BIOCHEMISTY

Course No.-DTC-111, Credit Hours – 2 (1+1)

AMINO ACIDS

BINITA RANI
ASSOCIATE PROFESSOR (DAIRY CHEMISTRY)
FACULTY OF DAIRY TECHNOLOGY
S.G.I.D.T., BVC CAMPUS,
P.O.- BVC, DIST.-PATNA-800014

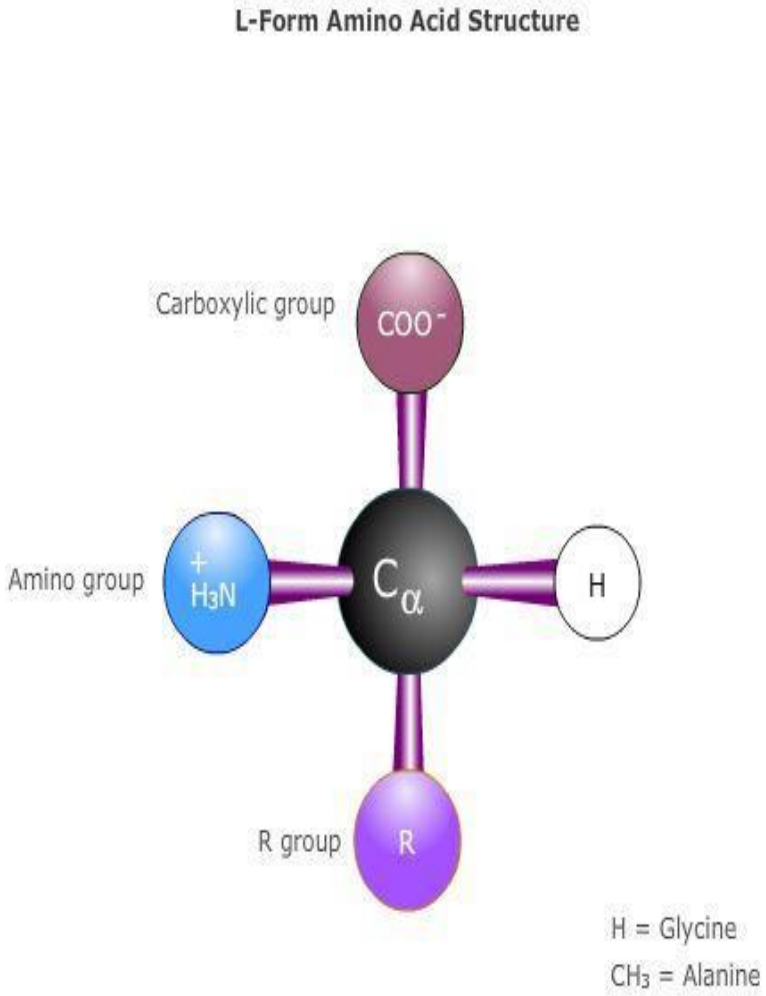
Introduction

- Amino acid - both **amino** and **carboxyl** functional groups.
- H2NCHRCOOH - **Alpha-amino acids** general formula
- **α–carbon -** to which **t**he amino and carboxylate groups are attached to
- Amino acids => **building blocks** of proteins => classified into
  - **essential** and
  - **non-essential**
  - **Twenty** amino acids are found => **eight** are essential .
- Situations in which adequate consumption of amino acids becomes essential
  - during early development and maturation
  - pregnancy, lactation, or
  - injury (a burn, for instance).
- **Complete protein source -** all the essential amino acids and incomplete protein source - lacks one or more.

