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STUDY AND VISUALIZATION OF THE CONCENTRATION DEPENDENCE ON
THE REFRACTIVE INDEX OF LIQUIDS

By

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ABSTRACT

Laser based measurement have been found in early 1900 indirectly by Albert Einstein during the research of photoelectric effects and until now, its application still growing. The main objective in this project is to study the dependence of refractive index (RI) on the concentration by laser based measurement. Low power laser pointer with the output of 1 mW and the wavelength of 630 to 670 nm are employed as a light source. The phenomenon of refraction occurs when a monochromatic laser light source passed through the prism which full with liquids. In this study two types of liquids consist of sugar and salt solution were utilized as samples. Generally, refraction happened when the source light travel through two different medium like air and sugar water because of the slightly change of speed of light. Hence, the output of light from the second medium were refracted far away from the normal line and it is called the index of refraction, n where can be determined by using Snell's Law. The concentration of these liquids were carried is from 5% to 65%. The RI value for both sample are proportional with its concentrations. The experimental value than has been compared with literature value. Then, based on the experimental set up, an interactive 'Easy_GUI' language was developed to determine the RI value for the future accessibility.

ABSTRAK

Penggunaan laser telah pun ditemui sekitar tahun ke 1900 oleh Albert Einstein secara tidak langsung sewaktu beliau membuat kajian mengenai kesan fotoelektrik dan sehingga kini aplikasinya dilihat semakin berkembang. Tujuan utama projek ini adalah untuk mengkaji kaitan index biasan dengan kepekatan suatu cecair menggunakan teknik laser. Laser pointer berkuasa rendah dengan pengeluaran kuasa sebanyak 1 mW dan panjang gelombang 630 ke 670 nm digunakan sebagai sumber cahaya. Fenomena pembiasan berlaku apabila cahaya monokromatik laser dikenakan kepada prisma yang berisi cecair. Kajian ini menggunakan dua jenis larutan iaitu, larutan gula dan garam sebagai sampel. Secara amnya, pembiasan berlaku apabila suatu sumber cahaya dipancarkan kepada dua medium yang berlainan iaitu udara dan cecair dan disebabkan oleh pengurangan halaju cahaya ketika memasuki. Seterusnya, cahaya yang terkeluar daripada medium yang kedua akan terbias jauh daripada garis normal dan dinamakan indeks biasan, n yang boleh dikira menerusi Hukum Snell. Kepekatan 5%, sehingga 65% digunakan untuk cecair-cecair ini. Nilai indeks biasan untuk kedua-dua sampel adalah berkadar langsung dengan kepekatan. Kemudian, nilai eksperimen di bandingkan dengan nilai daripada bahan rujukan. Oleh itu, berpandukan kepada susunan eksperimen, pengantaraan bahasa 'Easy_GUI' dihasilkan untuk mengira nilai indeks biasan bagi kemudahan di masa hadapan.