BENEDICT'S TEST

Dr. JYOTSNA A PATIL

BENEDICT'S TEST
(DEMO)

- Benedict's Test is a chemical analytical method used for the detection of reducing sugar in a solution.

- Benedict's Test is a qualitative test used for the differentiation of carbohydrates (saccharides/sugars) into reducing and non-reducing types.

- It is also used for detecting glucose in urine as a presumptive test of diabetes mellitus.

- To detect the presence of reducing sugar in the sample solution
- To diagnose diabetes mellitus by detecting glucose in the urine sample
- To estimate the concentration of reducing sugar in the sample solution

Principle of Benedict's Test

- In mild alkaline media reducing sugars are tautomerises strong reducing agents, enediols. These enediols reduce the cupric ions (Cu^{2+}) (present as Copper Sulfate ($CuSO_4$)) of Benedict reagent into cuprous ions (Cu^{+}). The cuprous particles are present in form of insoluble Copper (I) oxide or cuprous oxide (Cu_2O) which is of red color. These red-colored copper oxides get precipitated.

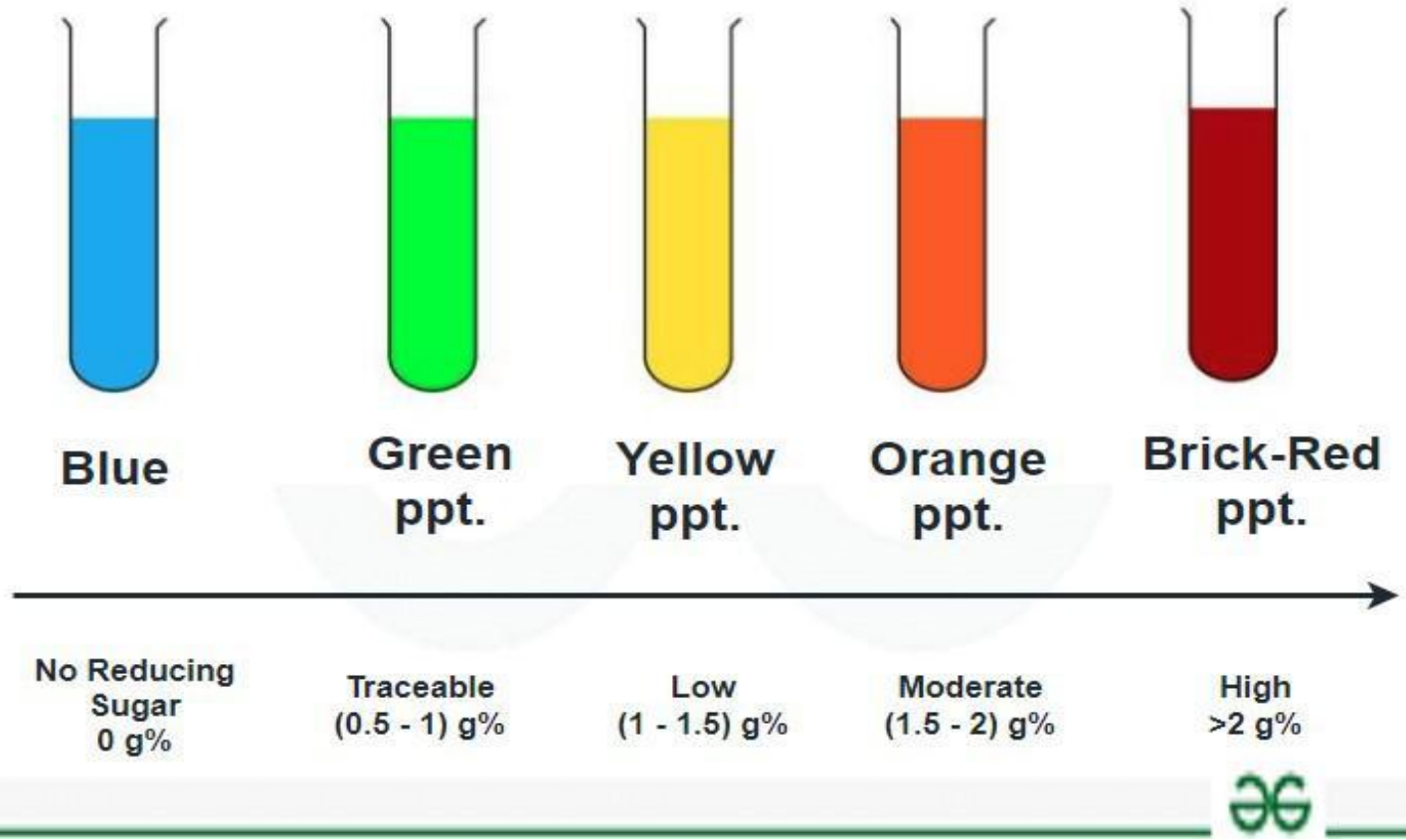
- The concentration of reducing sugar in the sample differs from the intensity and shade of the color of the reaction mixture. This shade of color can be used to estimate the concentration of reducing sugar in the sample.
- Color may vary from greenish to yellow to orange-red to brick-red.
- As the concentration of reducing sugar increases color gradually changes from greenish to yellowish to orange to brick-red.

- Requirements of Benedict’s Test
- Test-tubes and test-tube holders
- Bunsen burner
- Benedict’s Reagent
- Sample solution of unknown carbohydrate (or urine sample)
- PRODECURE: -
- Take 5 ml of Benedict's regent in test tube.
- Add 0.5 ml (8 drops) of Urine
- Mix well and Boil 2 min.
- Cool IN RUNNING TAP WATER and note the color.

Result Interpretation / Observation of Benedict's Test

- Any change in color from blue to green or yellow or orange or red within 3 minutes indicates a positive Benedict test i.e. presence of reducing sugar in the sample.
- For semiquantitative evaluation, the concentration of reducing sugar can be estimated based on the shade of developed color as follows;

Benedict's Test Results



- Shade of Color Approx. Concentration of Reducing Sugar (in g%) Indication
- Blue-No reducing sugar
- Green solution -< 0.5 Trace reducing sugar
- Green ppt.0.5 – 1Trace reducing sugar
- Yellow ppt.1 -1.5Low reducing sugar
- Orange-red ppt.1.5 – 2Moderate reducing sugar
- Brick-red ppt.>2High reducing sugar

- **Applications of Benedict's Test**
- In biochemistry for analysis and identification of unknown carbohydrates.
- In clinical diagnosis for rapid diagnosis of diabetes mellitus.

- **Advantages of Benedict's Test**
- A simple test in less time.
- Easily available reagents .
- Both qualitative and semi-quantitative evaluation.

- **Limitations of Benedict's Test**
- False-positive result due to reaction with drugs like penicillin, isoniazid, streptomycin, salicylates, and p-aminosalicylic acid.
- Chemicals in urine like creatinine, ascorbic acid, and urate retard Benedict's reaction.
- The exact concentration of reducing sugar can't be measured; only an estimated semiquantitative value can be indicated.
- Requires further test for identification of the carbohydrate