Today

Introduction to Carbonyls: Nomenclature and Resonance
Sections 15.1 – 15.3

Reactions of Carboxylic Acids and Carboxylic Acid Derivatives

Sections 15.4

Next Class

Test on Chap 10.1 – 10.4, Chap 13 (MS and IR), Chap 14 (NMR)

Second Class from Today

Reactions of Carboxylic Acids and Carboxylic Acid Derivatives

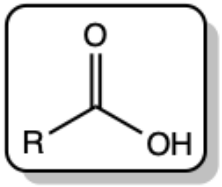
Sections 15.4 -15.9

Third Class from Today

Reaction of Amides , Nitriles, and Acid Anhydrides
Sections 15.10 – 15.16

Review Session Thursday, Feb. 23 in Wilson 130

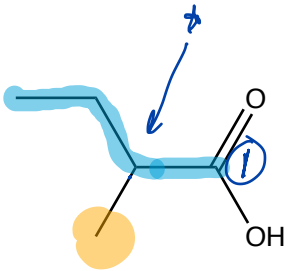
from 7:30 to 9:00



Longest chain that starts with the functional group

Remove the “e” and add “oic acid”

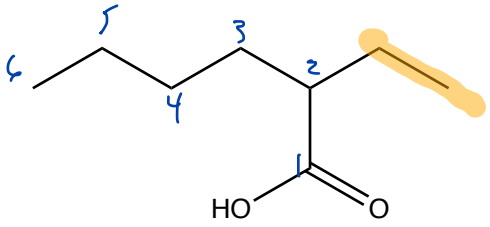
Place substituents in front of the name of the acid and number starting at the carbonyl carbon



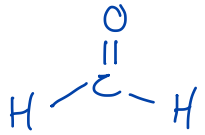
Butane → butanoic acid → 2-methylbutanoic acid

methane → methyl

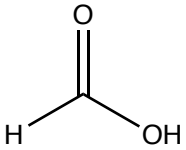
1 C long substituent



2-ethylhexanoic acid

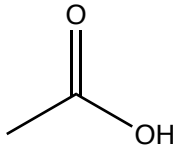


Formaldehyde



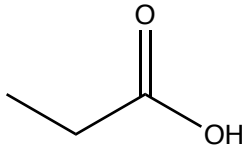
formic acid

methanoic acid



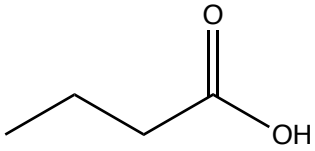
acetic acid

ethanoic acid



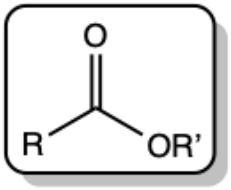
propionic acid

propanoic



butyric acid

butanoic acid



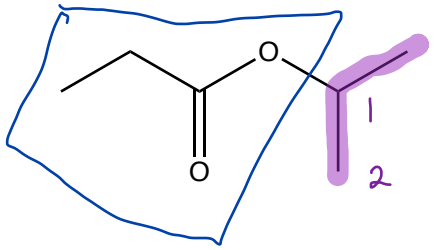
R' ≠ H

"OR group name" "carbonyl group name"

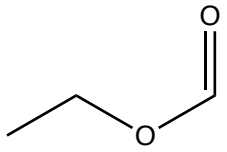
1. Group bonded to O
   a. named as though it is an alkyl substituent; that is, longest chain starting at the O, drop the "e" and add "yl"
   b. add any substituents to the beginning of the alkyl group's name

2. Name the carbonyl group
   a. the longest chain that starts with the C=O
   b. drop the "e" and add "oate"

3. name substituents by adding them to the beginning of the carbonyl group name

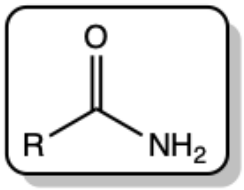


(1-methyl) ethyl propanoate



ethyl methanoate

ethyl formate

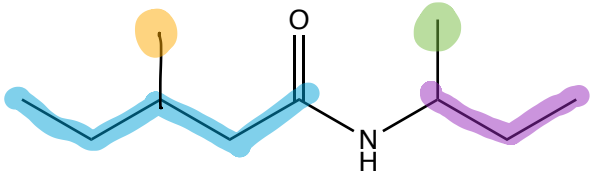


"N-substituent""carbonyl group name"

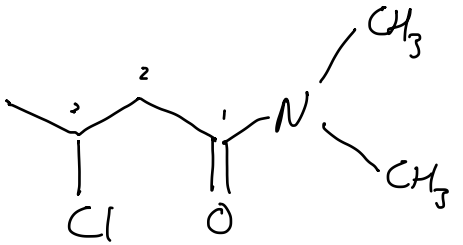
1. Groups bonded N are named as N-alkyl substituents
   a. longest chain starting at the N, drop the "e" and add "yl"
   b. substituents on alkyl group
      i. place in parenthesis at the beginning of the alkyl group's name
      ii. C atom connected to N is C-1 on the N-substituent

2. Name the carbonyl group
   a. the longest chain that starts with the C=O
   b. drop the "e" and add "amide"

3. name other substituents by adding them to the beginning of the carbonyl group name



What is the structure of *N,N*-dimethyl-3-chlorobutanamide?

