STUDIES OF ULTRASONIC AND VISCOMETRIC BEHAVIOR OF AZITHROMYCIN WITH DIFFERENT SOLVENT SYSTEMS DIOXANE-WATER AND METHANOL-WATER MIXTURE AT 305.15 K

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ABSTRACT

Antibiotic drug Azithromycin is mainly used for treatments of infectious disease caused by bacteria such as respiratory,skin,ear and sexually transmitted diseases such great importance of azithromycine in human life the densities, ultrasonic velocities and viscosities of azithromycine have been evaluated in different concentrations in 70% dioxane-water and 70% methanol-water mixtures at 305.15 K. Experimental data of sound velocities and densities of solutions in 70% dioxane-water helps to determine the various acoustical parameters such as adiabatic compressibility, apparent molal volumes, intermolecular free length, specific acoustic impedance, relative association etc. for evaluating the molecular interactions present in different solutions were studied.

Keywords: Azithromycin drug, dioxane water and viscometric measurements.

INTRODUCTION

In the fields of medicinal, industrial, biochemistry etc the study of molecular interactions between solutes molecule and solvent media has got great importance. It also helps the study of solute solvent and solvent-solvent interactions can by the measurement of relative viscosity and ultrasonic velocity of an electrolyte in solutions[1-3]. Many workers have presented the viscosity in different concentrations of ligand solutions in various solvents[4-13].The apparent and partial molar volumes of electrolyte solutions very important parameter for eluciding the ion-ions, ion-solvent and solute-solvent interactions in solution.

EXPERIMENTAL SECTION

The chemicals used were of AR grade and were purified by standard methods. Requisite amount of chemicals weighing was done by using electronic balance.By using the Pyknometers the densities of solutions were determined, which was standardized by the standard procedure. Ostwald's Viscometer was used for measurements of viscosity which was kept in elite thermostatic water bath (±0.1°C). The ultrasonic velocity of solution and solvent was determined by using single crystal interferometer (Mittal Enterprises, Model F-81) with accuracy of ± 0.03% and 2 MHz frequency.

RESULTS AND DISCUSSION

Acoustic parameters, densities and relative viscosities have been determined for all the solutions and were calculated by using different equations[14] and are presented in the following Table -I. After observing the table, the relative viscosity increases with increase in the concentration of solute that means increasing solute-solvent interactions, same results evaluated by different workers[15-19].

Table -I: Calculated Viscosities of azithromycine drug in different solvents at 305.15 K

Concentration c (mol/dm^3)	solvents			
	70% Dioxane		70% Methanol	
	ρ x 10^{-3} (kg/m^3)	ηr x 10^3 (kg/m.s)	ρ x 10^{-3} (kg/m^3)	ηr x 10^3 (kg/m.s)
0.05	0.8438	1.0591	0.8424	1.0779
0.06	0.8499	1.1260	0.8440	1.1710
0.07	0.8517	1.1812	0.8455	1.2363
0.08	0.8545	1.2446	0.8474	1.3025
0.09	0.8575	1.2890	0.8489	1.3612
0.10	0.8594	1.3450	0.8498	1.4050
0.12	0.8615	1.4083	0.8551	1.4352

Table -II: Ultrasonic velocity (U), density (ρ) and calculated values of various acoustic parameters for in 70% dioxane-water mixture at 303.15 K

Concentration c (mol/dm^3)	U (m/s^{-1})	ρ (kg/cm^3) x 10^{-3}	φv (cm^3/mole) x 10^2	φk (S) (cm^3/mole.bar)	βs (bar^{-1}) x 10^{-5}	RA	Z (cm/s.g^3) x 10^2	Lf (A^0) x 10^2
0.05	1455	0.9499	12.9511	3.8161	6.5395	0.9928	12.4869	5.8299
0.06	1444	0.9517	8.0531	1.9458	6.6317	0.9976	12.4176	5.8644
0.07	1432	0.9575	5.4608	1.3124	6.7044	1.0075	12.3939	5.8914
0.08	1412	0.9594	4.8755	1.0179	6.8935	1.0148	12.2459	5.9609
0.10	1399	0.9615	4.4797	0.8327	6.9136	1.0205	12.1615	6.0045

Table-II it can be concluded that the ultrasonic velocity decreases with increasing concentration of solute, which indicates the presence of molecular association between solute and solvent.

The values of φk(s), acoustic impedance (Z) and apparent molal volumes (φv) in different concentrations showed to be decreases as we increase in the concentration of solute.The of φk(s) show positive values the strong electrostatic force in the vicinity of ions, causing electrostatic solvation of ions[20].In case of L_f, β_s and R_A values of concentration increases may be due to the departure of solvent molecules around the ions due to weak ion-solvent interactions.

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