

Foreword

This supplementary booklet contains the abstracts that came in late, and also acknowledges the belated financial assistance that was received from CSIR and SINP, after the main book was printed. The print style is kept the same as the main book.

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(Convenors)

Study of Molecular Interactions in aqueous Lactose and Galactose using Pulse Echo Technique at 303 K

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The ultrasonic velocity (u), density (ρ) and viscosity (η) at 303 K have been measured in the liquid mixture of monosaccharide (galactose), disaccharides (lactose) in aqueous medium at 303 K over entire range of concentration. The various thermo acoustic parameters like adiabatic compressibility, free length etc. have been computed from three basic parameters u , ρ and η . The ultrasonic velocity (u) has been interpreted. The association in this mixture is the result of hydrogen bonding between solute and solvent molecules. In the present carbohydrate liquid mixtures, it is found that solute- solvents molecular interaction between two carbohydrates follows the order: Lactose > Galactose.

Key words: Ultrasonic velocity, carbohydrates, Galactose, Lactose, solute -solvent interaction



Study of Enhancement of Ultrasonic velocity in Methanol based Silver Nanoparticle suspension

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In this study, the methanol-based nanofluids was prepared by synthesizing silver (Ag) nanoparticles (NPs) by thermal decomposition method and then dispersed Ag nanoparticles in pure methanol using magnetic stirring equipment. The main objective of this paper is to measure the acoustic and thermo physical parameters of the methanol-based nanofluids at different concentration and at different temperature. We have also measured the particle size, Miller indices and lattice parameters of silver nanoparticles. The multifrequency interferometer techniques at the frequency of piezoelectric transducers 1MHz is applied for measuring the ultrasonic velocity of methanol-based nanofluids with an accuracy of ± 0.1 m/sec. The results show that ultrasonic velocity decreases initially with an increase of the nanoparticle weight/volume fraction, and then again increases and the enhancement is observed at concentration of 0.008. Dipole-Induced dipole type of interaction and Agglomeration of nanoparticles is considered to be the main reason for the ultrasonic velocity enhancement.

Keywords: Silver NPs, XRD, Ultrasonic velocity, Adiabatic compressibility, Density.



Ultrasonic spectroscopy in Resperidone and Polyethylene glycol suspension

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The ultrasonic absorption of drug-polymer suspension was determined as a function of temperature using pulser receiver. The suspensions were made up of a 1:1, 1:2, 1:3, 1:4, 1:5 mixture by weight of drug Resperidone and Polyethylene Glycol by using ultrasonic probe sonicator. Ultrasonic velocity, density, and viscosity have been measured for different suspension at different temperature ranging from 10°C to 50°C and the various acoustical data are evaluated. The product was further characterized by using techniques such as scanning electron microscopy (SEM), fourier transform infrared spectroscopy (FTIR), Ultraviolet absorption (UV). The SEM investigations exhibit that as we increase polymer ratio the drug molecules are uniformly coated with polymer which is useful for stability and rate controlled drug release.

Keywords : Drug-polymer suspension, ultrasonic, FTIR, UV, SEM.



Intermolecular Interaction study of L-Glutamic Acid in Aqueous Electrolytes

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The ultrasonic wave propagation through medium of binary and ternary liquid mixture has been drawing a special attention of physicists of their peculiar behaviour and wide applications in biomedical science. The ultrasonic velocity, density, viscosity and related acoustical parameter are the important tools in understanding the nature of interactions between components of liquid mixture. The basic parameters as ultrasonic velocity, density, viscosity have been measured at five different temperatures 303K, 308K, 313K, 318K, 323K in L-Glutamic acid in aq. NaCl and aq. NaNO₃ solution. The ultrasonic velocity measurements were made at 2 MHz by using Pulser Receiver. The dependence of ultrasonic velocity and other derived parameter is indicative of presence of molecular interactions. The experimental data have been used to calculate the related parameter namely adiabatic compressibility, free length, impedance, internal pressure, cohesive energy. The experimental findings are used to interpret the nature of intermolecular interactions.

