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Monosaccharides (Glucose) , Structure, Preparation, Examples, Question (For CBSE, ICSE, IAS, NET, NRA 2022)

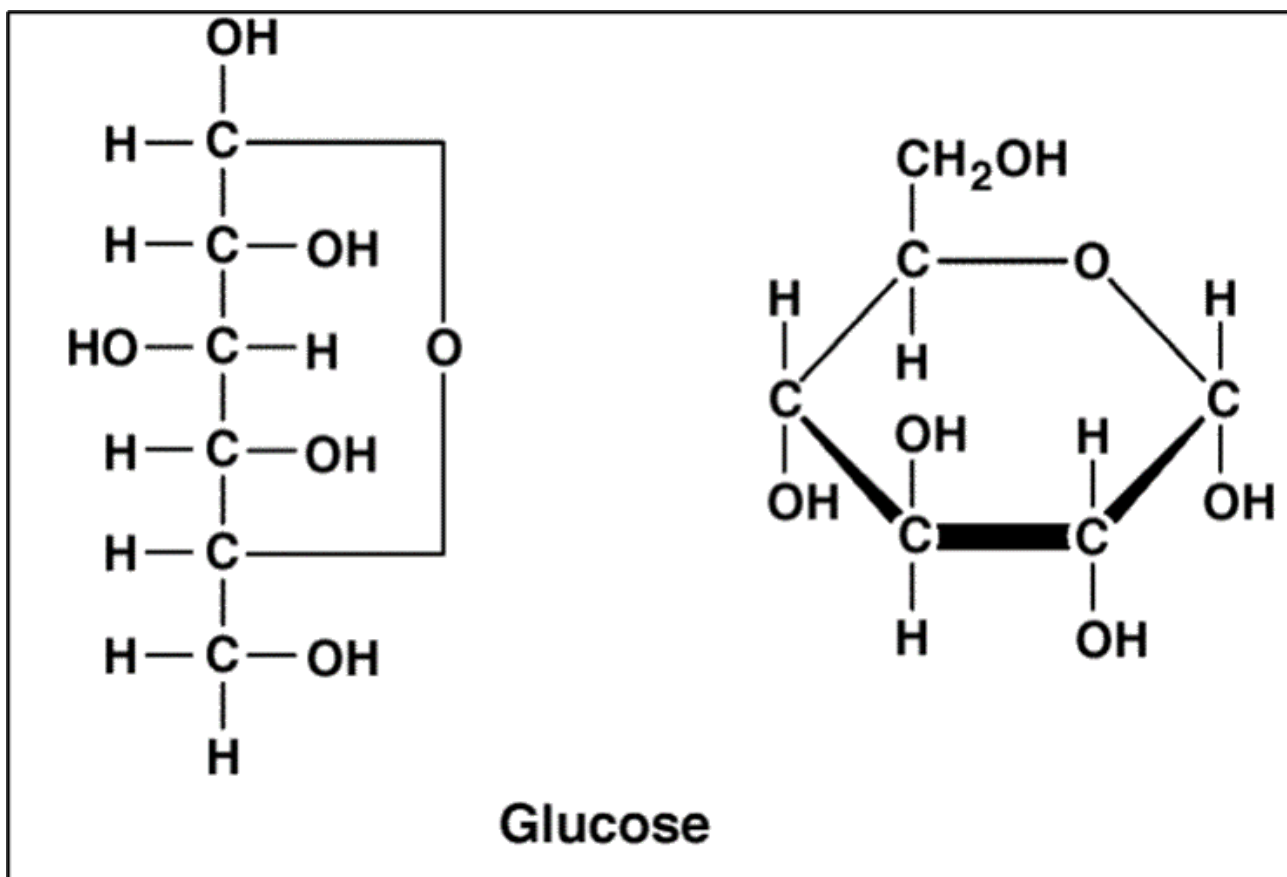
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What Are Monosaccharides?

- Monosaccharides are poly- hydroxy-aldehydes or -ketones, generally with an unbranched C-chain. A carbohydrate is an organic compound with the formula $(CH_2 O)_n$, with $n > 3$.
- Monosaccharides are the most basic form of carbohydrates. Most organisms produce and store energy by breaking down the monosaccharides glucose and harvest the energy released. This type of glucose is classified in terms of the number of carbon atoms and also the functional group attached to it. The monosaccharide which contains aldehyde is known as aldose and those which contain a ketone group is known as a ketose.

Where Can We Find Glucose?

Glucose occurs in both combined as well as in the free state in nature. We can find this in sweet fruits and in honey. Glucose present in ripe grapes in a large amount.



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Structure of Glucose

Structure of Monosaccharides

- All the monosaccharides have the formula as $(\text{CH}_2 \text{O})_n$. Here, the two hydrogen atoms and one oxygen atom associate itself to the central carbon molecule. A hydroxyl group is formed when oxygen

will bond with hydrogen. Several carbon molecules bond together because 4 bonds can form on carbon.

- One of the carbons will form a double bond with oxygen in the chain, which is termed as a carbonyl group. Depending upon its position, if it is formed at the end of the chain, then, the monosaccharides are said to belong to the aldose family and if it formed in the middle of the chain, then it belongs to the ketose family.

Preparation of Glucose

From Sucrose (Cane Sugar)

We get glucose and fructose in exactly equal amounts if sucrose is boiled with dilute HCl and H_2SO_4 in an alcoholic solution.



From Starch

When hydrolysis of starch is carried out in boiled and diluted H_2SO_4 at 393K under pressure, we get glucose.



Examples of Monosaccharides

Glucose

- Glucose molecules can be broken down by glycolysis in the process of cellular respiration. Glucose can be connected in long strings of monosaccharides to form polysaccharides. In plants, this thing is produced as cellulose. In plants, each cell is surrounded by cellulose that helps plants stand tall and turgid.
- Glucose is the most abundant monosaccharide, a subcategory of carbohydrates. Glucose is mainly made by plants and most algae during photosynthesis from water and carbon dioxide, using energy from sunlight, where it is used to make cellulose in cell walls, which is the most abundant carbohydrate.

Fructose

Fructose belongs to the ketose group. Differently shaped monosaccharides break down the specific enzyme. If fructose, combines with other monosaccharides then they form oligosaccharides. Sucrose has a fructose molecule joined with a glucose molecule with the help of a glycosidic bond.

Galactose

Galactose is produced by mammals in the form of milk. Lactose holds a lot of energy in its bonds and for breaking down the bonds apart, specific enzymes are developed by offspring's of mammals.

Question

What Are Monosaccharides Give Example?

Answer:

Examples of monosaccharides include glucose (dextrose) , fructose (levulose) , and galactose. Monosaccharides are the building blocks of disaccharides (such as sucrose and lactose) and polysaccharides (such as cellulose and starch) .

Are Glucose and Fructose Monosaccharides?

Answer:

Glucose and fructose are simple sugars or monosaccharides. Your body can absorb them more easily than the disaccharide sucrose, which must be broken down first.

What Are the 3 Classification of Carbohydrates?

Answer:

Carbohydrates are classified into three subtypes: monosaccharides, disaccharides, and polysaccharides.

What is the Main Function of Monosaccharides?

Answer:

First and foremost, monosaccharides are used to produce and store energy. Most organisms create energy by breaking down the monosaccharide glucose, and harvesting the energy released from the bonds. Other monosaccharides are used to form long fibers, which can be used as a form of cellular structure.

What Are the Three Most Important Monosaccharides?

Answer:

Three of the most important monosaccharides in foods are the six carbon sugars: glucose, fructose and galactose

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