# Amino acids it’s functions

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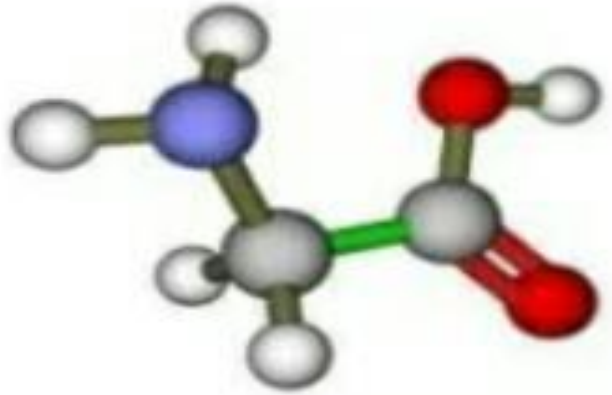
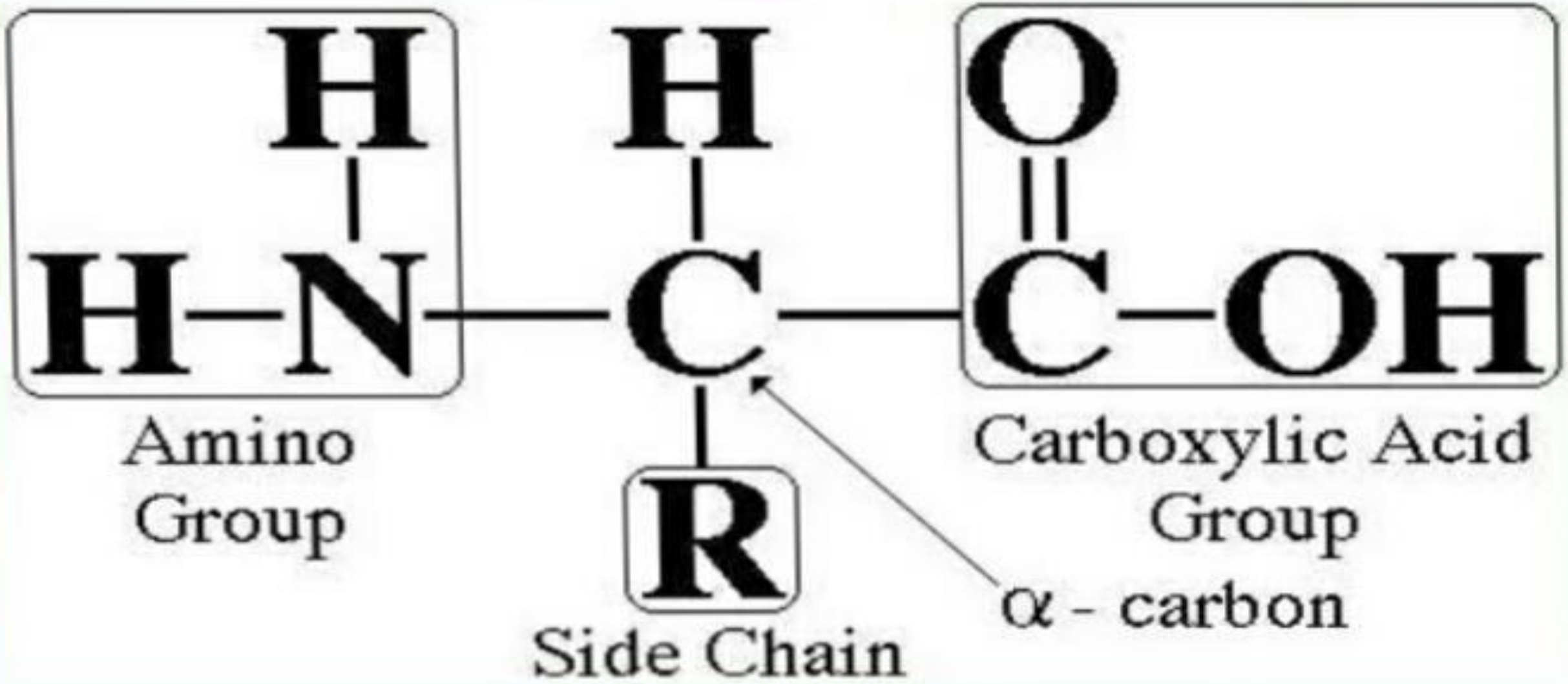


