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TOPIC-5: AMINO ACIDS & PROTEINS



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Essential Amino Acids

Histidine (His)^a

Isoleucine (Ile)

Leucine (Leu)

Lysine (Lys)

Methionine (Met)

Phenylalanine (Phe)

Threonine (Thr)

Tryptophan (Trp)

Valine (Val)

Nonessential Amino Acids

Alanine (Ala)

Arginine (Arg)^b

Asparagine (Asn)

Aspartic acid (Asp)

Cysteine (Cys)^b

Glutamic acid (Glu)

Glutamine (Gln)^b

Glycine (Gly)^b

Proline (Pro)^b

Serine (Ser)

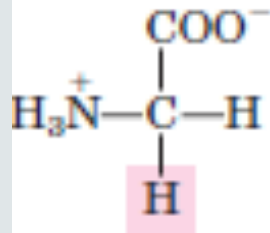
Tyrosine (Tyr)^b



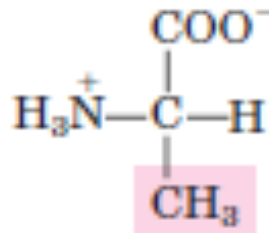
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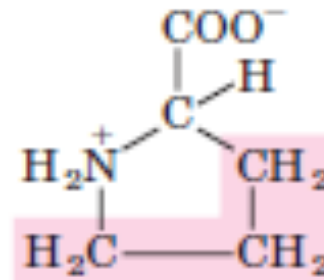
Nonpolar, aliphatic R groups



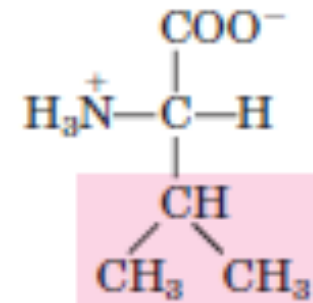
Glycine



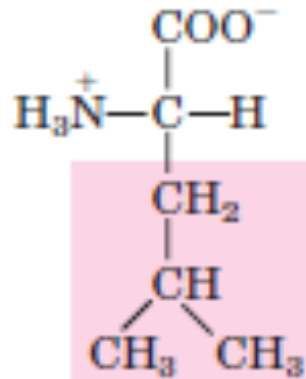
Alanine



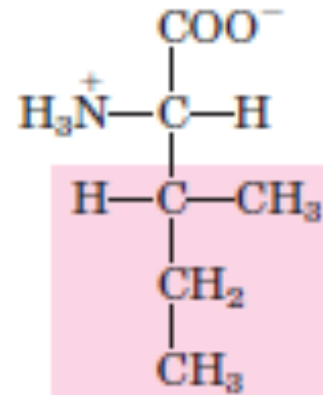
Proline



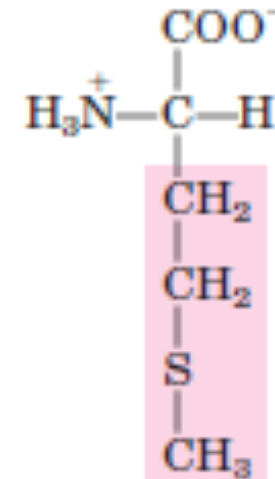
Valine



Leucine



Isoleucine



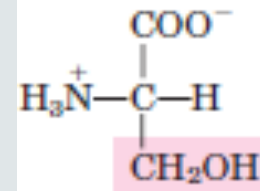
Methionine



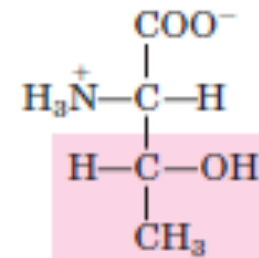
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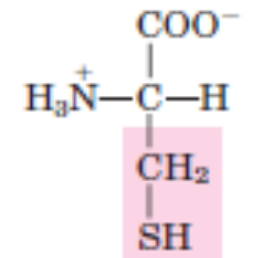
Polar, uncharged R groups



