

AMINO ACIDS



Amino Acids

Amino Acids are the building units of proteins. Proteins are polymers of amino acids linked together by Peptide bond.

There are about 300 amino acids occur in nature. Only 20 of them occur in proteins.

Structure of amino acids:

Each amino acid has 4 different groups attached to α - carbon (which is C-atom next to COOH). These 4 groups are : amino group, COOH gp, Hydrogen atom and side chain (R)

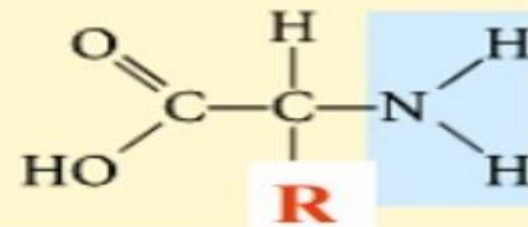


TABLE 5.1**Names and Abbreviations of the Standard Amino Acids**

Amino Acid	Three-Letter Abbreviations	One-Letter Abbreviations
Alanine	Ala	A
Arginine	Arg	R
Asparagine	Asn	N
Aspartic acid	Asp	D
Cysteine	Cys	C
Glutamic acid	Glu	E
Glutamine	Gln	Q
Glycine	Gly	G
Histidine	His	H
Isoleucine	Ile	I
Leucine	Leu	L
Lysine	Lys	K
Methionine	Met	M
Phenylalanine	Phe	F
Proline	Pro	P
Serine	Ser	S
Threonine	Thr	T
Tryptophan	Trp	W
Tyrosine	Tyr	Y
Valine	Val	V

CLASSIFICATION (ON THE BASIS OF STRUCTURE)

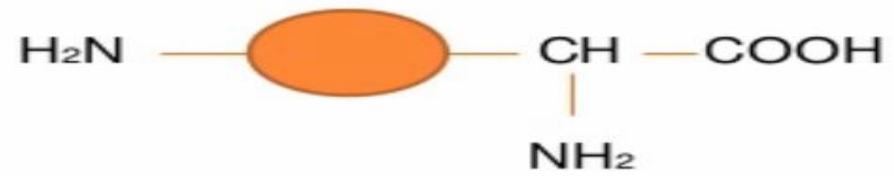
- Amino acids are classified as neutral, acidic, or basic according to no of amino group and carboxyl group in the molecule.
- **1) Neutral amino acids** - contain one amino group and one carboxyl group



- **2) Acidic amino acids** - contain one amino group and two carboxyl group



3) **Basic amino acids** – contain two amino groups and one carboxyl group.



CLASSIFICATION ON THE BASIS OF NUTRITION

- **Essential amino acids** – cannot be synthesized by the body. Therefore they must be present in our diet.

Arginine*

Histidine*

Isoleucine

Leucine

Valine

Lysine

Methionine

Threonine

Phenylalanine

Tryptophan

* Can be synthesized by adults but not by growing children. They are also called as **semi essential amino acids**.



- **Non essential amino acids** –

They are synthesized in our body. Hence they need not to be consumed in the diet.

Alanine

Asparagine

Aspartate

Glutamate

Glutamine

Glycine

Proline

Serine

Cysteine

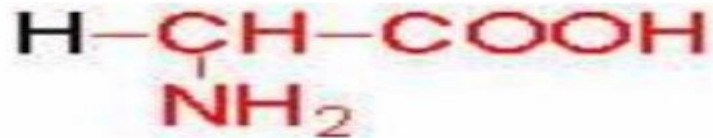
Tyrosine



PROPERTIES OF AMINO ACIDS

- **Solubility**: most of the amino acids are soluble in water and insoluble in organic solvents.
- **Melting point**: melt at higher temperature (above 200 ° c)
- **Taste**: **sweet** - glycine, alanine, valine
tasteless – leucine
bitter – arginine, isoleucine
- **Optical activity**: all the amino acids except glycine possess optical isomers due to presence of asymmetric carbon atom.

