

# PHYSICS PRACTICAL SHEETS

Date 23rd Feb 2023

K.V. CAMPUS

Class CE

Roll No. 25

Shift Morning

Object of the Experiment (Block Letter)

Experiment No. 8

Group T

Sub. Physics

Set

DETERMINATION OF SPECIFIC ROTATION OF A GIVEN SAMPLE USING A LAURENT HALF SHADE POLARIMETER

Apparatus Required:

- i) Laurent's half shade polarimeter
- ii) A sodium lamp.
- iii) Sugar, Balance, weight box, a graduated cylinder, two beakers, filter paper, funnel, pipette and glass rod.

Theory:

When a plane polarized light passes through any optically active medium (like sugar solution), it rotates the plane of polarization either in clockwise or anti-clockwise. The angle through which the plane of polarization rotates depends upon the optical path in the ~~optically~~ optically active medium, concentration of solution, wavelength of light used and the temperature. The specific rotation 'S' of any optically active medium is given by,

$$S = \frac{\theta}{L \cdot C}$$

where,  $\theta$  = angle of rotation of the plane of polarization produced by L decimetres of optically active solution of concentration C.

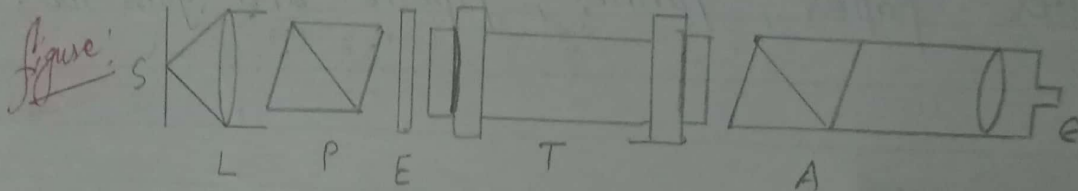


Fig: Schematic diagram of a Laurent's half shade polarimeter

S = source of light

L = a convex lens

P = the polarizer

T = liquid tube.

A = analyzer

Q = eyepiece of telescope.



Observation and calculations:

Temperature of water =  $25^{\circ}\text{C}$

Length of tube =  $20\text{cm} = 2\text{dm}$

Least count of main scale =  $1^{\circ}$

Number of division in Vernier scale = 10

$\therefore$  Vernier constant (V.C.) =  $1/10 = 0.1^{\circ}$

Table for value of  $\theta/c$ :

No. of obs	Concentration %	Scale reading		Rotation (degree)		Mean $\theta$ (degree)	$\theta/c$ (deg $\text{g}^{-1}\text{cc}$ )
		Vernier 1	Vernier 2	Vernier 1	Vernier 2		
1	0	33.4	208.3	—	—	—	—
2	20	58.3	240	24.9	31.7	28.3	141.5
3	10	43.5	229.8	10.1	20.5	15.3	153
4	5	39	217.5	5.6	9.2	7.4	148
5	2.5	36.4	212.9	3	4.6	3.8	152

Mean  $\theta/c = 146.62$

$\therefore$  Specific rotation =  $73.31$

Result:

The specific rotation of the provided sugar =  $73.31 \text{ deg g}^{-1}\text{cc dm}^{-1}$

The standard value of 'S' for sugar is =  $66.6 \text{ deg g}^{-1}\text{cc dm}^{-1}$

$$\therefore \% \text{ of error} = \left| \frac{73.31 - 66.6}{66.6} \right| \times 100\% = 10.07\%$$

Precautions:

- The tube and the beaker should be carefully rinsed with clean water.
- The tube should be rinsed every time before filling it.
- The optical part of the polarimeter shouldn't be touched with fingers.