

Isoelectric Point (pI)

Peptide Synthesis

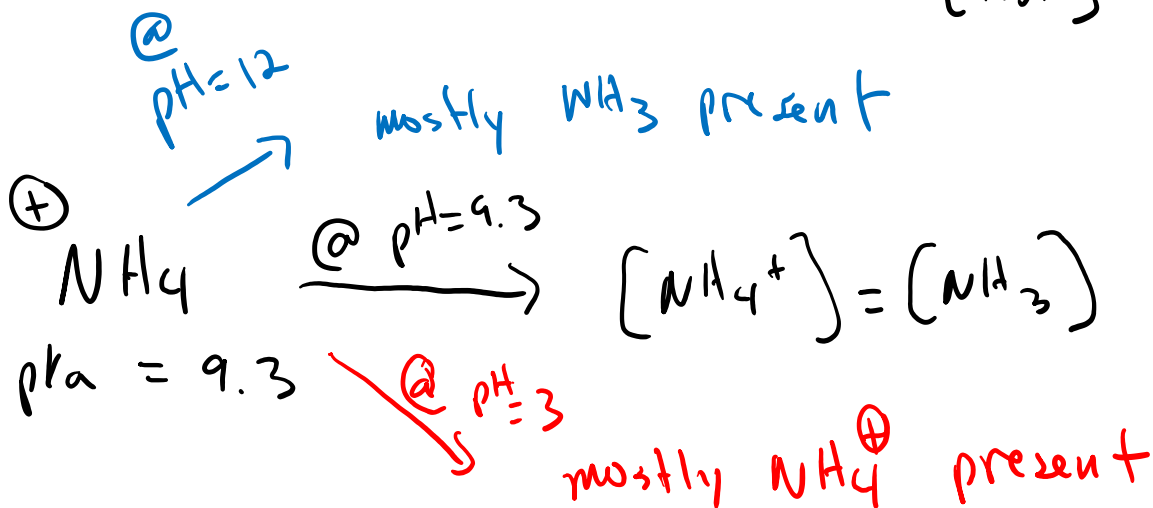
4/21/2023

A Brief Reminder about pH and pKa

$$\text{pH} = -\log [\text{H}^+]$$

describes H^+
content in a solution

$$\text{pH} = \text{pKa} + \log \frac{[\text{A}^-]}{[\text{HA}]}$$



$$K_a = \frac{[\text{H}^+][\text{A}^-]}{[\text{HA}]}$$

$\text{pKa} = -\log K_a$ describes acidity
of a molecule
or part of a molecule

$$\text{if } [\text{A}^-] = [\text{HA}]$$

then $\text{pH} = \text{pKa}$

pH above pKa - more A^-

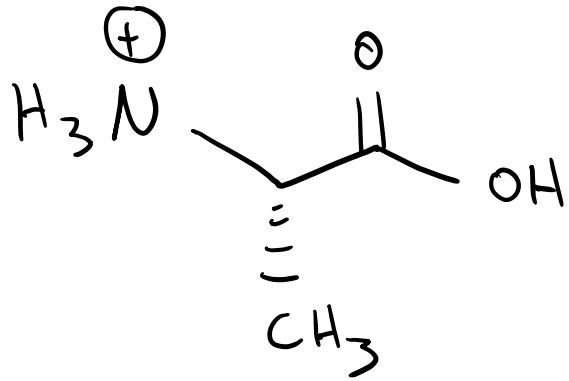
below more HA

Amino Acid pKa Table

TABLE 25.2 THE pK_a VALUES FOR TWENTY NATURALLY OCCURRING AMINO ACIDS			
AMINO ACID	α -COOH	α -NH ₃ ⁺	SIDE CHAIN
Alanine	2.34	9.69	—
Arginine	2.17	9.04	12.48
Asparagine	2.02	8.80	—
Aspartic acid	1.88	9.60	3.65
Cysteine	1.96	10.28	8.18
Glutamic acid	2.19	9.67	4.25
Glutamine	2.17	9.13	—
Glycine	2.34	9.60	—
Histidine	1.82	9.17	6.00
Isoleucine	2.36	9.60	—
Leucine	2.36	9.60	—
Lysine	2.18	8.95	10.53
Methionine	2.28	9.21	—
Phenylalanine	1.83	9.13	—
Proline	1.99	10.60	—
Serine	2.21	9.15	—
Threonine	2.09	9.10	—
Tryptophan	2.83	9.39	—
Tyrosine	2.20	9.11	10.07
Valine	2.32	9.62	—