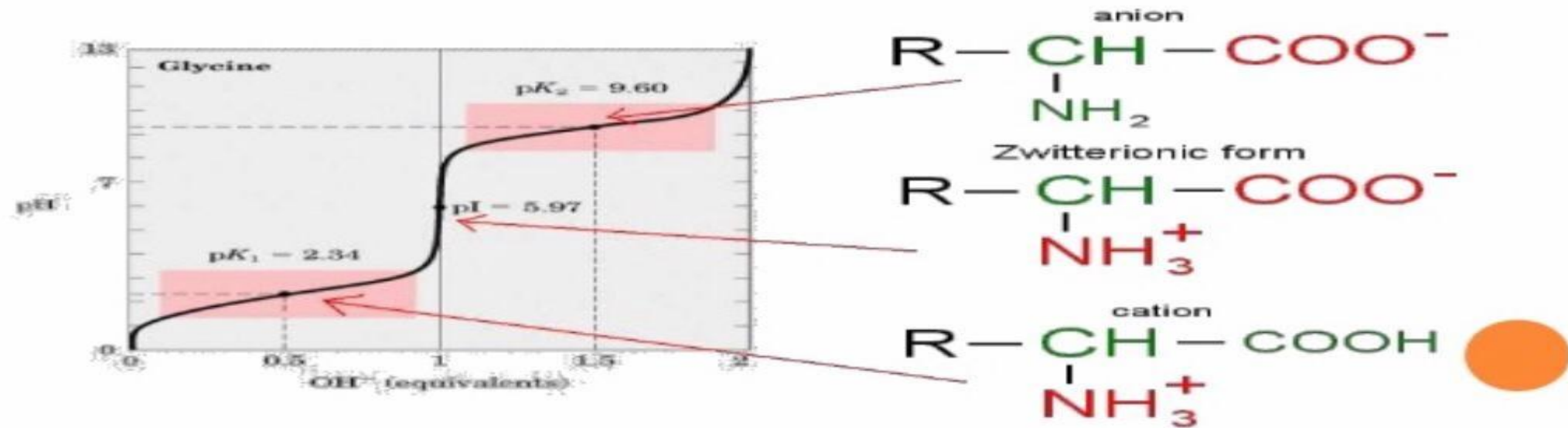
glycine



◦



- **Amino acids as ampholytes** : amino acids contain both acidic (-COOH) and basic (-NH₂) groups. They can donate a proton and accept a proton. Hence they are also called as ampholytes.
- **Zwitter ions** : Amino acids also exist in zwitter ion form. zwitter ion is a hybrid molecule that contain both positive as well as negative ionic groups. eg. leucine
 - at isoelectric ph - carries no net charge

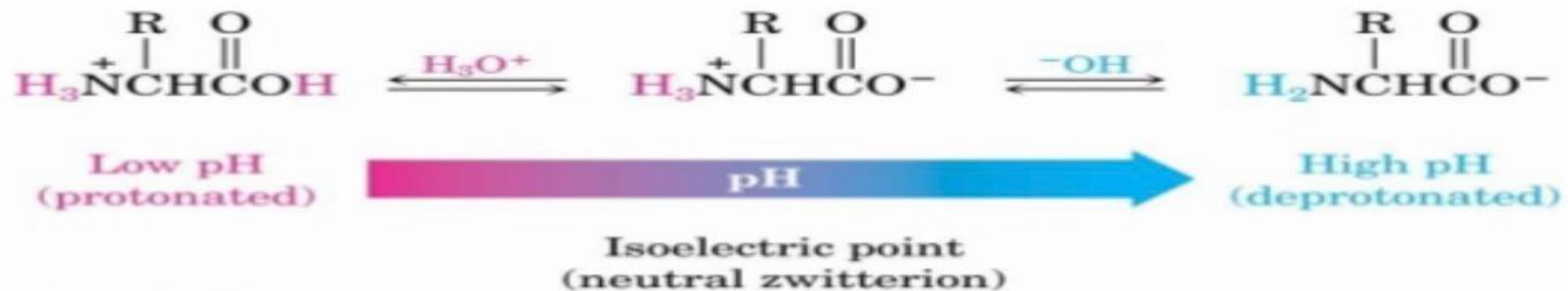


Zwitter ions or dipolar ion

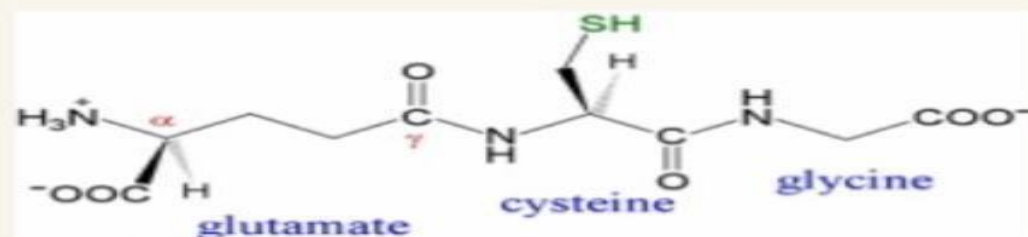
- The name **Zwitter** derived from the German word which mean hybrid.
- Zwitter ion is a hybrid molecule containing **positive and negative ionic group**.
- The **amino acids** rarely exists in a **neutral** form with free **carboxylic (-COOH)** and free **amino (-NH₂)** groups.
- In strongly **acidic pH** the amino acid are **positively charged**,
- in strongly **alkaline pH** it is **negatively charged**.
- Each amino acid has a **characteristics pH** at which it carries both **positive** and **negative** charge and Exist as **Zwitterions**.