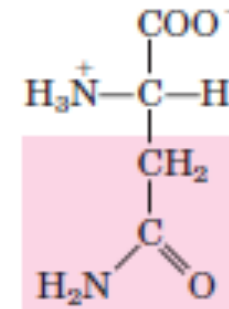
Serine



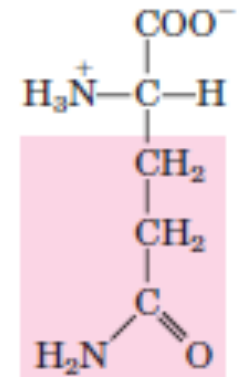
Threonine



Cysteine

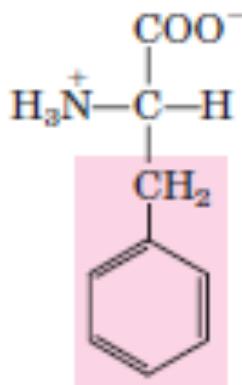


Asparagine

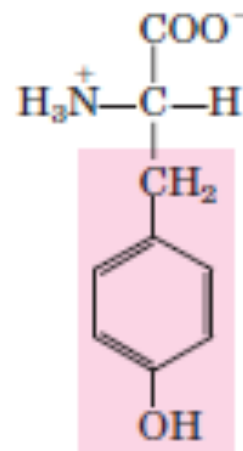


Glutamine

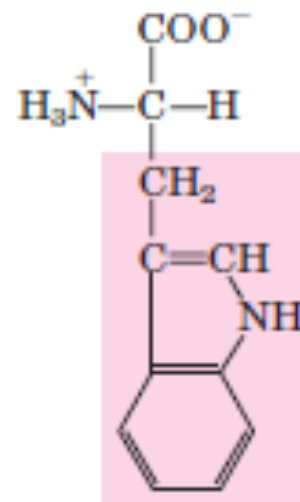
Aromatic R groups



Phenylalanine



Tyrosine



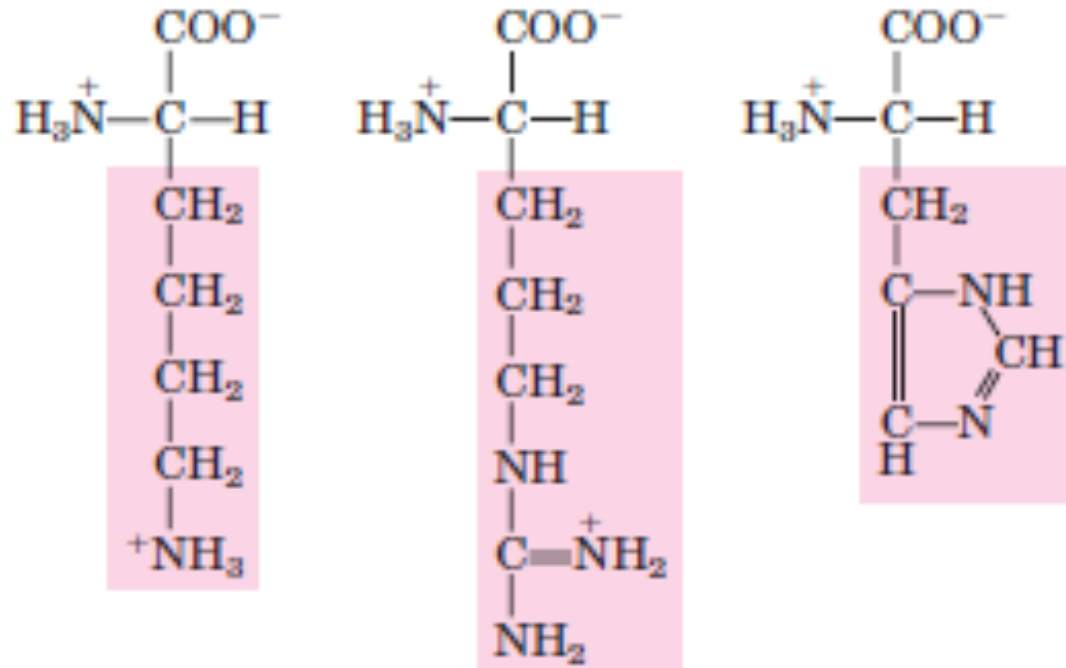
Tryptophan



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Positively charged R groups

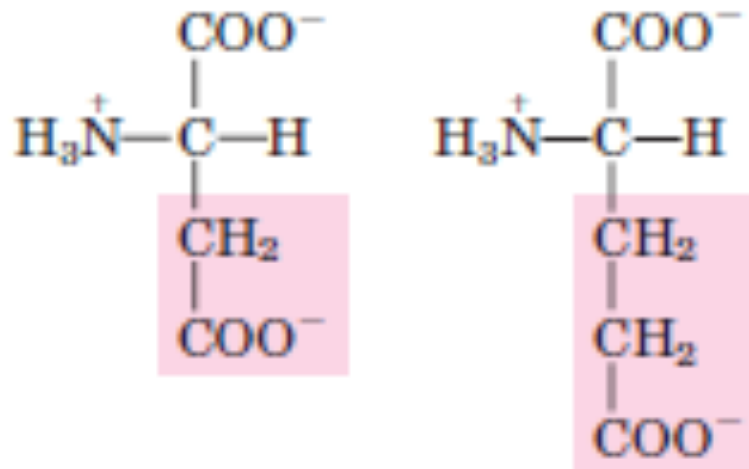


Lysine

Arginine

Histidine

Negatively charged R groups



Aspartate

Glutamate



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Physical Properties

1. Most aa are soluble in water
2. Most of them melt above 200 degree Centigrade
3. Sweet (Gly, Ala, Val), tasteless (Leu), bitter (Arg, Ile)
..[Monosodium glutamate in food]
4. All aa except glycine possesses optical isomer due to presence of asymmetric Carbon
5. Aa are ampholytes – contain both $-COOH$ and $-NH_2$, ie, can donate a proton or can accept a proton. They can exist as dipolar or Zwitterion

