

laboratory simulation: refraction essay sample



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Theory / Definitions

1. Optical (or transparent) medium:

A medium that allows the passage of light through it, just like glass.

2. Index of refraction:

The ratio of the speed of light in vacuum over the speed of light in the transparent medium. It has a density greater than 1

3. Refraction:

The bending of a wave front as the wave front passes between two substances in which the speed of the wave differs

4. Denote the angles of incidence and refraction.

Experiment 1: Dependence of angle of refraction on the angle of incidence

Laser light falls from air to a transparent medium.

Prediction: What do we expect to happen to the angle of refraction as the index of refraction of the transparent medium increases? Explain. The index of refraction increases which will make the angle of refraction decrease

The laser is placed so that the angle of incidence equals 50 degrees. Table 1:

Angle of refraction vs the index of refraction

Measurement

Index of refraction

Angle of refraction (degrees)

Conclusion compared to your prediction:

Based on the data, as the index of refraction increase, the angle of refraction decrease.

Experiment 2: Dependence of the angle of refraction on the angle of incidence
Predictions/Hypothesis: What do you expect to happen to the angle of refraction as the angle of incidence increases? Explain. As the angle of incidence increase, the angle of refraction increase.

Conclusion compared to the prediction:

Based on the data as the angle of incidence increase, the angle of refraction also increases. Conclusion: Theory predictions versus the results of the 2 experiments. A number of scientists between the 10th and the 17th centuries (Sahl, Snellius, Descartes) concluded that the following formula should relate the angle of incidence with the angle of refraction:

Explain if the results of the 2 simulated experiments above are compatible with the formula. Experiment

That $\sin\theta_i$ is inversely proportional to the index of refraction Experiment

Here, $\sin\theta_i$ is directly proportional to $\sin\theta_r$