Isoelectric pH

- pH at which amino acids exist as the **zwitter ion (neutral)** and carries no net charge.
- Thus molecule is electrically neutral.



What is Glutathione?



Glutathione is a very simple molecule that is produced naturally all the time in your liver. It is a combination of three simple building blocks of protein or amino acids – cysteine, glycine and glutamine.

It contains –SH group that acts like flypaper and all the bad things in the body stick onto it, including free radicals and toxins like mercury and other heavy metals.

Poor diet, pollution; toxins, medications, stress, trauma, aging, infections and radiation all deplete your glutathione.

This leaves you susceptible to unrestrained cell disintegration from oxidative stress, free radicals, infections and cancer. And your liver gets overloaded and damaged, making it unable to do its job of detoxification.

Glutathione production in the body begins to slow down after around 25 years of age. Depleted level of glutathione creates a condition where the body has to decide whether to use it for supporting immune system or for muscular system or for any other function.

GLUTATHIONE BENEFITS

- Increases **energy**
- Slows down the **aging process**
- Reduces **muscle & joint discomfort**
- Strengthens **immune system**
- Detoxifies the **liver & cells**
- Improves **mental focus & clarity**
- Improves **quality of sleep**
- Reduces the **effects of stress**
- Improves the **skin**
- Athletic **performance & recovery**

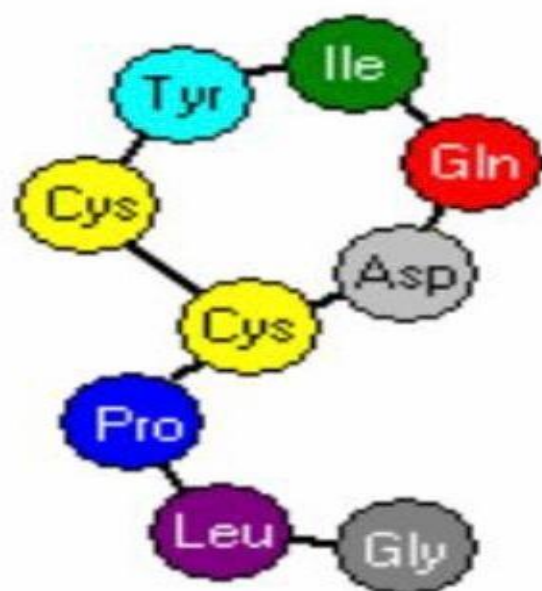


* These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.

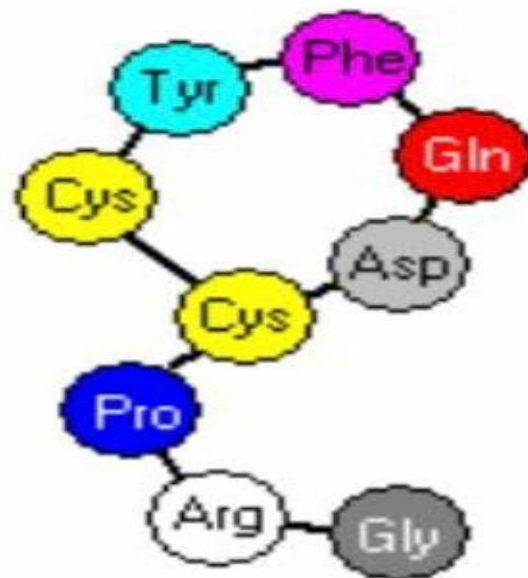
Oxytocin and Vasopressin

Site of Release	Hormone	Target	Effect
Hypothalamus (Posterior Pituitary)	Oxytocin	Uterus Mammary glands	Myometrial contraction Milk ejection
Hypothalamus (Posterior Pituitary)	ADH (Vasopressin)	Kidneys Vascular smooth muscle	Water reabsorbtion Vasoconstriction

Chemical Structures of Oxytocin and Vasopressin



Oxytocin



Antidiuretic hormone