

2.15 GENERAL CHARACTERISTICS OF PROTEINS

1. Composition. The elements generally present in proteins are carbon, hydrogen, oxygen and nitrogen.

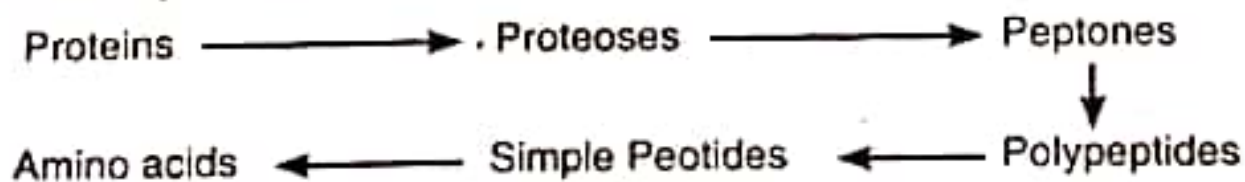
2. High molecular weights. As protein molecules are obtained from hundreds and thousands of amino acid molecules, their molecular masses run into several thousands and sometimes into several lakhs.

3. Physical state. Generally speaking, proteins are colourless, tasteless, amorphous solids having no sharp melting points. They are colloidal size particles. This property is used to separate proteins from crystalline salts by the process of dialysis.

4. Optical activity. Because of the presence of asymmetric carbon atoms, proteins show optical activity. However, all naturally occurring proteins have the same configuration *viz.* the L-glyceraldehyde configuration.

5. Amphoteric nature. Protein molecules exist as dipolar ions. Hence they react with both acids and alkalis and are thus amphoteric.

6. Hydrolysis. As amino acids are the constituents of proteins, the latter on hydrolysis in the presence of acids, bases or enzymes give back amino acids but in steps. The steps involved during hydrolysis are represented as under:



2.16 DENATURATION AND RENATURATION OF PROTEINS

Proteins are very tender and delicate substances. When subjected to heat or action of acids or alkalis, they lose their biological activity. They are said to be **denatured**. This phenomenon in which the proteins lose their biological activity and other characteristics under the effect of temperature, is called **denaturation**. The denatured proteins can be brought back to its original state by cooling the protein solution very slowly. This process is called **renaturation**.

During denaturation, there is a rearrangement in the secondary and tertiary structure of the protein but the primary structure remains unchanged. Coagulation of egg-white by the action of heat is an example of irreversible denaturation of proteins.