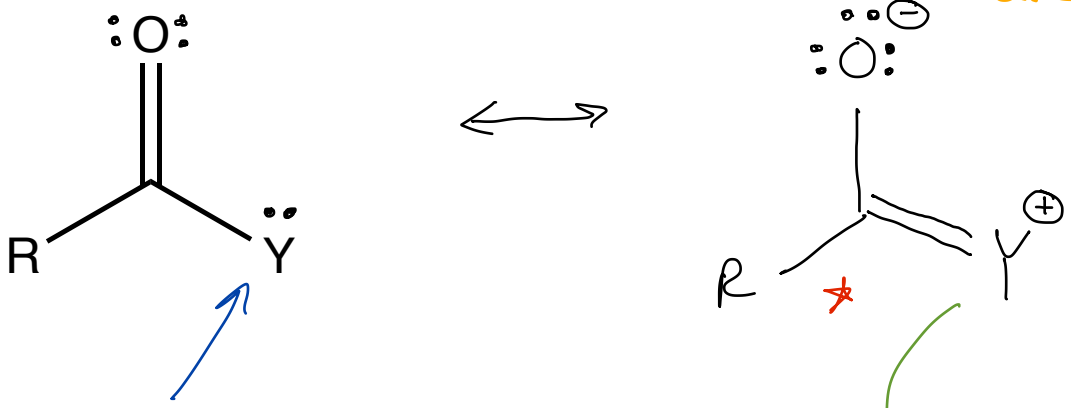


N-(1-methyl)propyl -3-methyl pentanamide

ata

N-secbutyl-3-methylpentanamide

common name

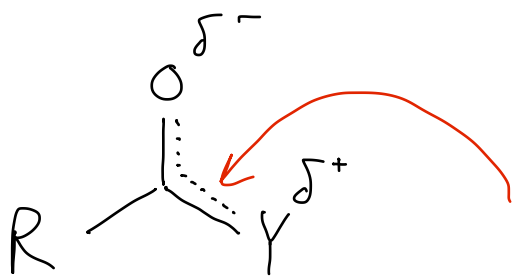


O becomes ⊖ because π bond e⁻'s are given to O atom

delocalized e⁻'s

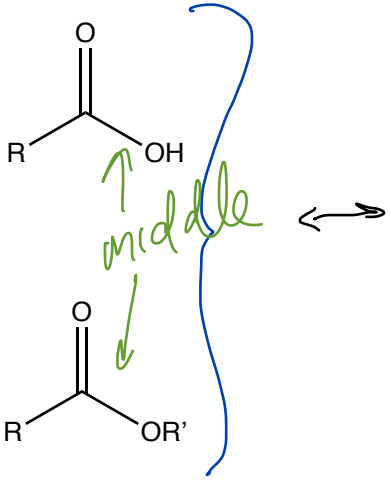
lp e⁻'s adjacent to a π bond

Y becomes ⊕ 'cuz I just donated its lp e⁻'s into a π bond

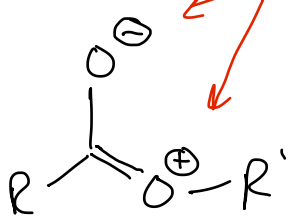


resonance hybrid

strength of this bond depends on the Y group and how important the other contributor is



middle

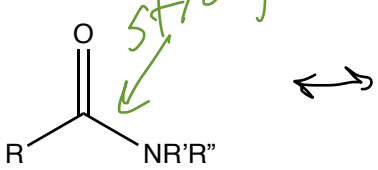


created charge separation

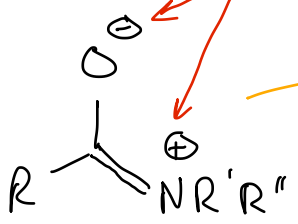
less π bond character than amide

which "looks" better
which "looks" worse
high E low E ?

