EXPERIMENT - 01

classmate
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AIM: To determine (a) wavelength of sodium vapour light /or (b) the radius of curvature of the surface of a Plano-convex lens, by forming Newton's rings.

MATERIAL REQUIRED

Sr. No.	Object	Specifications	Qnt.
1	Plano convex lens	large radius of curvature	1
2	Plane glass	—	1
3	Sodium vapour lamp	-	1
4	Traveling microscope	-	1
5	Magnifying Glass	-	1

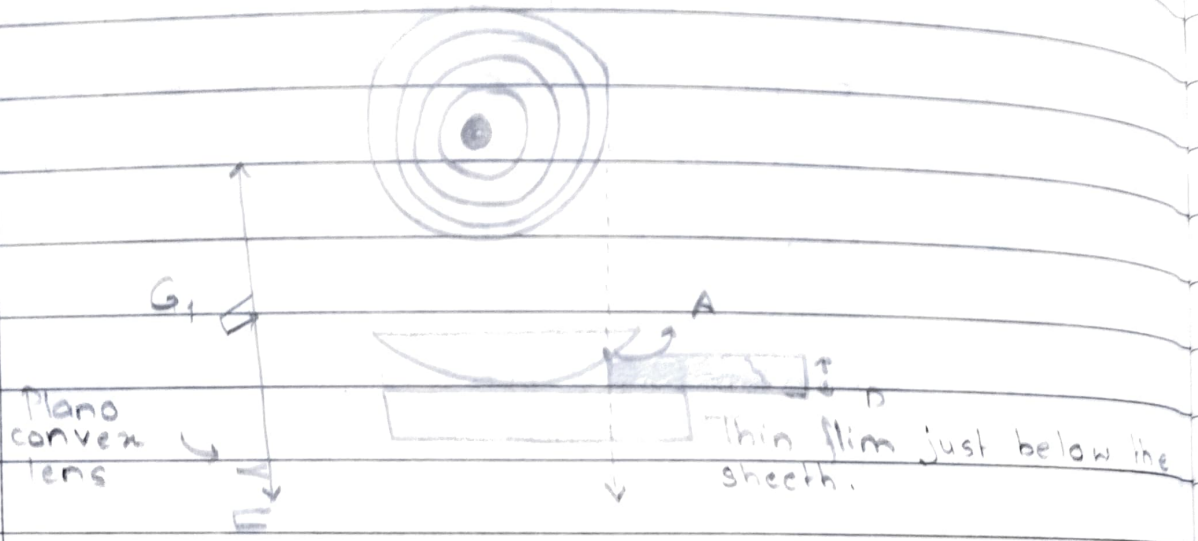
THEORY

The wavelength of light is given by the formula.

$$\lambda = \frac{(D_2^2 - D_1^2)}{4R(n_2 - n_1)}$$

where, D_1 & D_2 are diameter of ring n_1 & n_2 respectively.
n, an integer & r is radius

DIAGRAM



PROCEDURE

1. Set the plano convex length in 45°
2. Take the reading, from the monochromatic light source.
3. Take reading from both left & right
4. Then, minus B-A or A-B according to your need.
5. Find the wavelength of the light.
6. Calculate it.
7. Observe the rings inside the microscope
8. Note down the readings
9. Make the graph.

OBSERVATION & CALCULATIONS

1. L.C of Vernier of travelling microscope = 0.1 mm
2. Wave length of light = 5.8×10^{-9} m

S.No	Order of Ring	Microscope Reading						Diameter of fringes
		Left			Right			
		MS	VS	Total (A)	MS	VS	Total (B)	(B - A)
	n	46	31	49.31	47	62	47.62	0.69
	n+3	49	32	49.32	48	88	48.88	0.44
	n+6	49	79	49.79	48	54	48.54	1.25
	n+9	50	24	50.24	47	25	47.25	2.99
	n+12	50	44	50.44	47	97	47.97	2.47
	n+15	50	64	50.64	48	79	47.79	2.85
	n+18	51	83	51.83	48	62	47.62	4.21
	n+21	51	44	51.44	48	24	47.24	4.20
	~~n+24~~							
	~~n+45~~							
	~~n+60~~							

Wavelength of light radiation = 580 nm = 580×10^{-9} m

$$0.85 = \frac{(17.72 - 17.64)}{4R(21 - 18)}$$

$$0.85 = \frac{0.08}{4R(3)}$$

$$4R = \frac{0.08}{3} - \frac{0.85}{1}$$

$$4R = +0.82$$

$$R = \frac{+0.82}{4} = 0.205 \text{ mm}$$

$$= 0.000205 \text{ meter}$$

$$2.05 \times 10^{-4} \text{ m}$$

RESULT

Standard value of λ of given source of light	λ of given source of light by experiment	λ of given source of light by graph
580nm	580×10^{-9} m	

PREACAUTIONS

1. Glass plates & lens should be clean.
2. The lens should have large radius of curvature.
3. The sources of light used should be an extended one.