Date 9/9/19

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"Monochromators is sophisticated instrument

Apparatus Available:

Laser source, Grating, Scale with measurements.

SLO:

To determine the wavelength of the given laser source using transmission diffraction grating method.

Theory –

D = the distance from the grating to the screen.

d = the spacing b/w every two line (same thing as every 2 sources)

If there are N lines per mm of the grating, then the space b/w every 2 adjacent lines is $d = \frac{1}{N}$

The diffraction grating formula for the principal maxima is $d \sin\theta = n\lambda$,

where n is the order of diffraction and θ = angle of diffraction.

$\lambda = \frac{\sin\theta}{Nn}$ (nano-metre)

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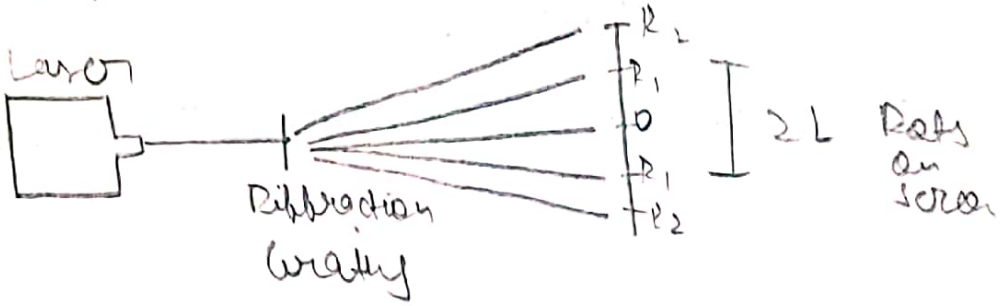

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n	S(cm)	2L(cm)	L(cm)	$\tan\theta = L/S$	$\theta = \tan^{-1}(L/S)$	$\sin\theta$	Mean	λ(cm)
1	25	3.2	1.6	0.064	3.66	0.0638	0.0634	634
	30	3.8	1.9	0.063	3.6	0.0627		
	35	4.5	2.25	0.064	3.66	0.0638		
2	25	6.5	3.25	0.13	7.4	0.128	0.128	640
	30	7.8	3.9	0.13	7.4	0.128		
	35	9.2	4.6	0.13	7.4	0.128		
3	25	8	4	0.16	9.09	0.157	0.207	690
	30	12	6	0.2	11.3	0.195		
	35	19.8	9.9	0.282	15.7	0.27		

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Observation:

No. of lines per meter on the grating is 10^5 nm

Calculations:

$\frac{0.0678 + 0.0627 + 0.0678}{3} = 0.0674$ $\lambda = \frac{0.674}{10^5} = 624$

$\frac{0.128 + 0.128 + 0.128}{3} = 0.128$ $\lambda = \frac{0.128}{10^5 \times 2} = 640$

$\frac{0.157 + 0.195 + 0.27}{3} = 0.207$ $\lambda = \frac{0.207}{10^5 \times 3} = 690$

$\frac{624 + 640 + 690}{3} = 654.6$ nm

Result:

The wavelength of the laser source is found to be 654.6 nm

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