**Photo-Elasticity**

Group 12

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**Aim:**

To determine the photo-elastic constants of a cubic crystal like sodium chloride.

**Apparatus:**

Sodium vapour lamp, lens, polariser, slit, Babinet compensator, microscope, crystal, weights.

**Procedure:**

1. First we aligned the sodium vapour lamp with the lens, polariser and the slit such that maximum intensity of light passed out of the slit onto the Babinet compensator.

2. Then alignment of the microscope was done such that vertical bright and dark fringes were seen.

3. The black vertical line seen through the microscope was aligned at the edge of a bright fringe and micrometer reading was noted and the microscope was moved with micrometer till a dark fringe crossed.

4. The micrometer reading was noted again which gave the fringe width. This was repeated several times and the average fringe width was calculated.

5. In the second part the crystal was placed in the path of the light and then the black vertical line was aligned as for part one.

6. Weights were applied on the crystal and the fringe shift was noted for each weight.

**Observations:**

Experiment 1 (without crystal)

|  |  |
| --- | --- |
| **No. of fringes** | **Distance (**in mm**)** |
| 1 | 6.26 |
| 2 | 6 |
| 3 | 5.65 |
| 4 | 5.18 |
| 5 | 4.56 |

Experiment 2 (with crystal)

|  |  |
| --- | --- |
| Weight added (in kg) | Distance(in mm) |
| 0.5 | 0.17 |
| 1.0 | 0.26 |
| 1.5 | 0.13 |
| 2.0 | 0.38 |
| 2.5 | 0.5 |

Refer to graph 2.0

**Graph:**

Graph 2.0

Dotted line is Line of Best Slope.

**Result:**

Fringe width = (0.26+0.35+0.47+0.62)/4

= 0.425mm

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| L=46.5cm |  |  |  |  |
| l=5cm |  |  |  |  |
| dimension of NaCl crystal | | | length=13.84mm | |
|  |  |  | breadth=6.15mm | |
|  |  |  | height=5.32mm | |
|  |  |  |  | |
|  |  |  |  | |

Wavelength of sodium light =5893-E10m

Refractive Index of crystal= 1.544

S/W= 1-E5cm/gm

 = 2.117-E12cm\*cm/dyne

**Precautions:**

1. Make sure that the maximum intensity of light is projected of on the Babinet compensator to observe fringe.
2. Make sure that the crystal isn’t broken from the corners.
3. Align the crystal properly for second part of experiment so that maximum light is passed through the crystal.
4. Look carefully at the fringe pattern when adding weights.