Comments

Comments on "Densities, Viscosities, Speeds of Sound, and Relative Permittivities for Water + Cyclic Amides (2-Pyrrolidinone, 1-Methyl-2-pyrrolidinone, and 1-Vinyl-pyrrolidinone) at Different Temperatures" (George J.; Sastry N. V. *J. Chem. Eng. Data* 2004, *49*, 235−242)

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In a recent paper, George and Sastry reported on the thermophysical properties of cyclic amides (lactams) + water binary mixtures[1] and compared their data with those published by us.[2] The authors calculated excess and mixing properties for 2-pyrrolidinone + water and *N*-methylpyrrolidinone + water mixtures and asserted that the severe discrepancies of our data (Figure 3 of ref 1) with their data and "the other literature values...are mainly attributable to the source and purity of pure amides".

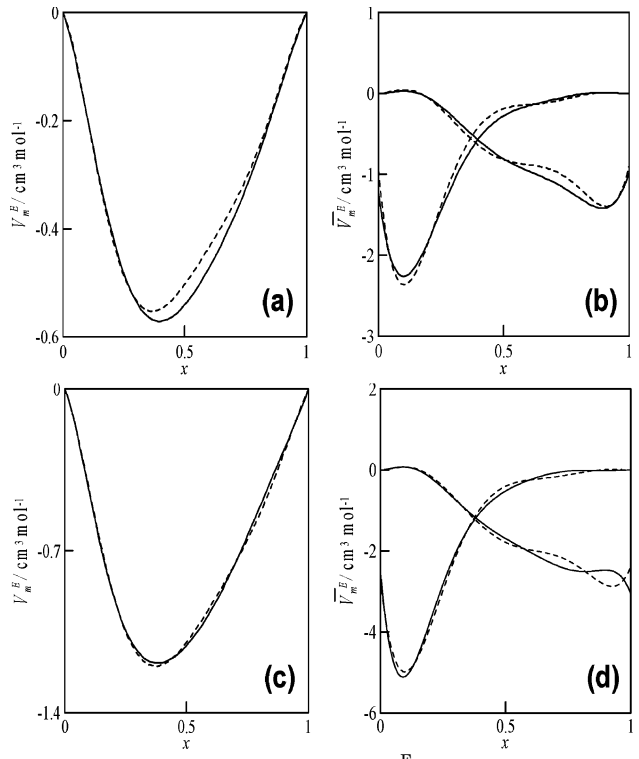

Figure 1. Excess molar volume, V_m^E, and partial excess molar volume, $\bar{V}_m^E$, for (a, b) (*x*)2-pyrrolidinone + (1 − *x*)-water and (c, d) (*x*)*N*-methylpyrrolidinone + (1 − *x*)water binary solvents at 298.15 K. −, Data from ref 2; - - -, data from ref 1.

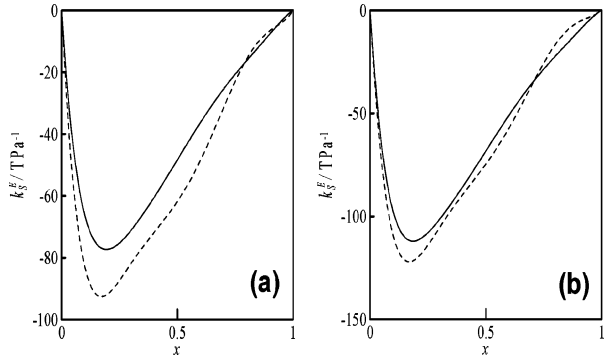

Figure 2. Excess isentropic compressibility, k_S^E, for (a) (*x*)2-pyrrolidinone + (1 − *x*)water and (b) (*x*)*N*-methylpyrrolidinone + (1 − *x*)water binary solvents at 298.15 K. −, Data from ref 3; - - -, data from ref 1.

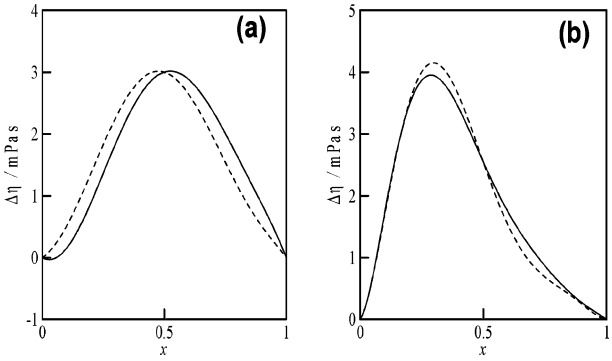

Figure 3. Viscosity deviation, $\Delta\eta$, for the (a) (*x*)2-pyrrolidinone + (1 − *x*)water and (b) (*x*)*N*-methylpyrrolidinone + (1 − *x*)water binary solvents at 298.15 K. −, Data from ref 2; - - -, data from ref 1.

After we replotted and compared our data with those by George and Sastry (Figure 1), it became clear that

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such discrepancies are inexistent; these authors treated our data in an incorrect manner and introduced a plotting error by swapping the lactam mole fraction with the water mole fraction, with the result being a curve symmetrical with the real one at the $x = 0.5$ vertical axis. Our excess molar volumes and partial excess molar volumes[2] agreed well not only with "the other literature values" but also with those by George and Sastry (Figure 1). However, their data distribution contained 13 data pairs within the 0.5 to 1.0 mole fraction range (water-rich region), whereas the 0.0 to 0.5 range (lactam-rich region), which was covered with only 6 data pairs, was used to deduce the water partial molar volume at infinite dilution; such a distribution is somewhat surprising in view of the very interesting behavior displayed by these lactams.

To ensure such a comparison, we have also plotted (Figure 2) the related property, excess isentropic compressibility;[3] the data by George and Sastry exhibited extraneous curvatures at $x > 0.5$, which were probably due to the technique used for the speeds of sound, (García et al. used an Anton Paar DSA5000, ± 0.5 m s^{-1}; George and Sastry used interferometry, ± 1 m s^{-1}.) Although their densities had a declared accuracy of $\pm 1 \times 10^{-5}$ g cm^{-3} (no GC purity was reported), those were in fact quoted with six digits; the readings were performed at (298.15, 308.15, 318.15, and 338.15) K, but the densitometer was calibrated at (293.15, 313.15, and 333.15) K, the references being air and water, which was also used as a binary component.

In Figure 3, the viscosities of the mixture show only slight discrepancies from what may be due to the different experimental methodology. George and Sastry reported viscosities with three digits measured with a capillary viscometer (stated accuracy ± 0.033 mPa s) and ascribed the same uncertainty (flow time ± 0.1 s, manual stop watch) to low viscosities (1.663 mPa s for *N*-methylpyrrolidinone) as to high viscosities (13.363 mPa s for 2-pyrrolidinone).

Literature Cited

(1) George, J.; Sastry, N. V. Densities, Viscosities, Speeds of Sound, and Relative Permittivities for Water + Cyclic Amides (2-Pyrrolidinone, 1-Methyl-2-pyrrolidinone, and 1-Vinyl-2-pyrrolidinone) at Different Temperatures. *J. Chem. Eng. Data* **2004**, *49*, 235−242.

(2) García, B.; Alcalde, R.; Leal, J. M.; Matos, J. S. Solute−Solvent Interactions in Amide−Water Mixed Solvents. *J. Phys. Chem. B* **1997**, *101*, 7991−7997.

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