SUMMARY OF THE FINAL REPORT

Project Title

MOLECULAR INTERACTIONS BETWEEN SOME CARBOXYLIC ACIDS AND AMINES.

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SUMMARY

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Introduction

The molecules in a liquid are so close together that the various interactions such as Vander Waal's forces, electronic fields and ionic interactions assume considerable significance. Because these factors are not easy to evaluate, it is expedient to heavily rely on experimental information in characterizing liquids. The data may be classified according to the equilibrium and non-equilibrium conditions of the fluid. The consideration of collection of thermodynamic properties makes up the first category, while the second involves the transport phenomenon.

Of the several physical properties of liquids which can be employed to study the various molecular interactions prevailing therein, we have chosen

i. Density
ii. Viscosity and
iii. Ultrasonic velocity.

Materials and Methods

Systems Undertaken

System I: Benzene +Tri-ethyl amine (TEA) + Acetic Acid

System II: Benzene +Tri-methyl amine (TMA) + Acetic Acid

Temperatures: 303K, 308 K, 313 K

The density measurements were made by using electronic monopan balance supplied by CONTECH with accuracy of 0.0001 gm and specific gravity bottle of 10ml capacity.

Viscosity was made by using Ostwald's viscometer. The time of flow was measured with digital stop watch.

The sound velocity was measured by using ultrasonic multiple frequency interferometer supplied by Mittal enterprises New Delhi working at 3 MHz (Model No. M815)

Results and Discussion

The results were graphically analyzed and following conclusion were drawn.

Density

The Densities of (**System I**) *Benzene + Tri-ethylamine + Acetic acid* & (**System II**) *Benzene + Tri-methylamine +Acetic acid* at temperatures 303, 308, 313 K is discussed. From data experimentally obtained graphs of density vs. mole fraction of tri-ethylamine for system I and graph of density Vs mole fraction of tri-methylamine for system II have been plotted. From these graphs it is observed that the density increases with mole fraction, attains maximum and decreases again. The density of the mixture is indicative parameter of molecular interactions. This non-linear behavior of density shows certainly the presence of molecular interactions among the components of the mixture. And further it is found that as the temperature increases the density decreases. The variation of density with concentration and temperature can be attributed to the structural changes in mixture.

Viscosity

For system I viscosity values increase with mole fraction of tri-ethylamine become maximum at certain mole fraction again it decrease. Similar behavior is observed in system II

Viscosity increases with mole fraction of tri-methylamine, becomes maximum and again decreases after certain value of mole fraction. The increasing trend of viscosity is the indication of frictional resistance and that may be due to change in effective molecular area of the cohesive or adhesive forces or relative random velocity between the components of the mixture.As the temperature increases viscosity decreases. The reason is that when the system temperature increases, it gives the molecules of the mixture the required energy in the form of thermal energy to overcome intermolecular forces.

Velocity

The ultrasonic velocity increases with mole fraction becomes maximum & decreases again. As density increases the number of particles in a given region is increased and this leads to quick transfer of sound energy. For this reason the velocity increases. It can be seen that ultrasonic curves fall with rise of temperature of the both systems. This is anticipated because rise of temperature is accompanied by molecular agitation disrupting the molecular alignment & affecting the complexed species.