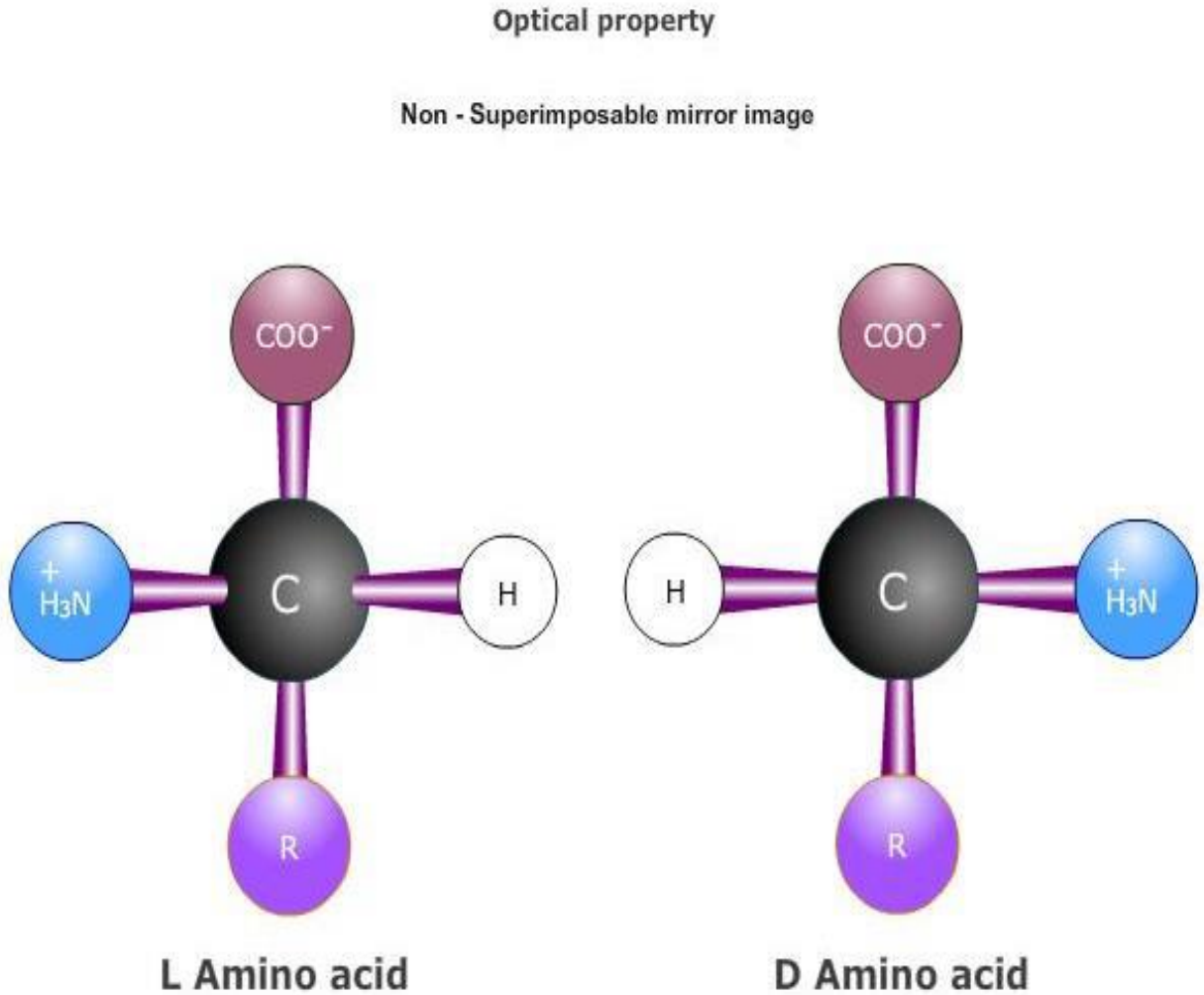
Optical Property

- Protein - Twenty types of amino acids
- one- or three-letter abbreviations for each amino acid used => amino acid representation in peptides.
- All amino acids have **asymmetric** carbon so they are **optically active,** except glycine
- Amino acids can be
  - dextrorotatory or
  - levorotatory

  depending upon the **rotation of plane polarized light**
- **L-amino acids** representative of **majority** of amino acids found in proteins.
- D-amino acids - produced by exotic sea-dwelling organisms
- The L and D convention for amino acid configuration refers to optical activity of the glyceraldehyde isomer from which the amino acid is synthesized rather than the optical property of the acid itself (L-glyceraldehyde is levorotary; D-glyceraldehyde is dextrorotary)



General structure of amino acid



Non superimposable Mirror images of Amino Acids

Zwitterions

- At **the isoelectric point**, protonated **ammonium groups** and deprotonated **carboxylate groups** are **equal**, resulting in a **net neutral charge** and formation of Zwitterions

- Zwitterion can behave as both a **base** as well as an **acid**.

