

Topic: Protein; Classification

B.Sc. Botany Hons. III

Paper: VI Group: A

Dr. Sanjeev Kumar Vidyarthi

Department of Botany

Dr. L.K.V.D. College, Tajpur, Samastipur

L.N. Mithila University, Darbhanga

Classification of Proteins

Proteins are classified based upon:

- (A) Based upon Solubility
- (B) Based upon Structural Complexity

A. Classification Based upon Solubility


On the basis of their solubility in water, proteins are classified into-

i. Fibrous proteins:

These are insoluble in water. They include the structural proteins. They have supportive function (e.g., collagen) and/or protective function (e.g., hair keratin and fibrin).

ii. Globular proteins:

They are soluble in water. They include the functional proteins, e.g., enzymes,



hemoglobin, etc.

B. Classification Based upon Structural Complexity:

On the basis of their structural complexity they are further divided into-

- (1) Simple
- (2) Conjugated and
- (3) Derived proteins.

1. Simple proteins:

Proteins which are made up of amino acids only are known as simple proteins.

They are further sub-divided into-

(a) Albumins:

They are water soluble, heat coagulable and are precipitated on full saturation with ammonium sulphate, e.g., serum albumin, lactalbumin and ovalbumin.

(b) Globulins:

They are insoluble in water, but soluble in dilute salt solutions. They are heat coagulable and precipitate on half-saturation with ammonium sulphate, e.g., serum globulin and ovo-globulin.

(c) Glutelins:


They are insoluble in water and neutral solvents. Soluble in dilute acids and alkalis. They are coagulated by heat, e.g., glutelin of wheat.

(d) Prolamines:

Water insoluble but soluble in 70% alcohol, e.g., gliadin of wheat, proteins of corn, barley, etc.

(e) Histories:

Water soluble, basic in nature due to the presence of arginine and lysine, found in nucleus. They help in DNA packaging in the cell. They form the protein



moiety of nucleoprotein.

(f) Protamine's:

Water soluble, basic in nature, not-heat coagulable. Found in sperm cells, hence component of sperm nucleoprotein.

(g) Globin's:

They are water soluble, non-heat coagulable. e.g., globin of haemoglobin.

(h) Albuminoids or scleroproteins:

Insoluble in all neutral solvents, dilute acids or alkalies, e.g., keratin of hair and proteins of bone and cartilage.

2. Conjugated proteins:

Proteins which are made up of amino acids and a non-amino acid/protein substance called the prosthetic group are known as conjugated proteins.

The various types of conjugated proteins are-

(a) Chromo proteins:

Here the non-protein part is a coloured compound in addition to the protein part. Ex. Haemoglobin has heme as the prosthetic group and cytochromes also have heme.

(b) Nucleoproteins:

These proteins are bound to nucleic acids, e.g., chromatin (histones + nucleic acids).

(c) Glycoproteins:

When a small amount of carbohydrate is attached to a protein it is known as glycoproteins, e.g., mucin of saliva. (Note: Glycoproteins have major amounts of protein and some amount of carbohydrates and proteoglycans contain major amounts of carbohydrates and little amount of proteins).

(d) Phosphoprotein:

Phosphoric acid is present with the protein. Ex. Milk casein and egg yolk (vitellin).

(e) Lipoproteins:

Proteins in combination with lipids, e.g., LDL, HDL.

(f) Metalloproteins:

They contain metal ion in addition to the amino acids, e.g., hemoglobin (iron), ceruloplasmin (copper).

3. Derived proteins:

They are the proteins of low molecular weight produced from large molecular weight proteins by the action of heat, enzymes or chemical agents.

Proteins → Proteans → Proteoses → Peptones → Peptides → Amino acids