



## **Lecture title: Disaccharides**

**Lecturer Affiliation:** *Department of Physiology, Biochemistry, and Pharmacology College of Veterinary Medicine, University of Mosul, Mosul, Iraq*

**Summary:** The mono saccharides are joined by glycosidic bonds to form disaccharides, oligosaccharides and polysaccharides. Glycosides are formed when the hydroxyl group of anomeric carbon of a monosaccharide reacts with OH or NH group of second compound that may or may not be a carbohydrate. The bond so formed is known as glycosidic or glycosyl bond.

**Disaccharides:** A disaccharide consists of **two** monosaccharaides.

They are crystalline, water soluble and sweet to taste. they are divided to:

- 1.Reducing disaccharides with **free carbonyl group**, e.g. **maltose, lactose**
2. Non-reducing disaccharides with **no free carbonyl group**, e.g. **sucrose**.

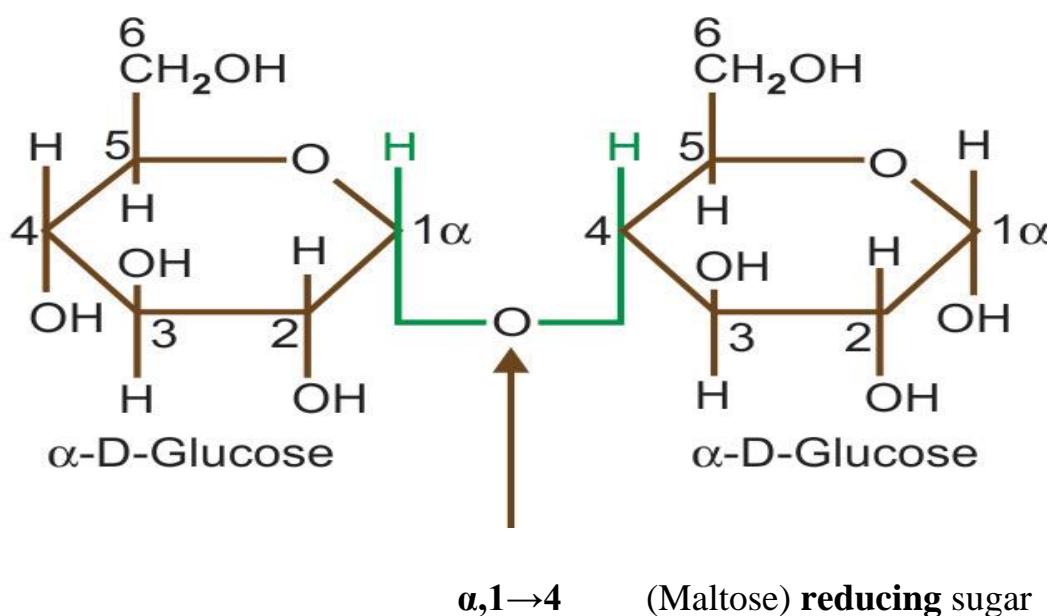
**Maltose** yields **2 molecules of glucose** on hydrolysis.

**Lactose** yields molecule of **glucose** and molecule of **galactose** on hydrolysis.

**Sucrose** yields molecule of **glucose** and molecule of **fructose** on hydrolysis.



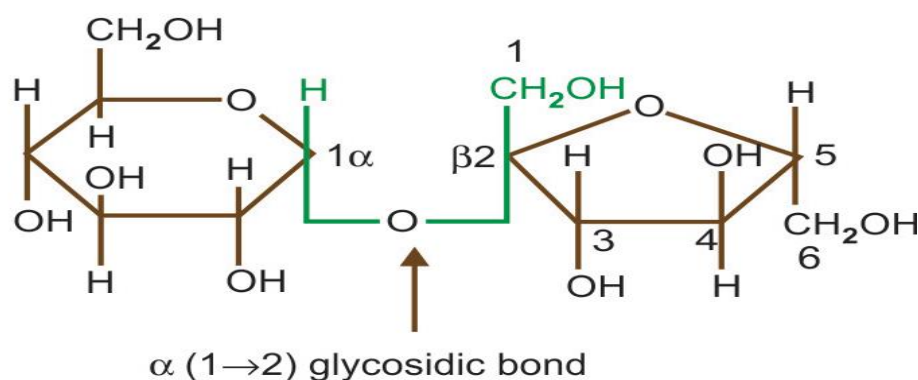
**Maltose** contains two glucose residues, joined by **glycosidic linkage** between **C-1** (the anomeric carbon) of one glucose residue and **C-4** of the other, leaving one **free anomeric carbon** of the second glucose residue, which can act as a **reducing agent**. Thus, maltose is a **reducing disaccharide**.



