CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
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Project Number
J1823

Project Title
The Effects of Wavelength on the Refraction of Light

Abstract

Objectives/Goals
My experiment was based on the principles of Snell's Law, or the Law of Refraction. I wished to find out whether the wavelength of a laser beam affected how much it was refracted and consequently slowed down in different mediums. My hypothesis was that the beam of the lowest wavelength would be refracted the most and would thus have the slowest speed, or the smallest angle of refraction.

Methods/Materials
My experiment involved measuring the angle of incidence vs. the angle of refraction to compare the speeds of three lasers of different wavelengths; a 645nm red laser, a 532nm green laser, and a 405 violet laser. Each of these was to be refracted through three different solutions containing different percent amounts of sugar to increase the refractive index. The measurements were to be compared through three solutions for consistency. The materials necessary were: a rectangular glass container, three laser pointers, a protractor, a measuring cup, sugar, and water. The sugar and water were measured and combined to form 30, 50, and 80 percent solutions. These solutions were then poured into the glass container at separate intervals. Each laser was fired though each solution one at a time. The protractor was then set at 90 degrees in line with the beam before it entered the medium, and it was recorded in a lab book what the angle of refraction in the medium was. These results were written down in order of percent of the solution, from least to greatest. They were then observed and made into a graph displaying the results.

Results
Angle measurements were as followed in order of 30 percent to 80 percent
645nm - 86.2;85.6;85.85
532nm - 84.8;83.7;83.2
405nm - 82.4;80.8;80.2

Conclusions/Discussion
After reviewing my results, I was able to conclude that my hypothesis was correct. The laser beam with the longest wavelength had the least amount of change from the angle of incidence to the angle of refraction (or the largest angle of refraction), while the beam with the shortest wavelength had the smallest angle of refraction in comparison. From this I reason that the violet laser was refracted the most and had the slowest speed throughout the mediums.

The findings made on the subject of light and electromagnetic waves are still crucial today. Lasers

Summary Statement
My project wanted to find out whether the wavelength of a laser beam affected how much it was refracted and thus slowed down in mediums of increasing refractive indexes.

Help Received
No help recieved.