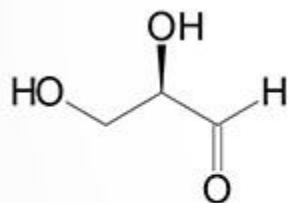


INTRODUCTION TO CARBOHYDRATES

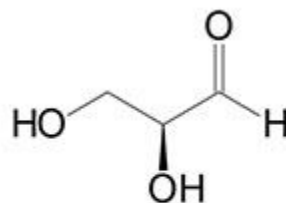
"Carbohydrates" are chemically defined as "polyhydroxy aldehyde or polyhydroxy ketones or complex substances which on hydrolysis yield polyhydroxy aldehyde or polyhydroxy ketone." Carbohydrates are one of the fundamental classes of macromolecules found in biology. Carbohydrates are commonly found in most organisms, and play important roles in organism structure, and are a primary energy source for animals and plants. Most carbohydrates are sugars or composed mainly of sugars. By far, the most common carbohydrate found in nature is glucose, which plays a major role in cellular respiration and photosynthesis. Some carbohydrates are for structural purposes, such as cellulose (which composes plants' cell walls) and chitin (a major component of insect exoskeletons). However, the majority of carbohydrates are used for energy purposes, especially in animals. Carbohydrates are made up of a 1:2:1 ratio of Carbon, Hydrogen, and Oxygen (CH₂O)_n.

Carbohydrate Nomenclature

The predominant carbohydrates encountered in the body are structurally related to the aldotriose glyceraldehyde and to the ketotriose dihydroxyacetone. All carbohydrates contain at least one asymmetrical (chiral) carbon and are, therefore, optically active. In addition, carbohydrates can exist in either of two conformations, as determined by the orientation of the hydroxyl group about the asymmetric carbon farthest from the carbonyl. With a few exceptions, those carbohydrates that are of physiological significance exist in the D-conformation. The mirror-image conformations, called enantiomers, are in the L-conformation.



D-Glyceraldehyde



L-Glyceraldehyde

Carbohydrates have six major functions within the body:

- Providing energy and regulation of blood glucose.
- Sparing the use of proteins for energy.
- Breakdown of fatty acids and preventing ketosis.
- Biological recognition processes.
- Flavor and Sweeteners.
- Dietary fiber.

The characteristics of a carbohydrate :

Chemical Structure. A carbohydrate is a simple sugar. Its basic structure is composed of the elements carbon, hydrogen and oxygen, with generally twice the hydrogen as carbon and oxygen. In its simplest form, a carbohydrate is a chain of sugar molecules called monosaccharides.

The three main types of carbohydrates:

Among the compounds that belong to this family are cellulose, starch, glycogen, and most sugars. There are three classes of carbohydrates: monosaccharides, disaccharides, and polysaccharides. The monosaccharides are white, crystalline **solids** that contain a single aldehyde or ketone functional group.

The importance of carbohydrates:

Carbohydrates are all about energy and are found in foods like fruits, vegetables, breads, pasta, and dairy products. Your body uses these foods to make glucose, which is your body's main energy source. Glucose is a type of sugar that can be used right away for energy or stored away to be used later.