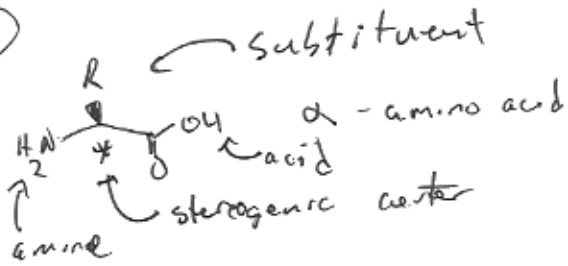


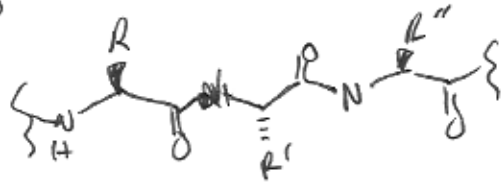
Chapter ~~26~~ ²³ Amino Acids, Peptides & Proteins

①



There are 20 common naturally occurring amino acids
 $R = 20$ different subs

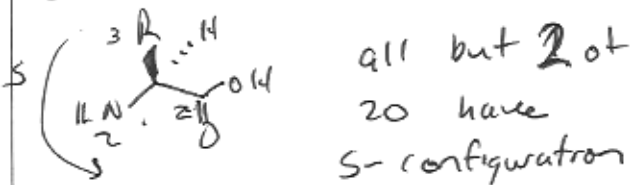
②



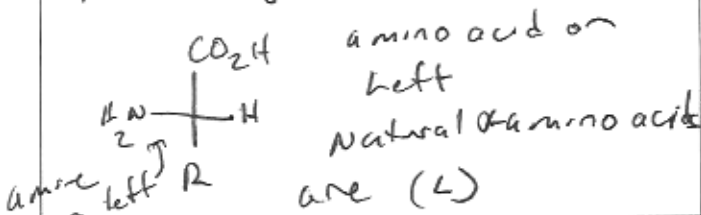
Proteins: polymers of α -amino acids (\approx about 30)

Peptides: polymer of \leq about 30 α -amino acids

③ stereochemistry:



Fischer Projection



④

Common α -amino acids

<u>R</u>	<u>structure</u>	<u>name code</u>	<u>stereochem</u>
H		Glycine gly	none

see page 117b

* = essential amino acid
 \therefore must ingest; body can not make

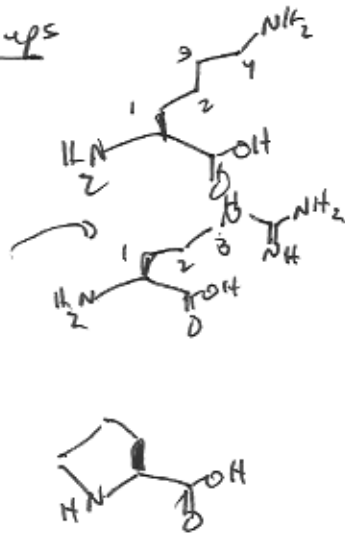
⑤

<u>R</u>	<u>structure</u>	<u>name</u>	<u>3-letter code</u>	<u>1-letter code</u>	<u>stereochem</u>
alkyl		alanine	Ala	A	S
		valine	Val*	V	S
		leucine	Leu*	L	S
		isoleucine Ile*	Ile*	I	S

R	Structure	Names / codes	Stereochem
<u>Aromatics</u>	 	phenylalanine*, Phe, F tyrosine, Tyr, Y Histidine*, His, H Tryptophan, Trp, W	S S S S
<u>Alcohols</u>	 	Serine, ser, S Threonine*, Thr, T	S S
<u>Sulfur containing</u>	 	Cysteine, Cys, C Methionine*, Met, M	<u>R only one</u> S
<u>Carbonyl containing</u>	 	Aspartic Acid, Asp, D Glutamic acid, Glu, E Asparagine, Asn, N Glutamine, Gln, Q	S S S S

