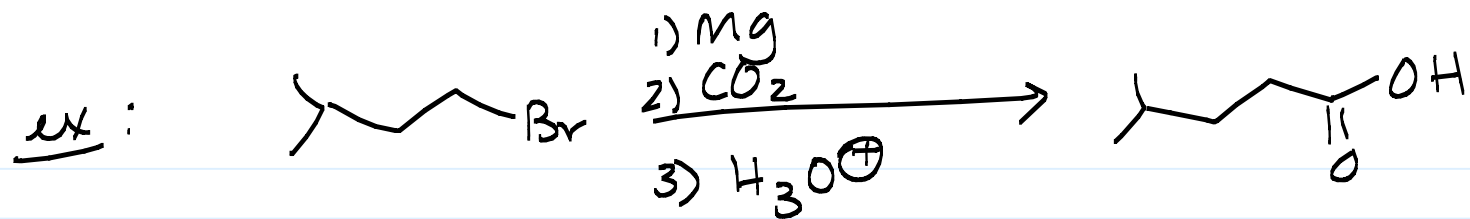


③ Ozonolysis w/ Oxidative Work-up



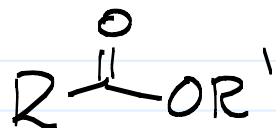
④ Grignard or Lithium Reagents



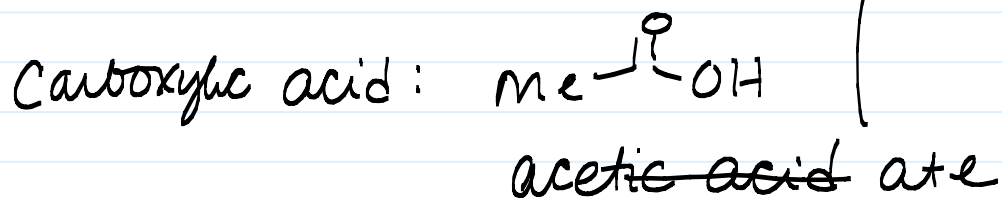
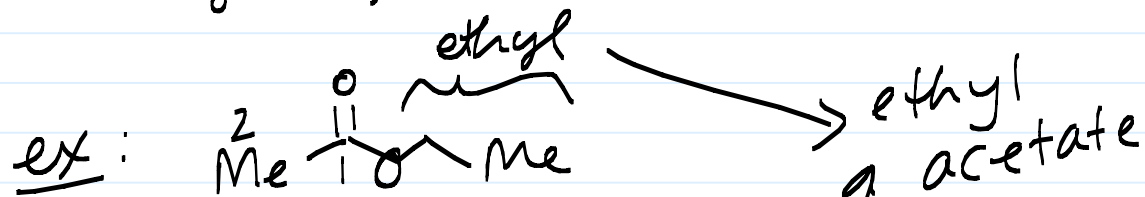


Chapter 18: Carbonylic Acid Derivatives

Esters



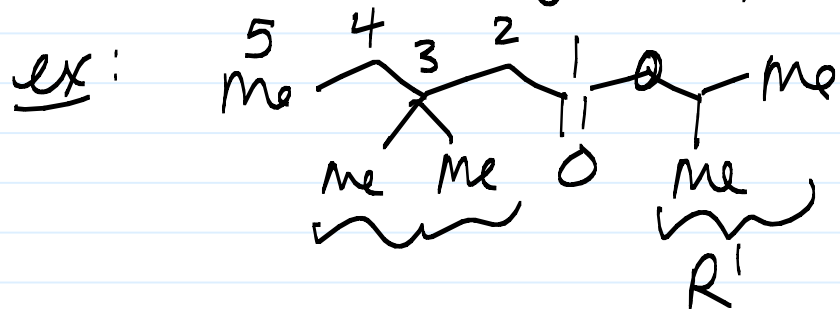
Naming: If small ester (< 5 C's):



- ① Use parent name of carboxylic acid
- ② Replace "ic" with "ate" acid
- ③ R' goes first name

If larger ester (≥ 5 C's)

