

Disaccharides

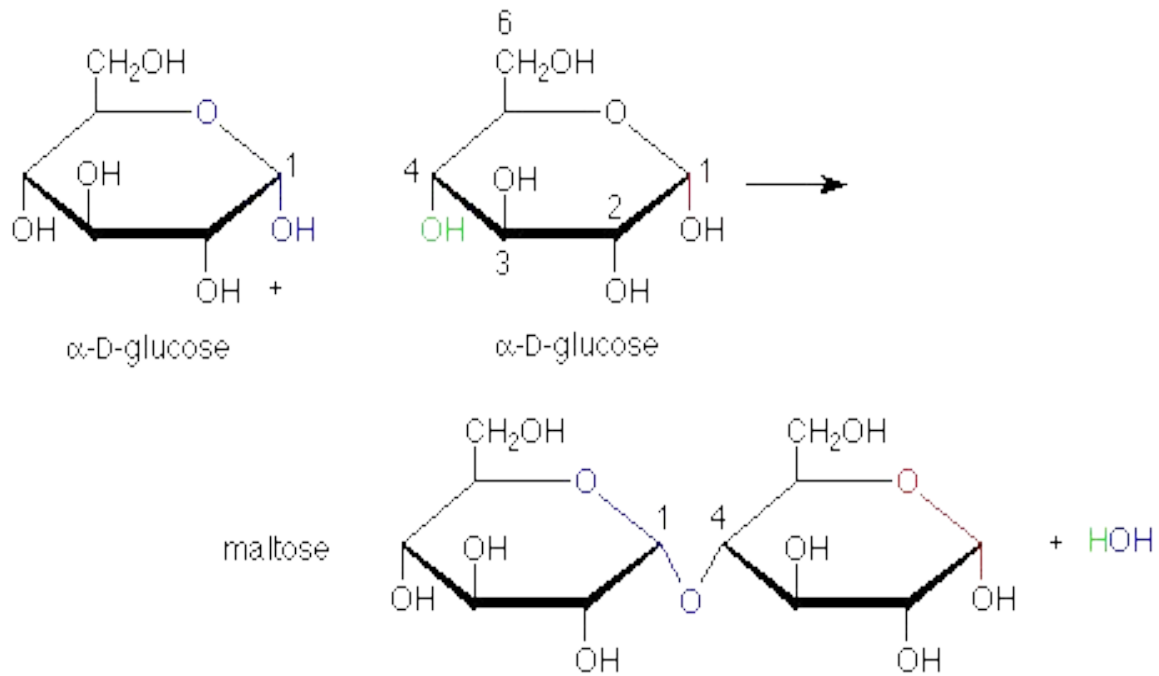
Disaccharides

- 3 main disaccharides-sucrose
maltose
lactose
- All are isomers with molecular formula $C_{12}H_{22}O_{11}$.
- On hydrolysis they yield 2 monosaccharide.
- Soluble in water
- Even though they are soluble in water, they are too large to pass through the cell membrane.

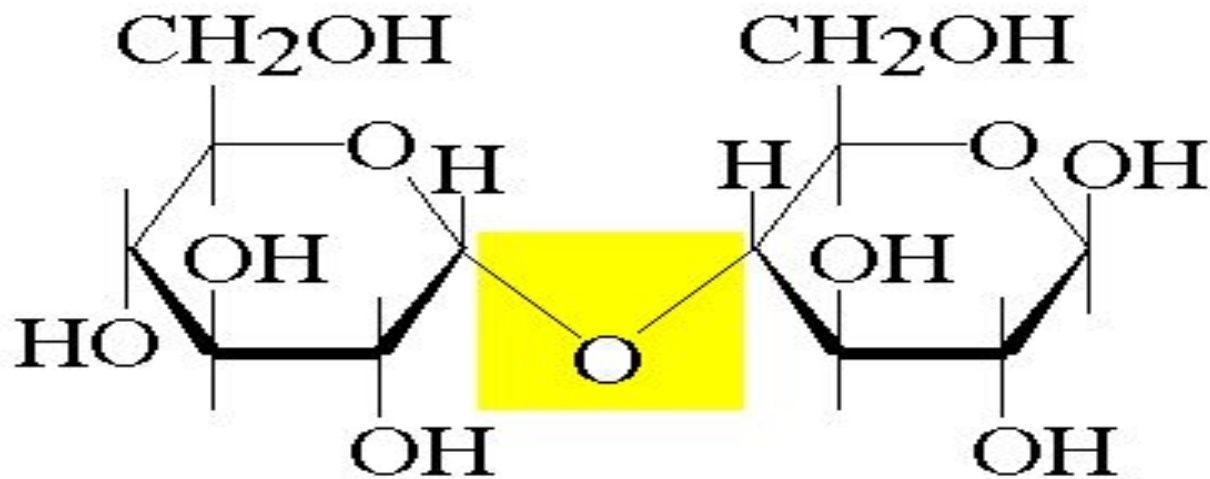
Structure of Disaccharides.

