

# EXPERIMENT

## 3

### Determination of glucose in the sample

**Principle:** There are three methods for determination of glucose, i.e., chemical method, polarimetric method and fermentation method. The second is the most accurate and rapid method, and is of considerable technical importance. The chemical method, although less accurate than the polarimetric method, is of great value for the estimation of sugars in biological fluids. It is often to be preferred to the polarimetric method owing to the probable presence of other substances having high optical rotations.

**Procedure:**

1. Standardize the freshly prepared Fehling's solution by titrating it directly against a standard solution of pure anhydrous glucose.

2. *Preparation and standardization of Fehling's solution*

**Solution A:** Dissolve 17.320 g of powdered crystalline copper sulphate,  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ , in water and make the solution up to 250 mL in a graduated flask.

**Solution B:** Dissolve 86.5 g of crystalline sodium potassium tartrate ('' Rochelle salt, in warm water. Dissolve 30 g of pure sodium hydroxide in water. Mix the tartrate and hydroxide solutions, cool and make up to 250 mL in a graduated flask.

Mix equal volume of both solutions to make Fehling's solution. To standardize this solution, weigh out accurately about 1.25 g of pure anhydrous glucose dissolve in water and make up the solution to 250 mL in a graduated flask. Place 25 mL of the freshly prepared Fehling's solution in a China dish. Add 25 mL water to dilute the glucose solution. Boil this solution *very gently* over gauze.

Now add the standard glucose solution from a burette, 1 mL at a time, into the boiling Fehling's solution until the blue color disappear entirely. Repeat this procedure three times and determine exact volume of Fehling's solution required for the known amount of glucose. Then calculate the weight of glucose equivalent to 1 mL of the Fehling's solution. It is usually found that:

1 mL of the above Fehling's solution = 0.0050 g of glucose.

3. Weigh out accurately about 1.25 g of the sample, dissolve it in water and make the solution up to 250 mL. Titrate this solution against 25 mL of the standard Fehling's solution precisely as before.

### Observations and Calculations

No	Initial reading	Final reading	Vol. of Glucose solution (mL)
1	0.0	26.7	26.7
2	0.0	26.6	12.6
3	0.0	26.7	26.7

Volume used = 26.7 mL

Weight of glucose dissolved in 250 mL = 1.25 g

Volume of glucose required to react with 25 mL of Fehling's solution = 26.7 mL

1 mL of Fehling's solution = 0.005 g of glucose

26.7 mL of glucose solution contains pure glucose =  $25 \times 0.005$  g

250 mL of glucose solution contains pure glucose =  $\frac{25 \times 0.005}{26.7} \times 250 = 1.170$  g

1.25 g of sample of glucose contains pure glucose = 1.170 g

100 g of sample of glucose contains pure glucose =  $\frac{1.170}{1.25} \times 100 = 93.63$  g

**Result:** The given sample contains 93.63% pure glucose.