
The most important heteropolysaccharides are as follows:**(a) Neutral heteropolysaccharides:**

The most important acetyl glucosamine of the animal cells is the chitin which is an important constituent of the cells of the crustaceans and some insects. The chitin provides mechanical support to the cells.

(b) Acidic heteropolysaccharides:

The acidic heteropolysaccharides contain different kinds of monosaccharides and sulphuric or other acids in their molecules. The most important acidic heteropolysaccharides of the protoplasm of the animal cells are the hyaluronic acid, chondroitin sulphate and heparin.

The hyaluronic acid forms the cementing material of the connective tissues.

It occurs in the skin, connective tissues and Synovial fluid of the joints. The Chondroitin sulphate occurs in the cells of the cartilage, skin cornea, umbilical cord and it serves as a matrix for the bone formation. The heparin is a blood anticoagulant and is found in the liver, lung, thymus, spleen and blood.

C) Mucoproteins and Glycoproteins:

When the acetyl glucosamines, monosaccharides and proteins unite together they form Mucoprotein and glycoproteins. These include the blood group polysaccharides and occur in the red blood corpuscles, saliva, gastric mucin, ovomucoids, ovalbumins, serum and albumins.

(iii) Lipids (Fats)

- The lipids (Gr., lipos = fat) are the organic compounds which are insoluble in water but soluble in ether, chloroform, benzene, hot alcohol and petroleum ether. They contain long chains of aliphatic hydrocarbons or benzene rings in their molecules.

‘The lipids are non- polar and hydrophobic. ‘They are important constituents of the cellular membranes, hormones and vitamins of the cells and are the source of energy for the cells.

- The lipids contain carbon (C), hydrogen (H) and oxygen (O) and are classified into following types:

(iii) Proteins:

- The proteins are the most important constituents of the protoplasm. All proteins are composed of carbon (C), hydrogen (H), oxygen (O), nitrogen (N) and some of them in addition contain sulphur (S) and phosphorus (P). The protoplasm is dependent almost entirely upon proteins for its supply of nitrogen, sulphur and phosphorus.
- The proteins, are the polymers of the amino acids. An Organic compound containing one or more amino groups ($-NH_2$) and one or more carboxyl groups ($-COOH$) is known as amino acid. The amino acids occur freely in the protoplasm and constitute the So called amino acid pool, The amino acids are derived from the organic acids in which the hydrogen in alpha position is replaced by the amino groups.

(iv) Enzymes:

- The protoplasm and many cellular organelles contain very important organic compounds known as the enzymes (Gr., en= in+ zyme = leaven The enzymes are the specialized proteins having the capacity to act as catalysts in chemical reactions.
- Like other catalysts of the chemical world, the enzymes are the catalysts of the biological world and they influence the rate of a chemical reaction, while themselves remain quite unchanged at the end of the reaction, The substance on which the enzymes act is known as substrate.

- The enzymes play a vital role in various metabolic and biosynthetic activities of the cell such as synthesis of DNA, RNA and protein molecules and metabolism of carbohydrates, lipids, fats and chemical substances.

(v) **Vitamins:**

- The vitamins are complex organic compounds of diverse chemical nature which are required in minute amounts for normal growth, functioning and reproduction of cells. The vitamins play an important role in the cellular metabolism and they act as the enzymes or other biological catalysts in the various chemical activities of the cell.
- The cell cannot synthesise the vitamins from the standard food and so they are taken along with the food. Their deficiency in the cell causes metabolic disorders and leads to various diseases.

Nucleic Acids:

- The nucleic acids are the complex macromolecular compounds of immense biological importance. They control the important biosynthetic activities of the cell and carry hereditary information's from generation to generation.
- There occur two types of nucleic acids in living organisms, viz., ribonucleic acid (RNA) and deoxyribonucleic acid (DNA). Both types of nucleic acids are the polymer of nucleotides: A nucleotide is composed of nucleoside and phosphoric acid.
- Even the nucleoside is composed of the pentose sugar (ribose or deoxyribose) and nitrogen bases (purines and pyrimidine's). The purines are adenine and GUADINE and pyrimidine's are cytosine, thymine and uracil.