- Formed by combination of 2 monosaccharides.
- Bonds between 2 monosaccharide are known as Glycosidic bond.
- Consider a combination of a molecule of alpha –glucose and a molecule of beta glucose, the product is a beta maltose and water.

Formation of maltose



Glycosidic linkage between glucose.



1-4 glycosidic linkage

Fermentation

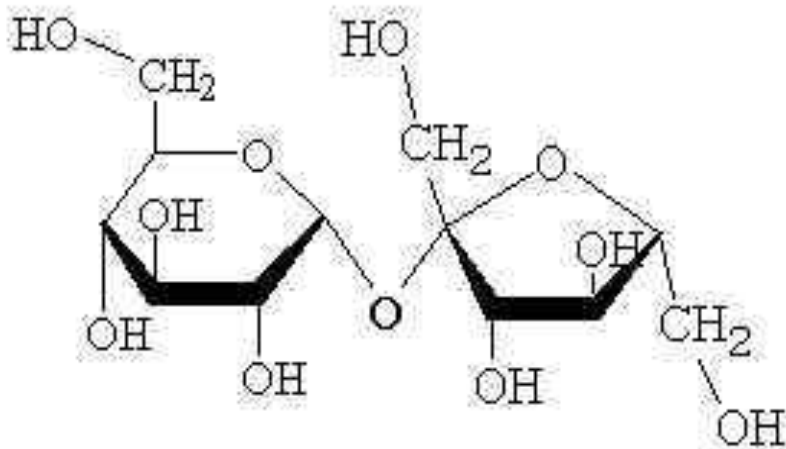
- Sucrose and maltose will ferment when yeast is added because yeast contains the enzyme sucrase and maltase.
- Lactose will not ferment because yeast does not contain lactase.

Testing for disaccharides

- The chemical reactions of these sugars can be used to distinguish them in the laboratory.
- If you have 2 test tubes containing a disaccharide, $C_{12}H_{22}O_{11}$. To determine if it is sucrose lactose or maltose.
- We can use the alkaline Cu complex reaction of glucose and the principle of fermentation.

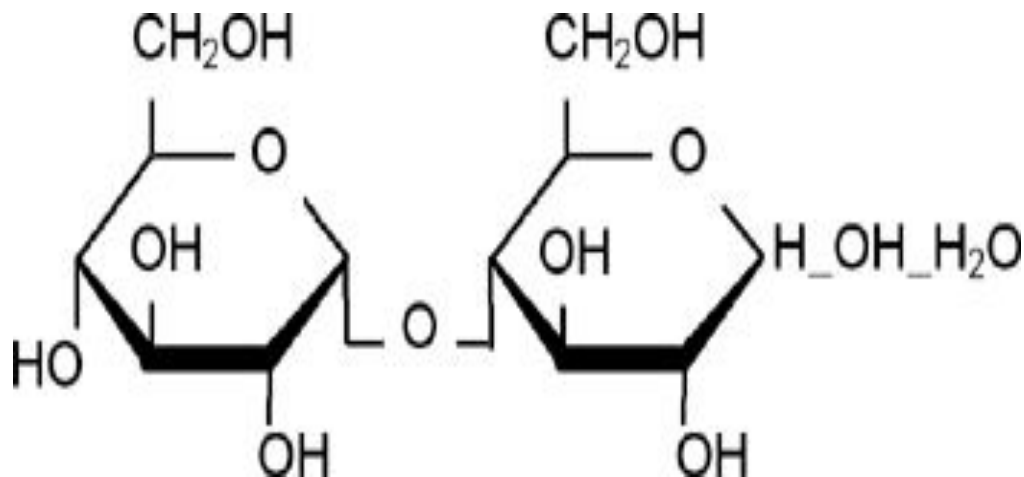
Sucrose

- Is a sugar used at home
- Also known as the cane sugar
- When hydrolyzed, it forms a mixture of glucose and fructose.



