Studies of Some Substituted Dihydropyrimidinones in DMF-Water Solvent by Viscometrically at Different Temperature

Roshani R. Dharamkar[1], G. D. Tambatkar[2]

[1]Department of Chemistry, Vidnyan Mahavidyalaya, Malkapur-443101, Dist.: Buldana, Maharashtra, India

[2]Department of Chemistry, Shri D. M. Burungle Science & Arts College, Shegaon-444203, Dist.: Buldana,

Maharashtra, India

ABSTRACT

Measurements of density & Viscosity has been carried out for some substituted dihydropyrimidinones at different temperature in DMF-Water medium. Viscosities & densities of present system has been measured at 300K,305K, 310K, 315K. Using above data various parameters such as Relative Viscosity, Falkenhagen Coefficient A, Jones Doles Coefficient B, & Thermodynamic Parameters have been computed. The results are interpreted on the basis of solute -solvent & solute-solute interaction.

Keywords: Falkenhagen Coefficient A, Jones Doles Coefficient B, & Thermodynamic Parameters.

I. INTRODUCTION

The Studies on Viscometric Measurements has been regarded as a sensitive tool for understanding various interactions occurs in the solution of liquid mixtures & their dependence on composition & temperature are of importance in many fields of applied research. Viscosity & Its derived parameters provide the valuable information regarding molecules. Viscosity is one of the important property of liquid. The measurement of viscosity like other transport properties of electrolytes. Provide useful information about Solute-Solute & Solute-Solvent interaction The present study deals with the study of molecular intraction in terms of viscosity & Some Substituted dihydropyrimidinone of an Solvent-Water mixtures in different Concentration. Viscosity measurement like other transport properties of electrolyte, provides useful information about Solute-Solute & Solute-Solvent interactions. These interaction have been studied in aqueous & non aqueous Solutions by manyworkers[1-3].

Viscometry[4-5] is an important tool in order to elucidate the solute as a structure maker or a structure breaker. Viscosity provides an insight into the stage of association of the solute & extent of its interaction with solvent. The nature & degree of molecular interaction in different solution depends upon several factors i.e. the nature of the solvent, the structure of the Solute & also the extent of Solvation taking place in the solution . Viscosity is one of the Physical Properties of the liquid & gas as it implies resistance to flow as fluid exhibit a Characteristics property of flowing under applied force, even the force of their own weight, physical properties of liquid & binary mixture have been the subject of interest in research laboratories[6-8].

In recent years, such the considerable efforts have been given for the elevation of ideal & excess thermodynamic quantities of binary & ternary liquid mixture[9-10]. The Study of Molecular interaction in the liquid mixtures is of Considerable in the elucidation of the structural properties of the molecules. The nature & degree of molecular interactions in different solutions depend upon the nature of the medium, the structure of the solute molecule & also the extent of solvation taking place in solution. The present study of some substituted dihydropyrimidinone is selected. In Acoustic Parameters provide a better insight into molecular environment to liquid mixture. It seemed important to study molecular interaction, which motivated the authors to carry out the present investigation in the binary liquid mixtures of dihydropyrimidinone with DMF-Water Solvent at different temperatures.

II. MATERIALS & METHODS

Solvent DMF used in the present work was of AR grade, Purified & dried by the usual procedure. Densities, Viscosity, Relative Viscosity & Specific Viscosity were measured at different temperatures over a wide range of composition. Densities were determined by using bicapillary pycnometer. The Viscometer Calibrated with double distilled water[11-12]. All the measurements were carried out at different temperatures. Ligand solutions of different concentration were prepared in 20% DMF-Water of Dihydropyrimidinoes, for each measurement sufficient time was allowed to attain thermal equilibrium in thermostat.

Table 1 : System-TFP in 20% DMF-Water Medium

Table 1.1

At 300 K					
Conc. Mol dm^{-1}	Density x10^3 Kg m^{-3}	Time flow in sec.	Viscosity x10^{-3} Nsm^{-2}	Relative Viscosity	Sp. Viscosity
0.02	0.99481	66.1	0.50509	0.93516	-0.85278
0.04	0.99502	66.6	0.50832	0.94111	-0.57794
0.06	0.99522	66.8	0.50998	0.94418	-0.46196
0.08	0.99547	66.9	0.51093	0.94520	-0.38550
0.1	0.99574	66.9	0.51196	0.94850	-0.34919