Amino Groups

Guanidino group



Lysine⁺, Lys, K

S

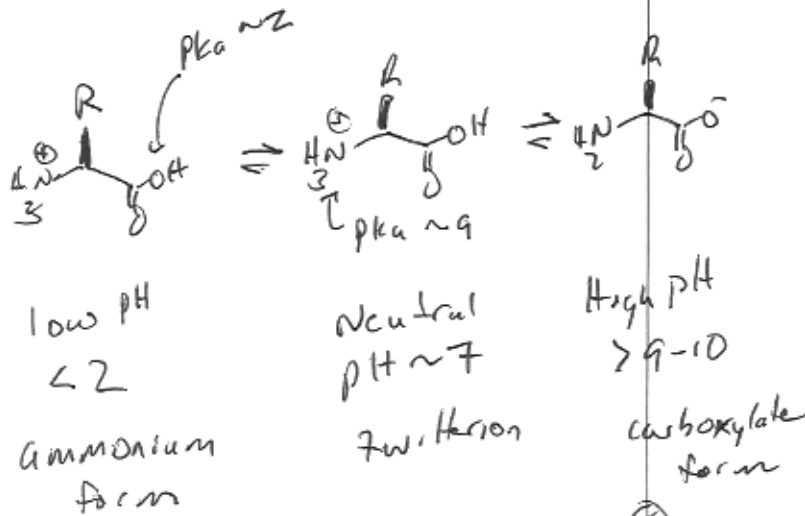
Arginine⁺, Arg, R

S

Proline⁺, Pro, P

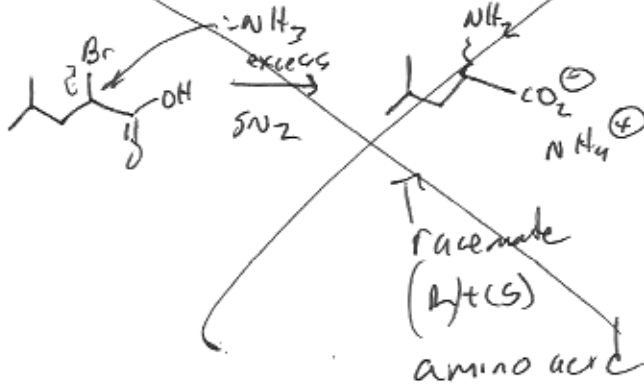
S

⑥ Protonation state vs pH

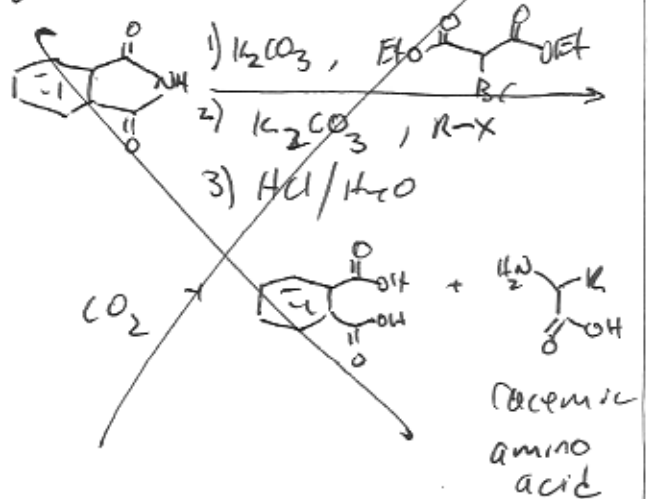


