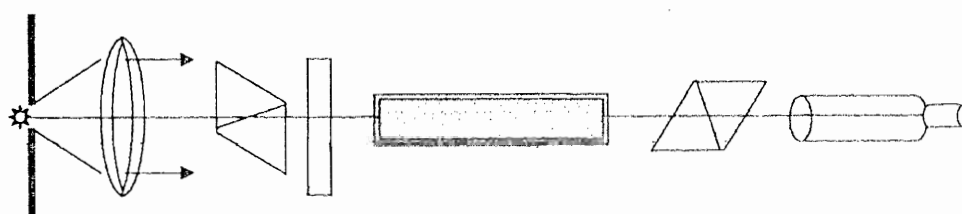


POLARIMETER (Biquartz)

Object: To determine the specific rotation of cane sugar solution using Polarimeter.

Specific rotation: Specific rotation is the rotation produced by a column in a solution of an optically active substance one centimeter long, the concentration of the substance being one gram per c.c.

Apparatus Used: Polarimeter, Electric bulb with housing,, sugar, balance, graduated cylinder and thermometer.



Source

P. Nicol

H

Solution

A Nicol

Eye piece

Fig. 1

Description: As shown in Fig. 1, **Source** is the Sodium Vapor lamp fitted in housing, **P.Nicol**, the polarizing Nicol, **H**, the Half shade device, **A Nicol**, the analyzing Nicol and **Eye piece** is the observing eye piece and **solution** is contained in the tube with glass end.

Formula: The specific rotation S of the plane of polarization of sugar dissolved in water

$$S = \frac{\theta}{l \times c} = \frac{\theta \times v}{l \times m}$$

Where,

c	= Concentration of the solution $m/v = \dots \text{gm/cc}$
θ	= Rotation produced in degree
l	= Length of the tube in cm.
m	= Mass of sugar in gm dissolved in water
v	= Volume of sugar solution.

Method :

1. Weigh 5 gm. of sugar and carefully dissolve it in water to make up to 100 cc of solution. The solution should be well mixed by pouring it from one jar to another so that it becomes of one uniform concentration. This gives a 5% solution of sugar.

2. Clean the glass tube, fill it with water and close the end; see that there are no air-bubbles in the tube and no water is sticking on the outside of the end glasses. Put the tube in position and rotate the analyzer A till the field of view is completely and uniformly dark i.e. both halves are equally dark. Read the position of analyzer on the circular scale, provided for the purpose. A further rotation through 180° will again produce an extinction.

Calculations:

1. Draw a graph between θ and concentrations. The graph will be a straight line as shown in Fig. 2.
2. Find out the value of θ for particular value of concentration.
3. Calculate the value of specific rotation S as

$$S = \frac{\theta \times v}{l \times m} \dots^\circ/\text{cm}/\text{gm}/\text{cc}$$

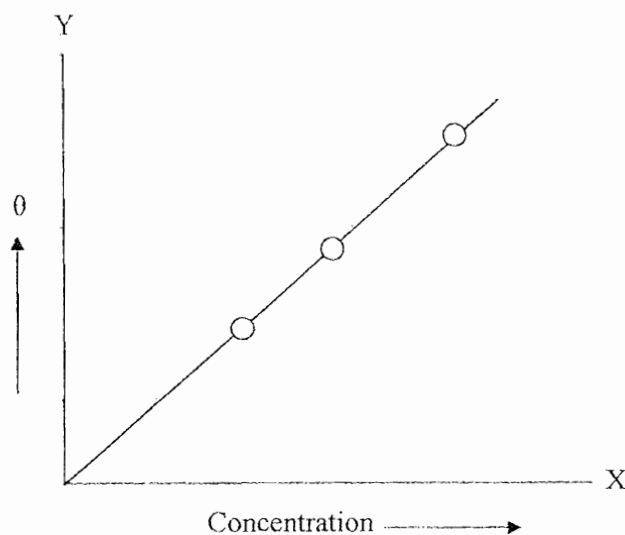


Fig. 2

Results:

1. The specific rotation of sugar solution (Solvent water) = $^\circ/\text{cm}/\text{gm}/\text{cc}$ at $^\circ\text{C}$ at $\lambda = 5880 \text{ \AA}$
2. Standard value of specific rotation of water = 66.5°
3. Standard value of specific rotation of Glucose (Solvent water) = 52°

Precautions and Source of Error:

1. The polarimeter tube should be well cleaned
2. Water and sugar used should be dust free
3. Whenever a solution is changed, rinse the tube with new solution under concentration or clean the tube with water and dry it
4. There should be no bubble inside the tube.
5. The position of analyzer should be set accurately
6. Readings should be taken when halves of the field of view become equally illuminated.