- ① Name of parent alkane
- ② drop "e"; add "oate"
- ③ carboxyl carbon = highest priority
- ④ R' name goes first

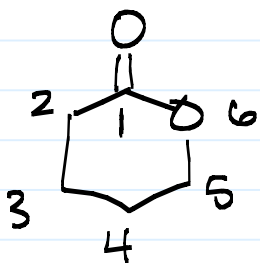


isopropyl
3,3-dimethyl pentanoate

Lactones = cyclic esters

① Name as "oxacycloalkanones"

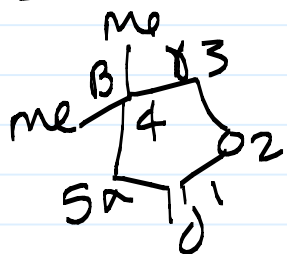
ex:



6-oxacyclohexanone or
2-oxocyclohexanone

② Ring size via Greek letters

ex:

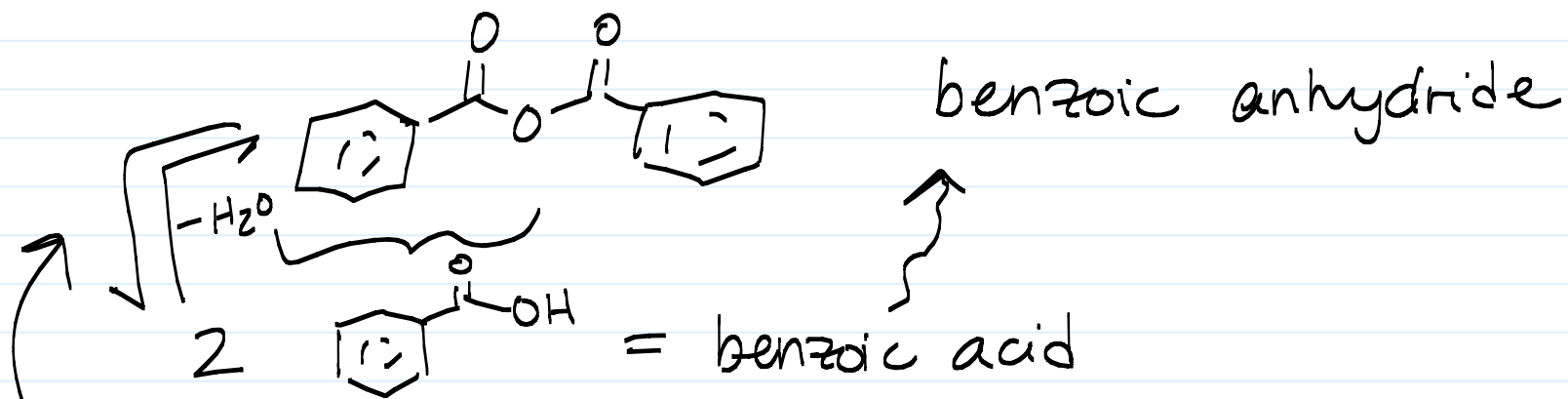


4,4-dimethyl 2-oxocyclopentanone

γ-lactone

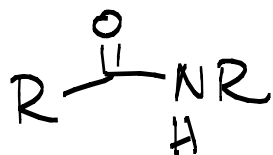
↑ gamma

Anhydrides : Name of carboxylic acid + "anhydride"



formally (but not the best way to make them)

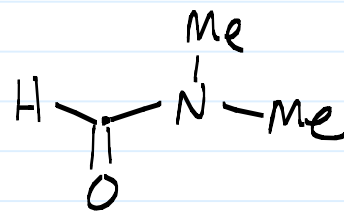
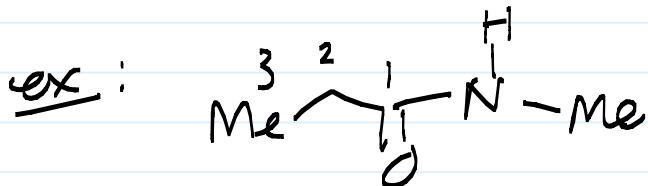
Amides



Naming: ① Drop "e" from parent alkane

② Add "amide"

