

# Qualitative Tests of Carbohydrates

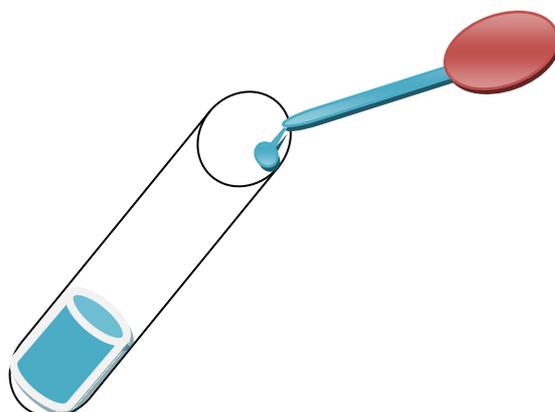
## A. Molisch's test

### 1. Principle.

This general test is used to identify the carbohydrates from other macromolecules proteins and lipids. Sulfuric acid which is the test reagent dehydrates pentose to form fufural and hexose to form 5-hydroxymethylfufural. The fufural and 5-hydroxymethylfufural further react with  $\alpha$ -naphthol present in the test reagent to produce violet compound appears as a ring at the junction between the two layers.

### 2. Procedure.

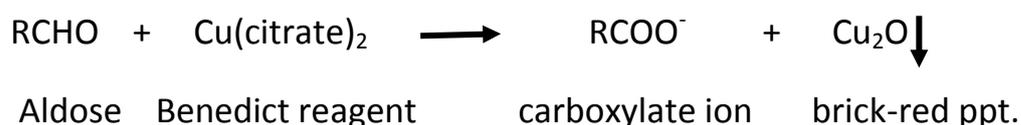
1. In clean dry test tube add two ml of 5% glucose solution or any other sugar.
2. Add for the sugar solution in the test tube two drops of (10%  $\alpha$ -naphthol in absolute ethanol) and mix well.
3. Add for the mixture by dropping 1-2 ml of concentrated sulfuric acid on the internal wall of the tube in a slant manner without mixing as shown below.
4. Observe the appearance of violet ring between the two layers of the mixture solution.



## B. Benedict's test

### 1. Principle.

This test is used to distinguish between reducing and non reducing sugars. Reducing sugars include all monosaccharides and many disaccharides including lactose and maltose. Benedict test is most commonly used to test for the presence of glucose in urine. The presence of glucose in urine is an indication of diabetes mellitus. Reducing sugars reduce cupric ions ( $\text{Cu}^{+2}$ ) to cuprous form ( $\text{Cu}^{+1}$ ) which is responsible for the color change to brick-red. The color appearance and the amount of the precipitate formed ( $\text{Cu}_2\text{O}$ ) depends on the amount of reducing sugar that present.



### 2. Procedure.

1. In clean dry test tube add 1 ml of 5% glucose solution (reducing sugar).
2. In the second test tube add 1 ml of 5% sucrose solution (non reducing sugar).
3. For each tube add 2 ml of Benedict's reagent and mix well.
4. Keep both tubes in boiling water bath for five minutes.
5. Observe the formation of brick-red precipitate for glucose solution indicating that the sugar is reducing (positive result). And no color change occurs with solution of sucrose indicating that the sugar is non-reducing (negative result).