

B.Sc. Botany (Hons) – 2ND SEM

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Carbohydrates and its Classification

Carbohydrates are macronutrients and are one of the three main ways by which our body obtains its energy. They are called carbohydrates as they comprise *carbon*, *hydrogen* and *oxygen* at their chemical level. Carbohydrates are essential nutrients which include sugars, fibres and starches. They are found in grains, vegetables, fruits and in milk and other dairy products. They are the basic food groups which play an important role in a healthy life.

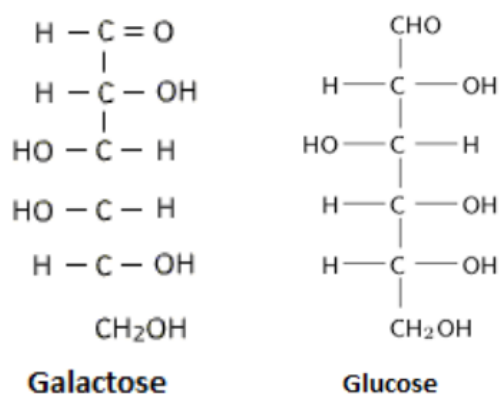
The food containing carbohydrates are converted into glucose or blood sugar during the process of digestion by the digestive system.

Our body utilizes this sugar as a source of energy for the cells, organs and tissues. The extra amount of energy or sugar is stored in our muscles and liver for further requirement. The general formula of this class of organic compounds is $C_n(H_2O)_n$.

Classification of Carbohydrates

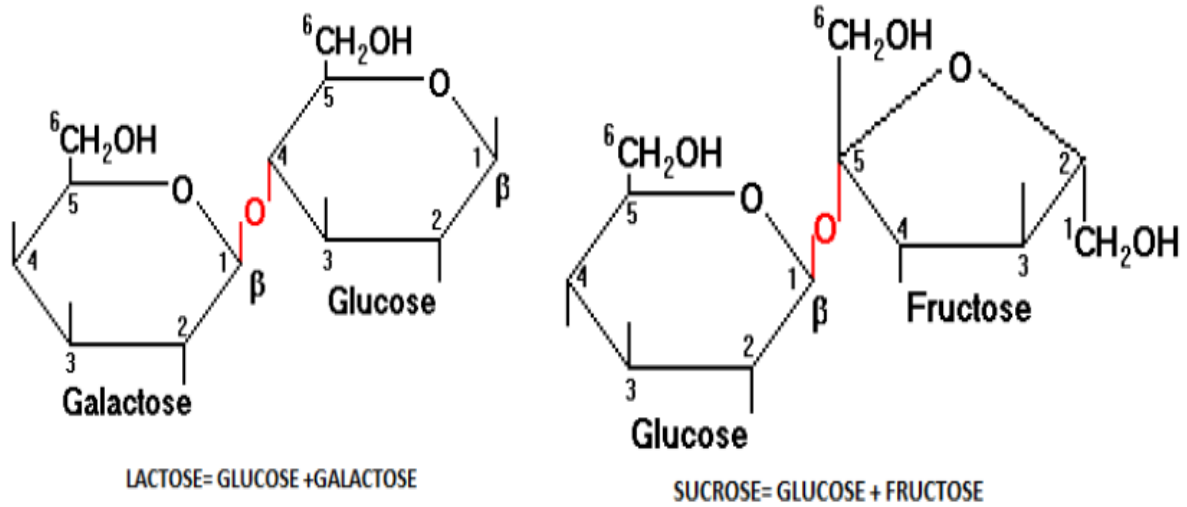
1. Monosaccharides

Glucose is an example of a carbohydrate monomer or monosaccharide. Other examples of monosaccharides include mannose, galactose, fructose, etc. The structural organization of monosaccharides is as follows:



2. Disaccharides

Two monosaccharides combine to form a disaccharide. Examples of carbohydrates having two monomers include- Sucrose, Lactose, Maltose, etc.



