

AMINO ACIDS AND PROTEINS.

Amino acid are group of compound or group of molecules that has two functional group amino group and carboxyl group. (NH_2/COOH), attached to it. all amino acid have chiral center except glycine because it have two hydrogen attached to it.

STRUCTURE OF AMINO ACID

So the R- on the chiral carbon atom is different for each of the twenty amino acid that's found in protein. Every amino acid has it's own unique structure and reactivity depending on the (R-group) the ^{variation} ~~arrange~~ ^{ment} of the R-group determine the characters of the molecules or protein that ~~grow~~ which the bond of the amino acid join or linked together

OPTICAL ISOMERS OF AMINO ACID

If the carbon atom is attach to four different group it's called **Asymmetric** and therefore, it exhibit optical isomerism.

The amino acid except glycine possesses

four different (R, H, C, NH₂) L-carbon.

CLASSIFICATION OF AMINO ACIDS

Amino acids are classified into:
base on:

- (1) polarity, (2) nutritional, (3) metabolic, (4) structural

① BASE ON STRUCTURAL

Amino acid ~~has~~ ^{has} aliphatic side chain:

(1) glycine (2) Alanine (3) Valine

(4) leucine (5) Isoleucine (6) proline

(7) Methionine.

② BASE ON HYDROXYL GROUP (OH)

(1) Serine (2) Threonine (3) tyrosine

③ BASE ON SULFUR GROUP (S)

(1) Methionine (2) Cysteine

④ BASE ON ACIDIC

(1) Aspartic (2) glutamic

⑤ BASIC amino ACIDS

1- Lysine 2- Arginine 3- Histidine.

⑥ Aromatic Amino ACID

(1) phenylalanine (2) tyrosine (3) tryptophan

(7) Imino acid is proline.

Proteins are polymers composed of L-amino acids. They perform structural and dynamic functions in the organisms.

PROPERTIES OF AMINO ACID.

Physical properties

- 1- amino acid are soluble in water and in soluble in organic solvent.
- 2- They have generally melt at higher temperature, often above 200°C
- 3- Amino acid may be sweet or bitter.
- 4- All amino acid except glycine possesses optical activity.
- 5- Amino acid have both acidic and bases that why it exist as ampholytes.

CHEMICAL PROPERTIES.

- 1- Amino acids form salts ($-\text{COONa}$) with bases and ester ($-\text{COOR}$) with alcohol
- 2- Decarboxylation
- 3- Reaction with ammonia
- 4- Reaction due to $-\text{NH}_2$ group.
- 5- Colour reaction of ammonia
- 6- Oxidative determination.

AMINO ACIDS USEFUL AS DRUGS.

- 1- Enkephalin $\rightarrow$ are small peptides that can serve as neurotransmitters in the brain.
- 2- D-penicillamine $:-$ is employed in the chelation therapy of Wilson's disease
- 3- Gabapentin $:-$ is used in anticonvulsant.

STRUCTURE OF PROTEIN:

- 1- Primary structure:- the linear sequence of amino acids forming the backbone of proteins. (polypeptides)
- 2- Secondary structure:- The spatial arrangement of protein by twisting of the polypeptides chain.
- 3- Tertiary structure:- The three dimensional structure of a functional protein.
- 4- Quaternary structure:- Some of the protein are composed of two or more polypeptide chains referred to as subunits. The spatial arrangement of such subunits is called Quaternary structure.

PEPTIDE BOND.

The amino acid are held together in a protein by covalent bonds or linkage, these bonds are rather strong and serve as the cementing material between the individual amino acids.

BONDS RESPONSIBLE FOR PROTEIN STRUCTURE

* Covalent bonds are (i) peptide & disulfide bond

DISULFIDE BOND:- $(S-S)$ is formed by the Sulfhydryl group $(-SH)$ of two cysteine residues, to produce cystine. These bonds contribute to the structural conformation and stability of protein. The disulfide bond may be formed in a single polypeptide chain between different polypeptides.

NON-COVALENT

1- Hydrogen bonds:- the hydrogen bonds are formed by sharing of hydrogen atoms between the nitrogen and carbonyl oxygen of different peptide bonds, each hydrogen bond is weak but collectively strong.

2- Hydrophobic bond:- the non-polar side chains of neutral amino tend to be ~~acidic~~ closely associated with each other in protein, the occurrence of hydrophobic forces is observed in aqueous environment where in the molecules are forced to stay together.

3- Electrostatic bond:- these bond are formed by interaction between negatively charged groups (eg COO^-) of acidic amino acid with positively charged group (eg NH_3^+) of basic amino acid.

4- Van der Waals force:- these are non-covalent associations between electrically neutral molecules.

PROPERTIES OF PROTEIN

- 1- protein form colloidal solution instead of true solution
- 2- protein is globular or oval in shape
3. Isoelectric p H .
- 4- Acidic & basic protein
- 5- precipitation protein.

DENATURATION:- the phenomenon of disorganisation of native protein structure. result in the loss of sec, ter, qu, structure of protein.