



Lect.2.

test for reducing sugars

Two Experiment.

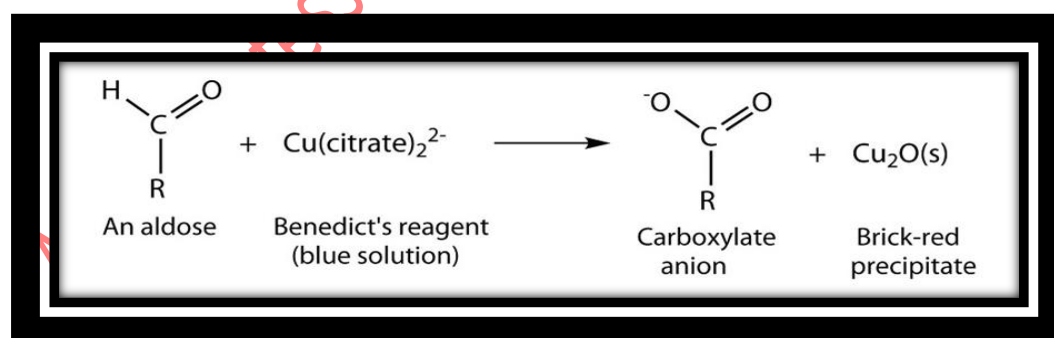
Benedict's test (A test for reducing sugars).

Object : To detect the presence of reducing sugars in the given solution by Benedict's test.

Principle:

the Principle is similar to that of the Fehling's Test, the reducing sugars can reduce Copper ion (Cu^{+2}) to Cuprous ion (Cu^{+}) which is the basis of Benedict's Test and Fehling's Test .

Copper sulphate hydrolysis to form Cupric hydroxide. the hydroxide (OH^{-}) group comes from dissociated of water . Cupric hydroxide is reduce to Cuprous oxide on heating with a reducing carbohydrates. Cuprous hydroxide during the process of heating is converted to red Cuprous oxide.



Reagent

1-Copper sulphate 2-Sodium carbonate 3- Sodium citrate.

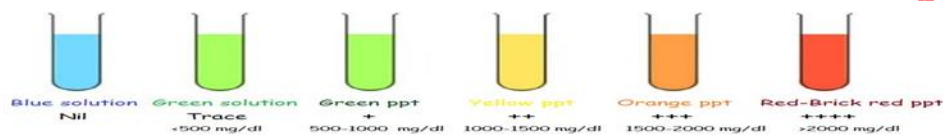
Benedict's reagent prepared by dissolving 173 gm of Sodium citrate and 90 gm of Sodium carbonate in about 750ml H_2O mix and heat , dissolving 17.3 gm of Copper sulphate in about 100 ml H_2O , Add the solution of Sodium citrate and Sodium carbonate and Copper sulphate Made the volume up to 1000 ml with water.

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Procedure

Take 5ml of Benedict's reagent in the test tube, add 1ml of given solution mix and boil over a flame or a boiling water for 2 minutes cool the solution.



| |
|-----------|
| Color |
| Green |
| Yellow |
| Orange |
| Red |
| Brick Red |
| Blue |





| Constituent | Amount | Function |
|-----------------|--------------|---|
| Copper sulphate | 17.3 gm. | Furnishes cupric ions (Cu ⁺⁺) |
| Sodium carbonat | 100 gm | Makes medium alkaline |
| Sodium citrate | 173 gm. | Complexes with the copper (II) ions so that they do not deteriorate to copper(I) ions during storage. |
| Distilled water | Upto 1000 ml | Solvent |

| Experiment | Observation | Inference |
|--|---|--------------------------------|
| Substance in water + 3ml Benedict's solution, then boil for few minutes and allow to cool | Red, green, or yellow precipitate is obtained | Reducing sugar is not present. |
| Substance in water + 3ml Benedict's solution, then boil for few minutes and allow to cool. | Solution remains clear or is a little blue | Reducing sugar is not present. |



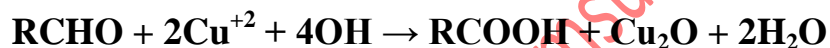
Three Experiment Test for reducing sugars

Fehling's Test

Object : To detect the presence of reducing sugars in the given solution by Fehling's test

Principle

The carbohydrates having a free aldehydes or ketones group. the reducing sugars can reduce Cupric ion (Cu^{+2}) to Cuprous ion (Cu^{+}) which is the basis of Fehling's Test. The copper sulphate present in Fehling's Test reagent hydrolysis to give Cupric hydroxide. Cupric hydroxide, $\text{Cu}(\text{OH})_2$ blue color is reduced Cuprous oxide Cu_2O (red) on heating with a reducing carbohydrates. The color of the .solution change to from red to blue



| |
|--------|
| Color |
| Blue |
| Yellow |



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Reagent

Two solutions are required:

Fehling's A" uses 7%(34.65gm) $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ dissolved in 500ml distilled water.

Fehling's "B" uses of potassium hydroxide , sodium potassium tartrate (Rochelle,s salt) it prepared by dissolved 125g of KOH and .173g of sodium potassium tartrate in 500ml distilled water.

These two solutions should be stoppered and stored until needed

For the test. Mix 15 ml of solution-"A" with 15 ml of solution-"B

Procedure

Add 2 ml of Fehling's test in test tube, and add 1ml of given solution heat in a boiling water for 2 minutes cool.

A positive test is indicated by a green suspension and a red precipitate.



(Fehling's test color)



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Comparison between Benedict's test & Fehling's test.

| Fehling's test | Benedict's test |
|--|---|
| The Reagent is unstable | The Reagent is stable . |
| It has to be prepared in two parts and stored separately. | Single solution is prepared and storage is convenient. |
| The strong alkali (KOH) in The Reagent can destroy the carbohydrates. | Sodium carbonate is a very weak base |
| It is a more sensitive test than Benedict's. | It is a less sensitive test than Fehling's |
| It is only qualitative test. | It is both qualitative and semi qualitative test |