

Carbohydrates

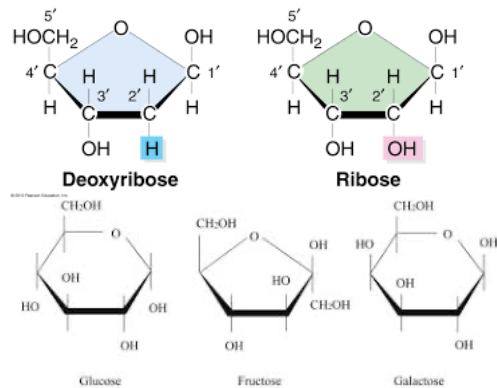
Carbohydrates are molecules made of carbon, hydrogen and oxygen. They all have the same structural pattern: $(CH_2O)_n$.

Monosaccharides

Monosaccharides are the smallest carbohydrates found in the organism. These are small molecules, soluble in water.

There are mainly 2 types:

- 5-C pentoses (ribose, deoxyribose)
- 6-C hexoses (glucose, fructose, galactose)

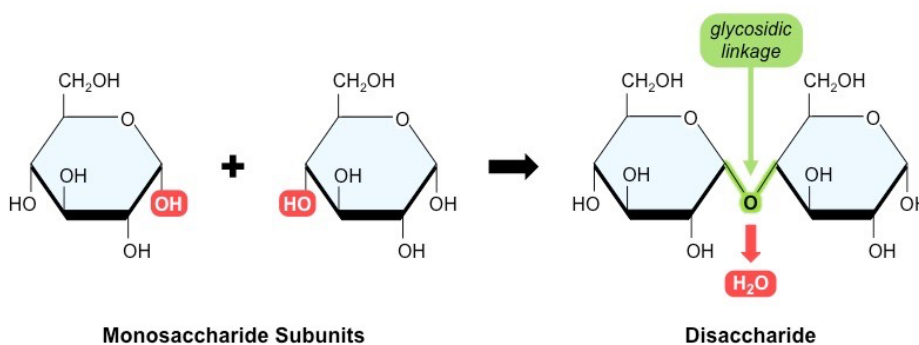


Monosaccharides are essential to a cell as an energy reserve: Photosynthesis “stores” solar energy in their bonds, and the breaking of these bonds in cellular respiration makes this energy accessible for the metabolism of the cell.

They are also essential as precursors of nucleotides (and therefore DNA and RNA, building blocks of inheritance).

From nano to macro

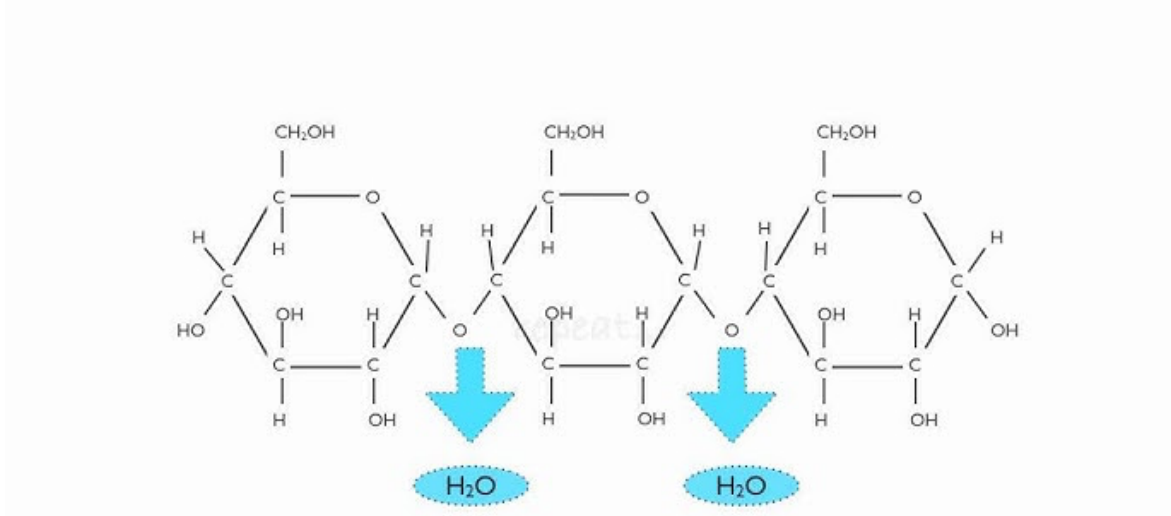
2 sugars can be joined by a condensation reaction: the elimination of water (H_2O) between 2 molecules. The bond formed is called a glycosidic linkage.



Ex: Sugars we can find in our diet are usually disaccharides
Sucrose: glucose – fructose Lactose: glucose – galactose Maltose: glucose – glucose

What is life made of?

This operation can be repeated indefinitely, leading to the formation of large molecules called polysaccharides. These are insoluble in water



Ex: *branched polysaccharides, like starches (amylopectin and amylose), synthesized in plants and glycogen, synthesized in animals, are osmotically inactive carbohydrate storages, found in seeds, roots, chloroplasts, ...*



Unbranched polysaccharides, like cellulose, forms the plant cell walls

Cellulose (fiber)

