Chemistry Class 12 NCERT Solutions: Chapter 14 Biomolecules Part 4

Q: 12. Define the following as related to proteins

(i) Peptide linkage

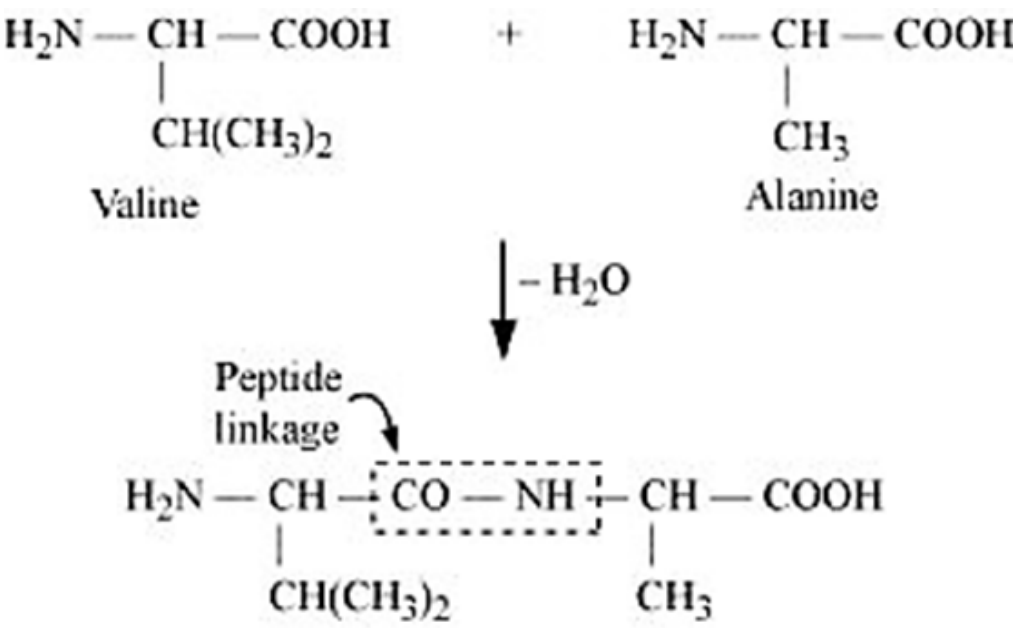
(ii) Primary Structure

(iii) Denaturation

Answer:

(i) Peptide linkage

The amide formed between $-COOH$ group of one molecule of an amino acid and $-NH_2$ group of another molecule of the amino acid by the elimination of a water molecule is called a peptide linkage.



Valylalanine (Val – Ala)

(ii) Primary Structure:

The primary structure of protein refers to the specific sequence in which various amino acids are present in it, i.e.. , the sequence of linkages between amino acids in a polypeptide chain. The sequence in which amino acids are arranged is different in each protein. A change in the sequence creates a different protein

(iii) Denaturation:

In a biological system, a protein is found to have a unique 3-dimensional structure and a unique biological activity. In such a situation, the protein is called native protein. However, when the native protein is subjected to physical changes such as change in temperature or chemical changes such as change in $_{pH}$, its H-bonds are disturbed. This disturbance unfolds the globules and uncoils the helix. As a result, the protein loses its biological activity. This loss of biological activity by the protein is called

denaturation. During denaturation, the secondary and the tertiary structures of the protein get destroyed, but the primary structure remains unaltered.

One of the examples of denaturation of proteins is the coagulation of egg white when an egg is boiled.

Q: 13. What are the common types of secondary structure of proteins?

Answer:

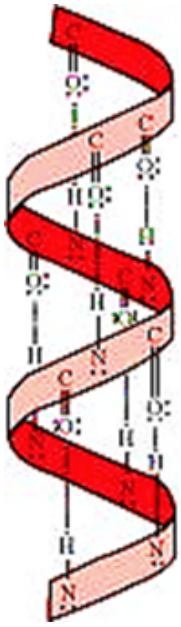
There are two common types of secondary structure of proteins:

(i) α – helix Structure

(ii) β – Pleated Sheet Structure

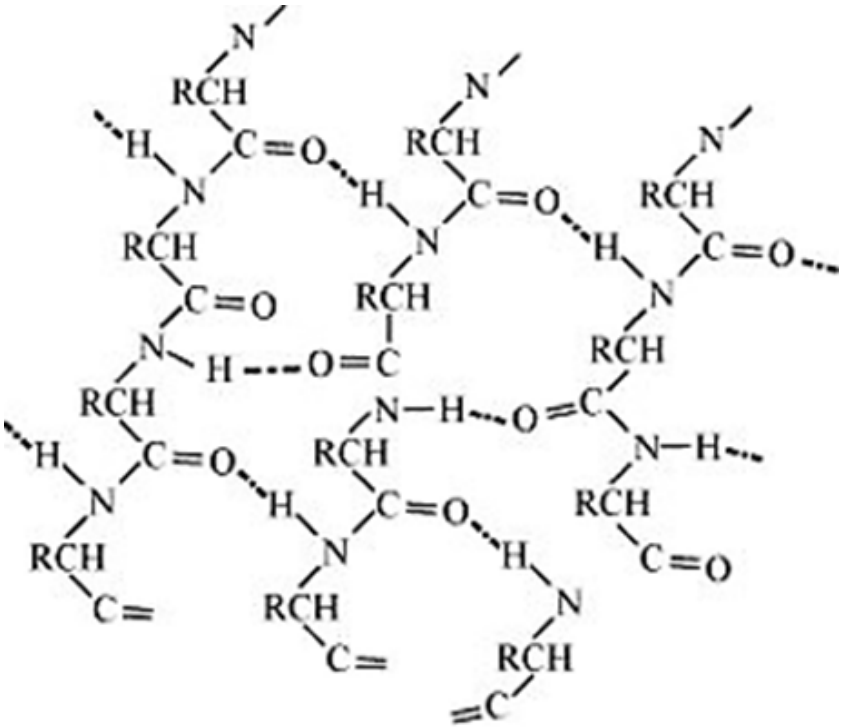
(i) α – Helix Structure

In this structure, the $-NH$ group of an amino acid residue forms H-bond with the $\rangle C=O$ group of the adjacent turn of the right-handed screw $(\propto -\text{helix})$.



(ii) β – Pleated Sheet Structure

This structure is called so because it looks like the pleated folds of drapery. In this structure, all the peptide chains are stretched out to nearly the maximum extension and then laid side by side. These peptide chains are held together by intermolecular hydrogen bonds.



Q: 14. What type of bonding helps in stabilising the ∝ -helix structure of proteins?

Answer:

The H-bonds formed between the $-NH$ group of each amino acid residue and the $\rangle C=O$ group of the adjacent turns of the ∝ -helix help in stabilising the helix.

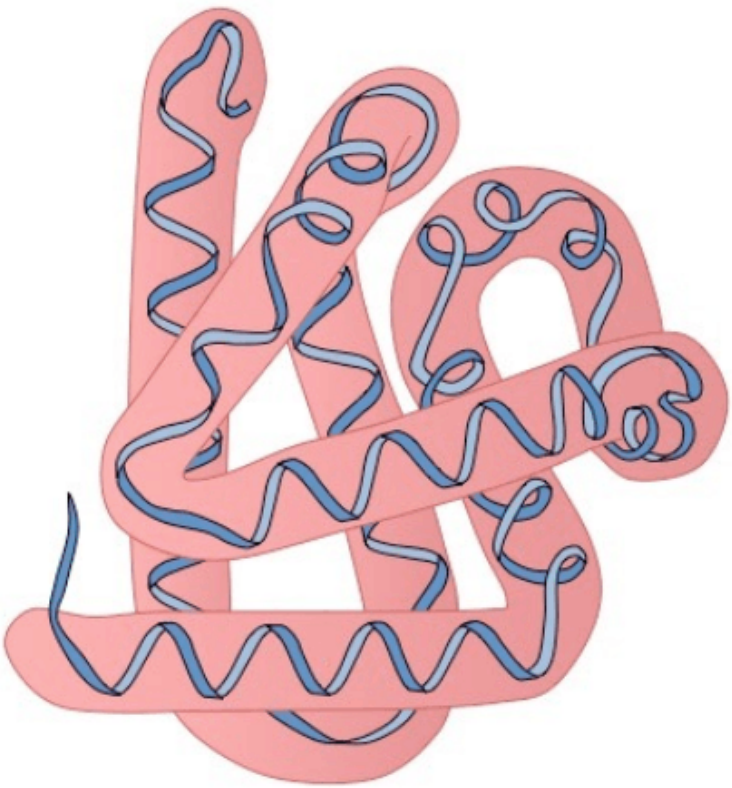
Q: 15. Differentiate between globular and fibrous proteins.

Answer:

Fibrous Protein		Globular Protein	
1.	It is a fibre-like structure formed by the polypeptide chain. These proteins are held together by strong hydrogen and disulphide bonds.	1.	The polypeptide chain in this protein is folded around itself, giving rise to a spherical structure.
2.	It is usually insoluble in water but soluble in concentrated acids and alkalis	2.	It is usually soluble in water
3.	Fibrous proteins are usually used for structural purposes. For example, keratin is present in nails and hair; collagen in tendons; and myosin in muscles	3.	All enzymes are globular proteins. Some hormones such as insulin are also globular proteins.

Q_15_Table of Globular and Fibrous Proteins

Fibrous Protein



Globular Protein