DEPARTMENT OF ZOOLOGY, ONLINE LECTURES, PART- II

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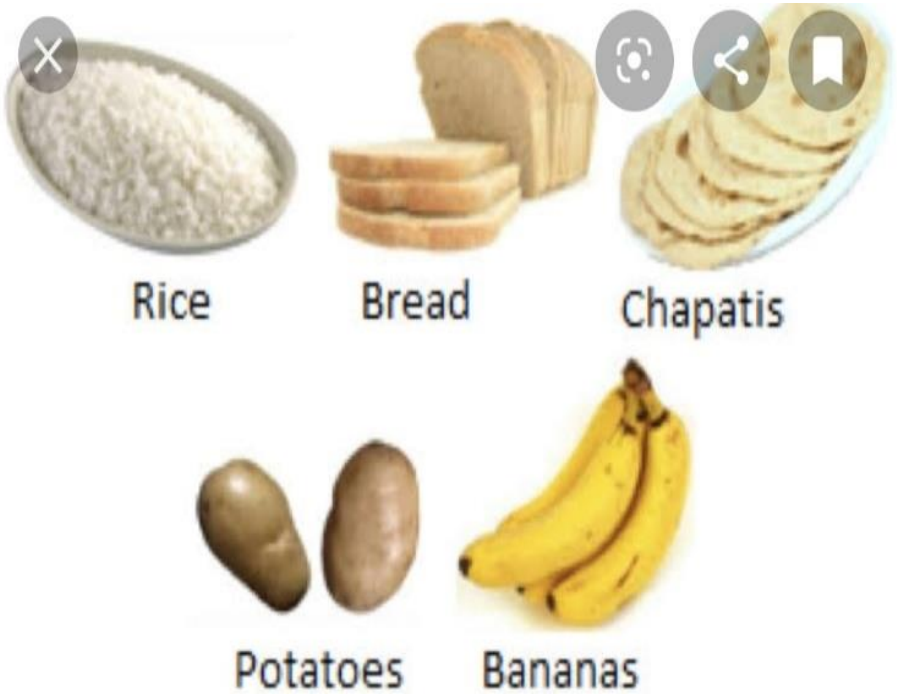
QUALITETIVE ANALYSIS OF CARBOHYDRATE

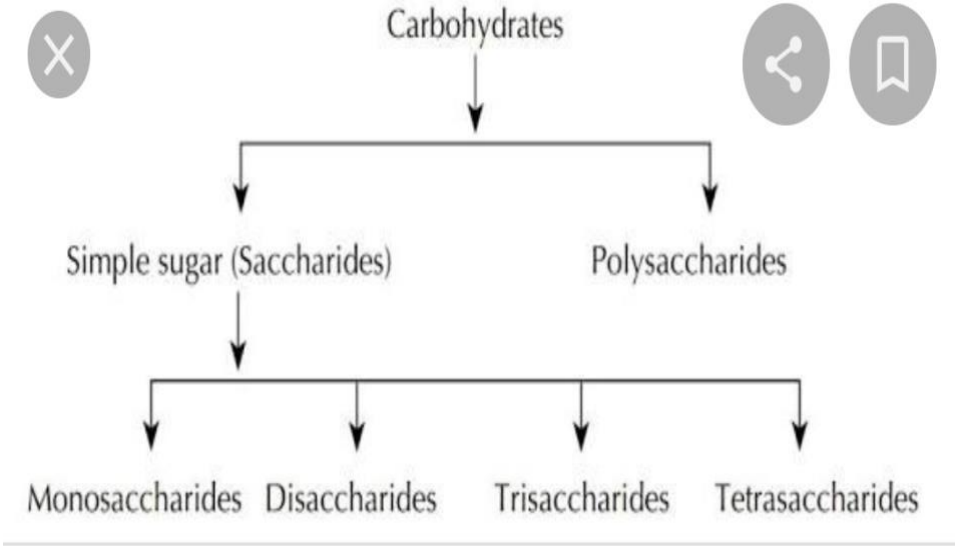
CARBOHYDRATE:

any of a large group of organic compounds occurring in foods and living tissues and including sugars, starch, and cellulose. They contain hydrogen and oxygen in the same ratio as water (2:1) and typically can be broken down to release energy in the animal body.