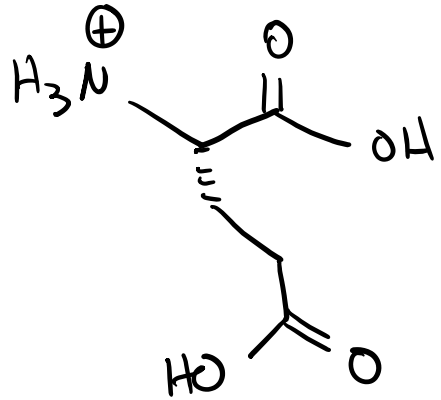
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Alanine



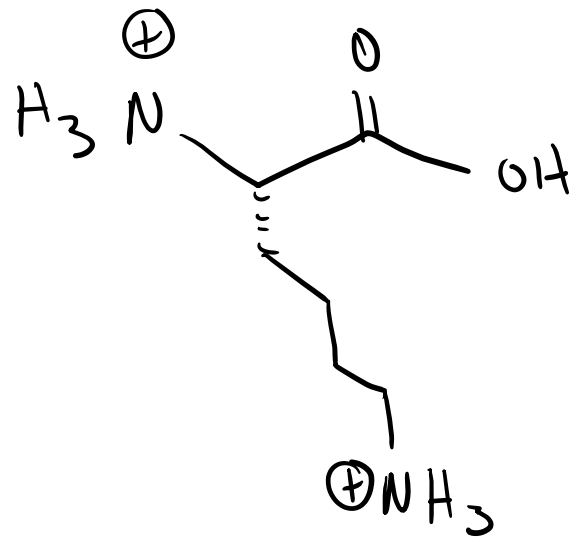
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Glutamic acid



