

The background of the cover features a faint, light-colored molecular structure composed of interconnected circles and lines, resembling a network or a complex organic molecule, set against a dark grey background.

# CHAPTER 5

# AMINO ACIDS

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## 5.1 GENERAL PROPERTIES OF AMINO ACIDS

The key elements of an amino acid are **carbon**, **hydrogen**, **oxygen**, and **nitrogen**. Amino acids are alpha amino acid that contains an **amino** group, a **carboxylic acid** group and a side-chain that varies with different amino acids. The alpha amino acid has the following structure (Figure 5.1).

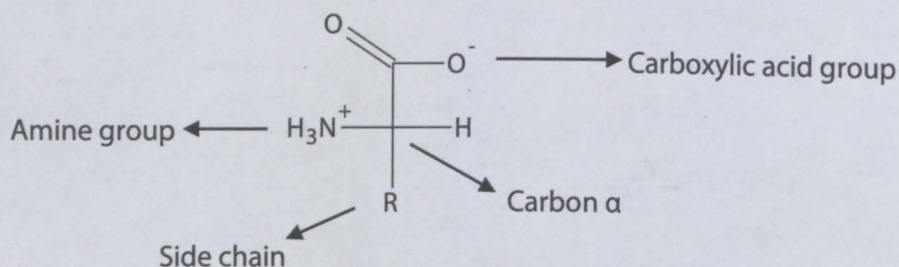


Figure 5.1: Generic structure of an amino acid.

In a neutral solution (pH 7), the carboxyl group exists as  $\text{-COO}^-$  and the amino group as  $\text{-NH}_3^+$ . Because the resulting amino acid contains one positive and one negative charge, it is a neutral molecule called a zwitterion. Amino acids are also chiral molecules. With four different groups attached to it, the  $\alpha$ -carbon is said to be asymmetric. The two possible configurations for the  $\alpha$ -carbon constitute non identical mirror image isomers or enantiomers (Figure 5.2).

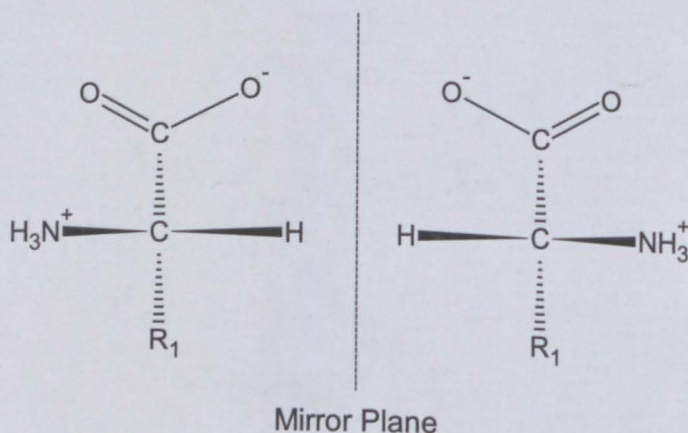


Figure 5.2: Mirror image of a basic amino acid.

Linkages between amino acids are known as a peptide bond. Linkages between two amino acids forms a dipeptides (**Figure 5.3**). The peptide chain may be extended to incorporate three amino acids in a tripeptide, four in tetrapeptide and so on. Polypeptide contains many amino acid units. Proteins are naturally occurring polypeptides that contain more than 50 amino acid units. Most proteins are polymers of 100-300 amino acids.

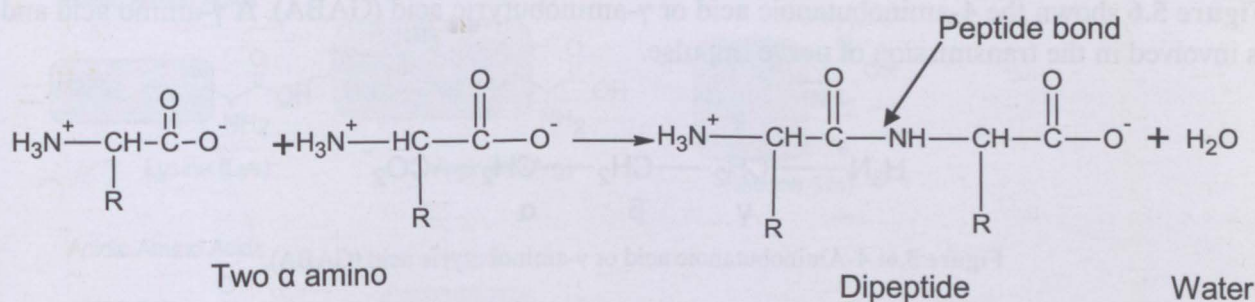


Figure 5.3: Formation of dipeptide with peptide bond.

## 5.2 CLASSIFICATION AND NOMENCLATURE OF AMINO ACIDS

Amino acids are classified as  $\alpha$ ,  $\beta$ ,  $\gamma$  and so on, according to the location of the amine group on the carbon chain that contains the carboxylic acid function.

### Example 1:

1-Aminocyclopropanecarboxylic acid (**Figure 5.4**) is a biological precursor of ethylene in plant.

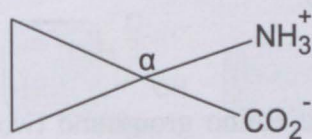


Figure 5.4: 1-Aminocyclopropanecarboxylic acids.

### Example 2:

**Figure 5.5** shown the 3-aminopropanoic acid or  $\beta$ -alanine. It is one of the structures of coenzyme A.