Study of the Intermolecular Ion-Solvent and Surfactant-Solvent Interactions in Binary and Tenary Liquid Mixtures.

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Densities, p, viscosities, h and ultrasonic speeds, u of pure benzyl alcohol, ethanol, 1-propanol, 1-octanol and of their binary mixtures: benzyl alcohol + ethanol, + 1-propanol, and + l-octanol; while p and u of pure I-butanol, I-heptanol, cyclohexanol and of their binary mixtures: benzyl alcohol + 1- butanol, + 1-heptanol and + cyclohexanol were measured at 303K over the whole composition range, expressed in terms of mole fraction, x, of benzyl alcohol From these experimental data, the values of isentropic compressibility, Kg, relative association, Ra, acoustic impedance, Z, molar sound speed, Rm, molecular association, Ma for both the above mentioned binaries were calculated. Deviations in viscosity, Dh, ultrasonic speed, Du and excess acoustic impedance, Z^E from linear dependence on composition for the first three mixtures, whereas, the excess functions Ks^E, V^E and Z^E for the last three mixtures were computed. These derived parameters have been used to interpret the intermolecular interactions in the above six binaries.

The experimental viscosity and ultrasonic speed data of the first three binary mixtures were used to test the validity of the empirical viscosity relations: Grunberg- Nissan, Tamura-Kurata, Hind-Mclaughlin and Katti- Chaudhary, and the empirical relations for ultrasonic speed: Nomoto's relation, collision factor theory (CFT), free length theory (FL T) and Yan Dael and Yangeel ' s ideal mixing relation. The above empirical relations for ultrasonic speed were also tested for the remaining three binary mixtures. The relative merits and de-merits of these relations were discussed.

Densities, viscosities and ultrasonic speeds were also measured for pure cyclohexane, cyclohexanol, 1-octanol, 1-decanol, 2,2,4-trimethyl pentane, n-hexane, formamide, 1-butanol, 2-methyl-1-propanol, 2-methyl-2-propanol, and of binary mixtures: cyclohexane + cyclohexanol, + 1-octanol, + 1-decanol; 2,2,4-trimethyl pentane + n-hexane, + cyclohexane; formamide + 1-butanol, + 2-methyl-1-propanol, and + 2-methyl-2-propanol at 308 K over the entire composition range. Derived parameters such as Ks, intermolecular free length, L_f, Z, R_A, Rm, M_A,D*Ks,* V^E, Dh and D*u* were calculated. In addition, excess free energy of activation of viscous flow, G^{*E}, apparent molar isentropic compressibility, Kf,2 and apparent molar volume, Yf,2 of butanols in formamide were also calculated. Moreover, V^E data of formamide + butanols were analysed using Prigogine-Flory-Patterson theory. Theoretical values of ultrasonic speed

and viscosity of the above binaries were obtained using various empirical relations as mentioned earlier .

Specific conductances of 0.10, 0.15, 0.20, 0.25, 0.30, 0.35,0.50, 0.70, 0.90, 1.10, 1.30, 1.50 and 1.70 mM cetyltrimethylammonium bromide (CTAB) in 0.01 M- KI + dimethylsulphoxide (DMSO) at 303, 308, 313 and 318 K were measured. The values of critical micelle concentration (CMC) of CT AB at given temperatures were obtained from the breaks in specific conductance vs ÖC plots. Using the values of CMCs, thus obtained, thermodynamic parameters DGm^{o}, DHm^{o} and DSm^{o} of micellization were calculated. These parameters were used to discuss the process of micellization of CTAB in 0.01M-KI + DMSO solvent