Amino Acids

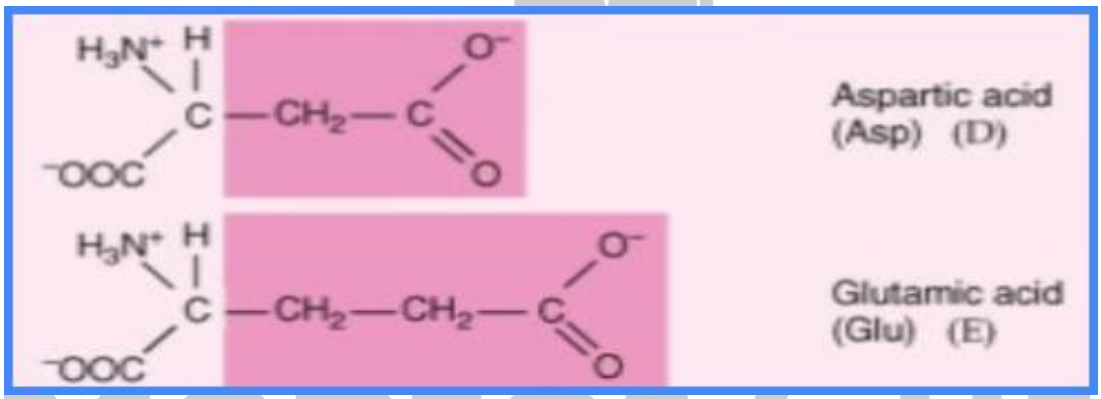
Amino acids are the building blocks of proteins. There are thousands of amino acids available in nature, proteins contain only 20 different kinds of amino acids, all of which are L-alpha-amino acids. The same 20 standard amino acids make proteins in all the living cells, may it either be a virus, yeast, bacteria, plant or human cell. These 20 amino acids combine in different sequences and numbers to form various proteins.

Types of Amino Acids - Based on Charge

On the basis of charge Amino Acids can be classified as follows.

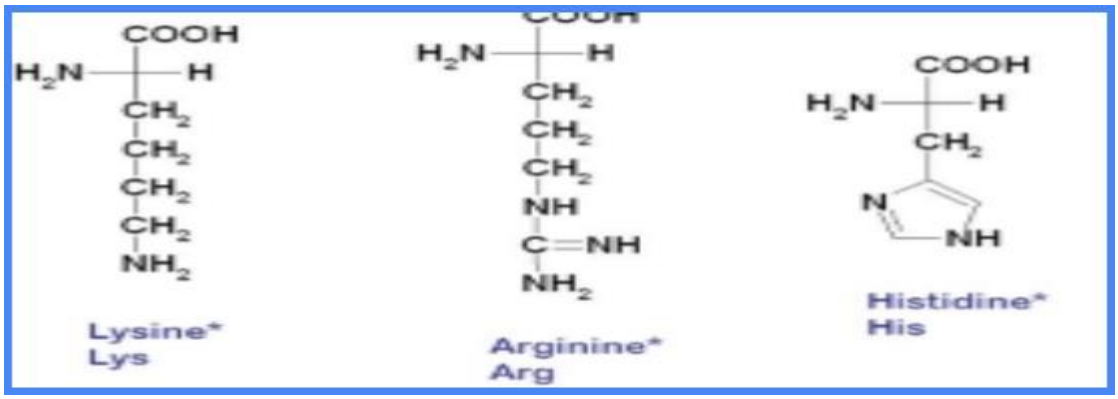
Acidic Amino Acids: Amino acids that contain a negative charge or an acidic group are called Acidic Amino Acid.

