

Topic: Amino Acid(Structure & Classification)

Class: B.Sc Part –III (Hons.)

Paper- V

Group – A

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Saroj**

Department: Zoology

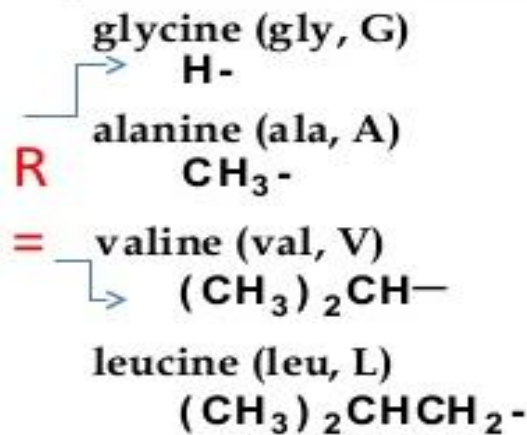
**College: Dr. L. K. V. D College, Tajpur,
Samastipur**

Classification of Amino Acids

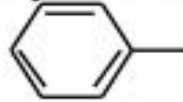
- Classification based on side-chain structure:
 - – Non-polar amino acids.
 - – Polar, uncharged amino acids.
 - – Acidic amino acids.
 - – Basic amino acids.
- Other side chain structural classifications:
 - – Aromatic, cyclic, hydroxyl, and thiol amino acids. 7

Classification of Amino Acids

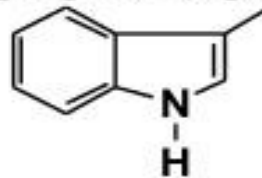
Nonpolar side chains (predominant form at pH 7.0)



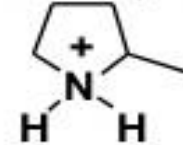
phenylalanine (phe, F)



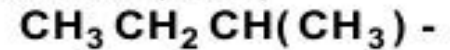
tryptophan (trp, W)



proline (Pro, P)



isoleucine (ile, I)



methionine (met, M)



Polar side chains (predominant form at pH 7.0)

asparagine (asn, N)



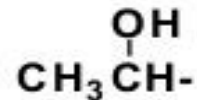
serine (ser, S)



glutamine (glu, G)



threonine (thr, T)



Classification of Amino Acids

Acidic side chains (predominant form at pH 7.0)

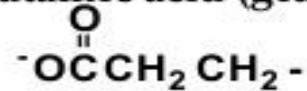
aspartic acid (asp, D)



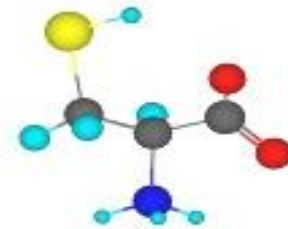
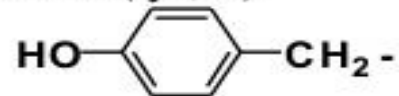
cysteine (cys, C)



glutamic acid (glu, E)

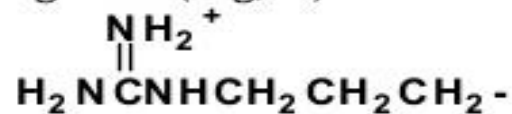


tyrosine (tyr, Y)

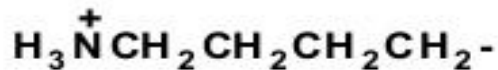


Basic side chains (predominant form at pH 7.0)

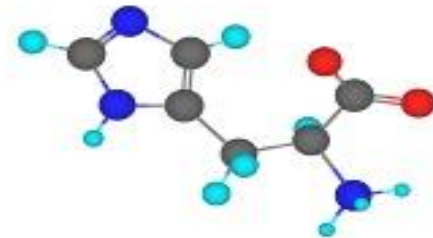
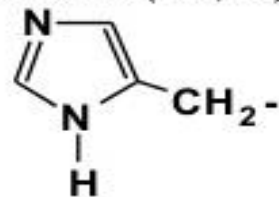
arginine (arg, R)



lysine (lys, K)



histidine (his, H)



Essential Amino Acids

- An essential amino acid is an amino acid that cannot be synthesized itself by the organism (usually referring to humans), and therefore must be supplied in the diet.
- 10 amino acids are essential amino acid
- They are - arg, his, ile, leu, lys, met, phe, thr, trp, val
- Must obtain from the diet
- An adequate diet must contain these essential amino acids. Typically, they are supplied by meat and dairy products
- Essential amino acids help the body function and regulate neurotransmitters, chemicals in the brain that control mood and behavior.
- A lack of essential amino acids can cause emotional or physical difficulties and lead to health disorder