⑦ Synthesis of amino acids

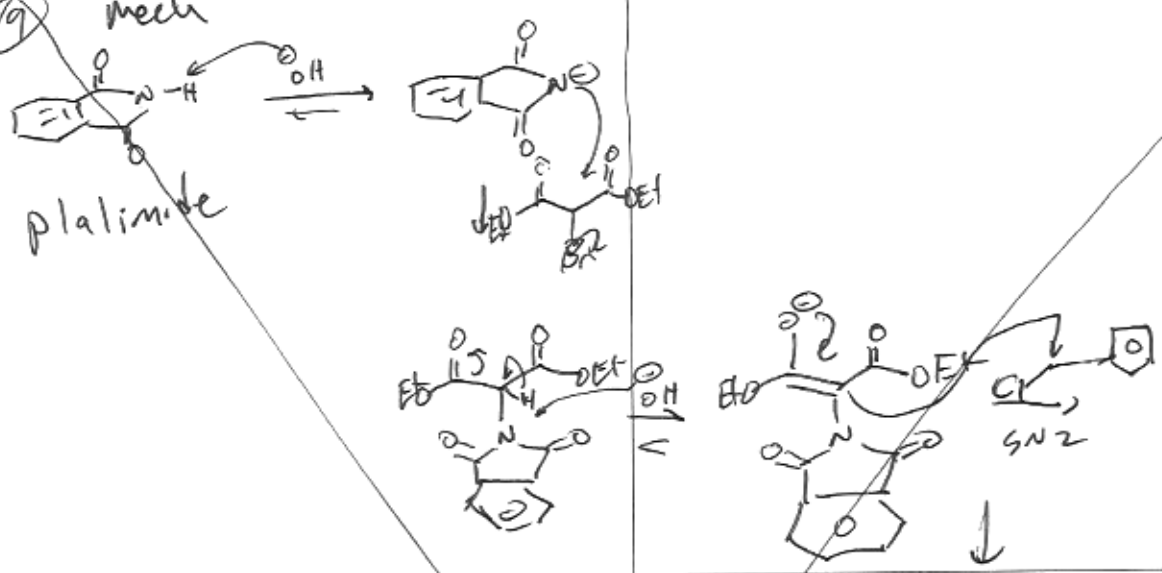
a) Alkylation of ammonia



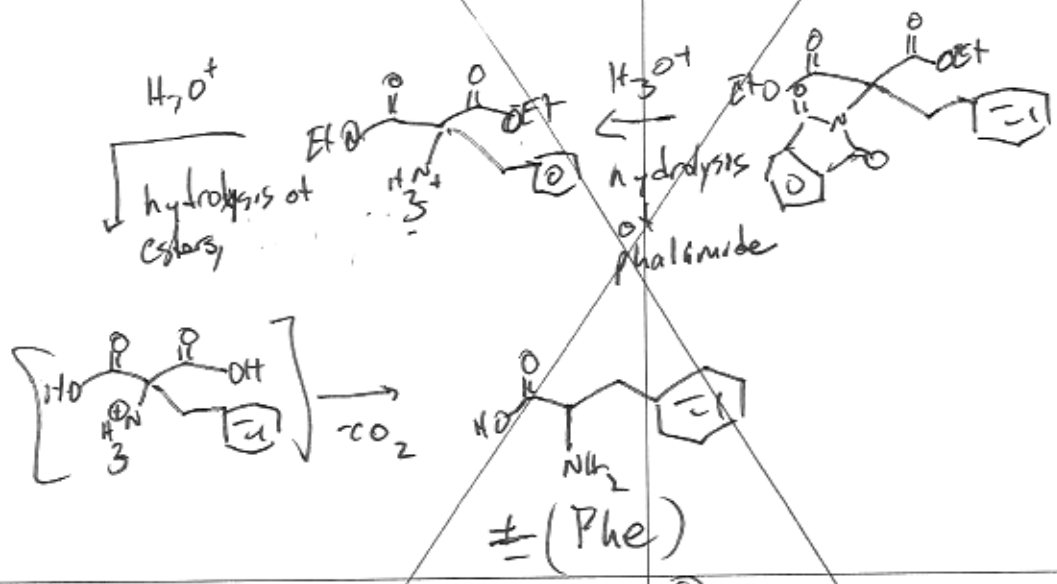
⑧ Gabriel malonic Ester Synthesis



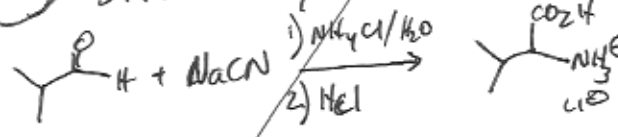
9) mech
 phalimide



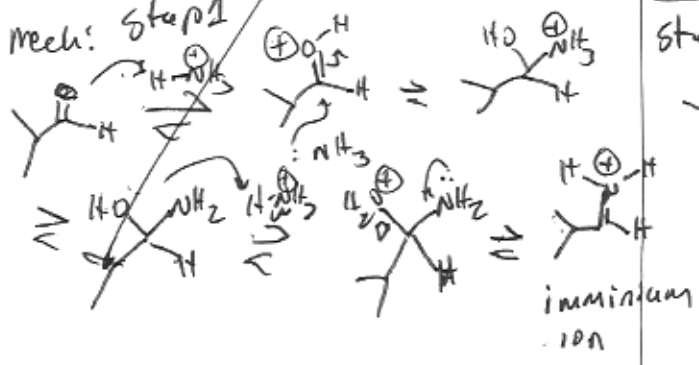