Example: Aspartic acid, Glutamic acid



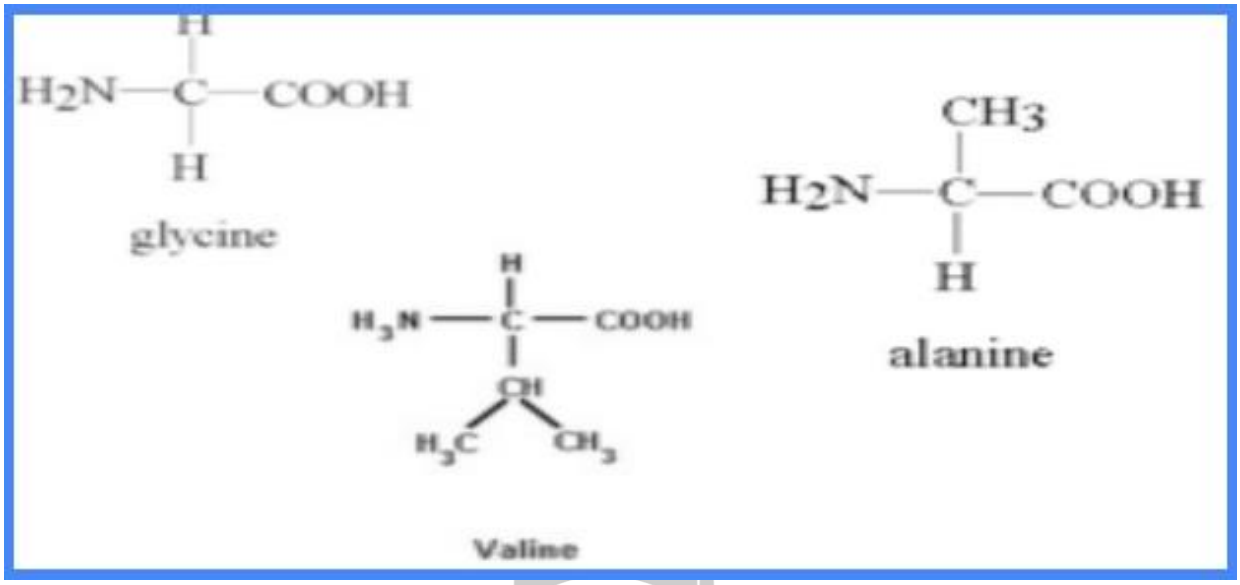
Basic Amino acids: Amino acids that contain a positive charge or a basic group Basic Amino Acid.

For Example: - Lysine, Arginine, Histidine



Neutral Amino acids: Those amino acids that do not contain any charge on the 'R' group are called Neutral Amino Acids

For Example:- Valine, Glycine, Alanine



Types of Amino Acids – on the Basis of Nutrition

On the basis of nutrition Amino Acids can be classified as follows.

Essential Amino acids: These amino acids cannot be synthesized in the animal body, and therefore must be present in their diet.

For example, in human beings, essential amino acids are valine, isoleucine, phenylalanine, methionine, leucine, lysine, tryptophan and threonine.

Non-essential amino acids: These amino acids can be synthesized in the animal body and may not be supplied in the diet. For example, alanine, arginine, tyrosine, asparagine, glutamine, proline, etc. In plants, all the amino acids are non-essential.

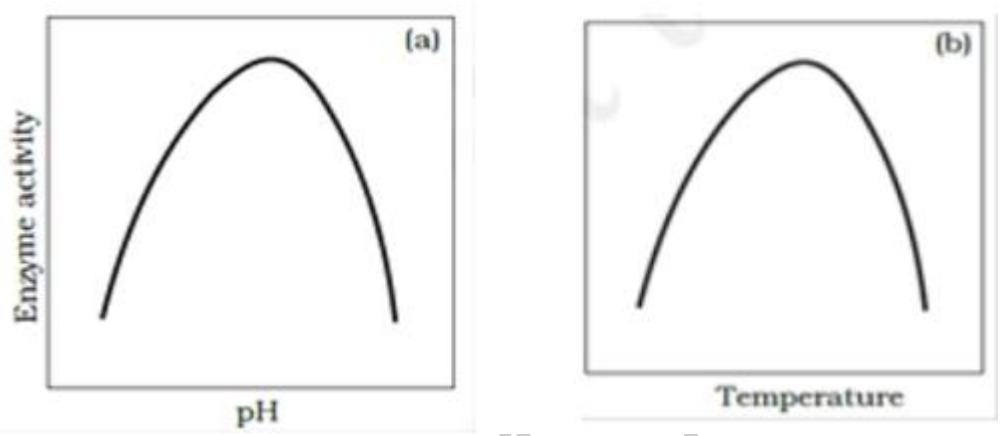
For example, in human beings, essential amino acids are valine, isoleucine, phenylalanine, methionine, leucine, lysine, tryptophan and threonine.

