Tishk International University
Faculty of Applied Science
Nutrition and Dietetics Department
Fall Semester/ 2nd Grade

Nutritional Biochemistry I/ NUT 207
Pre-Lab (4): Fehling's Test

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Outline

- Definition
- Principle
- Procedure
- Result
- Uses

Fehling's Test

- Fehling's test is a chemical test used to differentiate between reducing and non-reducing sugars.

- This test can also be used to distinguish ketone functional group **carbohydrates** and water-soluble carbohydrates.

Objectives

- To detect the presence of carbohydrates in a solution.
- To differentiate between reducing and non-reducing sugars.

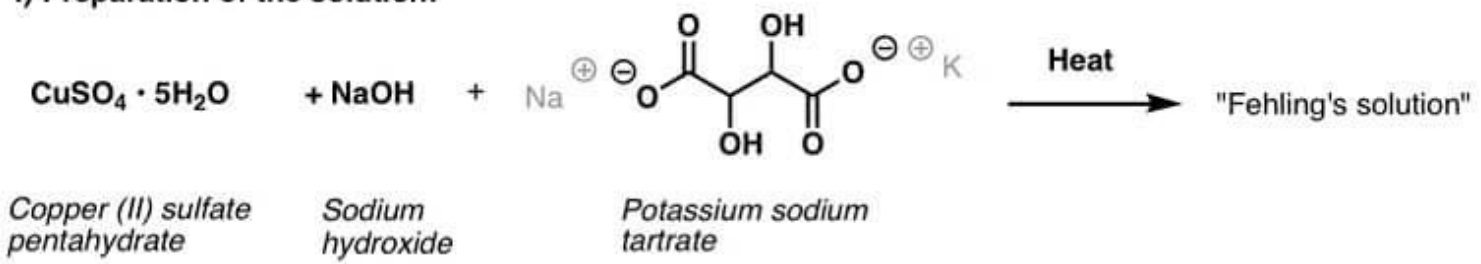
Principle of Fehling's Test

- The carbohydrates having free or potentially free carbonyl groups (aldehyde or ketone) can act as reducing sugars.

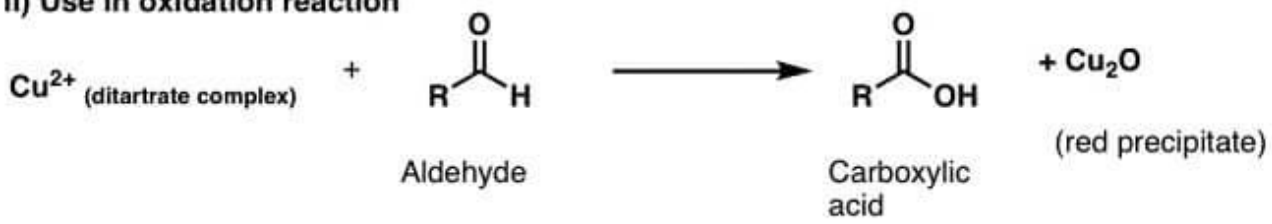
- The Fehling's solution appears ***deep blue*** in color and consists of copper sulfate mixed with potassium sodium tartrate and strong alkali, which is usually sodium hydroxide.

Fehling's solution

i) Preparation of the solution:



ii) Use in oxidation reaction



Reaction

$2Cu(OH)_2 + \text{reducing sugar} \rightarrow 2Cu_2O + \text{Aldonic acid}$

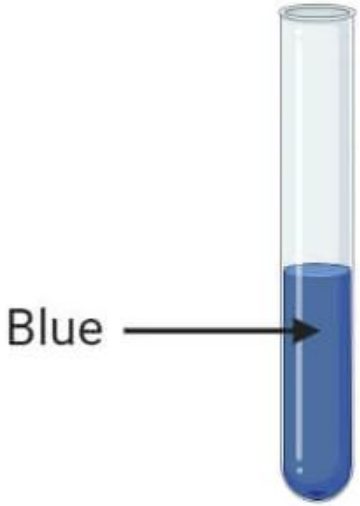
Requirements

- **1. Reagent**
- Fehling's solution A: Dissolve 7 g of $CuSO_4.7H_2O$ in 100 ml of water.
- Fehlings solution B: Dissolve 24 g of KOH and 34.6 g of potassium sodium tartrate in 100 ml water.
- Fehling's solution: Mix equal volumes of both the solution just before use.
- Sample (5% Glucose, 5% Sucrose, 5% Fructose, 5% Starch, 5% lactose)
- **2. Materials Required**
- Pipettes
- Test tubes
- Test tube stand
- **3. Equipment**
- Water bath

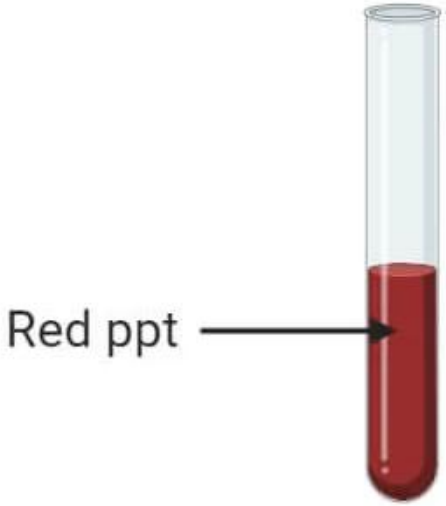
Procedure

- Take 1 ml of a given sample in a clean, dry test tube. The concentration of the test samples should be 5% (w/v).
- Take control of 1 ml of distilled water in another tube.
- Add about 2-3 drops of Fehling's reagent to both the tubes and mix them in a vortex.
- Keep the test tubes in the water bath for 1-2 minutes.
- Observe the appearance of color in the test tubes.
- Note down the appearance of color seen in the test tubes.

Interpretation of Fehling's Test



Negative Test (aldehydes and alpha-hydroxy-ketone absent)



Positive Test (aldehydes and alpha-hydroxy-ketone present)

Uses of Fehling's Test

- Fehling's test is used to distinguish between the presence of aldehydes and ketones in carbohydrates as ketone sugars except alpha-hydroxy-ketone do not react in this test.

- Fehling's test is performed in medical facilities to detect the presence of glucose in urine. This helps to identify whether the patient has diabetes or not.

Limitations of Fehling's Test

- Aromatic aldehydes cannot be detected by this test.

- This reaction takes place only in an alkaline environment. In an acidic environment, the copper (II) ions would be stabilized and not easily oxidized, thus failing the reaction.

Results

Solution	Observation