**Sucrose** :a disaccharide of **glucose** and **fructose**, it is formed by plant but not by human beings. Sucrose is the commonly used **table sugar**. In contrast to maltose and lactose, sucrose is non reducing sugar (why?)



because sucrose contains **no free anomeric carbon atom**, the anomeric carbon of both glucose and fructose are involved in the formation glycosidic bond.



**Sucrose**

Non reducing sugar

## Oligosaccharides

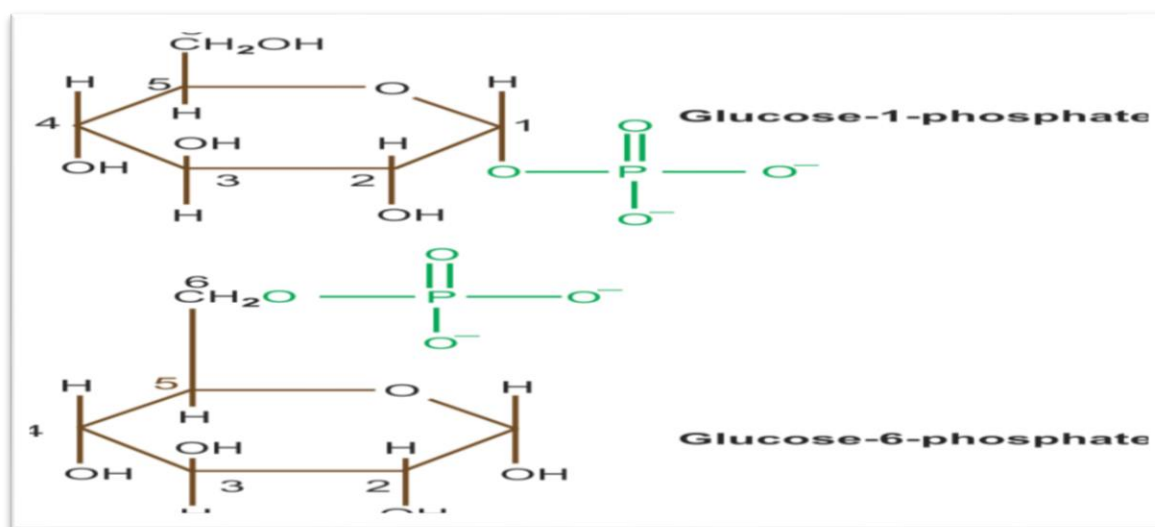
Oligosaccharides (Greek: oligo-few) contain **3-10 monosaccharide** molecules which are liberated on hydrolysis. Based on the number of monosaccharide units present, the oligosaccharides are further subdivided to :

tri-saccharides tetra-saccharides etc.

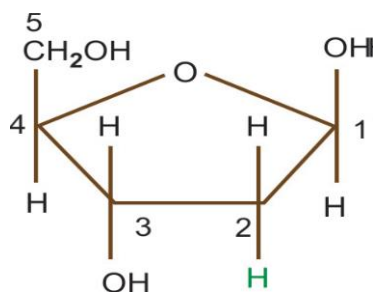
Integral membrane proteins contain covalently attached carbohydrate units, oligosaccharides, on their extracellular face. Many secreted proteins, such as antibodies and coagulation factors also contain oligosaccharide units.



## Phosphoric acid ester of glucose



**Deoxy sugars** possess a hydrogen atom in place of one of their hydroxy groups e.g. 2-deoxy ribose Found in DNA.



2-deoxy ribose