③ Substitution of N is designated w/ "N"-prefix

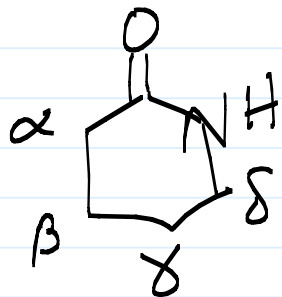


N-methyl propanamide

N,N-dimethyl formamide (DMF)

Lactams = cyclic amides

Naming as "azacycloalkanones"



2-azacyclohexanone

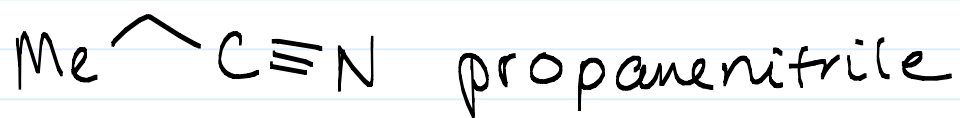
δ-lactam

↑ delta.

Nitriles

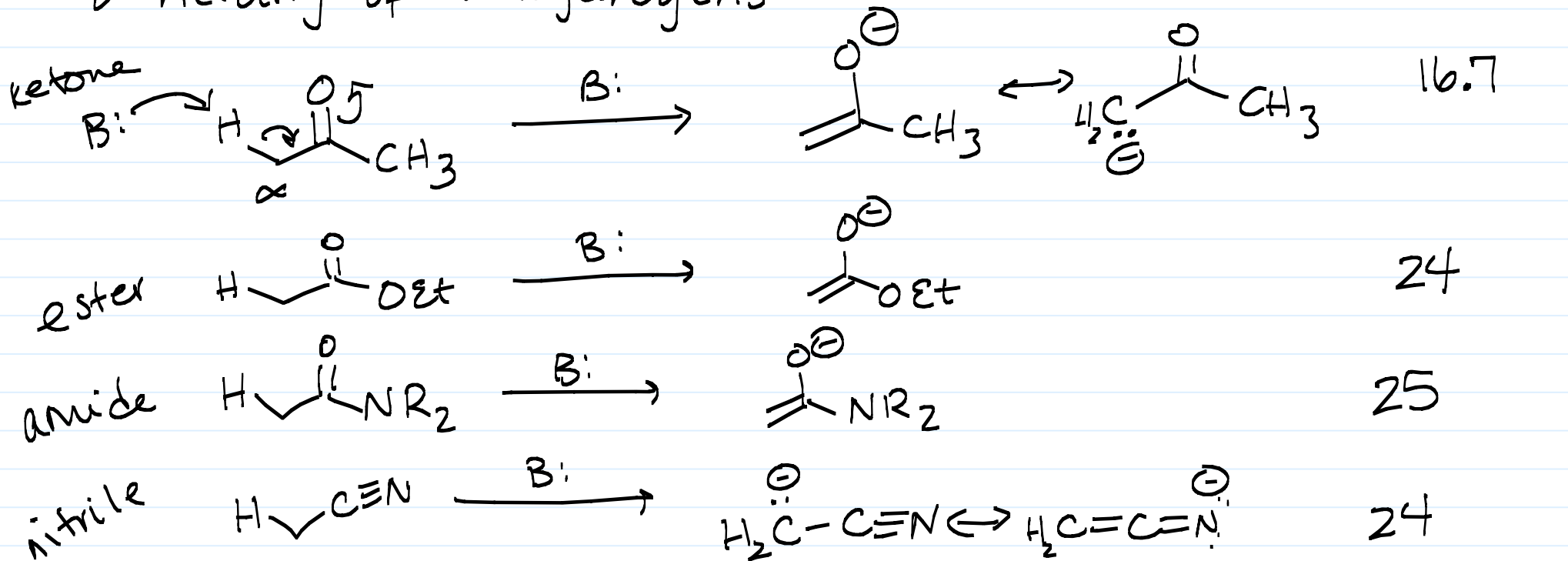


behave like like acyl compound

