16/07/202

D. B. College (Jaynagar) Chemistry department

Akhilesh kumar singh B.Sc. Part-II (Hons)
Mob:- 8750390927

CARBOHYDRATES, AMINO ACIDS & POLYMERS

* Disaccharides:

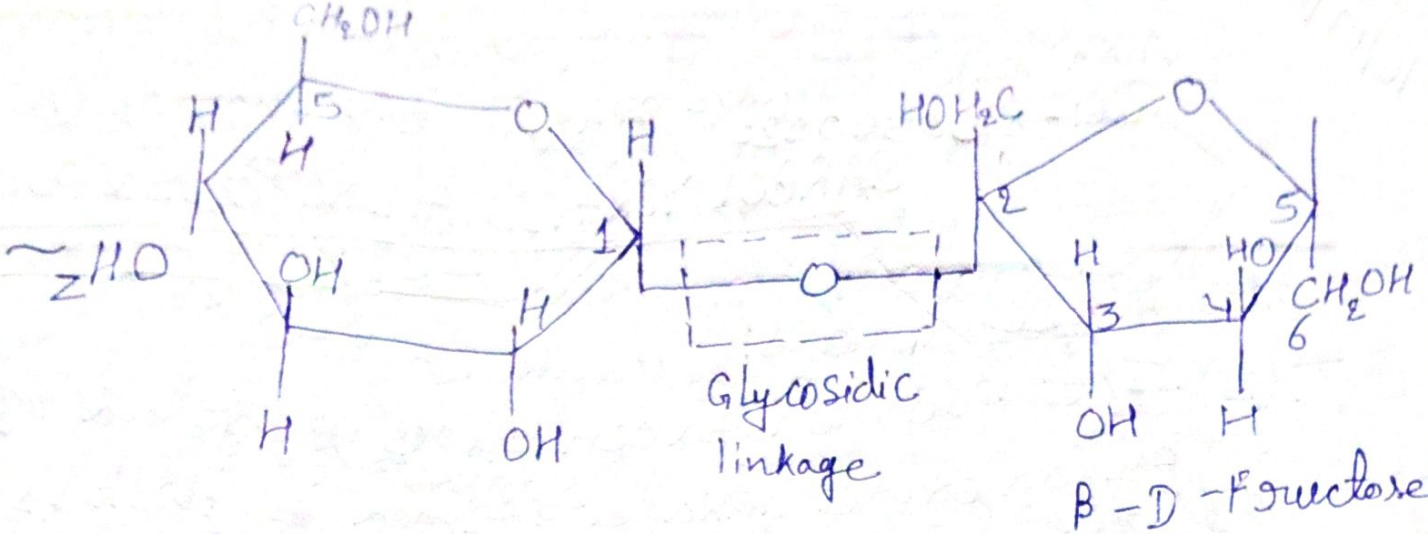
The two monosaccharides are joined together by an oxide linkage formed by the loss of a water molecule. Such a linkage between two monosaccharide units through oxygen atom is called glycosidic linkage.

(i) Sucrose: One of the common disaccharides is sucrose which on hydrolysis gives equimolar mixture of D-(+) glucose and D-(-) fructose.

$$C_{12}H_{22}O_{11} + H_2O \longrightarrow C_6H_{12}O_6 + C_6H_{12}O_6$$

Sucrose — D-(+)-Glucose — D-(-) Fructose

These two monosaccharides are held together by a glycosidic linkage between C1 of α-glucose and C2 of β-fructose. Since the reducing groups of glucose and fructose are involved in glycosidic bond formation, sucrose is a non reducing sugar.



