University of Mosul
Lecture No.: 4
College of Veterinary Medicine
Date:
Unit of Scientific Affairs
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Lecture title: Properties of Amino acids

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Summary: **Properties of Amino acids include physical and chemical**

Physical Properties include:

1. Amino acids are colorless, crystalline solid.

2. All amino acids have a high melting point greater than 200 ^{0}C

3. Solubility: They are soluble in water, slightly soluble in alcohol, and dissolve with difficulty in methanol and ethanol (R-group of amino acids and pH play important role in solubility).

4. On heating to high temperatures, they decompose.

5. Have absorbance at 280 nm

Chemical Properties

1. **Zwitterion property**

What is Zwitter ion?

zwitterions, also known as dipolar ions, are chemical species containing positive and negative charges within the same molecule.

Because of this, it can act as both an acid and a base in a chemical reaction. The word "Zwitter" comes from the German word for "hybrid" or "mixed."

A zwitterion which at least one has a positive and one has a negative electrical charge. The net charge of the entire molecule is zero.

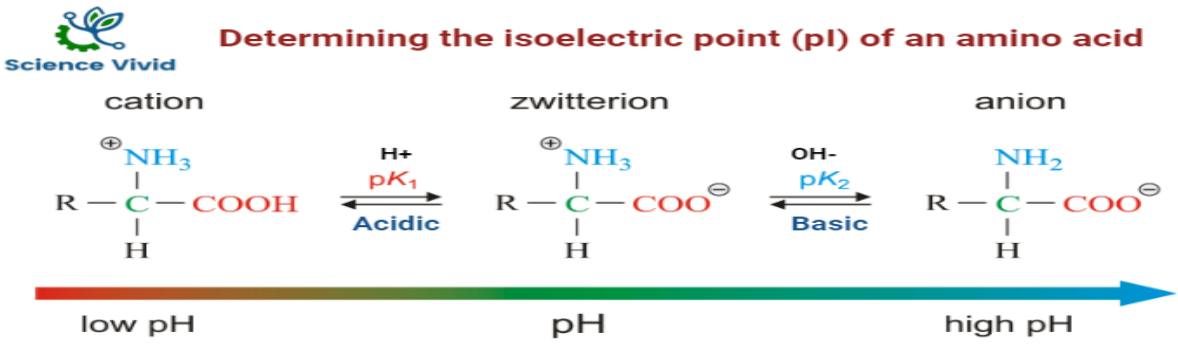
Amino acids are the best-known examples of zwitterions. Because they contain an amine group (basic) and a carboxylic group (acidic).

Isoelectric point (PI)

Define

The isoelectric point (pI) is defined as: **the pH at which the net charge of an amino acid molecule(the positive charges and negative charges to be exactly equal) is equal zero**. (**+ and - = Zero charge)**

Accordingly, amino acids are positively charged at a pH below their pI and negatively charged at a pH above their pI



2.- Amphoteric properties of amino acids :

In aqueous solution the carboxyl group of an amino acid can lose a proton and the amino acid group can accept a proton to give a dipolar ion known as zwitter ion. Therefore in zwitter ionic form the amino acid can act both as an acid and as a base. Thus amino acid show amphoteric behaviour.

Amino acids are amphoteric in nature acts as both acids and base due to:

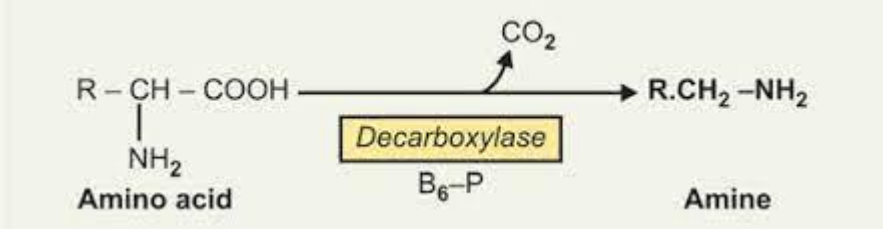
a- Amine group present
b- Carboxylic group

3 – Decarboxylation of amino acids : (elimination of CO2)

Decarboxylation is the reaction by which CO2 is removed from the COOH group of an amino acid as a result an amine is formed.

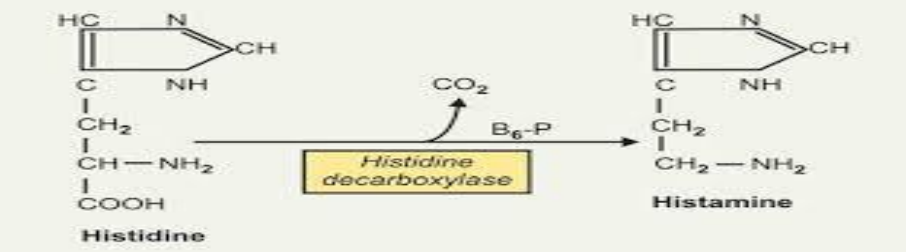
The reaction is catalysed by the enzyme decarboxylase, which requires pyridoxal-P (B6-PO4) as coenzyme. Tissues like liver, kidney, brain possess the enzyme decarboxylase and also by microorganisms of intestinal tract.

Commonly example :



Decarboxylation of amino acids example :

a- Histidine → Histamine + CO2 (Histamine regulation of vasodilatation and bronchoconstriction. In addition, it can also serve as a neurotransmitter)



b- Tyrosine →Tyramine + CO2 (Tyramine elevates blood pressure)