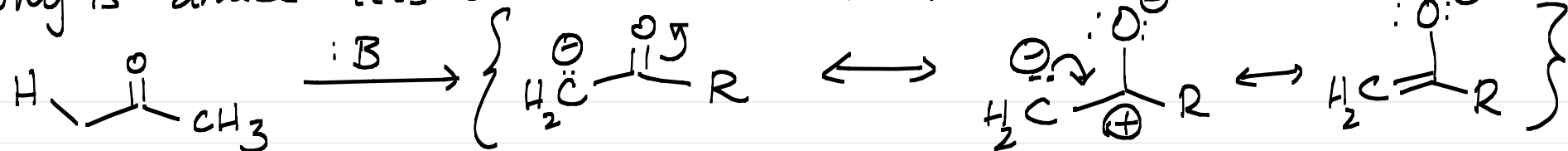


Reactivity of Acyl Compounds

→ Acidity of α -hydrogens

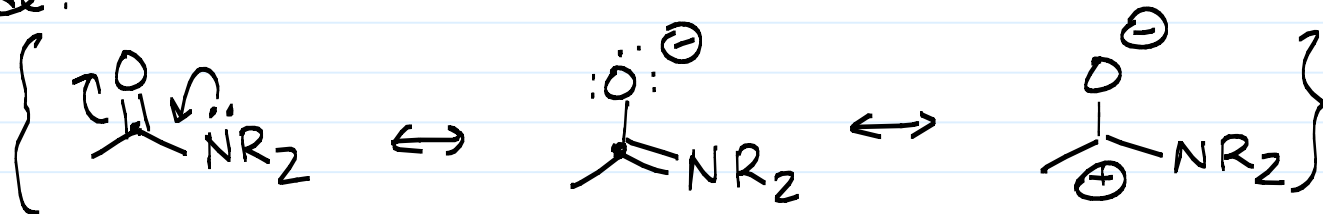


Why is amide less acidic than ketone?



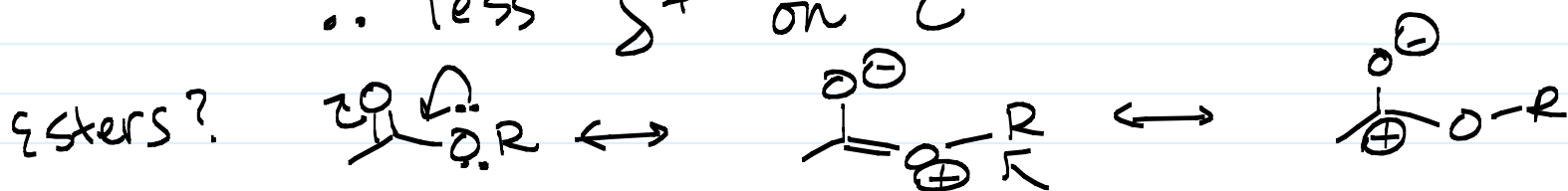
↑ The more δ^+ on this C → the more it will stabilize the anion.

Amide:

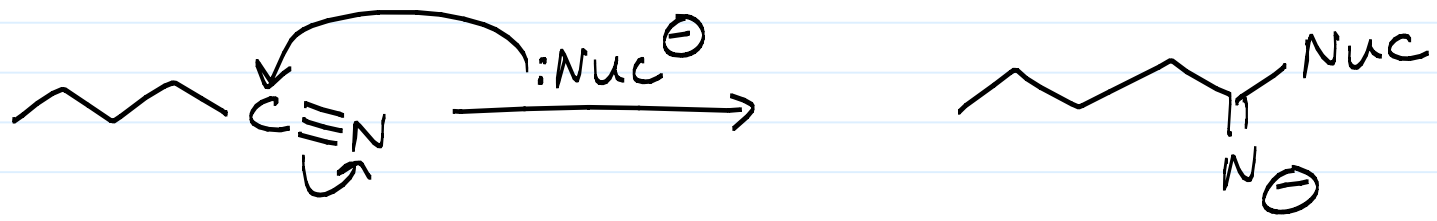
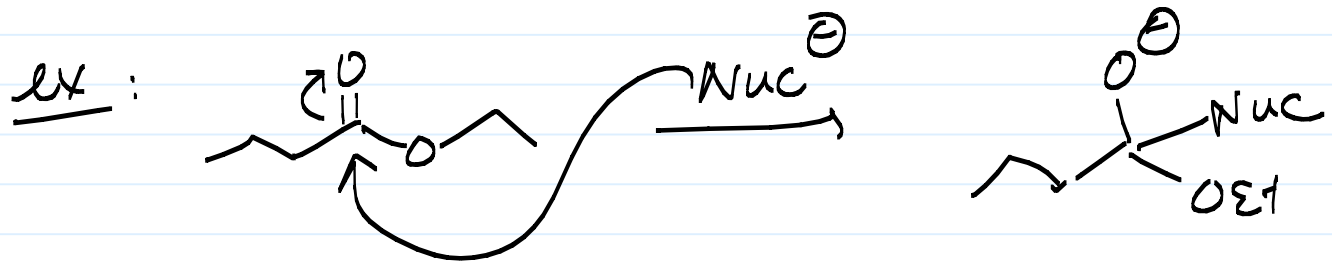