H_3O^+
 hydrolysis of esters



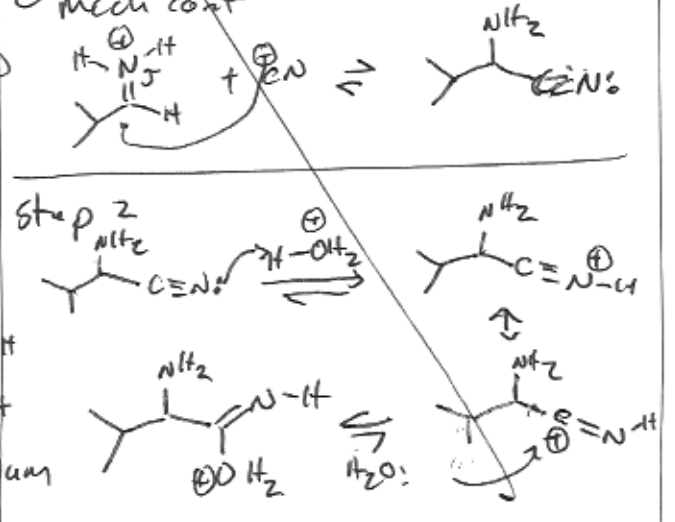
10) Strecker synthesis



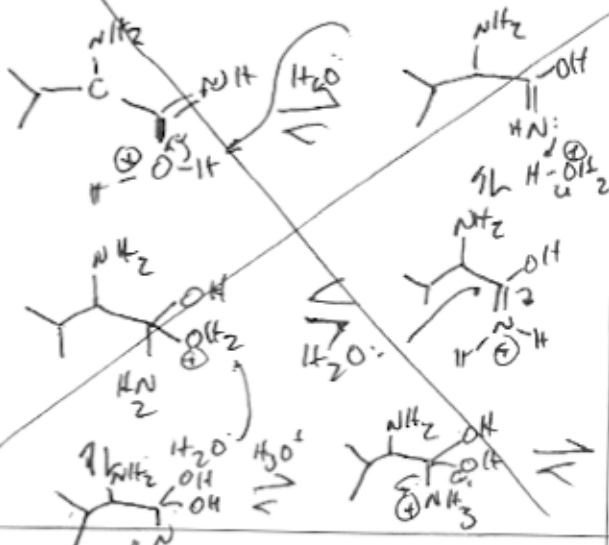
mech: step 1



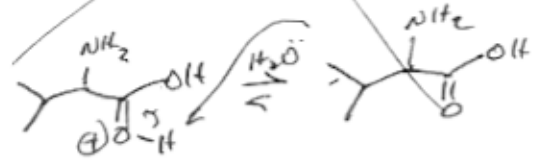
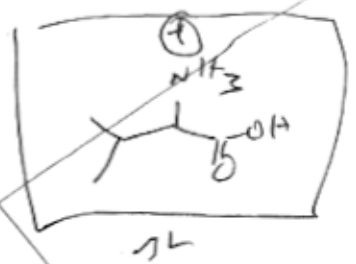
11) mech cont