O is positive + more eneg than N or Cl so this worse than the others resonance contributors



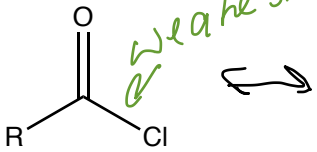
strongest



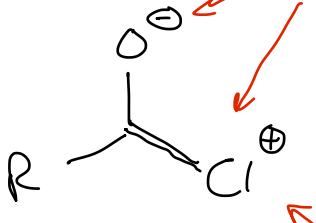
charge sep

N is positive

strongest π bond because less eneg than O & better 2p-2p overlap than Cl



weakest

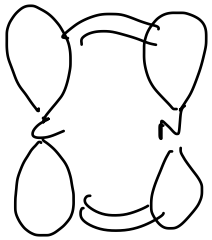


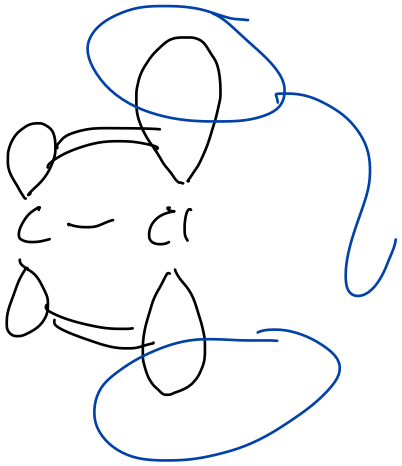
charge sep

how much do these contribute

Cl is positive

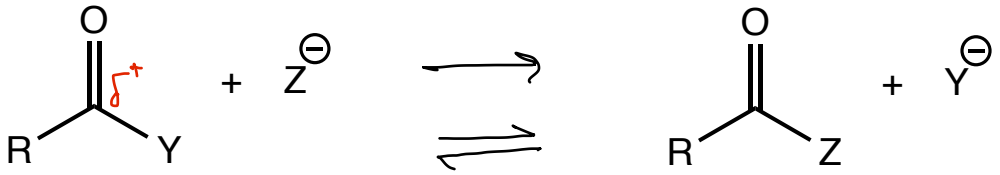
Cl uses 3p orbitals which are a mismatch with C's 2p orbitals, so π bond is weaker than π bond in amide





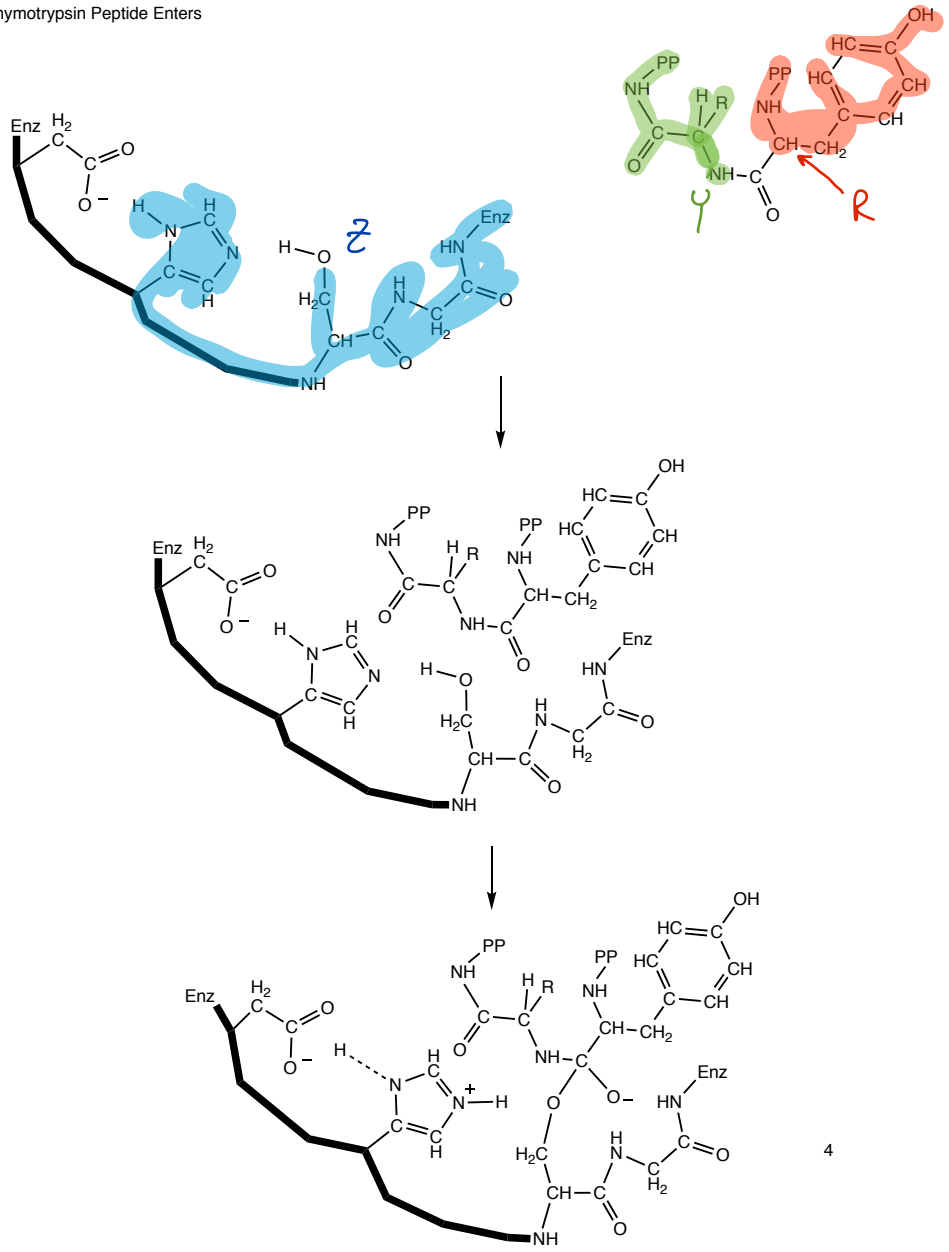
too big ...
not used well
making the π
bond. e⁻'s can
be farther away
from the area between
the nuclei

