THE CLASSIFICATION OF PROTEINS

- **<u>According to their function</u>**
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1.	As catalysts, i.e. enzymes.
2.	As structural elements (Collagen, Elastin).
3.	As mode of transport (Albumin, Globulin, Hemoglobin)
4.	As hormones (Insulin, Growth hormones).
5.	As protective agents (Antibodies, Blood clothing)
6.	As contractive elements (Actin, Myosin)

- **<u>According to their composition</u>**
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1. Simple proteins.

Simple proteins are made up of amino acids only and on hydrolysis yield amino acid mixture only.

2. Conjugated Proteins

They are proteins that contain a non-protein group (also 'prosthetic group') attached to the protein part. It has a non-protein component and amino acid mixture.

Conjugated Protein = Protein part + Prosthetic group.

Conjugated proteins are classified according to the nature of the non-protein group attached to the protein part (**Ошибка! Источник ссылки не найден.**).

Exsample of simple proteins

1. Fibrous proteins

a. Collagen	It contains high proportion of hydroxyproline and hydroxylysine. It is a major protein of connective tissues. On boiling with water it forms gelatin.
b. Elastin	It is present in tendons and arteries.
c. Keratin	It contains large amount of sulphur as cystine. It is present in hair, wool, nails etc.

2. Globular Proteins

a. Albumins	Serum albumin and ovalbumin of egg white. It is water-soluble. It is precipitated from solution by full saturation of ammonium sulphate. It is coagulated by heat.
b. Globulins	Serum globulins, fibrinogens and muscle myosin. It is soluble in dilute salt solutions. It is precipitated from solution by half saturation of ammonium sulphate. It is coagulated by heat.
c. Glutelins	Cereal proteins such as glutelins of wheat, oxyzenin from rice and zein of maize. It is soluble in weak acids or bases but insoluble in neutral aqueous solutions.
d. Gliadins (Prolamines)	Gliadin from wheat and zein from corn. It is water insoluble but soluble in ethanol.
e. Protamines	Salmine from salmon sperm cells contains high proportion of arginine.
f. Histones	Strong basic proteins stabilize the three-dimensional structure of chromatin

Some Proteins Contain Chemical Groups Other Than Amino Acids

Many proteins, such as the enzymes ribonuclease and chymotrypsinogen, contain only amino acids and no other chemical groups; these are considered simple proteins. However, some proteins contain chemical components in addition to amino acids; these are called **conjugated proteins**. The non-amino acid part of a conjugated protein is usually called its **prosthetic group**. Conjugated proteins are classified on the basis of the chemical nature of their prosthetic groups (Table 7); for example, **lipoproteins** contain lipids, **glycoproteins** contain sugar groups, and **metalloproteins** contain metal atom orion. A number of proteins contain more than one prosthetic group. Usually the prosthetic group plays an important role in the protein's biological function.

Exsample of conjugated proteins

Class	Prosthetic group	Example
Lipoproteins	Lipids	Blood lipoproteins
Glycoproteins	Carbohydrates	Immunoglobulin G
Phosphoproteins	Phosphate groups	Milk casein
Hemoproteins	Heme (iron porphyrin)	Hemoglobin
Flavoproteins	Flavin nucleotides	Succinate dehydrogenase
Metalloproteins	Iron	Catalase
	Zinc	Alcohol dehydrogenase
	Calcium	Calmodulin
	Molybdenum	Dinitrogenase
	Copper	Superoxide dismutase

PROTEIN-LIGAND INTERACTION

Note: the protein-ligand interaction is the main mechanism of protein function.

1. Memorize:

a. any protein molecule has special regions, called **active site** that binds to some compound, called **ligand**;

b. protein active sites are formed by specific arrangement of amino acids that are approximated during the formation of tertiary structures;

c. the bonds between active site and a ligand may be covalent or non-covalent;

d. proteins manifest high specificity (selectivity) when they bind ligands by complementary interaction in active site;

Comlementary: chemical and topological correspondence of active site structure to ligand structure.

QUATERNARY STRUCTURE OF PROTEINS

Learn the main characteristics of the quaternary structure and the properties of the oligomeric proteins.

Memorize: quaternary structure is a three-dimensional arrangement of two or more polypeptide chains. Proteins with multiple subunits are called oligomeric proteins or oligomers for short (p.85, 86, fig. 8.15).

STUDY THE PECULIARITIES OF FUNCTIONING OF OLIGOMERIC PROTEINS WITH HEMOGLOBIN AS AN EXAMPLE.

2. Learn the oxygen saturation curves for myoglobin and hemoglobin (p.90, fig. 8.21)

Study the agents that affect O_2 binding by hemoglobin (p.91, fig.8.22, 8.23, 8.24).

1. Remember binding of protons by hemoglobin lowers its affinity for oxygen, contributing to a phenomenon known as the Bohr effect (fig. 8.2 5).