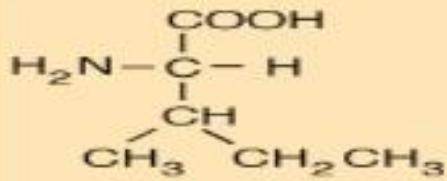
List of Essential & Nonessential Amino Acid

Essential

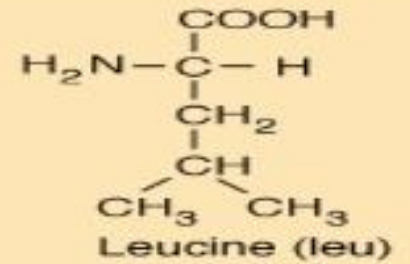
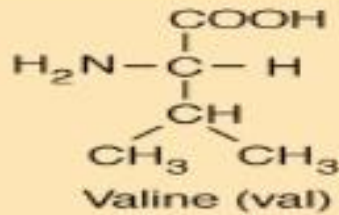
Histidine
Isoleucine
Leucine
Lysine
Methionine
Phenylalanine
Threonine
Tryptophan
Valine
Arginine

Nonessential

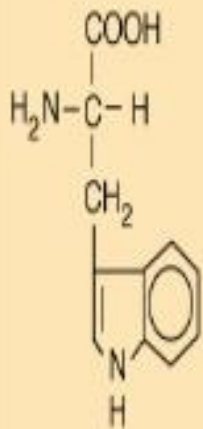
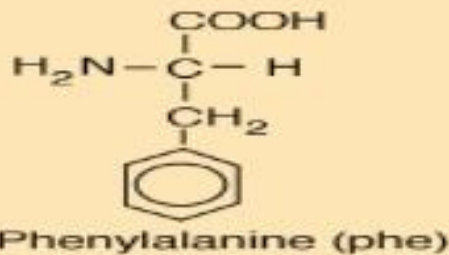
Alanine
Aspartate
Cysteine
Glutamate
Glutamine
Glycine
Proline
Serine
Tyrosine
Asparagine



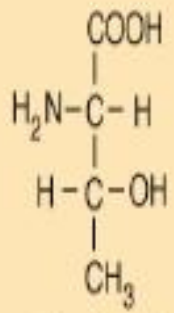
Isoleucine (ile)



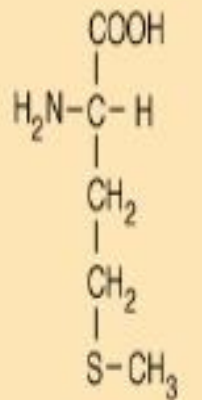
Essential amino acids with hydrocarbon R-groups



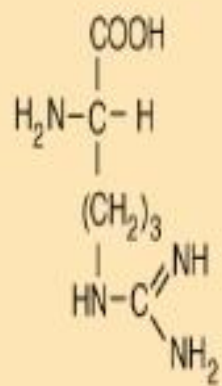
Tryptophan (trp)



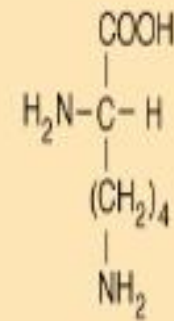
Threonine (thr)



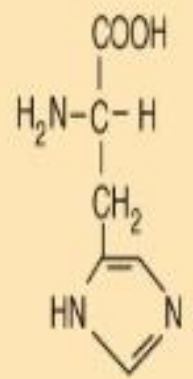
Methionine (met)



Arginine (arg)



Lysine (lys)



Histidine (his)

Essential amino acids with neutral R-groups

Essential amino acids with acid or base R-groups

- Although α -amino acids are commonly written in the unionized form, they are more properly written in the zwitterion (internal salt) form (Germ. Zwitter means hybrid)
- Both the $-\text{NH}_2$ and the $-\text{COOH}$ groups in an amino acid undergo ionization in water.
- At physiological pH (7.4), a zwitterion forms
 - Both + and – charges
 - Overall neutral
 - Amphoteric
- Amino group is protonated
 - Carboxyl group is deprotonated
- Soluble in polar solvents due to ionic character