

Thermodynamic Properties of Liquid Binary Mixtures of Cyclohexane with n-Alkanes

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An evaluation of current state of experimental studies and theoretical calculations of thermodynamic properties of binary mixtures of cyclohexane with n-alkanes has been carried out. The overview has showed that experimental data are scarce and unsystematic. It seems not to have been subjected to overall analysis. The measurements have been carried out only for some types of mixtures and compounds. To determine thermodynamic properties of mixtures the acoustic method has been used. The binary mixtures of cyclohexane with n-octane, cyclohexane with n-dodecane and cyclohexane with n-hexadecane have been chosen as the subject of the study. The speed of sound in the liquid mixtures has been measured using technique of direct determination of transit time of acoustic pulses through known distance. The measurements were made at temperatures from 298 to 433 K and pressures from 0.1 to 100.1 MPa with an inaccuracy not exceeding 0.15%. The experimental speed of sound data have been obtained for the first time. The own speeds of sound obtained at atmospheric and elevated pressures as well as literature values for density and isobaric heat capacity at atmospheric pressure have been used to calculate the different thermodynamic properties over a wide range of parameters. As a result, the values of density, isobaric and isochoric heat capacity, adiabatic and isothermal compressibility, excess molar volume become available. The temperature, pressure and mixture composition dependences of thermodynamic and excess properties have been discussed. Comparison between the obtained values for density and those available in the literature has revealed good agreement.