

**Topic: Amino Acid(Structure & Classification)**

**Class: B.Sc Part –III (Hons.)**

**Paper- V**

**Group – A**

**Faculty Name : Dr. Kumari Sushma  
Saroj**

**Department: Zoology**

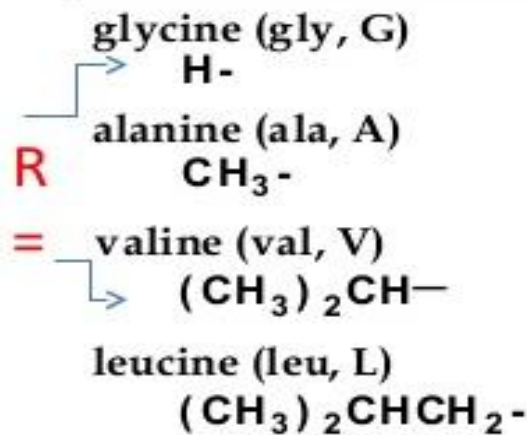
**College: Dr. L. K. V. D College, Tajpur,  
Samastipur**

# Classification of Amino Acids

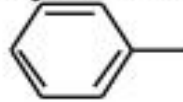
- Classification based on side-chain structure:
  - – Non-polar amino acids.
  - – Polar, uncharged amino acids.
  - – Acidic amino acids.
  - – Basic amino acids.
- Other side chain structural classifications:
  - – Aromatic, cyclic, hydroxyl, and thiol amino acids. 7

# Classification of Amino Acids

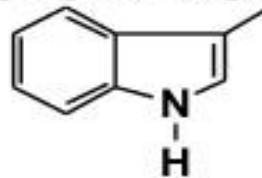
## Nonpolar side chains (predominant form at pH 7.0)



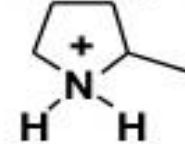
phenylalanine (phe, F)



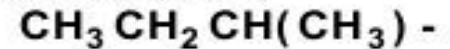
tryptophan (trp, W)



proline (Pro, P)



isoleucine (ile, I)



methionine (met, M)



## Polar side chains (predominant form at pH 7.0)

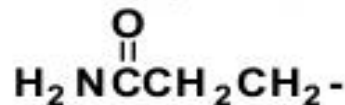
asparagine (asn, N)



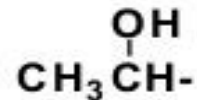
serine (ser, S)



glutamine (glu, G)



threonine (thr, T)



# Classification of Amino Acids

## Acidic side chains (predominant form at pH 7.0)

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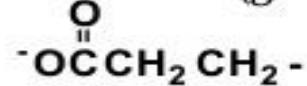
aspartic acid (asp, D)



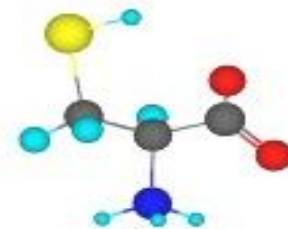
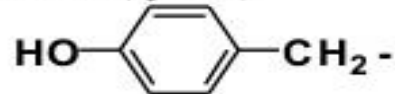
cysteine (cys, C)



glutamic acid (glu, E)



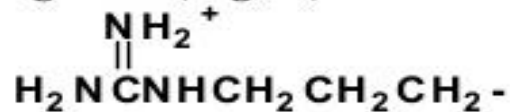
tyrosine (tyr, Y)



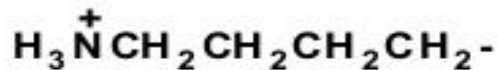
## Basic side chains (predominant form at pH 7.0)

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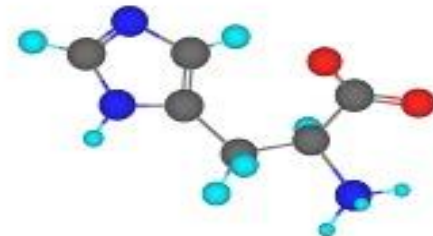
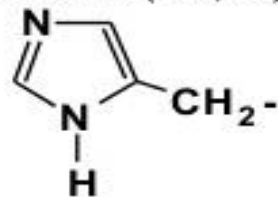
arginine (arg, R)



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



- Although  $\alpha$ -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