# What is amino acid?

- Amino acids are the molecules having one amino group , one carboxyl group, one H atom and one specific group (R group) attached to the central C atom.
- R group varies in structure, size , electric charge and influence the solubility of amino acid in water.
- The key elements of amino acids are C,N,O,H.
- Amino acids are basic structural **building blocks of protein.**

# Basic structure of amino acid



# Nutritional classification of amino acid

- Essential or indispensable amino acid
- Non-essential or dispensable amino acid amino acid

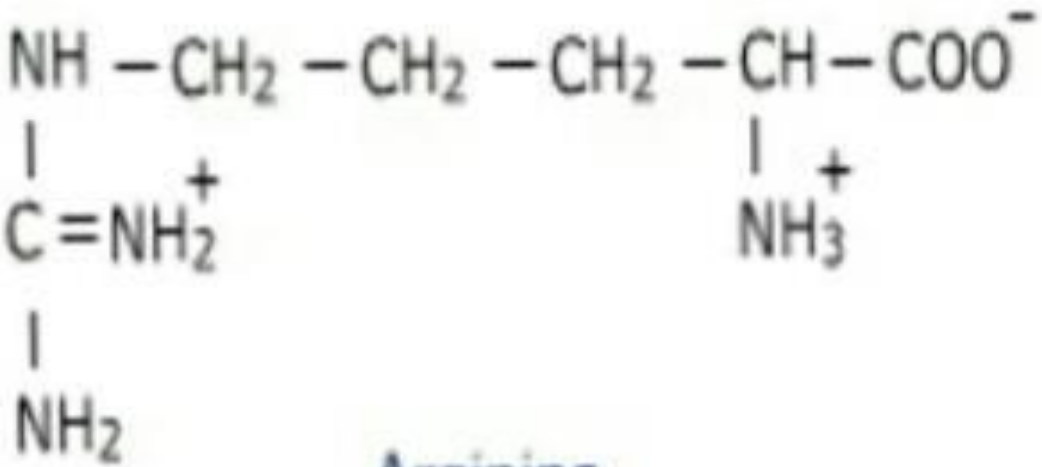
# Essential amino acid

- Essential amino acids are ***not synthesized by the body.***
- Need to be ***supplied through diet.***
- Required for proper growth and maintainance of individual.

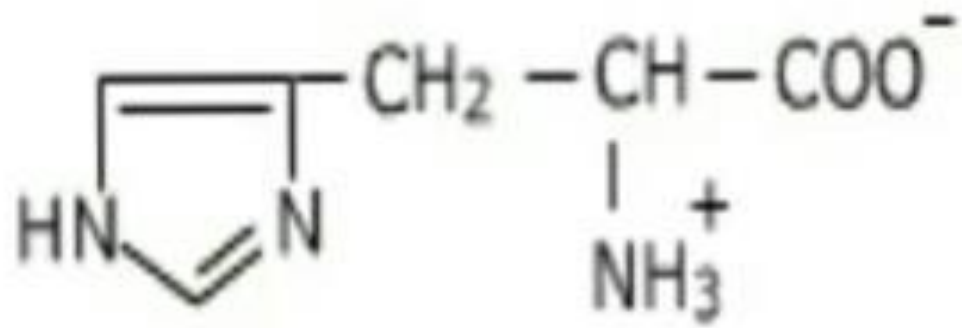
Arginine,Valine,Histidine,Isoleucine,Leucine, Lysine, Methionine, Threonine, Tryptophan, Phenylalanine

# Semi-essential amino acid

- **Arginine and Histidine can be synthesized by adults but not by growing children, hence these are considered as semi-essential amino acids.**



Arginine



Histidine

# Non-essential amino acid

- These **can be synthesized by the body** to meet the biological needs.
- need not to be consumed through the diet.

