Introductory Biochemistry

Classification of Amino Acids

Lecture-1

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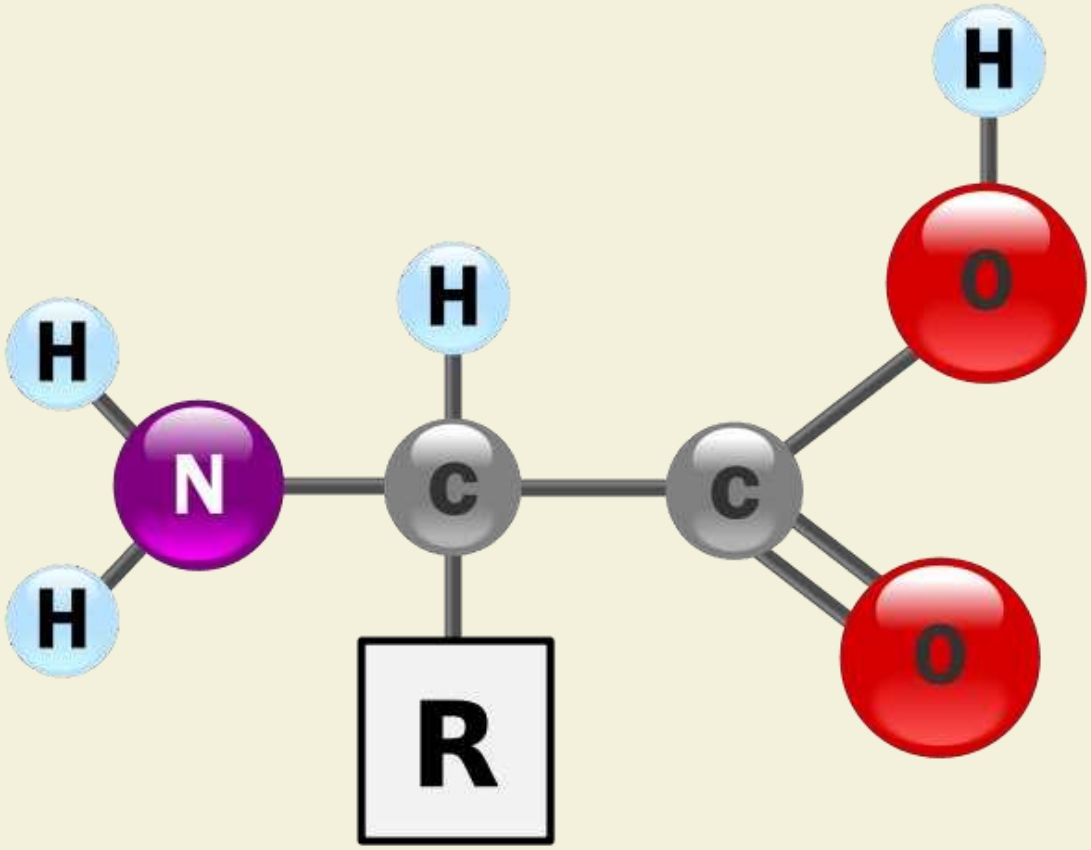
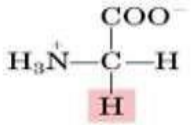
WHAT ARE AMINO ACIDS?

- ✓Amino acids are organic compounds containing
  - amine [- NH_2]
  - carboxyl [-COOH]
  - side chain [R group]
- ✓The major key elements if amino acids are carbon, hydrogen, nitrogen, oxygen.
- ✓About 500 amino acids are known (though only 20 appear in the genetic code) and can be classified in many ways.

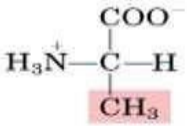
BASIC STRUCTURE [SKELETON]



