

# BIO TEAM 429

إعداد:

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تم إعداد وتنسيق المذكره على أساس تبسيط المعلومات وترتيبها بوضع الجداول والرسوم التخطيطيه على قدر المستطاع ووضعتها على هيئة أسئلة مع الأجوبه من أجل سهولة المذاكره والإستفاده القصوى

مع ذلك.... هذا لا يمنع من الرجوع إلى الكتاب كمصدر أساسي للمذاكره

مع تمنياتنا للجميع بالتوفيق والنجاح

ولا نرجوا من عملنا هذا إلا الدعاء لنا بالتوفيق

# Amino Acids

## In Nature:

There are more than  
300 A.A

## Mammalian protein:

20 A.A (only A.A  
that are coded for  
DNA the genetic  
material in the cell)

## 1-What are Amino Acids

- ✚ Amino acids are the building blocks of protein.
- ✚ A.A joined together by peptide bond.

## 2-Amino Acids composed of:

- ✚  $\alpha$ - carbon atom, carboxylic group, primary amino group (except for proline, which has a secondary amino group) & variable side chain group (R).

## Note:

- ✚ All A.A have asymmetrical carbon except for Glycine (the smallest A.A).
- ✚ All 20 A.A have a primary amino group except proline (has a secondary amino group).

## 3-what do we mean by asymmetrical carbon?

- ✚ The  $\alpha$ -carbon of each A.A is attached to 4 different groups & therefore it is a chiral or optically active carbon.

## 4-why the $\alpha$ -carbon of Glycine is not asymmetrical carbon?

- ✚ Because it's  $\alpha$ -carbon has 2 hydrogen substituents and, therefore, is optically inactive.

## 5-The advantages of asymmetrical carbon:

- ✚ 1-stereoisomers = (mirror image).

- ✚ Exist in 2 forms, that are mirror image for each other:

★ L-amino acid.

★ D-amino acid.

**Note:**

All amino acids found in proteins are L-amino acid

But, the D-amino acids are found in:

- some antibiotics
- plant
- bacterial cell walls

**2-plane polarized light:**

All A.A are optical active except Glycine, they rotate the plane of polarized light in a polarimeter:

L-amino acid  $\Rightarrow$  rotate the polarized light to the left (levo-rotatory).

D-amino acid  $\Rightarrow$  rotate the polarized light to the right (dextro-rotatory).

**What does it mean Zwitterion?**

Is the isoelectric form of A.A that is, it has an overall charge of zero.

A.A that contain:

Basic amino group  $\Rightarrow$  proton acceptor

Acidic carboxylic group  $\Rightarrow$  proton donor

**Note:**

-At physiological pH almost (7.4):

Amino group  $\Rightarrow$  protonated (gain H atom) to form  $\text{NH}_3^+$

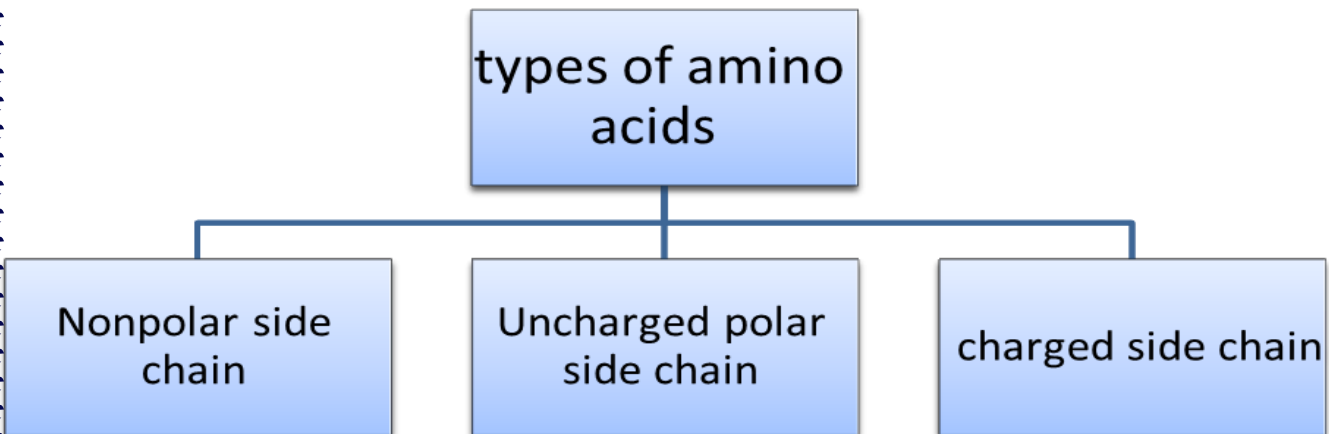
Carboxyl group  $\Rightarrow$  dissociated (lose H atom) to form  $\text{COO}^-$

-Each of the acidic & basic amino acids contains an ionizable group in its side chain R

-Amino terminus (N-terminus)  $\Rightarrow$  A.A with free amino group.

-Carboxyl terminus (C-terminus)  $\Rightarrow$  A.A with free carboxylic group.

-amino acids can be polymerized to form chain, polymers are composed of 2-10 or more aa known as di, tri, oligo or poly peptides.



-Glycine

-Alanine

-Valine

-Leucine

-Isoleucine

-Phenylalanine

-Tryptophan

-Methionine

-Proline

-Asparagine

-Glutamine

-Aysteine

OH in side chain

-Serine

-Threonine

-Tyrosine

Acidic side chain:

-Aspartic acid

-Glutamic acid

Basic side chain:

-Histidine

-Lysine

-Arginine

**PH:** the concentration of proton in aqueous solution.

**PK:** (dissociate constant): PH at which 50% of acid is dissociated.

**Pi:** PH at which net charge is zero.