

## **Protein**

Proteins are very large molecules composed of basic units called amino acids. Proteins contain carbon, hydrogen, oxygen, nitrogen, and sulphur.

Protein molecules are large, complex molecules formed by one or more twisted and folded strands of amino acids. Proteins are highly complex molecules that are actively involved in the most basic and important aspects of life. These include metabolism, movement, defense, cellular communication, and molecular recognition.

### **Functions of Proteins**

Positive negative attractions between different atoms in the long amino acid strand cause it to coil on itself again and again to form its highly complex shape. Folded proteins may combine with other folded proteins to form even larger more complicated shapes.

The folded shape of a protein molecule determines its role in body chemistry. Structural proteins are shaped in ways that allow them to form essential structures of the body.

Collagen, a protein with a fibre shape, holds most of the body tissues together. Keratin, another structural protein forms a network of waterproof fibres in the outer layer of the skin.

Functional proteins have shapes that enable them to participate in chemical processes of the body. Functional proteins include some of hormones, growth factors, cell membrane receptors, and enzymes.

### **Classification of Proteins**

Protein molecules are large, complex molecules formed by one or more twisted and folded strands of amino acids. Each amino acid is connected to the next amino acid by covalent bonds.

1. **Primary (first level)** – Protein structure is a sequence of amino acids in a chain.
2. **Secondary (secondary level)** – Protein structure is formed by folding and twisting of the amino acid chain. The two main types of secondary structure are the  $\alpha$ -helix and the  $\beta$ -sheet.

3. **Tertiary (third level)** – Protein structure is formed when the twists and folds of the secondary structure fold again to form a larger three dimensional structure. eg. Myoglobin
4. **Quaternary (fourth level)** – Protein structure is a protein consisting of more than one folded amino acid chain. The shape of the protein complex is stabilized by various interactions, including hydrogen-bonding, disulfide-bridges and salt bridges. Examples of proteins with quaternary structure include hemoglobin, DNA polymerase.

Proteins can bond with other organic compounds and form “mixed” molecules. For example, glycoproteins embedded in cell membranes are proteins with sugars attached. Lipoproteins are lipid-protein combinations.