Glycine, Alanine, Serine, Cysteine, Aspartate, Asparagine, Glutamate, Glutamine, Proline, Tyrosine.

# Physical properties of amino acids

- **Solubility :** most of the amino acids are ***soluble in water but insoluble in organic solvents.***
- **Melting point:** Amino acids generally melt at high temperature , often **above 200° c.**
- **Taste:** Amino acids may be sweet(Gly , Ala, Val); tasteless (Arg, Ile);

**Monosodium glutamate(MSG ; *ajinamoto)* is used as flavoring agent in food industry.** In some individuals intolerant to MSG **Chinese restaurant syndrome** (flu like) is observed.

# Stereochemistry of Amino acids

## All AMINO ACIDS ARE OPTICALLY ACTIVE(EXCEPT **GLYCINE**)

- All amino acids (**except Glycine**) have one asymmetrical carbon or ***chiral carbon***, to which four different groups are attached(carboxyl group, amino group, hydrogen atom, R group)
- The mirror images of a molecule of amino acid are ***non-superimposable*** to each other.
- Amino acids ***do not have plane of symmetry.***

**Amphoteric properties of amino acids:** that is they have both basic acidic groups and so can act as base or acid.

Neutral amino acids (monobasic, monocarboxylic) exist in aqueous solution Zwitter ion" i.e. contain both positive and negative charge. Zwitter ion is electri neutral and can't migrate into electric field.

**Isoelectric point (IEP) =** is the pH at which the zwitter ion is formed. e.g of alanine is 6

## Chemical properties of amino acids:

## 1- Reactions due to COOH group:

-Salt formation with alkalis, ester formation with alcohols, amide formation with amines and decarboxylation

-**2- Reactions due toNH2 group:** deamination and reaction with ninhydrin reagent.

-Ninhydrin reagent reacts with amino group of amino acid yielding blue colored product. The intensity of blue color indicates quantity of amino acids present.

(A **zwitterion** formerly called a **dipolar ion**, is a molecule with two or more functional groups, of which at least one has a positive and one has a negative electrical charge and the net charge of the entire molecule is zero. Because they contain at least one positive and one negative charge, zwitterions are also sometimes called **inner salts**)

## 3- Reactions due to side chain (R):

**1- Millon reaction:** for tyrosine gives red colored mass

**2- Rosenheim reaction:** for trptophan and gives violet ring.

**3- Pauly reaction:** for imidazole ring of histidine: gives yellow to reddish product

# Functions of amino acids

4) Niacin, Serotonin and melatonin are synthesized from Tryptophan
5) Melanin, thyroid hormone, catecholamines are synthesized from Tyrosine
6) **GABA** (neurotransmitter) is synthesized from Glutamic acid
7) Nitric oxide, a smooth muscle relaxant is synthesized from Arginine.
8) Act as precursors for haem, creatine , Porphyrins, purines and pyrimidines.

# THANK YOU

# CONCLUSION

Amino acids are at the basis of all life processes, as they are absolutely essential for every metabolic process. Among their most important tasks are the optimal transport and optimal storage of all nutrients (i.e., Water, fat, carbohydrates, proteins, minerals and vitamins). The majority of diseases such as obesity, high-cholesterol levels, diabetes, insomnia, erectile dysfunction or arthritis can essentially be traced back to metabolic disturbances. This also applies to hair loss and serious cases of wrinkle formation. **The positive effects of amino acids on: Arthritis, Osteoporosis, Cholesterol, Diabetes, Fat-burning, Healthy skin, Hair loss, Sleep, Mind swings and Performance.**