Table 1.2 :

At 305 K					
Conc. Mol dm^{-1}	Density x10^3 Kg m^{-3}	Time flow in sec.	Viscosity x10^{-3} Nsm^{-2}	Relative Viscosity	Sp. Viscosity
0.02	0.99411	64.2	0.49910	0.96026	-0.68905
0.04	0.99414	64.4	0.49913	0.96035	-0.48979
0.06	0.99418	64.6	0.49915	0.96152	-0.39678
0.08	0.99420	64.8	0.4942	0.96256	-0.39426
0.1	0.99422	64.9	0.49950	0.96956	-0.39223

Table 1.3 :

At 310 K					
Conc. Mol dm^{-1}	Density x10^3 Kg m^{-3}	Time flow in sec.	Viscosity x10^{-3} Nsm^{-2}	Relative Viscosity	Sp. Viscosity
0.02	0.99254	60.7	0.46822	0.93791	-0.85308
0.04	0.99287	60.8	0.46915	0.93978	-0.59730
0.06	0.99310	60.9	0.47161	0.94572	-0.58730
0.08	0.99333	61.1	0.47329	0.94809	-0.46.772
0.1	0.99355	61.2	0.47596	0.95143	-0.38683

Table 1.4 :

At 315 K					
Conc. Mol dm^{-1}	Density x10^3 Kg m^{-3}	Time flow in sec.	Viscosity x10^{-3} Nsm^{-2}	Relative Viscosity	Sp. Viscosity
0.02	0.99051	58.8	0.44872	0.95468	-0.67920
0.04	0.99089	59.2	0.54654	0.95648	-0.51587
0.06	0.99109	59.4	0.54056	0.95574	-0.51589
0.08	0.99124	59.6	0.54212	0.95209	-0.51590
0.1	0.99152	59.7	0.54345	0.95342	-0.51592

Table 2 : Values of Falkenhagen Coefficient A, Jones – Dole Coefficient B, at different temperatures in DMF-Water Medium

Temp T (K)		300K	305K	310K	315K
20 %Acetone-Water medium	A	-1.189	-0.979	-1.206	-1.039
	B	2.835	2.309	2.876	2.458

III. RESULT AND DISCUSSION

The densities & viscosities of trifluoperazine hydrochloride (TFP), 20% DMF-Water medium at 300K, 305K, 310K, & 315K have been measured in the concentration range 0.02 to 0.1mol/dm^3. The viscosity A & B Coefficient have been Computed by the least squares method from the plot of (nr-1/$\sqrt{c}$) Vs $\sqrt{c}$.

A Is measure of ion-ion interactions & B is measure of Solute-Solvent interaction has been calculated & listed in table. In the present study viscosity of liquid solutions increses with increase in concentration of antipsychotic drugs salts solution in 20% DMF-Water mixture & decreases with increase in temperature. The increasing values of density & viscosity shows that there is a moderate attraction with Solute & Solvent molecules. The decrease values with increase of temperature shows a decrease in intermolecular forces due to increase thermal energy of the system. The increases in viscosity with increases in concentration may be attributed to the increases in solute may be attributed to the increase in solute solvent interaction. Observation of above data shows that the viscosity A – Coefficients are found to be negative. The viscosity A Coefficient represent the ion interactions & negative Values have shown some physical significance. However negative a values have also been reported to be in other solvents in some studies[13-16]. The large & Small values of " A"

Shows the stronger & weaker solute – solute interactions respectively. When solute is introduced into solvent of organic water mixture it will interfere with the ordered structure of water in the solute co-sphere. As only one solute is present so such variation in the values can be explained.

It is evident from table 2 that the "B" Coefficient is an adjustable parameter, which may be either positive or negative & it is a measure of the effective hydrodynamic volume of solute which accounts for the solute solvent interactions. Viscosity B Coefficients have been established to arise from ion – solvent interactions & are responsible for introducing order or disorder in the structure of the solvent. Solute with negative B Coefficient is Characterized as structure breakers indicating weak solute – solvent interactions. The Values of viscosity A & B Coefficient responsible for solute – solute & Solute Solvent interactions.

IV. CONCLUSION

In the present study viscosity of liquid solutions increases with increase in Concentration of dihydropyrimidinone solution in 20% DMF – Water mixture & decreases with increases in temperature. It also observed that the value of viscosity A & B Coefficient responsible for solute & solute – solvent interactions.

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