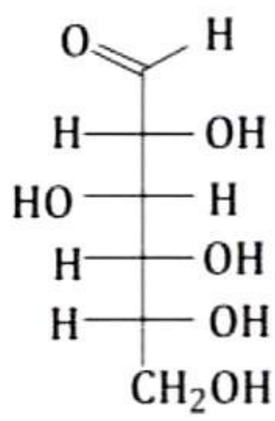
CHARACTERISTIC TEST OF CARBOHYDRATES, FATS AND PROTEINS

Living bodies are composed of several lifeless substances which are present in their cells in a very complex but highly organized form. These are called Biomolecules. The substances required for the growth and maintenance of living systems are supplied to the body in the form of food which contains carbohydrate, fats and oils, proteins, vitamins, minerals and water.

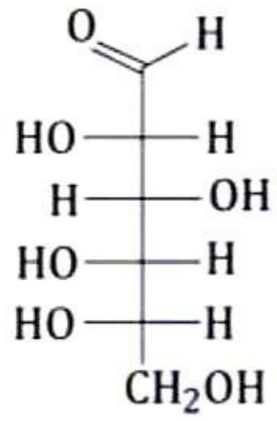
Carbohydrates

Carbohydrates are polyhydroxy aldehydes, polyhydroxy ketones, their derivatives and the substances which yield them on hydrolysis. The name carbohydrate is used for the compounds having the general formula, $C_x(H_2O)_y$. These are called carbohydrates because they can be treated as hydrates of carbon.
The carbohydrates which are ketones are called ketoses and those that are aldehydes are called aldoses. The general term for all the carbohydrates is glycose. The carbohydrates which cannot be hydrolysed to simple carbohydrates are called monosaccharides. For example, glucose, fructose, etc.

The carbohydrates which contain two to ten monosaccharide units are called oligosaccharides. For example, sucrose ($C_6H_{12}O_5$), maltose ($C_6H_{12}O_5$), raffinose ($C_{18}H_{32}O_{16}$), etc.
The carbohydrates which contain more than ten monosaccharide units are called polysaccharides. For example, starch, cellulose, glycogen, etc. These may be represented by the general formula $(C_6H_{10}O_5)_n$.
A more general classification of carbohydrates is sugars and non-sugars. The sugars like glucose, fructose and cane sugar are crystalline, water soluble and sweet substances. Non-sugars which include starch, cellulose, etc., are amorphous, insoluble in water and tasteless substances.



D (+) Glucose



L (-) Glucose

The carbohydrates which can reduce Tollen's reagent are called reducing sugars. All monosaccharides are reducing sugars. Most of the disaccharides are also reducing sugars. Sucrose is a non-reducing sugar.

Carbohydrates are generally optically active because they contain chiral centres. Carbohydrates perform two important functions in the body:

(a) They act as biofuels to provide energy for the functioning of living organisms.

(b) They act as constituents of cell membranes.