Maltose

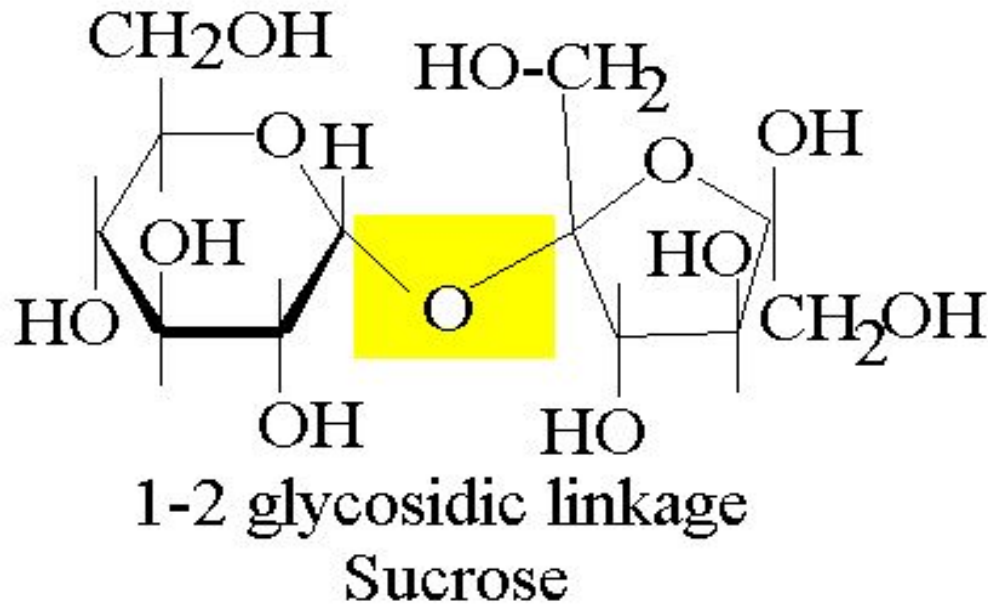
- Commonly known as malt sugar.
- Present in germinating grain
- Produced commercially by hydrolysis of starch.



Lactose

- Commercially known as milk sugar.
- Of animal origin
- Bacteria cause fermentation of lactose forming lactic acid.
- When these reaction occur ,it changes the taste to a sour one.

Formation of sucrose.



Polysaccharides

- Are polymers of monosaccharides.
- Hydrolysis produces many molecules of monosaccharide.
- Can be formed from pentoses or the 5 carbon sugars or the hexoses or six carbon sugars.
- Those from pentoses are called pentosans
- Those from hexoses are hexosans or sometimes called the glucosans.
- The hexosans are most common in terms of physiology.
- The hexosans have the general formula $(C_6H_{10}O_5)_x$

Polysaccharides

- The hexosans have the general formula $(C_6H_{10}O_5)_x$.
- Where x is a large number.
- Some of the common hexosans are starch, cellulose and dextrin.

Starch

- Insoluble in water
- Gives a characteristic blue colour with iodine.
- Test is used to determine the presence of starch in any solution or even to test for iodine.

Cellulose

- Wood, cotton and paper are composed primarily of cellulose.

Glycogen

- Is present in the body and stored in the liver and muscles.
- Where it supplies glucose.
- Forms a colloidal solution in water and gives a red color with iodine.
- Glycogen is formed in the body cells from molecules of glucose. In a process called glycogenesis.
- When glycogen is hydrolyzed to glucose, the process is called glycogenolysis.

Heparin

- Is a polysaccharide used as blood anticoagulant.
- It accelerates the inactivation of thrombin and other blood-clotting agents
- It's the strongest organic acid found in the body
- Other polysaccharides are Dextran and Heparin.