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THERMODYNAMICAL INVESTIGATION IN BINARY LIQUID MIXTURES OF ELECTROLYTES AND NONELECTROLYTES AT DIFFERENT TEMPERATURES

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ABSTRACT

Thermodynamical Studies of Binary mixture containing electrolytes and nonelectrolytes namely carbon disulphides, KBr, CS_2, NaBr has been determined at three different temperature. The aim of the present study to know about solute solvent interaction and ion-solvent interactions.The parameters such as Density (ρ), Viscosity (η), Surface tension, Electrical conductivity and Ultra sound velocity (u) are computed for CS_2-KBr and CS_2-NaBr system at 298K, 303K and 309K.

Keywords: Thermodynamic Parameters, Electrolyte and Non- Electrolyte.

INTRODUCTION

Density(ρ), Viscosity(η), Ultra sound velocity(u), Surface tension, Electrical conductivity measurements have been employed extensively to detect and assess weak and strong molecular interaction in binary mixtures because mixed solvent find practical application in many chemical and industrial processes.

The present investigation is carried out to study molecular interaction in Binary liquid mixtures containing electrolytes and nonelectrolytes at three different temperatures.

EXPERIMENTAL

The chemical used were of analytical reagent grade obtained from loba chemicals KBr and NaBr were dried over unhydrous Calcium chloride and fractionally distilled ultrasound velocity is determined by interferometric technique and used the ultrasonic interferometer model F-81 2MHz that is manufactured by M/S Mittal Enterprises, New Delhi Quartz crystal have different frequency and have the accuracy of about ±0.05% the average of ten reading was treated as a final value of ultrasound velocities. Density will be determined by calibrated double walled pycknometer.

The viscosity was measured by using calibrated ostawald Viscometer, The S.T. was measured by calibrated Stalgomometer. The temperature is maintained through the experiment by using thermostat at different temperature. Density, viscosity, ultrasonic velocity, conductivity and refractive index have been measured as a function of concentration and temperature at 298K, 303K and 313K at atmospheric pressure.

RESULTS AND DISCUSSION

This paper deals with the study of molecular interaction in Binary liquids mixtures of namely CS_2-KB_r and CS_2-NaB_r at 298ºK, 303ºK and 308ºK. We have reported Density(ρ), S.T., Viscosity(η), Ultrasound velocity(u), Electrical conductivity of Binary liquid mixtures with the help of experimental data (Tables-1, 2 and 3).

Table-1: Mole fraction of CS_2 + KBr at temp 298^0K

Mole Fraction of CS_2+KBr	Density (ρ) gm/ml	Viscosity (η)	Ultrasound Velocity (u) m/s	Surface tension ($\times 10^{-3}$N/m)	Electrical conductivity µs/cm
0.1	0.9041	0.384	1160	30.26	1250
0.2	0.9223	0.389	1163	30.08	1317
0.3	0.9315	0.393	1166	29.83	1387
0.4	0.9427	0.415	1168	29.67	1399
0.5	0.9578	0.426	1172	29.24	1457
0.6	0.9641	0.430	1174	28.94	1520
0.7	0.9817	0.432	1177	28.59	1567
0.8	1.1738	0.456	1180	28.42	1615
0.9	1.2521	0.487	1184	28.26	1688
1.0	1.3244	0.497	1197	28.11	1662

Table-2: Mole fraction of CS_2 + KBr at temp 303^0K

Mole Fraction of CS_2+KBr	Density (ρ) gm/ml	Viscosity (η)	Ultrasound Velocity (u) m/s	Surface tension ($\times 10^{-3}$N/m)	Electrical conductivity µs/cm
0.1	0.8662	0.375	1148	28.56	1307
0.2	0.8738	0.379	1146	28.22	1350
0.3	0.8836	0.384	1143	28.05	1405
0.4	0.8861	0.405	1140	27.69	1530
0.5	0.9238	0.416	1136	27.38	1562
0.6	0.9481	0.412	1133	27.12	1619
0.7	0.9668	0.418	1130	26.98	1630
0.8	0.9744	0.420	1127	26.77	1680
0.9	1.0018	0.428	1124	26.45	1712
1.0	1.1279	0.465	1121	26.17	1748

Table-3: Mole fraction of CS_2 + KBr at temp 308^0K

Mole Fraction of CS_2+KBr	Density (ρ) gm/ml	Viscosity (η) N.s / m2	Ultrasound Velocity (u) m/s	Surface tension ($\times 10^{-3}$N/m)	Electrical conductivity µs/cm
0.1	0.8341	0.368	1138	26.88	1320
0.2	0.8542	0.371	1135	26.56	1357
0.3	0.8675	0.375	1131	26.33	1420
0.4	0.8728	0.385	1126	26.15	1480
0.5	0.8987	0.398	1122	25.89	1590
0.6	0.9221	0.404	1118	25.62	1630
0.7	0.9437	0.412	1114	25.24	1690
0.8	0.9548	0.418	1110	25.07	1730
0.9	0.9839	0.425	1107	24.94	1750
1.0	0.9926	0.438	1104	24.60	1780

CONCLUSION

The measurements of Density(ρ), Viscosity(η), Surface tension, Ultra sound velocity, and Electrical conductivity are reported for CS_2 + KBr at 298K , 303K, and 308K. On the basis of these data we

conclude that, As the mole fraction of CS_2 increases, the value of all parameter increase except Surface Tension.

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