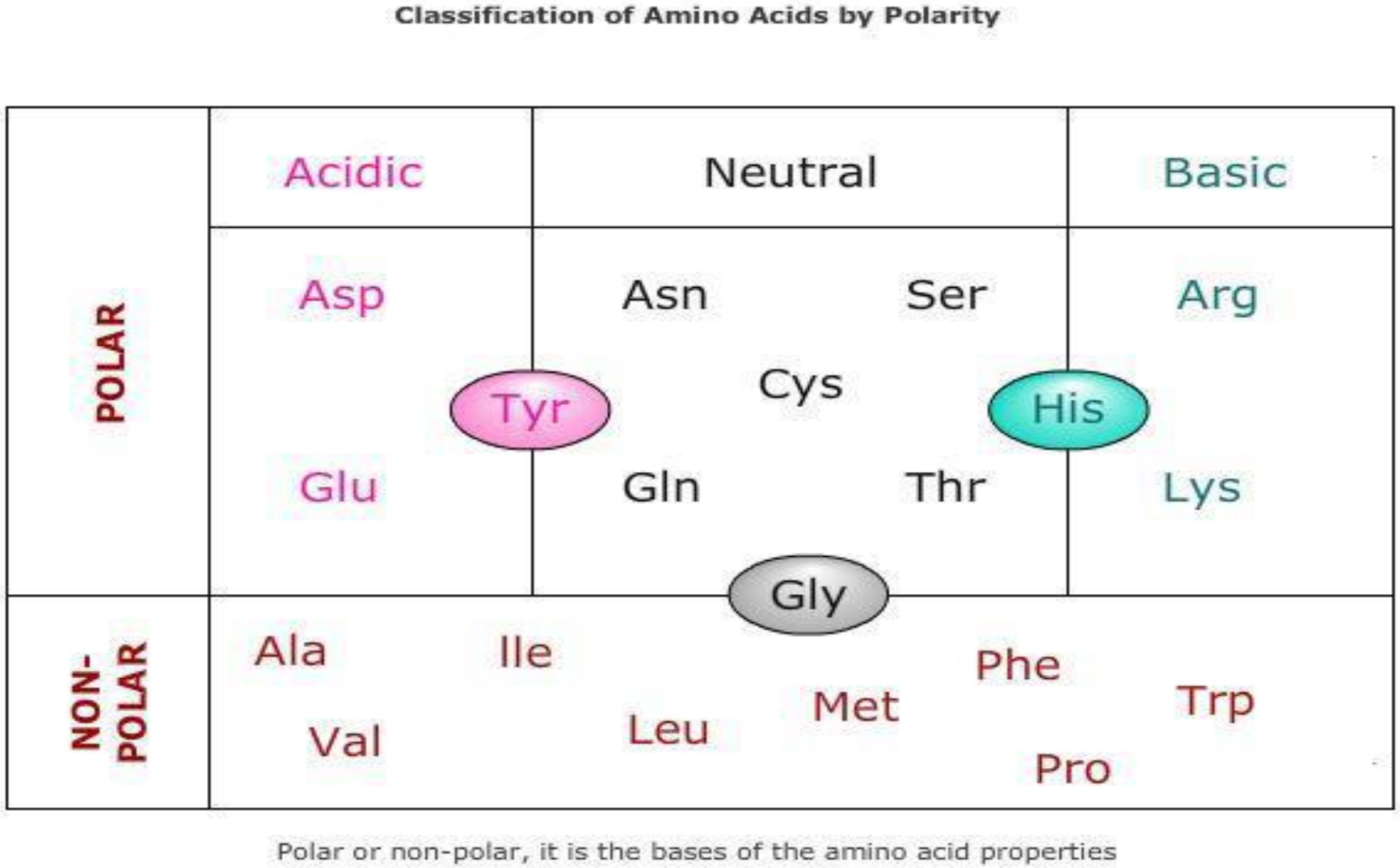
- For glycine, the isoelectric point is arithmetic mean of the two pKa values, because of absence of an ionizable group in its side chain.