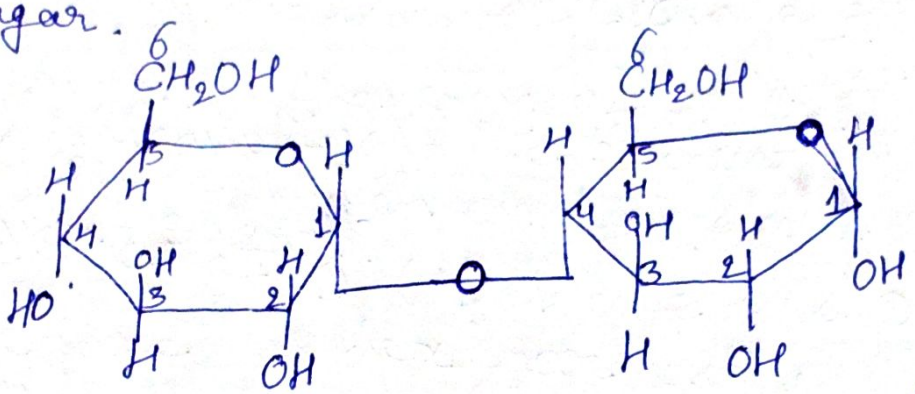
Sucrose

Thus, hydrolysis of sucrose brings about a change in the sign of rotation, from dextro (+) to laevo (−) and the product is named as invert sugar.

Sucrose is dextrorotatory, its specific rotation being +66.5°. D-glucose is also dextrorotatory, $[\alpha]_D = +53$, but D-fructose has a large negative rotation, $[\alpha]_D = -92$. Since D-fructose has a greater specific rotation than D-Glucose, the resulting mixture is laevorotatory. Because of this the hydrolysis of sucrose is known as the inversion of sucrose and the equimolecular mixture of glucose and fructose is known as invert sugar or

invertose.

(ii) Maltose: Another disaccharide, maltose is composed of two α-D-glucose units in which C-1 of one glucose (I) is linked to C-4 of another glucose unit (II). The free aldehyde group can be produced at C-1 of second glucose in solution and it shows reducing properties so it is a reducing sugar.

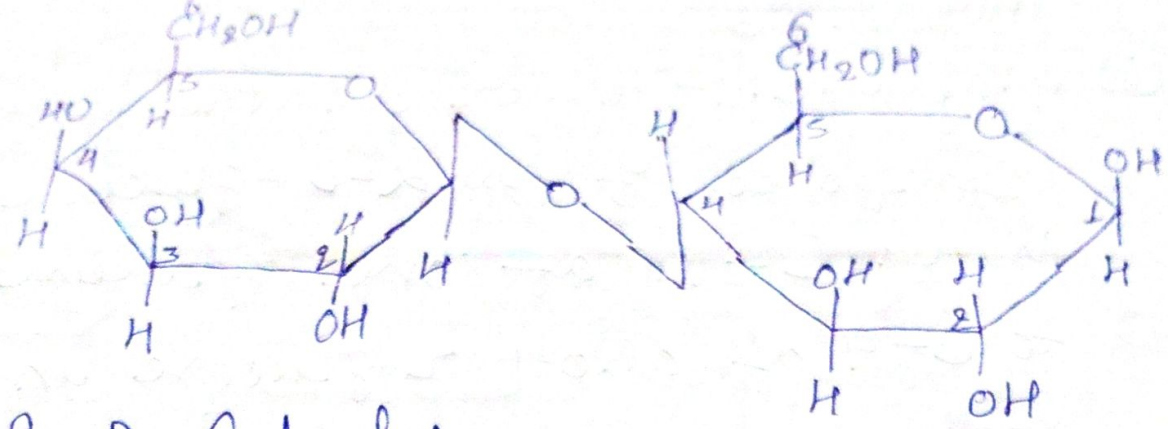


α-D-Glucose

α-D-Fructose

Maltose

(iii) Lactose: It is more commonly known as milk sugar since this disaccharide is found in milk. It is ~~commp~~ composed of β-D-galactose and β-D-glucose. The linkage is between C-1 of galactose and C-4 of glucose. Hence it is also a reducing sugar.



β -D -Galactose

β -D -Glucose

Lactose