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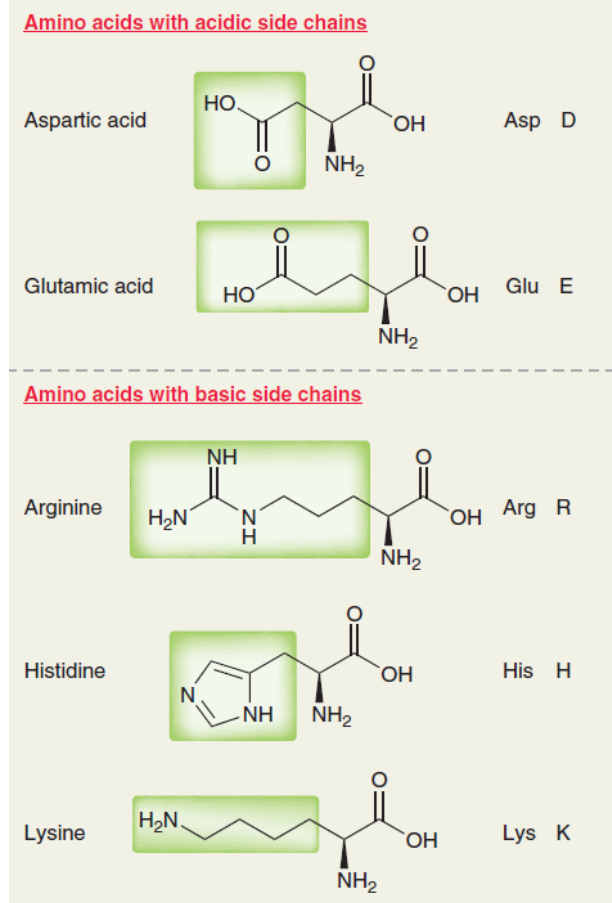
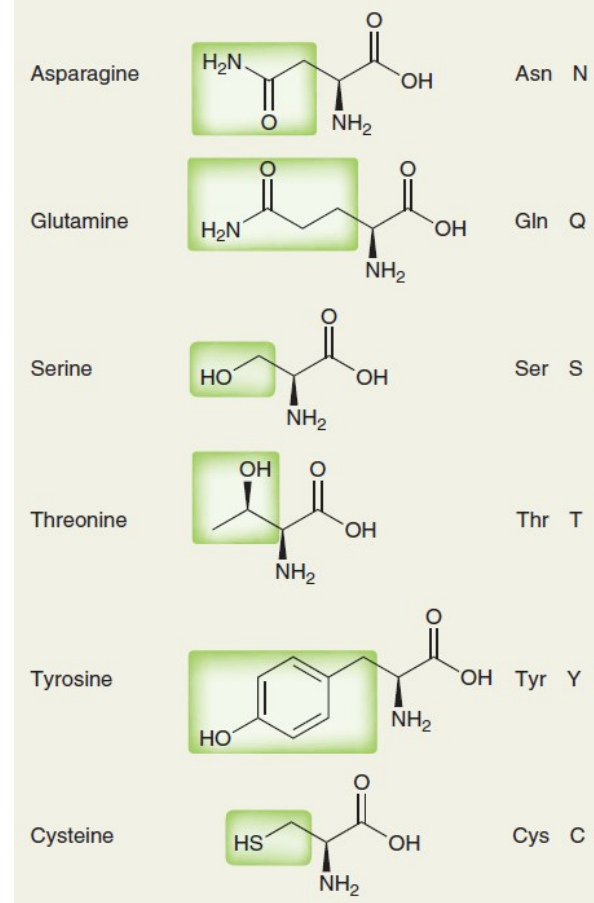
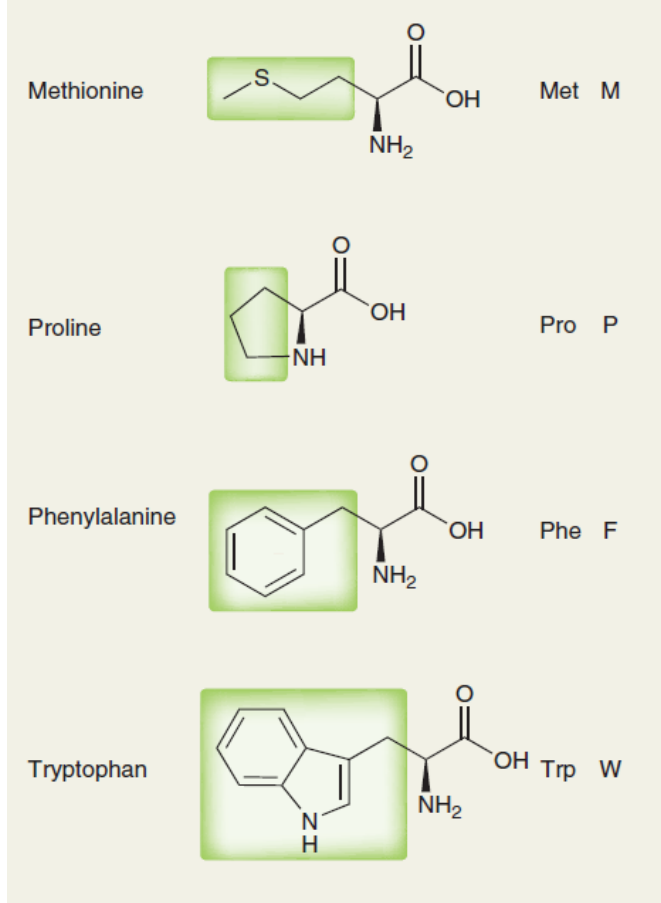
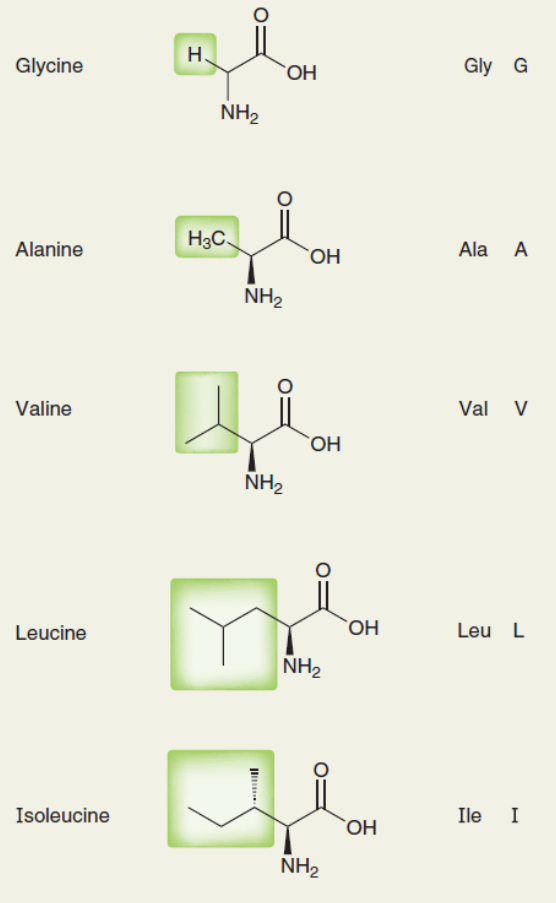
Lysine