- Glycine has a net negative charge at pH > pI. => move towards the anode

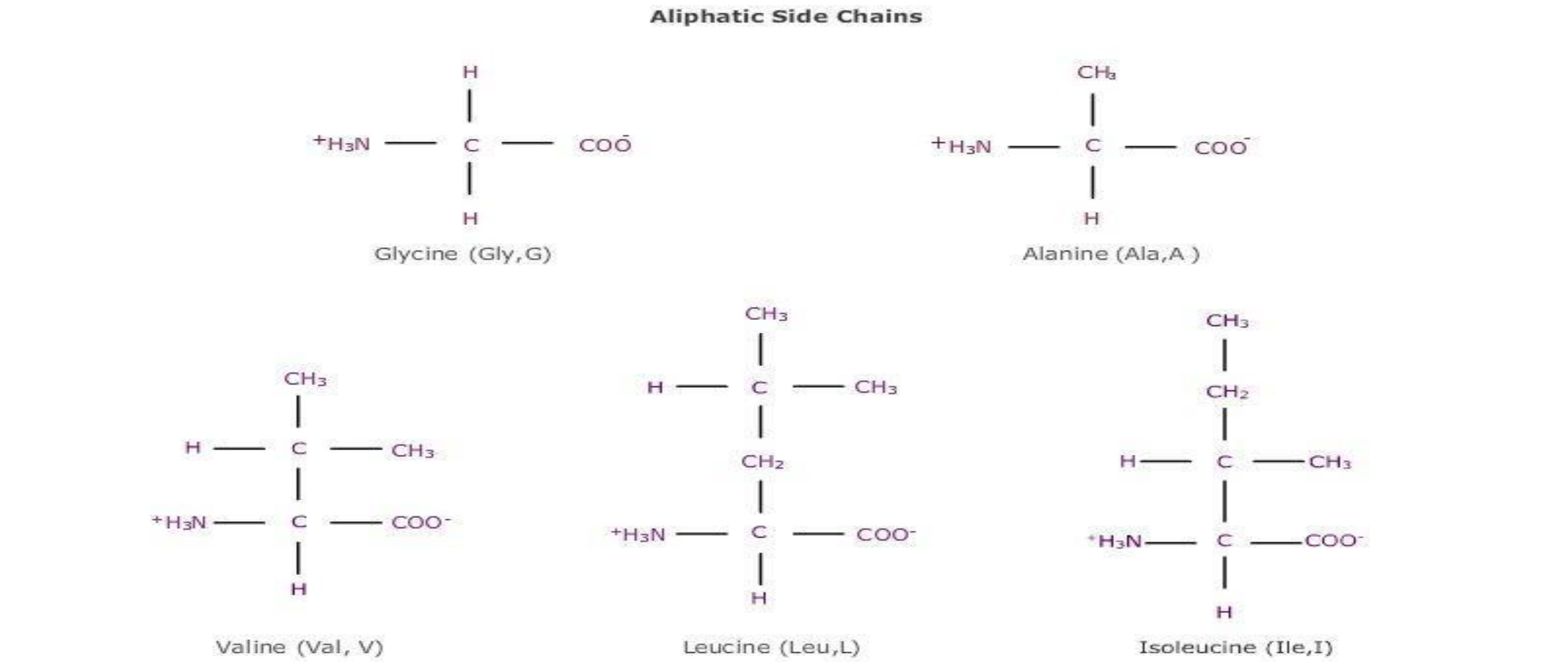
- At pH < pI, glycine has a net positive charge => move toward the cathode