Keywords: Intermolecular interaction, Electrolytes, Thermo acoustical parameters, Glutamic acid



Comparative Study of some Refined and Unrefined Groundnut oil with chemical additives using Ultrasonic Pulse Echo Method

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Ultrasonic techniques are finding increasing use in the food industry for both the analysis and modification of the food. By tuning frequency, ultrasound can be utilized in many industrial applications including food. Ultrasound techniques are relative cheap, simple and energy saving, and thus became an emerging technology for probing and modifying food products. Ultrasonic parameters provide valuable information about various inter and intra molecular interactions in solutions. Ultrasonic velocity, density and viscosity at a frequency of 2MHz and in the temperature range 303-318K in the interval of 5K are measured in refined and unrefined groundnut oil (UGO) and UGO with different organic chemical additives such as ethanol, 2-propanol, n-hexane and n-butyl acetate. The variation in the sound velocity, density and viscosity has been decreases with increase in temperature for RGO, UGO and UGO with different chemical additives. All the systems show in the order, unrefined groundnut oil (UGO) > refined groundnut oil (RGO) > UGO + alkanol > UGO + ester > UGO + alkane. The maximum values of acoustical parameters are exhibit in unrefined groundnut oil and lowest in UGO + n-Hexane. It is worthwhile to point out that the strong decreasing trend is in accordance with the self associative tendency of oils with chemical additives at higher temperature.

Keywords: Groundnut oil, organic solvents, sound velocity, density and viscosity



Synthesis and Ultrasonic Characterization of Silicon Carbide (SiC) NANO Suspension in Organic Based Solvent

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SiC nano particles were synthesized by novel sol gel chemical processing route by using silicon alkoxides and phenolic resin as starting materials. The sol was prepared by mixing 70 ml tetraethyl orthosilicate, 40g phenolic resin, 50 ml water and 30 ml ethanol. pH was controlled by gradually addition of 0.05 mole HCl as catalyst. The gel so obtained was aged in oven for 24 hr at 30°C and dried at 110 °C. The gel was pyrolyzed at 700 °C for 1 hr and then heated at 1400°C-1500 °C, we get nano particles of silicon carbide (SiC) in powder form. Average particle size has been estimated by using Debye-Scherrer formula. It was found to be ~ 50 nm. The structure morphology and were characterized by X-ray diffraction (XRD) and scanning electron microscopy (SEM). Nano suspension has been prepared in methanol. Ultrasonic velocity, density, viscosity measurement were carried out by Pulser Receiver technique operated at 2MHz. It helps in finding thermo acoustics parameters which related to the surface of nanoparticle and nanoparticle surfactant interactions.

Keywords: Nano suspension; Silicon Carbides; XRD; SEM; Ultrasonic characterization.



Ultrasonic wave propagation study in aqueous Polyacrylamide at 2 MHz

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Polyacrylamide is a carbon- carbon chain polymer which is highly water-absorbent used for forming a soft gel. It is also used in various applications such as polyacrylamide gel electrophoresis and in manufacturing soft contact lenses when hydrated. In the straight-chain form, it is also used as a thickener and suspending agent. More recently, it has been used as sub dermal filler for aesthetic facial surgery. The propagation of ultrasonic waves in aqueous Polyacrylamide gives an insight into the nature of miscibility/compatibility and molecular interactions in the present polymer solution. Various thermo acoustic parameters such as adiabatic compressibility (β_a), acoustic impedance (z), relaxation time (τ), free length (L_f), volume expansivity ($\hat{\alpha}$) and Molwen Moelwyn-Hughes (C_1) of aqueous polyacrylamide (PAA) solution were obtained from the measurement of ultrasonic velocity (u), density (ρ) and viscosity(η). All these measurements have been carried out by Pulse Echo technique at 2 MHz frequency in the concentration range of 0.05 to 0.3wt.% and at temperature range 288K-308K. The results have been used to discuss the nature and strength of intermolecular interactions in aqueous Polyacrylamide. The linear and nonlinear behaviour of these parameters are used to deduce information about the system used. These variations depend on structural changes due to intermolecular interactions in short region around the molecules.

Keywords: Polyacrylamide, ultrasonic velocity, density, acoustic parameters, molecular interactions etc.