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Study of Parameters of Binary Mixtures Using LCR Meter Technique

P.D.Gaikwad[a] ,P.T.Sonwane[b]

Sunderrao Solanke Mahavidhyala Majalgaon Dist. Beed

Sant Ramdas Arts, Science & Commerce College Ghansangvi Jalna

Email:pdgaikwad11@gmail.com.

Abstract

Study of Physicochemical Properties like Viscosity, Density and Refrative Index for Binary Mixture of Ethanol and aniline over entires Concentration range are measured at 303 K the experimental data further use to determine the excess properties Viz. Excess molar volume, Excess viscosity and excess molar refraction .The values of excess Properties further Fitted with Redlich-Kister equation to calculate the binary Coefficients. The resulting Excess Paramenters are used to indicate the presence of intermolecular interactions and strength of intermolecular interactions between the molecules in the binary mixtures.

Keywords: Dielectric Constant, Density, Visosity, Refractive Index, LCR meter.

Introduction:

THE study of binary liquid mixtures provides sensitive tool for detecting molecular interactions. In order to study the effect of increase of molecular size on solute-solvent interaction the series of alcohols and alkoxyalkanols are selected because no attempts have been made to study this binary system. Alcohols play an important role in many chemical reactions [1-3] due to their ability to undergo self-association with manifold internal structure and are in wide use in industry and science as reagent, solvent and fuels. Monoalkyl ethers of [4] ethylene glycol may exist in dynamic equilibrium existing in Gauche as well as open chain form. In this case monoalkyl ethers of dimethylene glycol intramolecular hydrogen bonding decreases with the increase in the size of the alkyl group. These molecules are also found to exist in both intramolecular hydrogen bonded form in

equilibrium with open chain form in dilute solutions. The intermolecular association is found to be absent in dilute solutions, whereas in pure liquid state the molecule existing in open chain may form multimers. Because of such interesting facts it is decided to carry out dielectric relaxation study of Alcohols with Alkoxyalkanols.

Experimental Details:

The setup consists of Digitizing oscilloscope Autocompute LCR Q-METER et Model 4910

Density Measurement: The Density measurement were Carried out by Portable Digital Density Meter (Anton Paar-35) for pure liquids and binary mixture.

Viscosity Measurements: Viscosity of the sample in the present study were measured by usinf Brookfield Viscometer Model LV DV-II+ Pro, Cone plate Model with CPE-40 Splindle.

Refractive Index: Measurement:Refractive Index Measurement are Sutdied using Abbeys Refractometer.LCR Meter Technique:Dielectric Constant were measured in the Present Study By using Autocompute LCR Q-METER et Model 4910

Results and discussions:

Table 1. Excess Molar Volume of Ethanol+aniline at 303K.

Volume Fractional of Ethanol	Density	Viscosity	Refractive Index	Dielectric Constant
0	**0.7735**	**0.511**	**1.328**	**15.5**
0.1	**0.7735**	**0.515**	**1.329**	**16.8**
0.2	**0.7734**	**0.567**	**1.33**	**18.7**
0.3	**0.7733**	**0.615**	**1.331**	**19.5**
0.4	**0.7732**	**0.656**	**1.333**	**21.7**
0.5	**0.7732**	**0.679**	**1.336**	**23.8**
0.6	**0.7727**	**0.745**	**1.341**	**24.8**
0.7	**0.7722**	**0.814**	**1.346**	**26.7**
0.8	**0.7715**	**0.884**	**1.351**	**28.2**
0.9	**0.7705**	**0.964**	**1.355**	**29.3**
1	**0.7693**	**1.044**	**1.359**	**30.5**

The existence of an intermolecular interaction through hydrogen bounded structures between Binary Mixtures. Dielectric relaxation study of liquids generally carried out on dilute solution of polar and non-polar liquids or binary mixture in dilute solutions of non-polar liquids and on mixtures of polar-polar liqids or simply binary mixtures.A large amount of work has been done on dilute solutions. Difficulty arises in measuring the dielectric absorption data in pure liquids because of its viscosity, bipolar interactions and internal field. Therefore, dielectric properties are usually carried out in dilute solutions of non-polar solvents. In these cases polar molecules will be quasi-isolated state.

Conclusion

If a dielectric medium consists of polar molecules (permanent dipole) then the dipoles are oriented at random in the absence of an external electric field when an electric field is applied then the forces acting on a dipole give rise to a couple whose effect is to orient the dipole along the direction of electric field. Thus the polar molecules become induced dipoles when they are oriented by the field and therefore their dipole moments get increased. This phenomenon is known as orientation polarization.

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