lone pair on N donates e-density to carbonyl

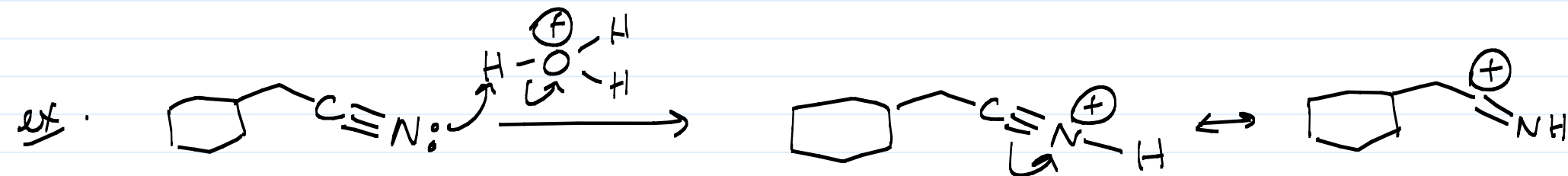
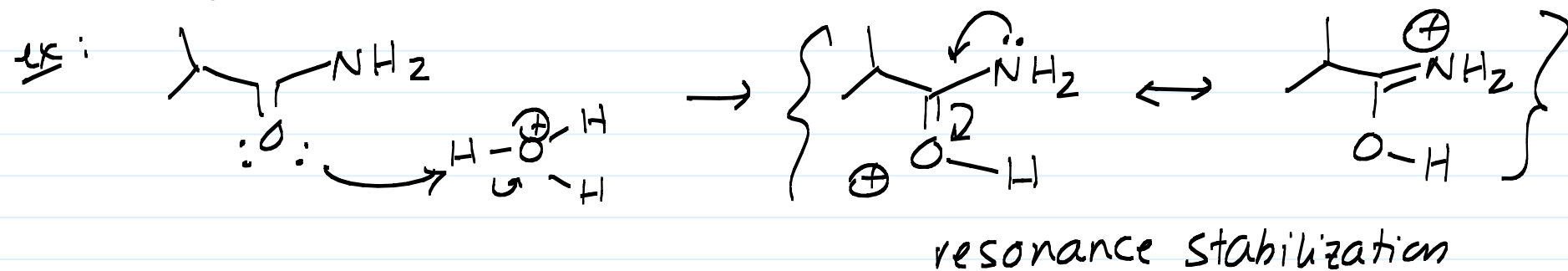
∴ less δ^+ on C



