

## Ultrasonic study on the mixture of *Gymnemasylvestre* and sugar solution

<sup>1</sup>G.Samuel , <sup>2</sup>I. Johnson

(Centre for Nano science and Applied Thermodynamics, Department of Physics, St. Joseph's College (Autonomous), Trichy-620002, India)

---

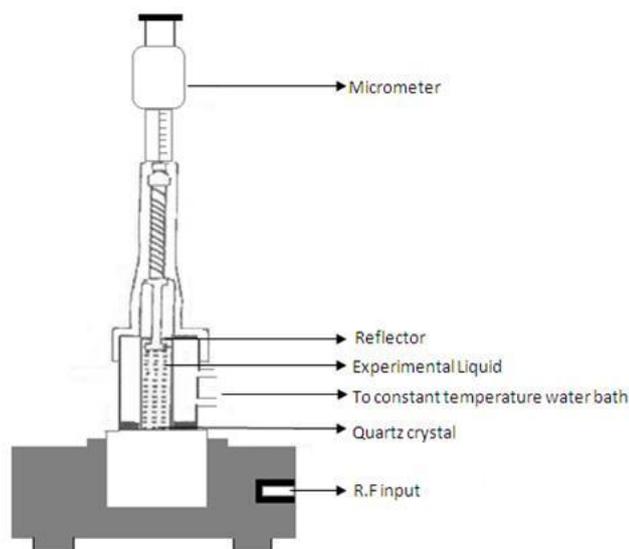
**ABSTRACT:** Ultrasonic interferometer technique has been widely used in industrial side. Now in this study it is used as a estimating tool for plants leaf extraction with sugar solution. Ultrasonic velocity, viscosity, compressibility and density of this mixture has been determined. The plant has a vital medicinal property like used as a medicine for snake bite, sugar reducing agent in blood etc., plant leaf extraction have been prepared by décotions method. With the values of these, sugar content and chemical compounds transformation can be estimated. From that change it is said that there is a change taken place after addition of plants extraction with the mixture.

**KEYWORDS :** Compressibility, Density, Ultrasonic velocity, viscosity and *gymnema sylvestre*.

---

### I. INTRODUCTION

Ultrasonic sound refers to sound pressure with a frequency greater than the human audible range (20Hz to 20 KHz). When an ultrasonic wave propagates through a medium, the molecules in that medium vibrate over very short distance in a direction parallel to the longitudinal wave. During this vibration, momentum is transferred among molecules. This causes the wave to pass through the medium. 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. The schematic diagram of an ultrasonic interferometer is shown in the figure.



In an ultrasonic interferometer, the ultrasonic waves are produced by the piezoelectric method. 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 quartzplate, 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.

## II. METHOD OF EXTRACTION

**Decotion :** In this process, the crude drug is boiled in a specified volume of water for a defined time; it is then cooled and strained or filtered. This procedure is suitable for extracting water-soluble, heatstable constituents. This process is typically used in preparation of Ayurvedic extracts called “quath” or “kawath”. The starting ratio of crude drug to water is fixed, e.g. 1:4 or 1:16; the volume is then brought down to one-fourth its original volume by boiling during the extraction procedure. Then, the concentrated extract is filtered and used as such or processed further.

## III. RESULTS

Table 1.

NAME OF THE LIQUID	VELOCITY (m/s)	DENSITY (kg/m <sup>3</sup> )	COMPRESSIBILITY (cm <sup>2</sup> /dyne)	VISCOSITY (mPa.s)
Distilled water	1494.714	0.9984	4.4831	0.798
Sample pure	1514.571	0.9999	4.3598	0.791
Sugar soln	1554.174	1.0619	3.8956	1.273
Sugar soln +sample(t=0sec)	1527.114	1.0221	4.2363	0.939
Sugar soln +sample(t=30sec)	1520.771	1.0217	4.1969	0.935

## IV. CONCLUSION

It is observed that from the tabular column 1, when the sugar solution is added with the medicinal plant the changes taken place in ultrasonic velocity, density, viscosity and compressibility shows that there is a definite transformation in chemical compound. It can be because of the fact that *Gymnema sylvestre* acted as sugar reducing agent(1),(2) in that sugar solution. Thus it is inferred that this plant is anti-Diabetic nature. So ultrasonic interferometer technique can be used as a one of the best tool of analyzing bio samples especially plants leaf extraction.

## REFERENCES

- [1] Comparative study of the effect of *Tephrosia vogelii*'s leaves ethanolic extract and Alfapor® (Alpha-cypermethrin) on *Amblyomma variegatum* Borgou cattle. T.J. Dougnon\*, S. Farougou, T.M Kpodékon, G. Hounmanou, D. Hounnonkpè Laboratory of Research in Applied Biology (LARBA), Polytechnic School of Abomey-Calavi, University of Abomey-Calavi, 01BP2009 Abomey-Calavi, Benin
- [2] Synergistic antibacterial effects of three edible plants extract against antibiotic-associated diarrheagenic resistant bacteria Md. Abu Sayeed, Mohammad Abdul Mannan, Md. Mostafizur Rahman, M. Sarwar Parvez Mohammad Firoz Alam Int. J. Micro. Myco. 2(3), 49-56.
- [3] Biochemical and histological changes associated with methanolic leaf extract of *Gongronema latifolium* in acetaminophen-induced hepatic toxicity in wistar albino rats Chinedu Imo, Friday O. Uhegbu, Ifeanchi Nkeiruka G., Egebeigwe Otito, Ezekwe A. S. Int. J. Biomol. & Biomed. 4(2), 1-7.
- [4] EFFICACY OF *GYMNEMA SYLVESTRE* AND *PTEROCARPUS MARSUPIUM* IN THE TREATMENT OF DIABETES—FTIR SPECTRAL STUDY P.Srividya\*, T.S. Renuga Devi and S.Gunasekaran\* \* PG & Research Dept. of Physics, Pachaiyappa's College, Chennai-30 International Journal of Health and Pharmaceutical Sciences.
- [5] Handbook of Chemistry and Physics, 65<sup>th</sup> Edn., The Chemical Rubber company, Cleveland, Ohio, USA, 1984.
- [6] Fundamental of Molecular Spectroscopy - C N Banwell
- [7] Organic Spectroscopy – W. Kemp
- [8] Molecular Spectroscopy – Arul Dhas.
- [9] C.V. Suryanarayana and S. Kuppasamy J. Acous. Soc. Ind. 7, 131 (1979)
- [10] Journal of Acoustical Society of India and Ultrasonic Society of India.