SOURCE OF CARBOHYDRATE:



CLASSIFICATION OF CARBOHYDRATE:



MONOSACCHARIDES: Monosaccharides, also called simple sugar, are the simplest form of sugar and the most basic units of carbohydrates. They cannot be further hydrolyzed to simpler chemical compounds. The general formula is C □H $_2$□O □. They are usually colorless, water-soluble, and crystalline solids. Example- Glucose, Fructose,

DISACCHARIDE: A disaccharide is the sugar formed when two monosaccharides are joined by glycosidic linkage. Like monosaccharides, disaccharides are soluble in water. Three common examples are sucrose, lactose, and maltose. Disaccharides are one of the four chemical groupings of carbohydrates. Example- Lactose, Maltose, Galactose.

POLYSACCHARIDE: Polysaccharides are long chains of monosaccharides linked by glycosidic bonds. Three important **polysaccharides**, starch, glycogen, and cellulose, are composed of glucose. Starch and glycogen serve as short-term energy stores in plants and animals, respectively. The glucose monomers are linked by α glycosidic bonds. Example- Starch, Cellulose.

REDUSING SUGAR:

A **reducing sugar** is any **sugar** that is capable of acting as a **reducing** agent because it has a free aldehyde group or a free ketone group. All monosaccharides are **reducing sugars**, along with some disaccharides, some oligosaccharides, and some polysaccharides.

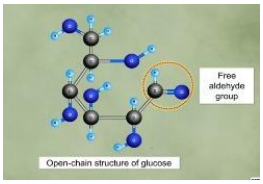
Example: Glucose, Fructose, maltose, Lactose, Galactose.

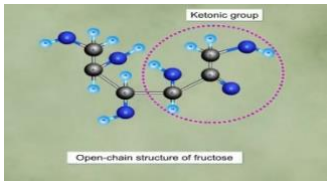
NON REDUSING SUGAR:

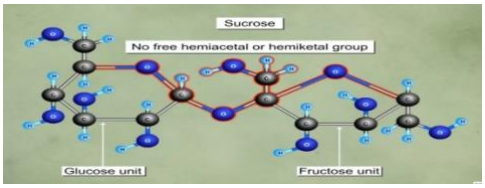
Non-reducing sugars do not have an OH group attached to the anomeric carbon so they cannot **reduce** other compounds. All monosaccharides such as **glucose** are **reducing sugars**. A disaccharide can be a **reducing sugar** or a **non-reducing sugar**. Maltose and lactose are **reducing sugars**, while sucrose is a **non-reducing sugar**.

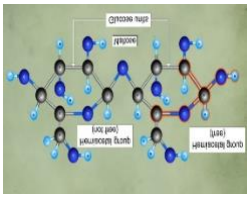
Example: Sucrose.

STRUCTURE OF SOME CARBOHYDRATE:









GENERAL TEST FOR CARBOHYDRATE:

EXPERIMENT	OBSERVETION	INFERENCE
1. **Fehlings test:** 2ml of water test sample solution was taken in a test tube then 2ml of feelings solution added to it. After they the test tube shaken and boil with the help of spirit lamp.	The initial blue colour of the mixture turned into green or yellow and finally a brock red ppt formed.	The result indicate that presence of **reducing sugar**.

2. **BENEDICT TEST:** 5-8 drops of sample solution and 2ml of benedict reagent was added in a test tube and it was placed in a boiling water bath for 2 to 3 min.	A brick red precipitete was appeared in the test tube.	The ppt of Cu2O confirm the presence of reducing sugar.
3. **MOLISHS TEST:** Add 2drops of molishs reagent to about 3ml of sample solution. Mixed the two throughly and pour in con H2SO4 down the side of the test tube so as to form a layer of acid.	A perple ring appears in the acid water interface.	Indicate presence of carbohydrate.
4. **BARFOEDS TEST:** About 1ml of test sample solution was added to about 3ml of barfoed reagent. This two are mixed thoroughly and boiled for 30 sec and the mixture was allowed to cool.	A red ppt was appeared.	The ppt of Cu2O confirm the presence of reducing sugar.
5. **SELIWANOFFS TEST:** About 1ml of test sample solution to about 3ml seliwanoffs reagent was added. Mixed the two thoroughly and boiled. The mixture was allowed to cool.	Red colour developed.	Indicates presence of keto-hexose.

CONCLUSION:

On the table given above we saw that carbohydrate like reducing sugars such as **GLUCOSE, FRUCTOSE** react with fehlings reagent and produce brick red colour precipitation.

In case of non reducing sugars like **SUCROSE** do not react with fehlings reagent.

Sucrose and fructose have **keto** group in their structure that's why they react with seliwanoffs reagent and produce red colour.