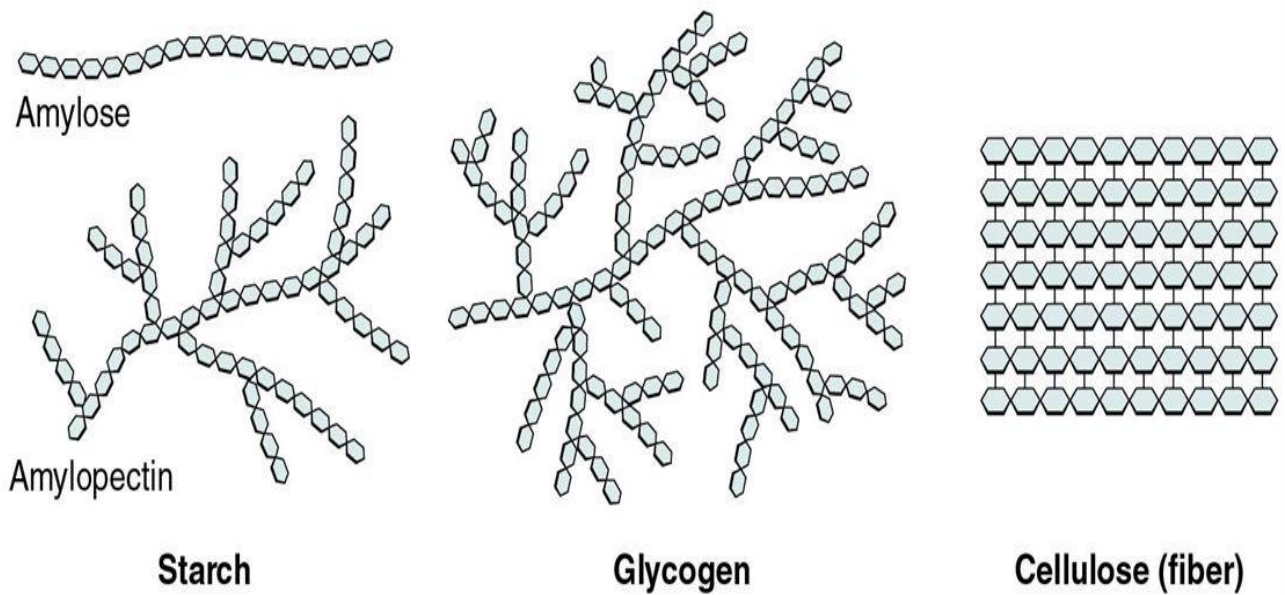
3. Oligosaccharides

Carbohydrates formed by the condensation of 3-10 monomers are called oligosaccharides. By this convention, trioses, pentoses, hexoses are all oligosaccharides.

4. Polysaccharides

These carbohydrates have two or more sugar molecules, hence they are referred to as starchy foods. In complex carbohydrates, molecules are digested and converted slowly compared to simple carbohydrates. They are abundantly found in lentils, beans, peanuts, potatoes, peas, corn, whole-grain bread, cereals, etc.

Polysaccharides are complex carbohydrates formed by the polymerization of a large number of monomers. Examples of polysaccharides include starch, glycogen, cellulose, etc. which exhibit extensive branching and are homopolymers – made up of only glucose units.



Starch is composed of two components- amylose and amylopectin. Amylose forms the linear chain and amylopectin is a much-branched chain.

Glycogen is called animal starch. It has a structure similar to starch, but has more extensive branching.

Cellulose is a structural carbohydrate and is the main structural component of the plant cell wall. It is a fibrous polysaccharide with high tensile strength. In contrast to starch and glycogen, cellulose forms a linear polymer.

Functions of Carbohydrates

The main function of carbohydrates is to provide energy and food to the body and to the nervous system.

Carbohydrates are known as one of the basic components of food, including sugars, starch, and fibre which are abundantly found in grains, fruits and milk products.

Carbohydrates are also known as starch, simple sugars, complex carbohydrates and so on.

It is also involved in fat metabolism and prevents ketosis.

Inhibits the breakdown of proteins for energy as they are the primary source of energy.

An enzyme by name amylase assists in the breakdown of starch into glucose, finally to produce energy for metabolism.