

ACOUSTICAL AND MOLECULAR INTERACTION STUDY ON STYRENE-ETHYLENE-BUTYLENE-STYRENE IN NON-POLAR SOLVENTS IN VARIOUS CONCENTRATIONS ON 303K

Submitted in partial fulfillment of the requirements for the award of
Master of Science Degree in Physics

By

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**DEPARTMENT OF PHYSICS
SCHOOL OF SCIENCE AND HUMANITIES**

SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with "A" grade by NAAC I 12B Status by UGC

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BONAFIDE CERTIFICATE

This is to certify that this Project report is the bonafide work of S. Manisha (41590012) who have done the Project work as a team who carried out the project entitled "ACOUSTICAL AND MOLECULAR INTERACTION STUDY ON STYRENE-ETHYLENE-BUTYLENE- STYRENE IN NON-POLAR SOLVENTS IN VARIOUS CONCENTRATIONS ON 303K" under my / our supervision from NOV 2022 to MAY2022.

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DATE: 09-05-2023

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SIGNATURE OF THE CANDIDATE

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ABSTRACT

Ultrasonic investigation of polymer mixtures consisting polar and non-polar components is of considerable importance in understanding intermolecular interaction between the mixtures and they find applications in several industrial and technological process. Many investigations have been studies in the collecting more data and discussion in terms of the properties of liquid mixtures. In view of growing interest, the result of an ultrasonic velocity, density and viscosity to study the related thermodynamic properties that is molar volume (V_a), available volume (V_m), isentropic compressibility (inter molecular free length (Lf) compressibility, surface tension and viscosity. The measurement of ultrasonic velocity of ultrasonic waves in liquids enables determination of some useful acoustic and thermodynamic parameters that are found to be very sensitive to molecular interactions. Hence these measurements are useful to study the strength of molecular interactions. Hence these measurements are useful to study the strength of molecular interactions in liquid mixtures. The thermodynamic studies of binary liquid mixture have attracted much attention of scientist and experimental data on number systems are available from review and publication.

Nanofluids have extremely large surface to volume ratio and thus have great potential in heat transfer applications. They have enhanced thermal properties, due to the presence of small sized nanoparticles and find wide range of applications like electronics, transportations, medical field. The important goal in nanofluid research is to develop nanofluid with stability for industrial applications. Nanofluids are prepared for sonication process which is a usual and simple method. Ultrasonication is an accepted technique for dispersing aggregated nanoparticles for the preparation of aqueous nano-suspensions. The nanofluids synthesized using metal or metal oxide nanoparticles have relatively high thermal conductivity than the base fluid.

Ultrasonic velocity and viscosity, density values are measured for different concentrations of fluids. The acoustic parameters like adiabatic compressibility, intermolecular free length and acoustic impedance are calculated from the experimental data. The variation of ultrasonic velocity and other parameters with particle concentration are discussed on the basis of interaction of ultrasonic wave.

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List of Abbreviations:

SEBS	Styrene-Ethylene-Butylene-Styrene
DMSO	Dimethyl sulphoxide
THF	Tetrahydrofuran
DMF	Dimethyl formamide
TPE	Thermoplastic elastomer
TPS	Thermoplastic styrenic elastomers

SYMBOLS:

λ - Wavelength

β - Compressibility

ρ - Density

η - Viscosity