Isoelectric pH (pI): pH at which molecule exist in Zwitterionic form.



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Chemical Properties

Due to Amino Group:

Reaction with Ninhydrin Reagent, Nitrous acid, etc.

Due to Carboxyl Group:

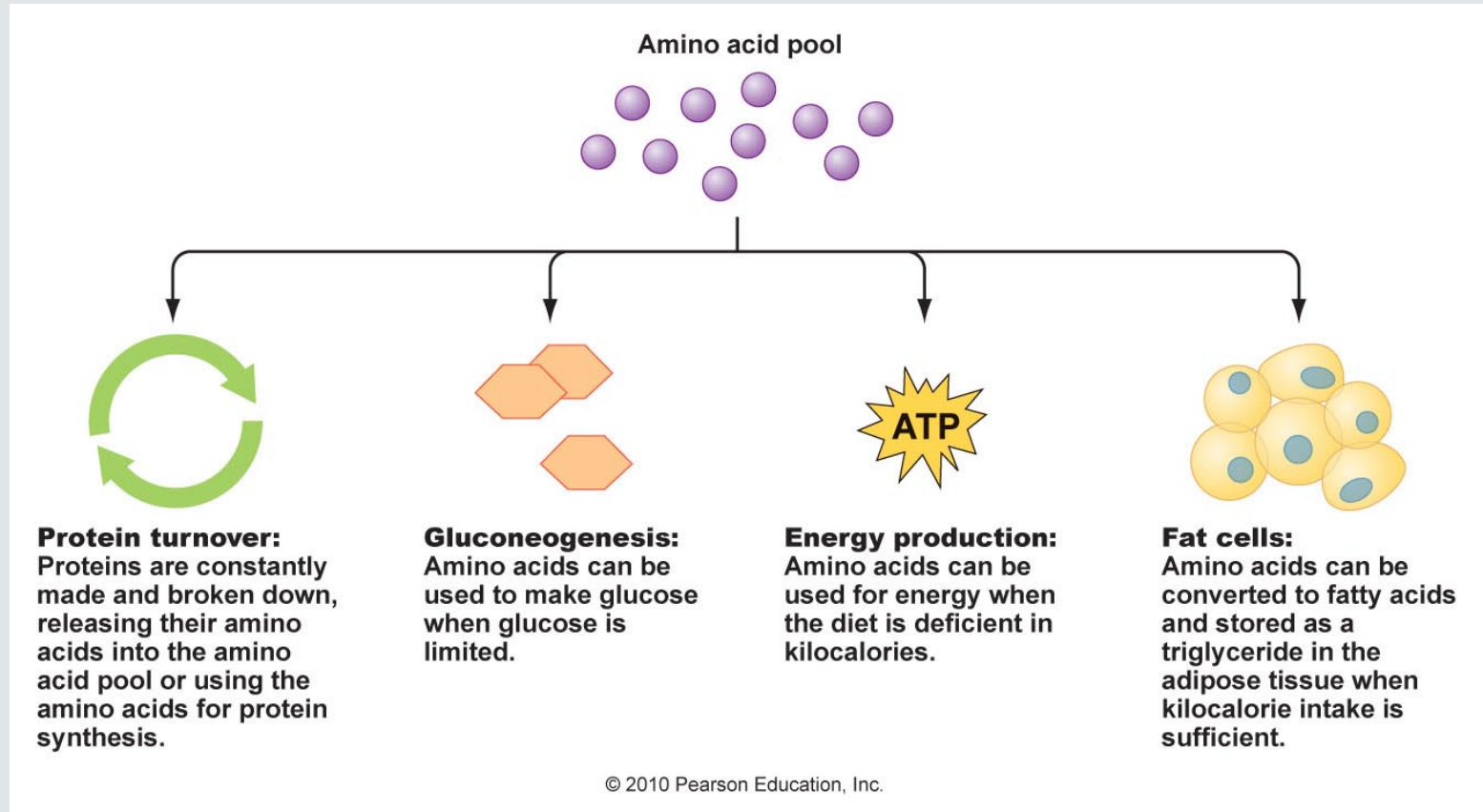
Decarboxylation reaction, reaction with bases and alcohols, etc.