Nucleophilic Acyl Substitution



Chymotrypsin Hydrolyzes Proteins

Chymotrypsin Peptide Enters



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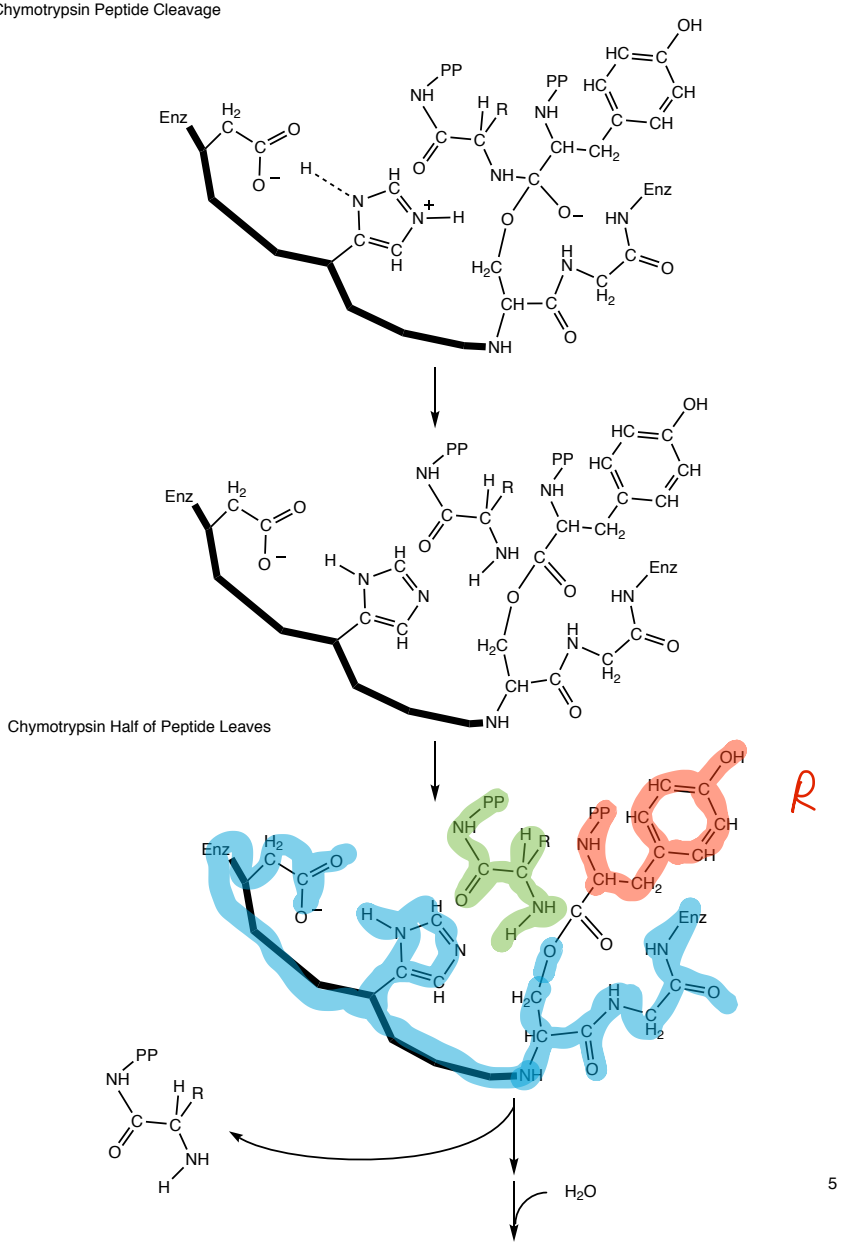
Chymotrypsin Peptide Cleavage



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