



## Carbohydrates:

Are biological molecules that contain carbon (C), hydrogen (H), and oxygen (O) atoms, where it can be defined as polyhydroxy aldehydes or ketones.

The general molecular formula of carbohydrates is  $(CH_2O)_n$ .

For example: Glucose, Fructose, Galactose has the molecular formula  $C_6H_{12}O_6$ .

Carbohydrates are very important because they provide energy and fuel for bodies so that brains can function properly and so that muscles can work.

Carbohydrates are preferred source of energy.

They can range from complex carbohydrates to simple carbohydrates. The simplest form of carbohydrates are monosaccharides.

### Importance of Carbohydrates:

- 1- Sources of energy especially for brain and RBC.
- 2- Carbohydrates are structural of cell membranes.
- 3- Serve as metabolic intermediates.
- 4- Components of the nucleotides that form DNA and RNA.

### Classification of Carbohydrates:

Carbohydrates can be classified into:

- 1- Monosaccharides.
- 2- Disaccharides.
- 3- Oligosaccharides.
- 4- Polysaccharides.



## Tests for Carbohydrates

### 1- Molisch test:

This test is specific for all carbohydrates. Monosaccharide gives a rapid positive test, Disaccharides and polysaccharides react slower.

Used to identify the carbohydrate from other macromolecules, lipids and proteins.

### Procedures

- 1- The test reagent ( $H_2SO_4$ ) dehydrates pentose to form furfural and dehydrates
- 2- hexoses to form 5- hydroxymethyl furfural.
- 3- • The furfural and 5- hydroxymethyl furfural further react with  $\alpha$ -naphthol present
- 4- in the test reagent to produce a purple ring.

### Results:





## 2- Barfoed's test:

Use to distinguish between reducing monosaccharide's (glucose-fructose-ribose) and the reducing disaccharides (maltose-lactose) reducing monosaccharide's respond to the test faster than reducing disaccharides. As disaccharides react slowly it need 7-12 minutes to form the red precipitate.

but when heated above five minutes, disaccharides break down ,by the action of heat to mono and give the same result to test.

### Procedures:

- 1- Place one ml of a sample solution in a test tube.
- 2- Add 3 ml of Barfoed's reagent (a solution of cupric acetate and acetic acid).
- 3- Heat the solution in a boiling water bath for 6 minutes.

### Results:

Barfoed's test  
(test for  
monosaccharides)