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Metabolic Fate of Amino Acids





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Classification of Proteins

1) Based on Chemical Nature and Solubility

- I. Simple Proteins
- II. Conjugated Proteins
- III. Derived Proteins

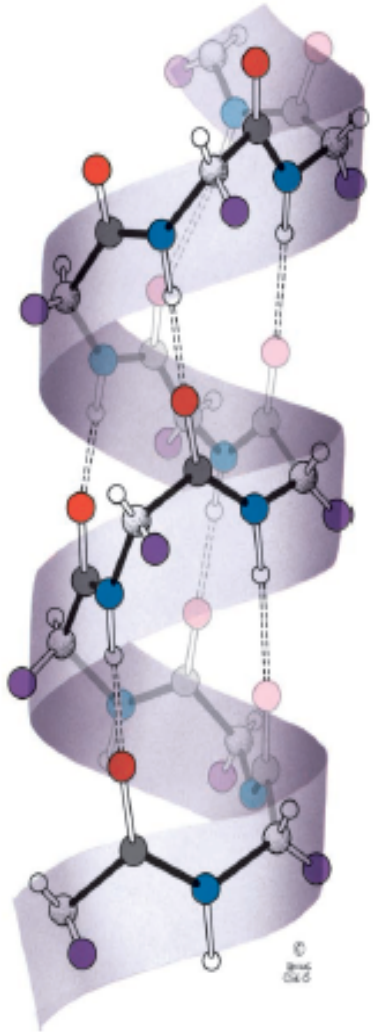
2) Based on Function

Hormonal, Secretory, Transport, Catalytic,
Contractile, Toxic, Exotic, Storage, Structural
Proteins

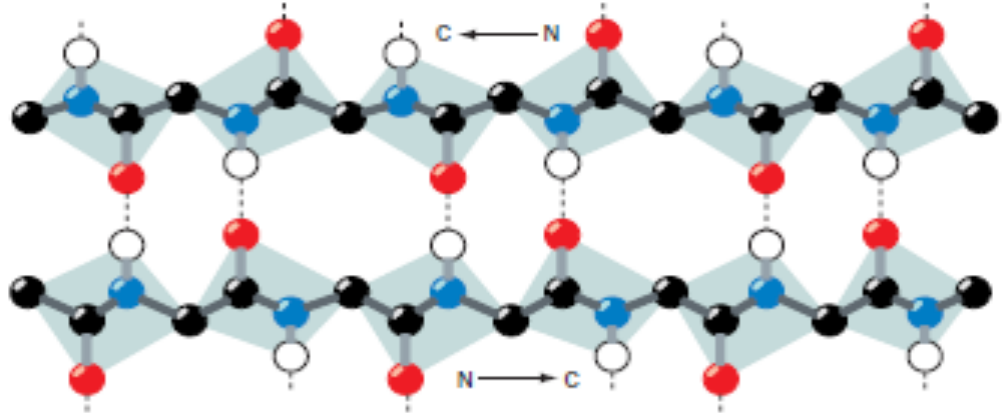


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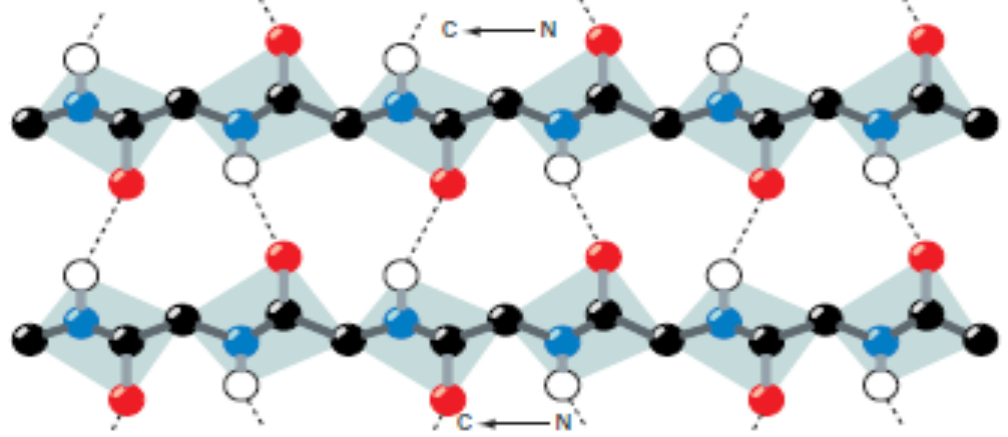
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(a) **Antiparallel**



(b) **Parallel**





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Protein Denaturation

