

'CARBOHYDRATES'

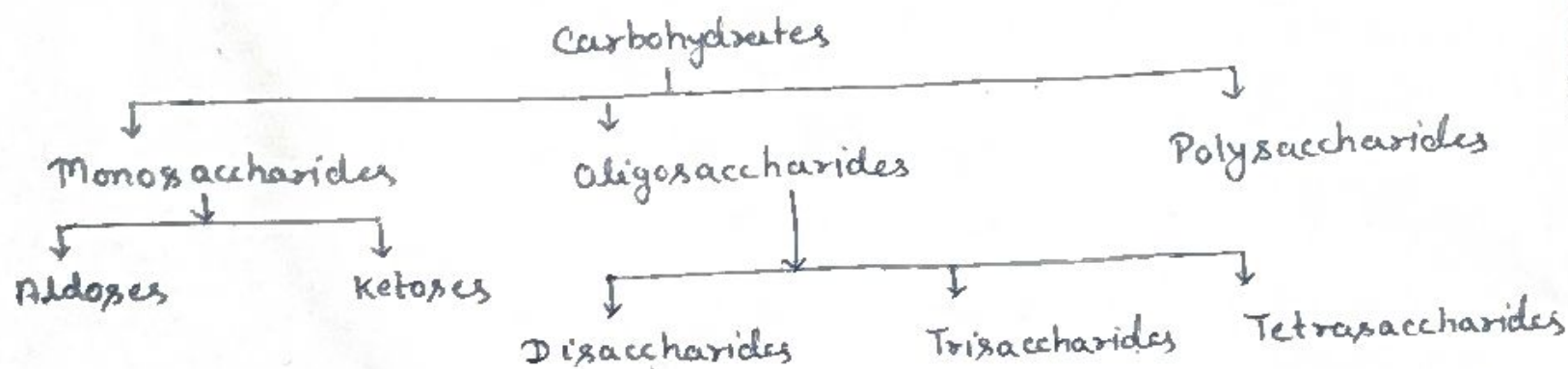
The carbohydrates are an important class of naturally occurring organic compounds.

These include glucose, fructose (honey), sucrose, starch and cellulose. They are all composed of C, H, O . In general carbohydrates can be represented by the formula $C_n(H_2O)_n$. 1 gm carbohydrate gives 4.1 calorie energy.

Definition → Carbohydrates can be defined as polyhydroxy aldehyde or ketones.

Carbohydrates which contain aldehyde group are ALDOSES and those contain ketose group are KETOSES.

CLASSIFICATION OF CARBOHYDRATES



①

Monosaccharides → These are single unit carbohydrates that cannot be broken into simpler carbohydrates upon hydrolysis. It can be classified into following types depending upon the no. of Carbon atoms —

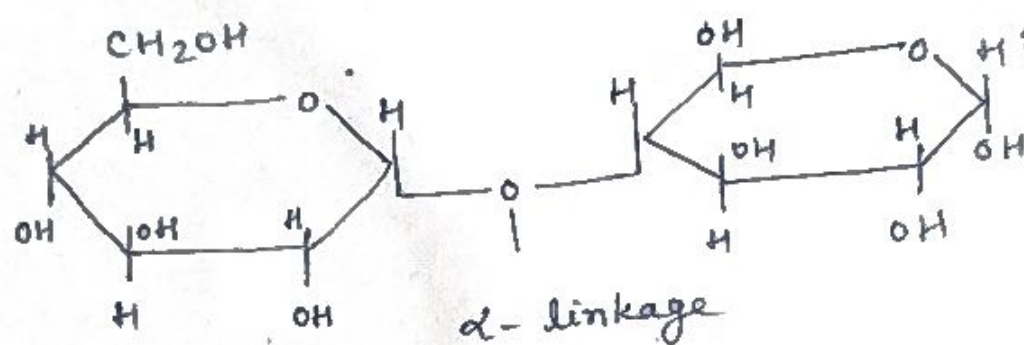
- Triose → Contains 3-carbon atoms. eg- Glyceraldehyde.
- Tetrose → eg- Erythrose.
- Pentose → eg- Ribose, Xylose etc.
- Hexose → eg- Glucose, fructose & galactose.
- Heptose → eg- Monoheptulose.

Most common monosaccharides are Hexose & Pentose

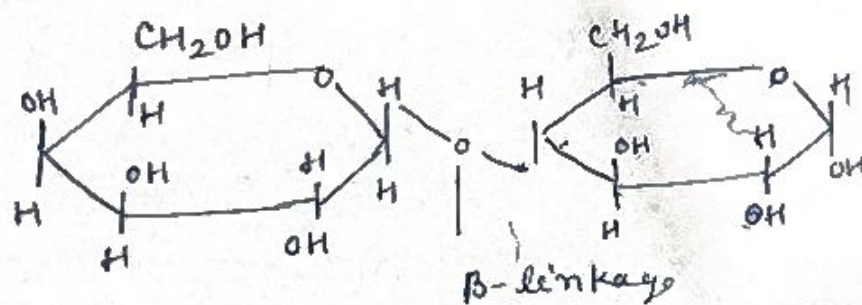
Structure of monosaccharides → Structure of monosaccharides may be of two types —

- (i) Straight chain and
- (ii) Ring.

Maltose → obtained from starch. It is composed of two α -D glucose - joined by 1,4, α D glycosidic bond.



Lactose → It is composed of β -D-galactose and α -D glucose - units joined by β -D glycosidic linkage between C-1 of the galactose and C-4 of the glucose unit.



③ Polysaccharides → Polysaccharides are made of many (10 or more) monosaccharide unit joined together by glycosidic linkages.
It is of two types —

Polysaccharides

Homopolysaccharides

⇒ Contains similar monosaccharides — ~~starch~~, starch, cellulose.

Heteropolysaccharides

⇒ Contains different types of monosaccharides - eg. Pectin, chitin.

Starch → Starch is the main contributor of carbohydrates in our diet.

Structure → It is actually a mixture of two structurally different polysaccharides, AMYLOSE (20%) and AMYLOPECTIN (80%). Both are composed of D-glucose units.

The amylose molecule is made up of D-glucose units joined by α -glycosidic linkage. The no. of D-glucose units in amylose ranges from 60-300.

AMYLOPECTIN has a branched-chain structure. It is composed of 25 to 30 D glucose units. Joined by 1,4 α -glycosidic linkage. These chains are in turn connected to each other by 1,6-linkage. The no. of D-glucose units in amylopectin ranges from 300 to 6000.

Cellulose →

⇒ It is made up of many β -D glucose unit which are present in parallel, so it is found in fibrous.

⇒ These units are joined by β -glycosidic linkages between C-1 of one glucose unit & C-4 of the next glucose unit.

⇒ The no. of D-glucose units in cellulose ranges from 300-2500.