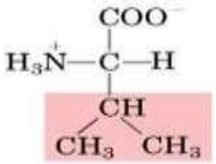
Nonpolar, aliphatic R groups



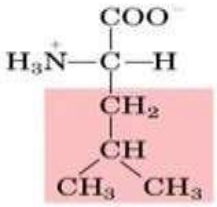
Glycine



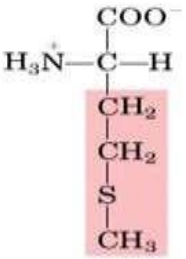
Alanine



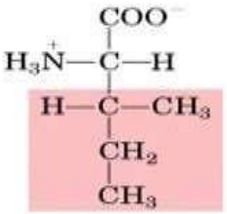
Valine



Leucine

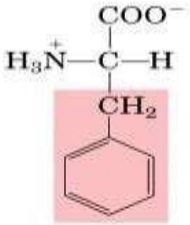


Methionine

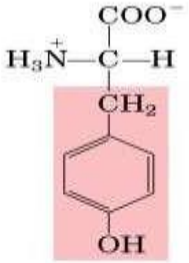


Isoleucine

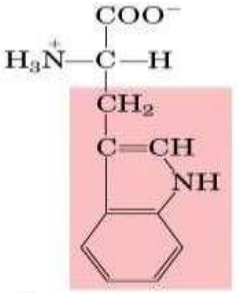
Aromatic R groups



Phenylalanine

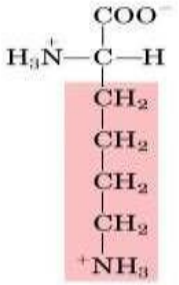


Tyrosine

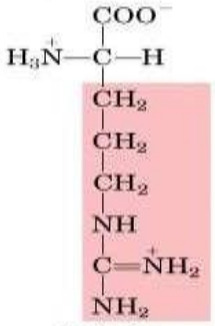


Tryptophan

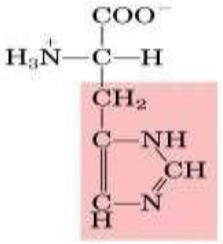
Positively charged R groups



Lysine

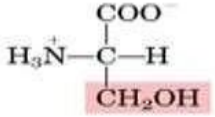


Arginine

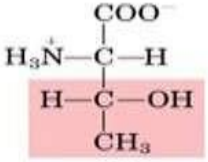


Histidine

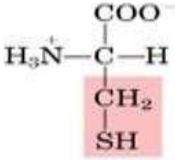
Polar, uncharged R groups



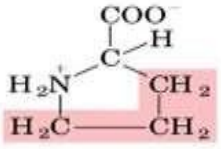
Serine



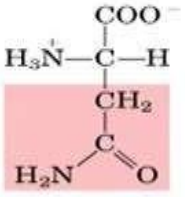
Threonine



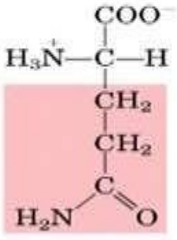
Cysteine



Proline

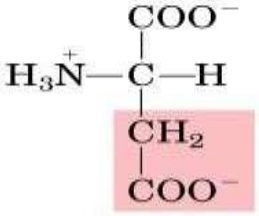


Asparagine

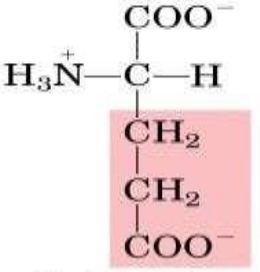


Glutamine

Negatively charged R groups



Aspartate



Glutamate

NEED FOR CLASSIFICATION

- ✓Classification of amino acids gives the grouping between 20 acids and a basic outline for grouping.
- ✓It makes a clear idea to pick the amino acid type.
- ✓This is much useful for biochemists for the easy understanding between each amino acids.

Classification:

Based on:

- ✓ R group
- ✓ Polarity and R group
- ✓ Distribution in protein
- ✓ Nutritional requirements
- ✓ Number of amino and carboxylic groups

Based on R-Group

- ✓ Simple amino acids

  These have no functional group in their side chain.

  Example: glycine, valine, alanine, leucine, isoleucine.

- ✓ Hydroxy amino acids:

  These have a hydroxyl group in their side chain

  Eg: serine, threonine.

- ✓ Sulfur containing amino acids: Have sulfur in their side chain.

  Eg: cysteine, methionine.
- ✓ Aromatic amino acids:

  Have benzene ring in their side chain Eg: phenylalanine, tyrosine.
- ✓ Heterocyclic amino acids:

  Having a side chain ring which possess at least on atom other than carbon.

  Eg: Tryptophan, histidine, proline.

- ✓ Amine group containing amino acids: Derivatives of amino acids in which.
  one of carboxyl group has been transformed into an amide group.
  Eg: Asparagine, glutamine.
- ✓ Branched chain amino acids:
  A branched-chain amino acid (BCAA) is an amino acid having aliphatic side-chains with a branch.
  Eg: leucine, isoleucine, valine.

- ✓ Acidic amino acids:

  Have carboxyl group in their side chain Eg: Aspartic and Glutamic acid.
- ✓ Basic amino acids:

  Contain amino group in their side chain Eg: Lysine, Arginine.
- ✓ Imino acid:

  Amino acids containing a secondary amine group

  Eg: Proline.

- Reference :

➢ Dr. J.L. Jain – Fundamentals of Biochemistry by Chand publications, New Delhi.

Thank You