

8.1: Carbohydrates Fundamentals

Carbohydrates, also known as sugars, are found in all living organisms. They are **essential to the very source of life** (ex. Ribose sugars in DNA and RNA) or **sustaining life itself** (e.g., Metabolic conversion of carbohydrates into usable biochemical energy, ATP). Another important role of carbohydrates is **structural** (ex. Cellulose in plants). General names for carbohydrates include sugars, starches, saccharides, and polysaccharides. The term saccharide is derived from the Latin word "saccharum" from the sweet taste of sugars. The name "carbohydrate" means a "hydrate of carbon." The name derives from the general formula of carbohydrate is $C_x(H_2O)_y$ - x and y may or may not be equal and range in value from 3 to 12 or more. For example glucose is: $C_6(H_2O)_6$ or is more commonly written, $C_6H_{12}O_6$.

Table 1: Common Carbohydrates

Name	Derivation of name and Source
Monosaccharides	
Glucose	From Greek word for sweet wine; grape sugar, blood sugar, dextrose.
Galactose	Greek word for milk--"galact", found as a component of lactose in milk.
Fructose	Latin word for fruit--"fructus", also known as levulose, found in fruits and honey; sweetest sugar.
Ribose	Ribose and Deoxyribose are found in the backbone structure of RNA and DNA, respectively.
Disaccharides - contain two monosaccharides	
Sucrose	French word for sugar--"sucre", a disaccharide containing glucose and fructose ; table sugar, cane sugar, beet sugar.
Lactose	Latin word for milk--"lact"; a disaccharide found in milk containing glucose and galactose .
Maltose	French word for "malt"; a disaccharide containing two units of glucose ; found in germinating grains, used to make beer.
Common Polysaccharides	
Starch	Plants store glucose as the polysaccharide starch. The cereal grains (wheat, rice, corn, oats, barley) as well as tubers such as potatoes are rich in starch.
Cellulose	The major component in the rigid cell walls in plants is cellulose and is a linear polysaccharide polymer with many glucose monosaccharide units.
Glycogen	This is the storage form of glucose in animals and humans which is analogous to the starch in plants. Glycogen is synthesized and stored mainly in the liver and the muscles.

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Thumbnail: *Haworth formula of D-glucose.*

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