Classification of Amino acids

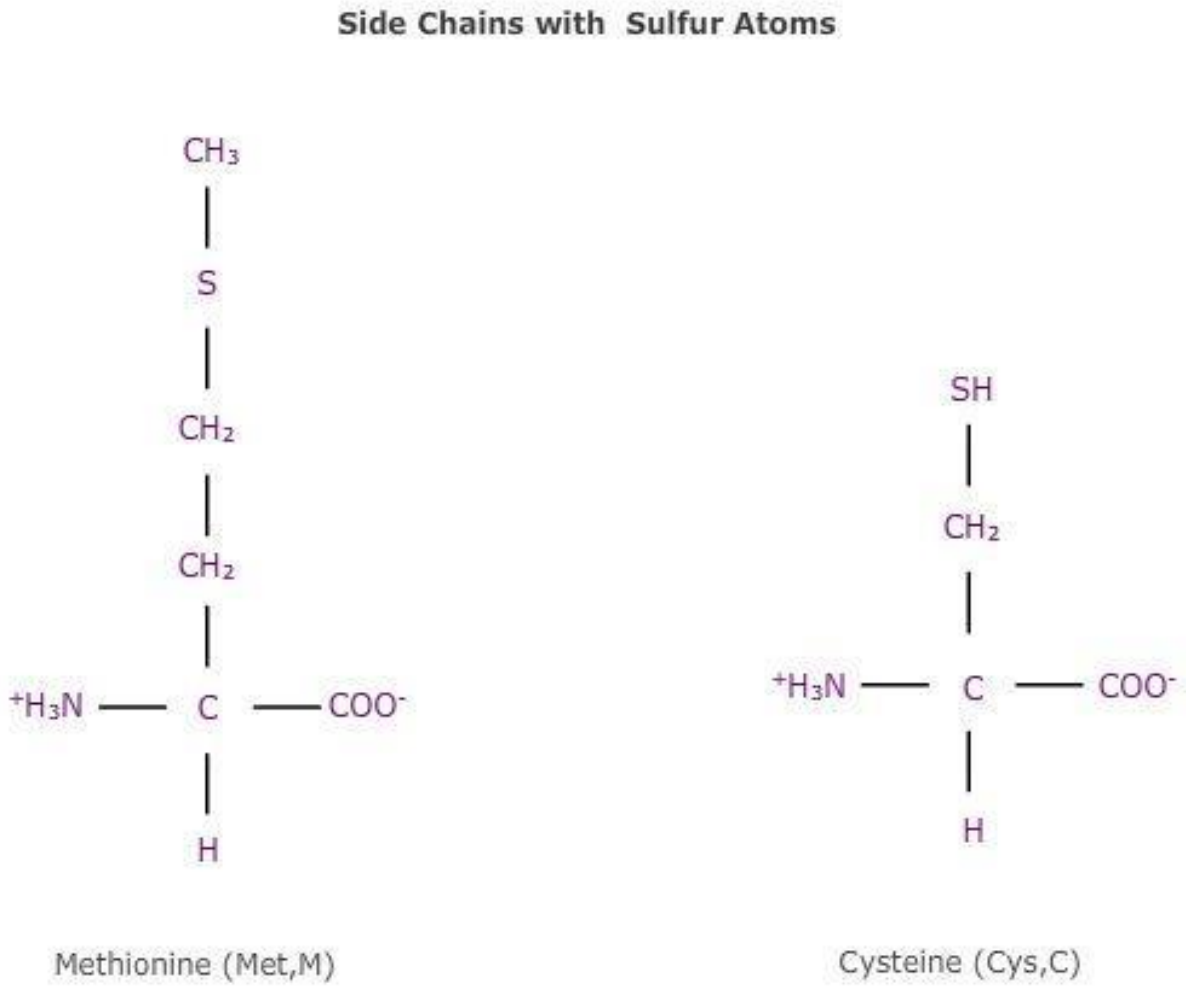
As acidic, basic, aliphatic, aromatic, or sulfur-containing based on the R groups properties.