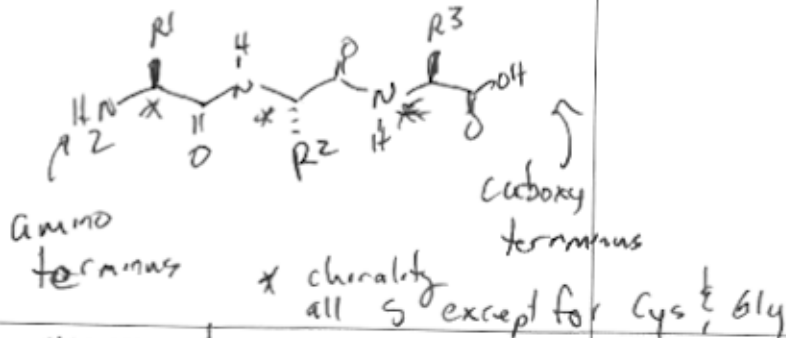
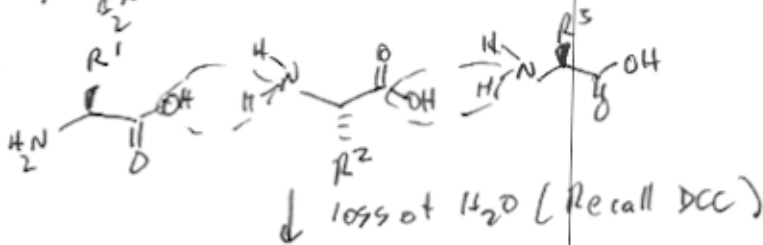
11 cont



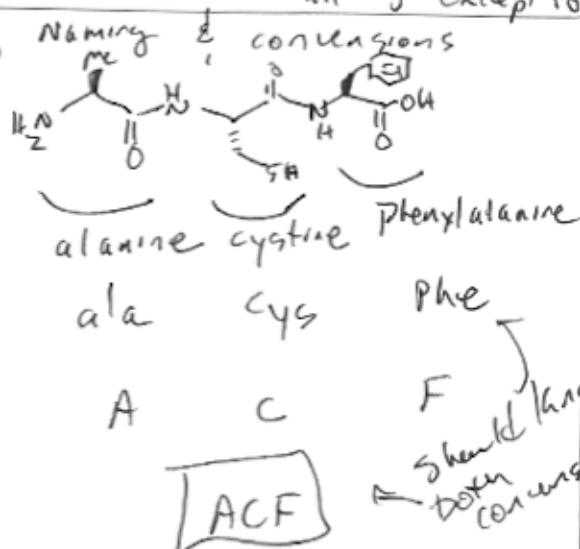
α -amino acid



12



13



draw amino terminus on left

14

Protein structure

- 1 Primary structure
Amino acid sequence
- 2 secondary structure
local environment / fold
(random coil, α -helix, β -sheet)
- 3 tertiary structure
Overall topology of protein
fold of 2^o structure
(globular, etc)
- 4 Quaternary structure Protein/Protein interactions

(15) notes on folding
driven by hydrophobic effect
- greasy (alkyl & aryl) side
chains avoid water &
are pushed to interior,
polar residues stay on
surface near water

Recall biological proteins are mainly in aqueous environment.

Gly oxalase - I

from

Glomastadium
acetobutylicum