Physics Experiment I

Prelab   Report

Experiment Title:	Polarized Light
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Final Mark:	

Score

Answers to Questions (20 points)

(1)How much polarized light is passed by a combination of the first polarized and a second that has its polarization axis at 30° with respect to the first?

Solution: According to the formula: $I = I_0 cos^2\theta$ (given in the physics experiment textbook), when the transmission axes make an angle 30 with respect to the first , we can get the calculating equation: $I = I_0 cos^2 30° = I_0\left(\frac{\sqrt{3}}{2}\right)^2 = \frac{3}{4}I_0$, Thus, the transmitted intensity I is $\frac{3}{4}I_0$.

(2)Explain what Brewster's angle is. Calculate Brewster's angle and its uncertainty for a piece of glass with an index of reflection of n=1.4±0.2.

Solution:
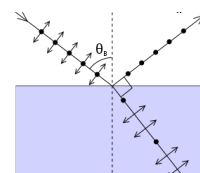
Let θ_1 be an angle of incidence, and θ_2 be an angle of reflection.

$n_1 sin\theta_1 = n_2 sin\theta_2$;

$n_1 sin\theta_B = n_2 sin(90° - \theta_B) = n_2 cos\theta_B$;

$\theta_B = \arctan(\frac{n_2}{n_1})$;

Since the index of refraction of $\frac{n_2}{n_1} = n = 1.4 \pm 0.2$. Then use a calculator to calculate arctan1.4 ,arctan1.2 ,and arctan1.6 , respectively. And get the result as following:

角度: ↓		角度: ↓		角度: ↓	
arctan1.2 =	50.194°	arctan1.4 =	54.462°	arctan1.6 =	57.995°
弧度: ↓		弧度: ↓		弧度: ↓	
arctan1.2 =	0.87606rad	arctan1.4 =	0.95055rad	arctan1.6 =	1.0122rad

arctan1.4- arctan1.2=0.07449;

arctan1.6- arctan1.4=0.06165;

Then choose the bigger one as the uncertainty. Thus, the Brewster's angle is (0.95055±0.07449) and its uncertainty is 0.07449.

(3)How many types of polarized lights are involved in this experiment? Give their names.

Solution: There are three types of polarized light involved in this experiment, which are linearly polarized light, elliptically polarized light and circularly polarized light.