Electrophilic @ Carbonyl C's + Nitrile C's

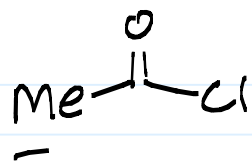


Acyl Compounds Can Be Basic

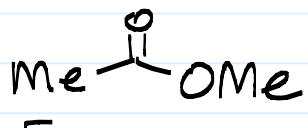


Spectroscopy

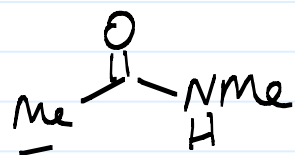
IR



1799 cm^{-1}



1750 cm^{-1}

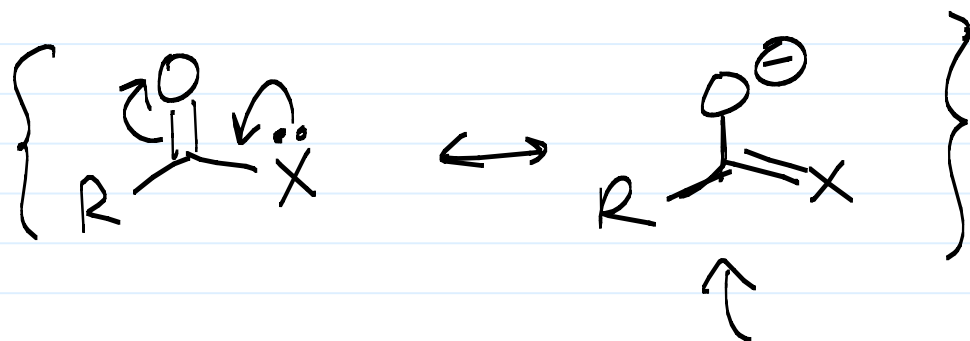


1688 cm^{-1}

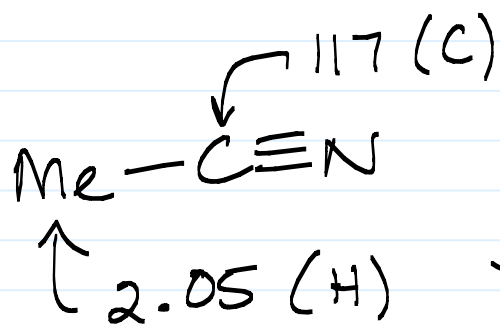
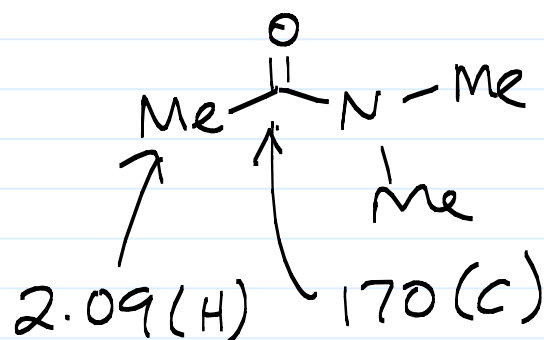
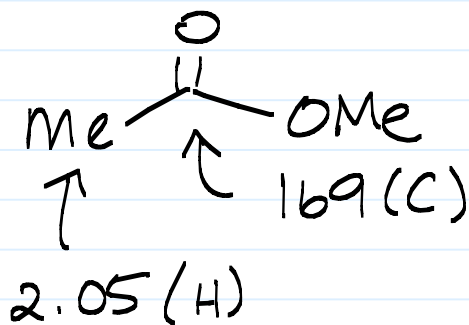
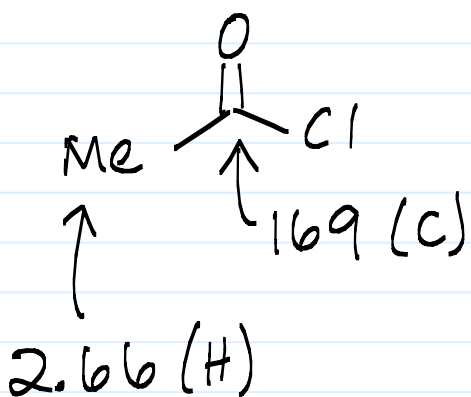
weaker C=O



more single bond
character in
C=O.



NMR: ^1H δ ; ^{13}C (ppm)



} If you think it's a nitrile →
Check IR for peak
 $\sim 2200 \text{ cm}^{-1}$!

Midterm 2

Avg \sim 140 pts.

180 - 250 A

140 - 180 B

100 - 140 C

60 - 100 D

Below 60 F