Drawing Peptide Chains

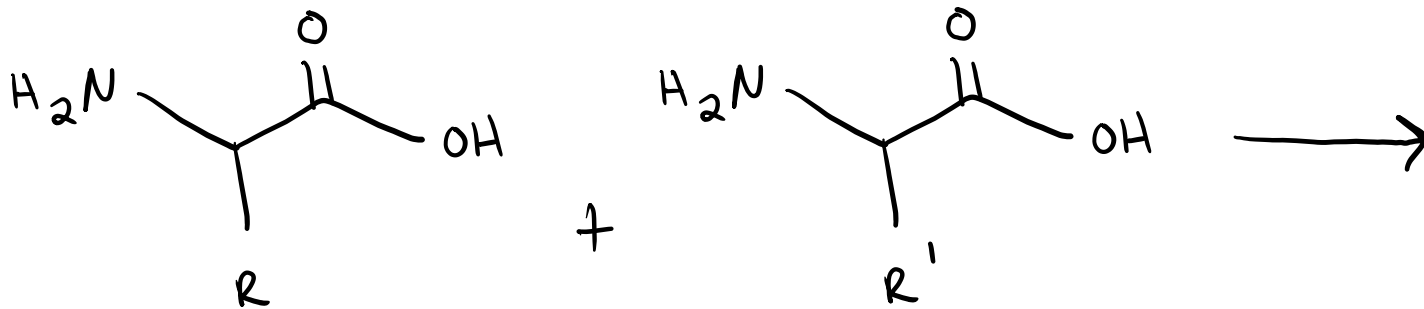
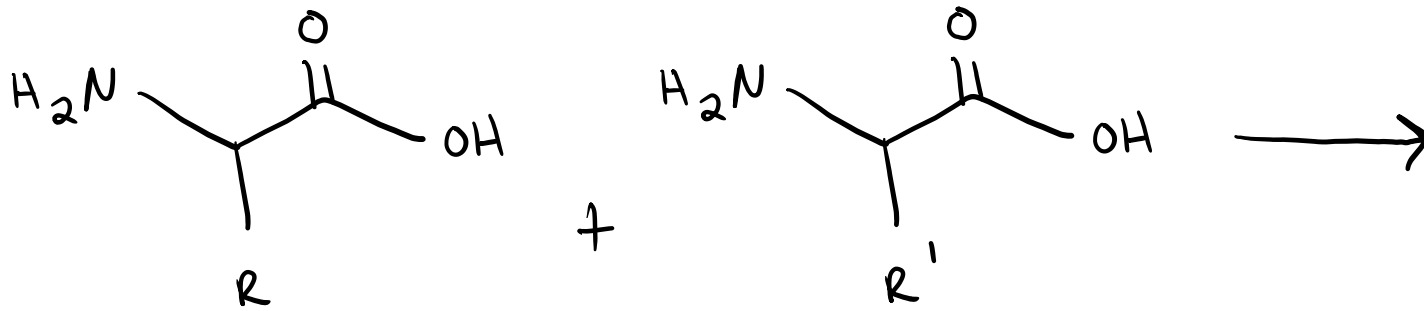
(25.4)

Draw Ala - Asp - Ser - Val



Synthesis of Peptides: Linking Amino Acids Together

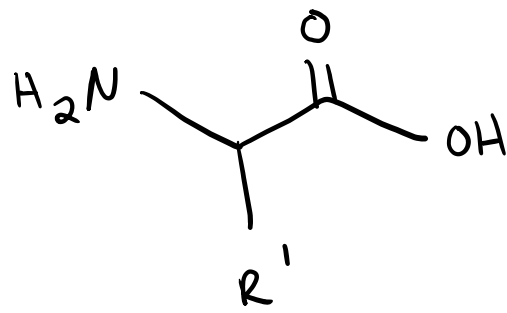
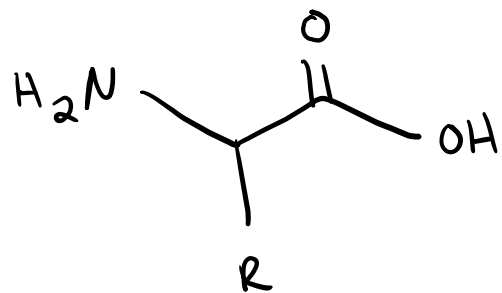
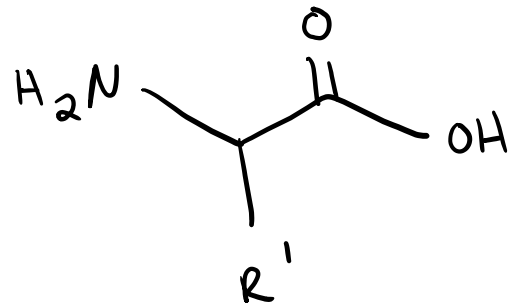
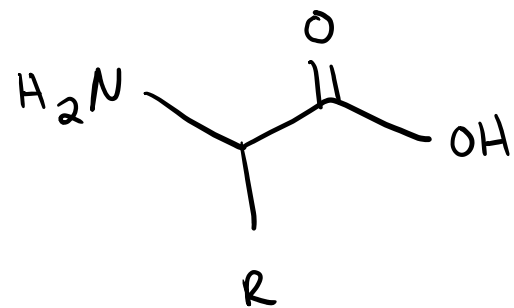
(25.6)



Peptide Bond Formation with DCC: Mechanism



Peptide Synthesis: Protecting Groups



Protecting the Amine Group with "Boc"