(Remember as VIP, MLL, TT) as the sequence for examples of essential amino acids.

Effects of pH and Temperature on Proteins

Each protein shows its highest activity at a particular temperature and pH called the optimum temperature and optimum pH. Activity declines both below and above the optimum value.

Low temperature preserves the enzyme in a temporarily inactive state whereas high temperature destroys enzymatic activity because proteins are denatured by heat.



Fats

Fats are a subgroup of compounds known as lipids that are found in the body and have the general property of being hydrophobic i.e, they are insoluble in water. Fats are also termed triglycerides, molecules made from the combination of one molecule of glycerol with three fatty acids

Fatty Acids:

A fatty acid has a carboxyl group attached to an R group.

The R group could be a methyl (–CH3), or ethyl (–C2H5) or higher number of –CH2 groups (1 carbon to 19 carbons).

Glycerol:

It has three carbon atoms, each of which has a hydroxyl (-OH) group bound to it.

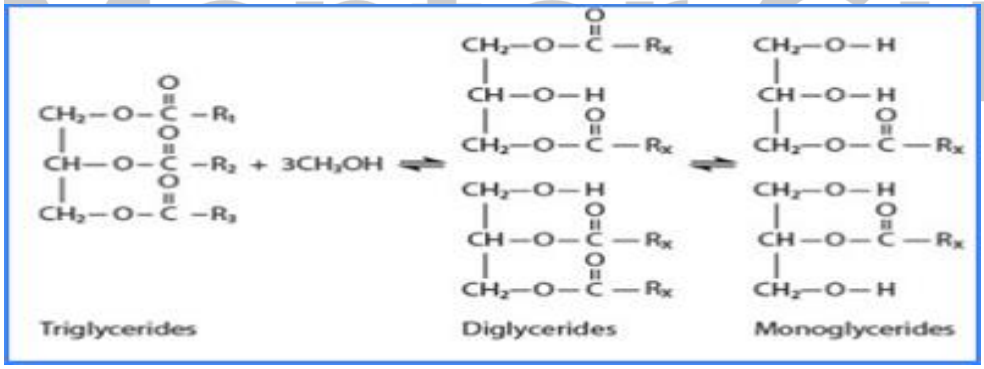
It is a simple polyol compound. It is a colourless, odourless, viscous liquid that is sweet-tasting and non-toxic.

Difference between Saturated and Unsaturated Fatty Acids

Basis for comparison	Saturated Fatty acids	Unsaturated Fatty acids
Meaning	Saturated fatty acids contain a single chain of carbon atoms with no double bond	Unsaturated fatty acids contain carbon chains with one or more double bonds.
Type of Bond	Hydrocarbon chain without double bond (only single bond).	Hydrocarbon chain with one or more double bonds (C=C).
Physical appearance	Solid at room temperature	Liquid at room temperature
Type of chain	Straight chain	Bend chains at double bond
Melting point	Relatively higher	Relatively lower
Sources to obtain	Animal fats, palm oil, coconut oil	Plant and vegetable oil, avocado, sunflower oil, walnuts, flax, canola oil and fish oil
Shelf life	They do not get spoil quickly and are long-lasting	They get spoil quickly

Types of Fatty Acids

1. **Monoglyceride:** Condensation of one fatty acid and glycerol.
2. **Diglyceride:** Condensation of two fatty acids and glycerol.
3. **Triglyceride:** Condensation of three fatty acids and glycerol.



Points to Remember

- Ester bonds: - In a fat molecule, the fatty acids are attached to each of the three carbons of the glycerol molecule with an ester bond through the oxygen atom.
- Usually, esters are derived from carboxylic acid and alcohol.