

The Use of Acoustic Parameters of Halo Substituted Chalconeimine for Determination of Ion Solvent Interaction

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Abstract: In this present investigation author enlighten the certain acoustic parameter of chloro, fluoro substituted chalconeimine [CFC] by measuring ultrasonic velocity at 2 MHz, with concentration range of 0.01 M at 32 °C. The ultrasonic velocity (u), adiabatic compressibility (β_s), intermolecular free length, (L_f). Apparent molal volume (Φ_v), Apparent molal Compressibility (Φ_k), are the acoustic parameters investigated in the study.

Keywords: ultrasonic velocity, chalconeimine, molal volume, compressibility, Solute –Solvent Interaction.

1. Introduction

Acoustical properties are the properties of materials that determine how they interact with sound. For determination of acoustic properties the ultrasonic waves with high frequency is used. The interaction of waves with systems involved to study certain parameter which is called as acoustic parameters. Ultrasonic waves, in recent years, have acquired the status of an important probe for the study of structure and properties of matter in basic science. Ultrasonic techniques are best suited for physicochemical studies of a system. Some of the phenomenon analyzed in recent past, are the acoustic attenuation due to phonon-phonon interactions, the nuclear spin interactions, and electron spin interaction with the acoustic waves and phonon electron magnetic field interactions.

In the field of technology, the waves are being used for detection of flaws, testing of materials, mechanical cleaning of surface etc. It is used to find out the cracks in objects etc. In medicinal science too, the waves are being used to detect bone fractures. cardiology, Cancer, bloodless surgery,

tumors, fetal conditions and in physiotherapy, gynaecology¹⁻³ acoustic properties of substituted chalcones in binary solvent mixtures have been studied by A.S. Burghate⁴ Acoustical Studies on Heterocyclic Drugs In 1,4- Dioxane at 303.15 K studied by Swati Kolhe, Dipak Patil⁵ et.al.

2. Experimental

Material and Methods

Synthesis of substituted chalconeimine Chloro Fluoro Substituted Chalconeimines CFC

The halosubstituted chalconeimine are synthesized by amination of chalcone with halo substituted amines, this chalcone are synthesized by using general Claisen Schmidt method. For evaluating the acoustic properties the very pure and analytical grade solvent and extra pure double distilled water is used. The densities of pure solvent and solutions are determined by using specific gravity bottle. The ultrasonic velocity measurements were made using a crystal controlled variable path ultrasonic interferometer (Mittal Enterprise, Model F-05) of 2MHz with accuracy of (\pm) 0.03 %

Table 1: Acoustic parameters of Chloro fluoro substituted chalconeimine

% Dioxane	Mole fraction of Dioxane	Ultrasonic Velocity (u) s (m/sec) $\times 10^3$	Adiabatic compressibility β_s (bar ⁻¹) $\times 10^{-7}$	Intermolecular free length L (Å) $\times 10^{-9}$	Apparent molal volume Φ_v (m ³ /mole) $\times 10^{-3}$	Apparent molal Compressibility (Φ_k) (m ³ mol ⁻¹ k(s) bar ⁻¹) $\times 10^{-4}$
100	1	1792.8	1.095704	2.8395	2.19547	100
90	0.6563	1554.8	1.025177	4.0350	2.60909	90
80	0.4584	1483.6	0.967003	4.6982	2.81939	80
70	0.3305	1407.6	0.923398	5.4657	3.04297	70

3. Results and Discussion

The ultrasonic velocity of the ligand is going to decrease with decrease in percentage of dioxane this indicates decrease the cohesion which is caused due to hydrogen bonding. The value of adiabatic compressibility increase (β_s) with decrease in percentage of solution may be due to departure of solvent molecules around ions supporting weak

ion-solvent interactions. The value of apparent molal volume (Φ_v) is high in case of more polar substituent than less polar substituents. The apparent molal volume Φ_v values increases with decrease in concentration of chalconeimine in binary mixtures this represents strong solute –solute and solute solvent interactions.

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The value of apparent molal compressibility (Φ_k) increases with decrease in percentage of all systems, Showing weak electrostatic attractive force in the vicinity of ions causing electrostatic solvation of ions. Compressibility is more in case of bulky substituents.

4. Conclusion

From the experimental data, density and compressibility data have been determined for halo substituted chalconeimine in binary liquid (dioxane+water) at 32°C the results have been used to study the ion-solvent interaction exists in the mixture.

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References

- [1] H.Horinaka, T.Iwade, Y. Kanetaka, F. Ogushi, T. Matsuyama, K. Wada, T. Matsunaka, Y. Cho, Jap. J. Appl. Phys., 42, 3287, (2003).
- [2] Topchyan A., Tatarinov A., Sarvazyan N., Sarvazyan A., Ultrasonic, 44 (3),259(2006).
- [3] N.Real, F.Moal, J.Wang, E.Vuillemin, F.Oberti, E.Roy, M. Kaassis, R. Trouve, Saumes J.L. and Claes P., J. Appl. Phys., Vol.91, 1274,(2001).
- [4] A.S. Burghate, Rasayan Journal of chemistry, Vol.2(7),140-142,(2014)
- [5] S.Kolhe, D. Patil, A.Sonar, J. Nehete, Indian Journal Of Science And Technology, 15(6):253–258,(2022)
- [6] Guang Zen, Chen Wu, Ye Chang, Cheng Zou, Bingbin Chen, Menglan Zang, ACS Publication, Vol.4(6),1524-1533,(2019)
- [7] P. P. Choudhari, D. S. Hedao, M. P. Wadekar, Archives of Applied Science Research, Vol. 8 (8), 14-20,(2016)
- [8] S. Dimitry Volkav, Olga Rogowa, Michail Proskurnine, Photoacoustics, Vol.17,(2020)
- [9] V. D. Mane, D. T. Mahajan and P. R. Rajput, *Der Pharma Chemica*, Vol. 8(5):107-114, (2016)