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Distinguish Between Reducing and Non-Reducing Sugars

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Durvesh Smita. Burhade¹, Paridhi Jain¹, Lakshay Saini¹, Yash Modi¹

¹Parul University

Durvesh Burhade Lab



Durvesh Burhade

Parul University

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We use this protocol and it's working

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Abstract

In this Protocol, we are performing tests to distinguish between reducing and non-reducing sugars and learn about the properties of reducing and non-reducing sugars. Reducing sugars have a free aldehyde, ketone group, which allows them to reduce other compounds. We distinguish between reducing sugars and non-reducing sugars on the basis of the free aldehyde or ketone group. Sugar is a type of carbohydrate. There are many different types of sugars. Some sugars have simple structures known as monosaccharides. Ex- glucose, fructose, and galactose. Sugar formed by Bonding between 2 monosaccharides is a disaccharide.

Guidelines

Carbohydrates are optically active polyhydroxy aldehydes, polyhydroxy ketones, or compound which give these units as hydrolysis products. Starch, cellulose and sugars are the familiar examples of carbohydrates.

Carbohydrates are classified on the basis of a number of polyhydroxy aldehyde or ketone units obtained from them on hydrolysis. Three broad classes are as follows: (i) Monosaccharides: These cannot be hydrolysed further to polyhydroxy aldehydes or ketones. (ii) Oligosaccharides: These yield 2-10 monosaccharide units on hydrolysis. Common amongst these are disaccharides, which produce two monosaccharide units. (iii) Polysaccharides: These yield a large number of monosaccharide units on hydrolysis. Monosaccharides are further classified on the basis of the number of carbon atoms and functional groups present in them. If a monosaccharide contains an aldehydic group, it is called an aldose. If it contains a keto group, it is called a ketose. Carbohydrates of all classes give Molisch's test. Carbohydrates, which are sweet in taste, are called sugars. Glucose, fructose (fruit sugar) and sucrose (table sugar) are examples of sugars. Sugars are classified into two major categories: reducing sugars and non-reducing sugars.

Materials

Fehling Reagent
Benedict Reagent
Molisch Reagent

Safety warnings

 Wear a Lab Coat & Purple Nitrile Gloves while handling solutions

Before start

Sr No	Reducing sugar	Non-reducing sugar
Definition	Carbohydrates act as reducing agents due to the presence of free aldehyde or ketone groups.	Carbohydrates that don't have any free aldehyde or ketone group.
Reducing agent	Good reducing agent	Non-reducing agent
Chemical properties	Have a free aldehyde or ketone group.	Do not have a free aldehyde ketone group.
Fehling's test	Give a positive reaction towards the test	Gives a negative reaction towards the test
Example	Monosaccharides or some disaccharides.	Polysaccharides and some disaccharides

Difference between Reducing & Non-Reducing sugar

Fehling's Test

- 1 Take a few drops of sugar solution, add  5 mL of Fehling's solution and heat the mixture.

Benedict's Test

- 2 8 drops of sugar solution are added to  5 mL of Benedict's reagent in a test tube and kept in the boiling water bath for 2 minutes.

Molisch's Test

- 3 2 drops of Molisch's reagent are added to  2 mL of sugar
The solution is in a test tube and add  2 mL of H₂SO₄

Solubility Test

- 4 A small amount of the substance was dissolved in water and observed.
A small amount of the substance was dissolved in hot water and observed.
A small amount of substance was dissolved in dilute HCL and observed.
A small amount of the substance was dissolved in alcohol and observed.

5 OBSERVATION

NAME OF THE TEST	OBSERVATION	INFERENCE
SOLUBILITY TEST	Soluble in water, hot water, dilute HCL and alcohol.	May be a monosaccharide.
MOLISCH'S TEST	A reddish-violet ring is formed at the junction of two liquids	Presence of carbohydrates
BENEDICT'S TEST	The blue colour turns orange	Presence of reducing sugar
FEHLING'S TEST	A brownish-orange precipitate was obtained	Presence of reducing sugar

We perform some experiments to identify whether the sugar is reducing or not so, in this table I have written about the observation and inference which we get after performing an experiment.

6 RESULTS

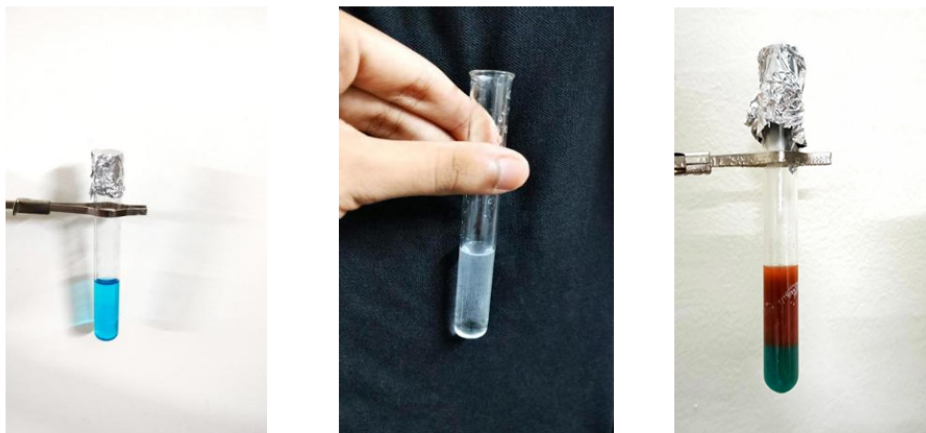


Figure (5.1): we have a solution and we are performing Fehling's test on it if it turns to brownish orange, then we can say that reducing sugar is present in the solution but as we can see the colour of the solution is blue so it means there is no reducing sugar in the solution.

Figure (5.2): we have a solution and we are performing Benedict's test on it as we can see the result is bluish in colour which means the reaction is negative means the reducing sugar of the ketone group is present in the solution.

Figure (5.3): we have a solution and we are performing Molisch's test on it as we can see the purplish red ring is present between 2 solutions it indicating the presence of carbohydrates in the solution.

Results of Experimentation

Protocol references

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