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Partial molar volumes and partial molar isentropic compressions of γ-butyrolactone and ε-caprolactone at infinite dilution in water at temperatures (278.15 to 318.15) K and at atmospheric pressure

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Abstract

Density and speed-of-sound values at T = (278.15, 283.15, 288.15, 293.15, 298.15, 308.15, and 318.15) K and at atmospheric pressure were measured, for dilute aqueous solutions of γ-butyrolactone and ε-caprolactone, using an Anton Paar DSA 5000 vibrating-tube densimeter and sound analyzer. A small but significant effect of hydrolysis was observed for aqueous ε-caprolactone and a procedure for eliminating its effect was proposed and employed. Values of the partial molar volume and isentropic compression at infinite dilution were obtained from this experimental data by suitable extrapolation procedures and compared with available data from the literature. The group contribution of the methylene group was evaluated and compared with that obtained for other classes of aqueous cyclic solutes.

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Keywords

γ-Butyrolactone, ε-Caprolactone, Aqueous solutions, Density, Partial molar volume, Speed of sound