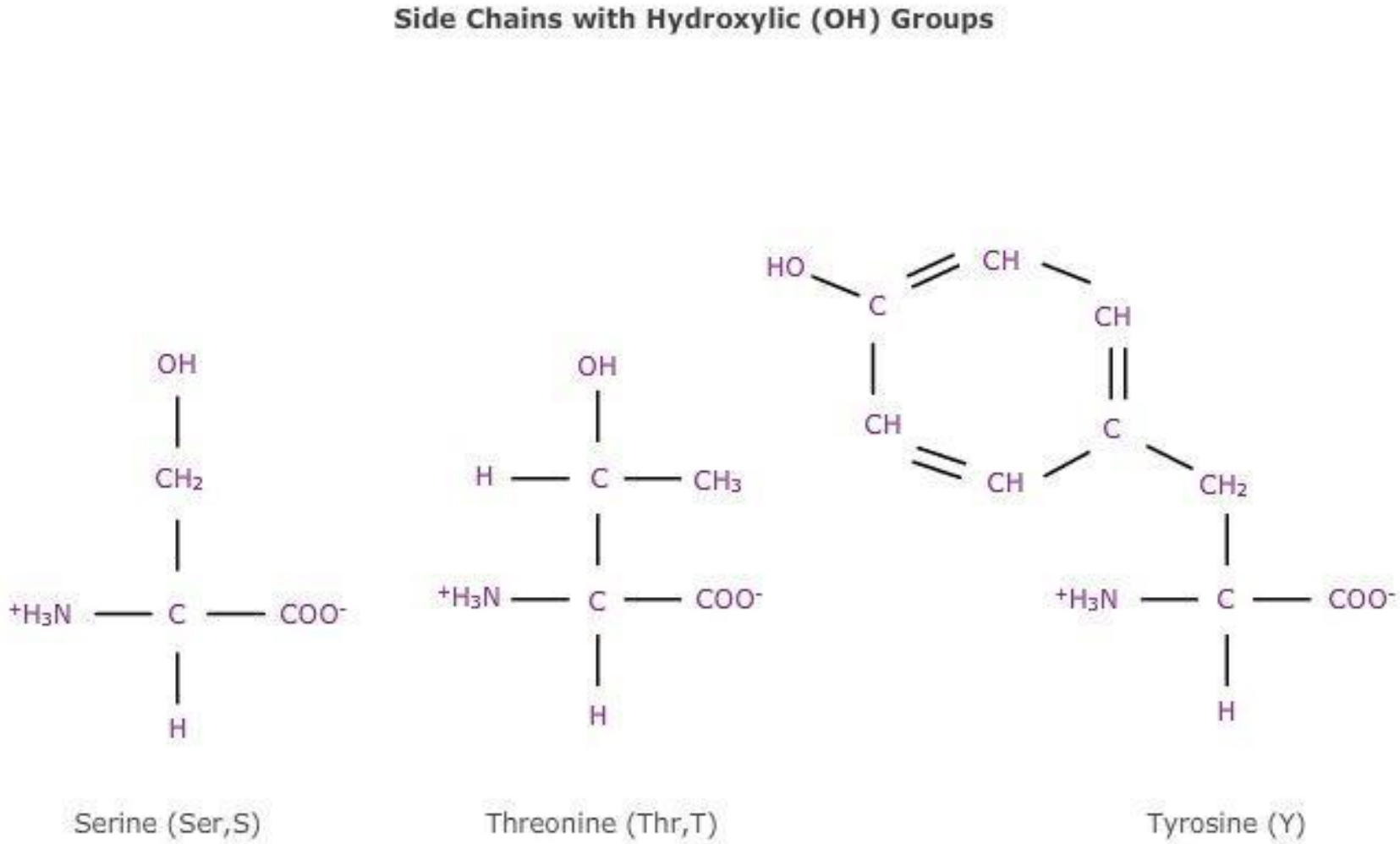
Amino acids with aliphatic side chains



Amino acids side chains with sulfur atoms

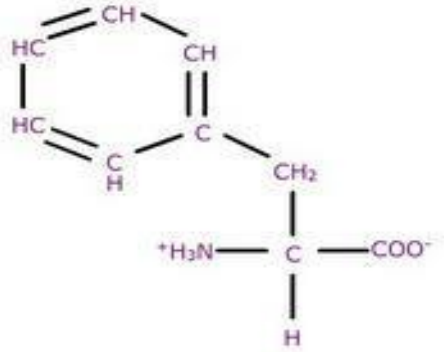


Amino acids side chains with hydroxylic (OH) groups

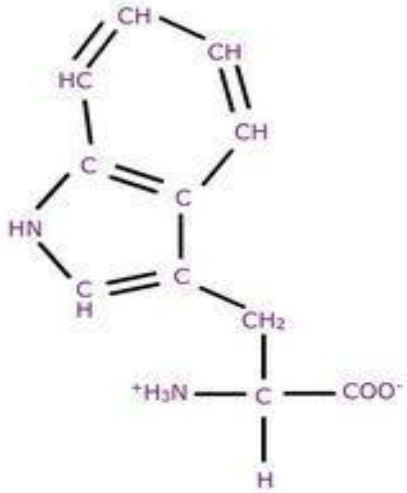


Amino acids with aromatic rings

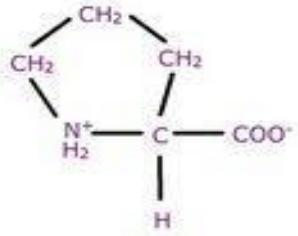
Side Chains with Aromatic Rings



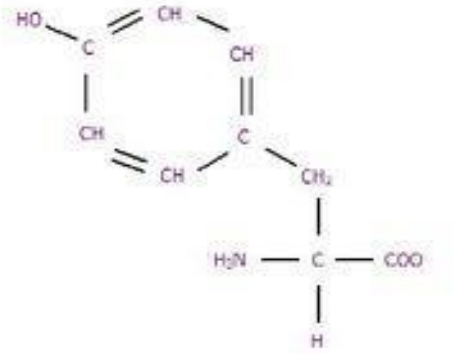
Phenylalanine (Phe,F)



