

## EXPERIMENT NO.4

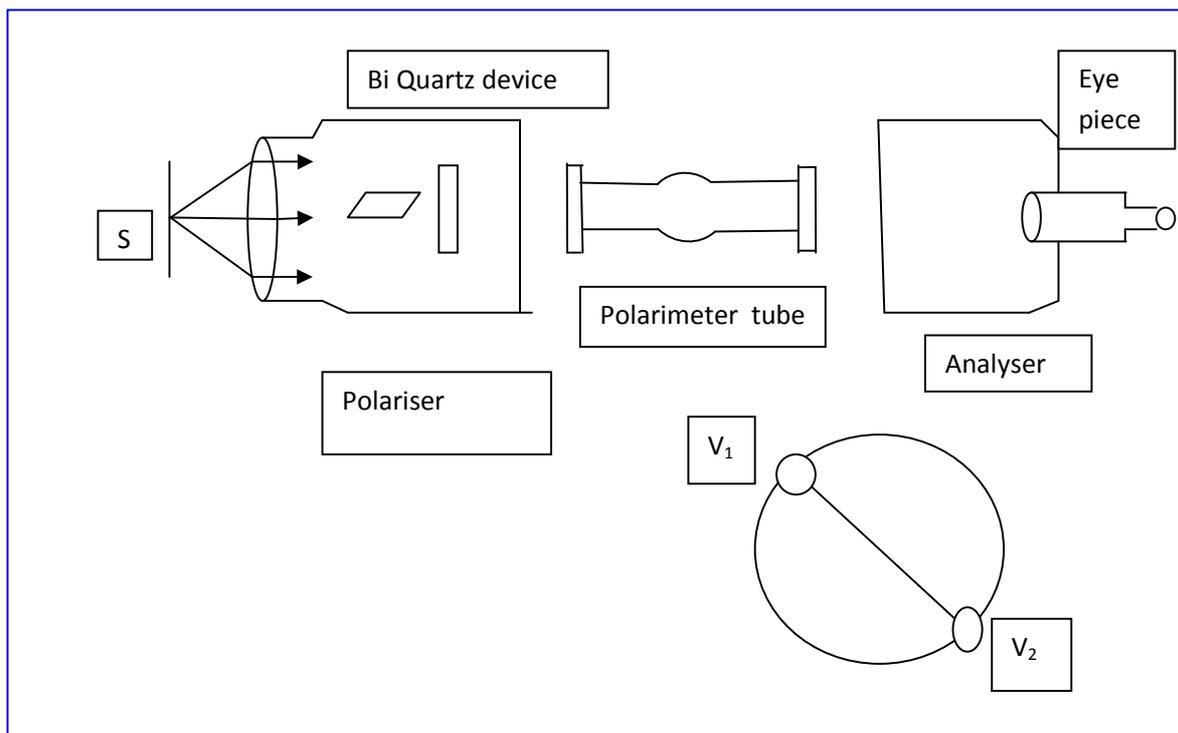
### OBJECT:

To determine the specific rotation of glucose by polarimeter using three different concentration.

### APPARATUS:

Polarimeter, A table lamp, Balance, Glucose, Measuring cylinder and a beaker.

### DIAGRAM:



## **FORMULA:**

Specific rotation is given by

$$S = \frac{B}{l \cdot c} = \frac{B \cdot V}{l \cdot m}$$

Where: B = Rotation produced in degrees

L = Length of the tube in decimeter.

m = Mass of the glucose dissolved in gm.

v = Volume of the glucose solution in c.c.

c = Concentration of the solution in gm. /c.c.

The standard value of specific rotation at temperature t° c is given by

$$S_t = 52.5 - 0.0184 (t - 20)$$

## **PROCEDURE:**

1. The polarimeter tube is cleaned and filled with water such that no air is enclosed in it. If there remains a small air bubble, then the bubble is brought in the bubble trap while placing the tube inside the polarimeter.
2. The tube is placed in its position inside the polarimeter and polarimeter is illuminated with a white light source.
3. The analyzer is rotated and adjusted in the position of tint of passage where yellow light is quenched and blue and red colors overlap and both halves of the field of view appear pink. The reading of the main scale and the vernier scale is noted.

4. The analyzer is rotated by  $180^\circ$  where a similar situation appears and the analyzer is again adjusted at the position of tint of passage. The reading on the main scale and the vernier scale is noted.
5. About two gm. of glucose is weighted and dissolved in water in the measuring cylinder to make 100 c.c. of solution. Concentration of this solution is about 2%
6. Water is removed and the solution is filled in the tube
7. The tube is placed in the polarimeter and the observations are taken as in the case of water.
8. 50 c.c. of the above solution is taken in measuring cylinder and water is added to make it 100 c.c. The concentration of this solution is about 1%  
Observations are repeated with this solution.
9. The above step is repeated and the observations are taken for the solution of about 0.5% concentration.

**OBSERVATIONS:**

- (A) (a) Mass of watch glass = gm.
- (b) Mass of watch glass and glucose = gm.
- (c) Mass of glucose (m) = gm.
- (d) Volume of the glucose solution (v) = c.c.
- (e) Temperature of the solution =  $^\circ\text{C}$

(f) Length of the polarimeter =            decimeter

Readings of the analyzer scale for tint of passage

**(B) With distilled water**

Vernier constant of the polarimeter =    cm.

S.No.	First Position (V <sub>1</sub> )			Position after Rotating by 180° (V <sub>2</sub> )		
	Clockwise	Anticlockwise	Mean	Clock- wise	Anti- clockwise	Mean
1.						
2.						

For water mean V<sub>1</sub>=

Mean V<sub>2</sub>=

**(C) For solution of glucose**

S. No.	Strength of solution	First Position (V <sub>1</sub> )	Position after Rotating by 180°
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					(V <sub>2</sub> )		
		Clock wise	Anti clock wise	Mean	Clock wise	Anti clock wise	Mean
1.							
2.							
1.							
2.							
1.							
2.							

**CALCULATION:**

(1) For solution of strength =        %

$$(V_1 - V_2) + (V_2 - V_2)$$

$$\text{Mean B} = \frac{\text{-----}}{2} =$$

$$S =$$

(2) For solution of strength =        %

$$\text{Mean B} =$$

$$S =$$

$$\text{Mean S} =$$

$$S_t =$$

**RESULT:**

The specific rotation of glucose at  $\text{ }^\circ\text{C} =$                       degree/dm (gm/ml)

Percentage error =                      %

**PRECAUTIONS:**

1. The polarimeter tube must be well cleaned.
2. Whenever a solution is changed, the tube is rinsed with new solution.
3. Care should be taken that there is no air bubble in the path of light.
4. Position of tint of passage must be noted very carefully.