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# Ultrasonic Study on Coconut Water and Sugar Solution Before and After Laser Exposure

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***Abstract**: Natural drinks are most essential for daily diet for everyone . The Cocos nucifera(coconut)water loaded with all kinds of health benefits for the body. The temperature is increasing day by day.Coconut water keep our normal body temperature. It contains lot of supplements and nutrients that are needed to sustain life. In this research it is underwent laser exposure for various interval of time and then it was studied through interferometer.Ultrasonic velocity ,density and adiabatic compressibility have been determined*
***Keywords:** Coco nucifera, LASER,Ultrasonic velocity ,density ,adiabatic compressibility.*

## I. Introduction

**LASER exposure**

LASER is a device that emits light through amplification based on the stimulated emission of electromagnetic radiation. He-Ne laser is used for our study. The best known and widely used He-Ne laser operates at a wavelength of 632.8nm in the red part of the visible spectrum. when the sampler is exposed by the laser beam,it collides with molecules of the solution. This collision produces the changes in molecular bonding. This changes will bring difference between the solution before and after laser exposure.

**Solution preparation:**

Cocos nucifera water[10],[11] fitered by wattman sheet. Sugar solution made up of 5gm sugar and 20 ml of distilled water.

**Experimental Technique:**
**Ultrasonic Interferometer:**
**The schematic diagram of an ultrasonic interferometer is shown in the figure(i).**

**Figure(i)**

In an ultrasonic interferometer, the ultrasonic waves are produced by the piezoelectric method[1] In a fixed frequency variable path interferometer, the wavelength of the sound in an experimental liquid medium is measured, and from this one can calculate its velocity through that medium. The apparatus consists of an ultrasonic cell, which is a double walled brass cell with chromium plated surfaces having a capacity of 10ml.The double wall allows water circulation around

the experimental medium to maintain it at a known constant temperature. The micrometer scale is marked in units of 0.01mm and has an overall length of 25mm. Ultrasonic waves of known frequency are produced by a quartz crystal which is fixed at the bottom of the cell. There is a movable metallic plate parallel to the quartz plate, which reflects the waves. The waves interfere with their reflections, and if the separation between the plates is exactly an integer multiple of half-wavelengths of sound, standing waves are produced in the liquid medium. Under these circumstances, acoustic resonance occurs. The resonant waves are a maximum in amplitude, causing a corresponding maximum in the anode current of the piezoelectric generator.If the distance is increased or decreased by exactly one half of the wavelength ($\lambda/2$) or an integer multiple of one half

wavelength,the anode current again becomes maximum. If d is the separation between uccessive adjacent maxima of anode current, then $d = \frac{\lambda}{2}$

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We have, the velocity (v) of a wave is related to its wavelength (λ) by the relation, Where, f is the frequency of the wave.Then the velocity of ultrasound is determined principally by the compressibility of the material of the medium. For a medium with high compressibility, the velocity will be less. Adiabatic compressibility of a fluid is a measure of the relative volume change of the fluid as a response to a pressure change. Compressibility is the reciprocal of bulk modulus, and is usually denoted by the Greek word beta (β).The adiabatic compressibility of the material of the sample can be calculated using the equation,

Where ρ is the density of the material of the medium and v is the velocity of the sound wave through that medium.

## II. Results And Discussion

From the present study, it is known that liquid physics is more important to understand the molecular interaction between them. Laser does the disruption of bio –cells of coconut water and transforms in to new compound. This change is confirmed from physical study like ultrasonic velocity, density and compressibility and FTIR study[3],[4],[5].

**Table 1.**

| Name of the liquids | Velocity m/s | Density Kg/m3 | Compressibility Cm2/dyne |
|---|---|---|---|
| **Coconut water before laser exposure** | **1522.32** | **1022.3** | **4.2209** |
| **Coconut water after 15 mns exposure** | **1457.76** | **1023.45** | **4.5979** |
| **Coconut water after 30 mns exposure** | **1453.8** | **1024.69** | **4.6174** |
| **Sugar solution before laser exposure** | **1665** | **684.23** | **5.2719** |
| **Sugar solution after 15 mns exposure** | **1629.2** | **697.43** | **5.4019** |

## III. Conclusions

**From the Table 1 ,**

It is observed that there is a definite change in the readings of ultrasonic velocity, density and density before and after laser exposure method. And its results Can be confirmed and verified from the FTIR studies at a point where it shows deletion peaks which show that due to laser exposure the molecular bonds are disrupted.So ultrasonic studies can be used to analyze bio-liquids.

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