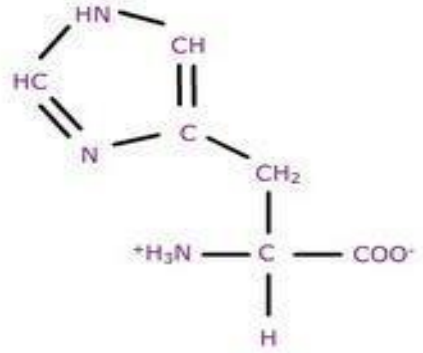
Tryptophan (Trp,W)



Proline (Pro,P)

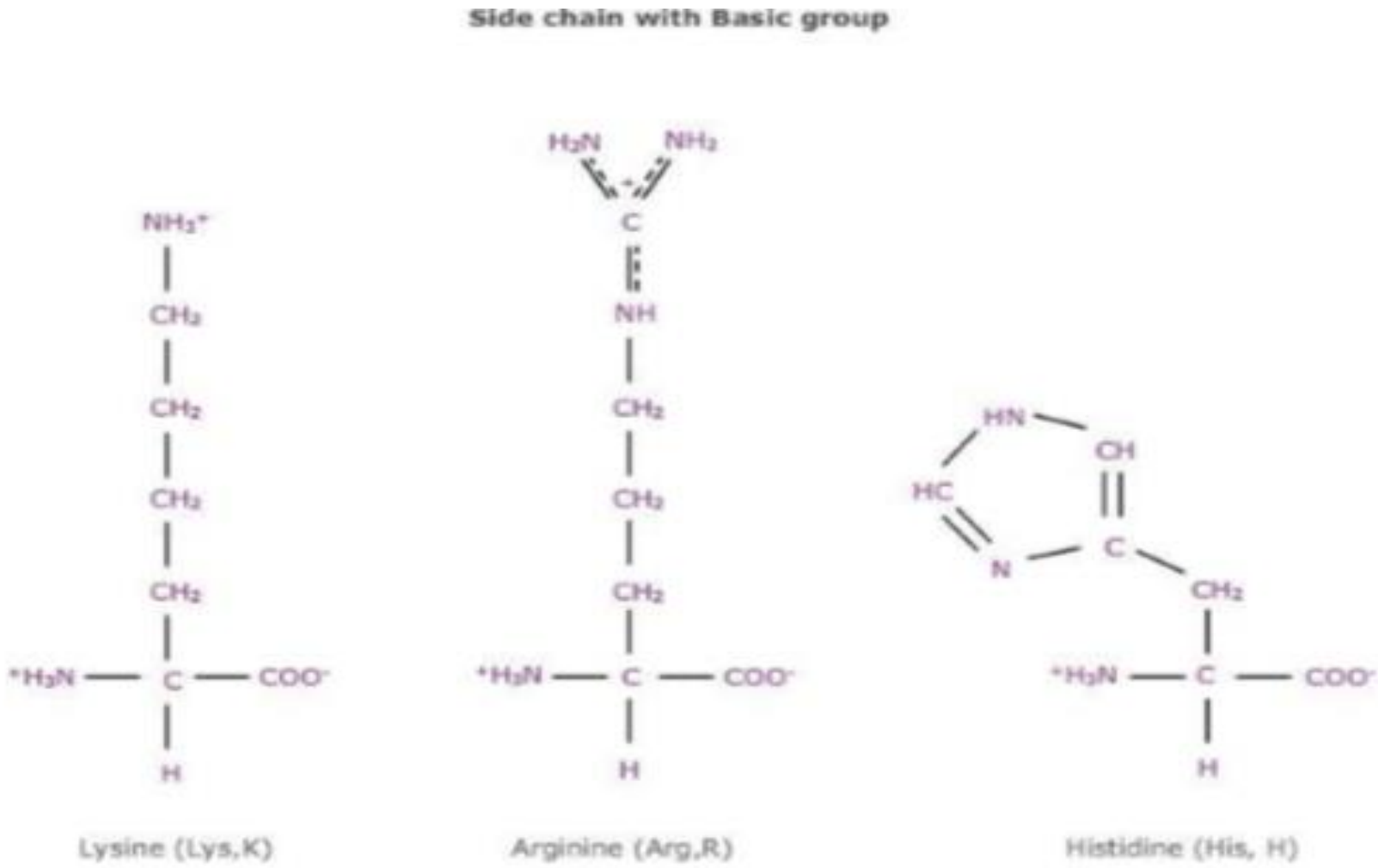


Tyrosine (Tyr, Y)



Histidine (His, H)

Amino acid side chain with basic group



Amino acids side chains with acidic groups or their amides