Thermodynamic Properties of NMP/Methanol over a Wide Temperature and Pressure Range

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N-methylpyrrolidinone (NMP) is one of the more used solvents in the chemical industry, due to its low volatility, high polarity, thermal and chemical stability, and high miscibility with water and organic solvents. It is widely used in many applications of chemical engineering (coal extraction and desulphurization of gases).

We are reporting measurements of speeds of sound of NMP/Methanol mixtures in the full composition range from 298.15 to 343.15 K and pressures up to 60 MPa, by means of a pulse echo technique operating at 5 MHz [1]. The densities were measured with a vibrating tube densimeter in the same range of temperatures and pressures as in previous research [2]. Isotherm molar heat capacities were determined at an ambient pressure and at temperatures between 298.15 and 358.15 K, using a Setaram micro III DSC calorimeter. To calculate the thermodynamic properties of these liquids from the speed of sound experimental results, the dependence of the density and isobaric heat capacity on temperature at atmospheric pressure, and of the speed of sound on temperature and pressure, was used. Our purpose is to increase the NMP/Methanol mixture solvent database in a wide range of pressures and temperatures, and to check the experimental density results using speed of sound values.

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[2] S. Aparicio, R. Alcalde, B. García, J.M. Leal, and M.J. Dávila, "Cubic and SAFT EOS analysis of the PVTx properties of the NMP methanol solvent," CHISA, Praha, Czech Republic, 2004.