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Static Dielectric Constants, Densities, Refractive Indices and Related Properties of Binary Mixtures at Various Temperatures Under Atmospheric Pressure

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Abstract

Experimental dielectric constants at (293.15, 298.15, 303.15) K, densities and refractive indices at 293.15 K are reported for water- ethanol and water- n-butanol binary mixture systems over the entire volume fraction range and atmospheric pressure. From the experimental dielectric data, the excess dielectric constant, effective Kirkwood correlation factor, Bruggeman factor and from density and refractive index data various parameters and their excess properties like excess density, excess refractive index, excess molar polarization, and excess molar volume were estimated and reported in the study. The static dielectric constant of the studied binary mixtures decreases with increase in temperature and volume fraction of the solutes. The density values are decreasing and refractive indices are increasing with increasing volume fraction of ethanol and n-butanol in water. Excess molar volumes values of ethanol and n-butanol are negative over the entire volume fraction range shows the presence of intermolecular interaction and hydrogen bonding in both the binary mixtures.

Keywords

[Static dielectric constant](#), [Density](#), [Refractive index](#), [excess properties](#), [polar binary mixtures](#)

References

- 1 R. Day and A. Underwood, "Quantitative Analysis, New Jersey: Prentice-Hall 1991.
- 2 H. Yilmaz and S. Guler, "Excess properties of methanol-water binary system at various temperatures," *Il Nuovo Cimento*, 20D, 1853-1851, 1998.
- 3 A. Jouyban, S. Shahla and H. Chan, "A simple relationship between dielectric constant of mixed solvents with solvent composition and temperature," *International Journal of Pharmaceutics*, 269, 353- 360, 2004. doi: 10.1016/j.ijpharm.2003.09.010.
- 4 M. Mohsen-Nia, H. Amiri, B. Jazi, "Dielectric constant of water, methanol, ethanol, butanol, and acetone: measurement and computational study," *J. Solu. Chem.*, 39, 701-708, 2010. DOI 10.1007/s10953-010-9538-5.
- 5 Hülya Yilmaz, "Excess properties of alcohol- water systems at 298.15K," *Turk. J. Phys.*, 26, 243-246, 2002.
- 6 A.P. Maharolkar, A. Murugkar, P.W. Khirade, S.C. Mehrotra, "Study of Dielectric and Acoustic Properties of Binary Liquid Mixtures of Cyclohexane with n-Butanol at 308 K," *Russian Journal of Physical Chemistry A*, 95, S56-S61, 2021. DOI:10.1134/S0036024421140120.
- 7 V. V. Navarkhele, "Dielectric and Excess properties of glycol with formamide at different temperatures," *Russian Journal of Physical Chemistry A*, 92, 1417-1422, 2018. DOI: 10.1134/S0036024418070191.
- 8 R. J. Sengwa, S. Sankhla and S. Shinyashiki, "Dielectric Parameters and Hydrogen Bond Interaction Study of Binary Alcohol Mixtures," *J. Sol. Chem.*, 37, 137-153, 2008. DOI 10.1007/s10953-007-9230-6.
- 9 J. G. Kirkwood, "The dielectric polarization of polar liquids", *J. Chem. Phys.*, 7, 911-919, 1939. A.C. Kumbharkhane, S. M. Puranik, S.C. Mehrotra, "Dielectric relaxation of tert-butyl alcohol-water mixtures using a time-domain technique", *J. Chem. Soc. Faraday Trans.*, 87, 1569-1573, 1991. <https://doi.org/10.1039/FT9918701569>.
- 10 A.C. Kumbharkhane, S.M. Puranik, S.C. Mehrotra, "Dielectric relaxation studies of aqueous N, N dimethylformamide using a picoseconds time domain technique", *J. Sol. Chem.*, 22, 219-229, 1993. <https://doi.org/10.1007/BF00649245>

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