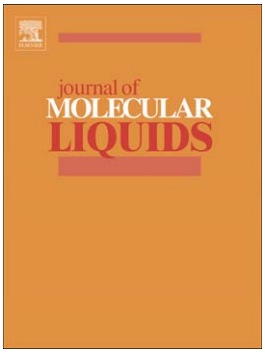

Volumetric, acoustic and optical properties for binary mixtures of nitroethane with chloroalkane at temperatures between 298.15 K and 318.15 K. Comparison with theories

Dana Dragoescu, Magdalena Bendová, Zdeněk Wagner, Daniela Gheorghe

PII: S0167-7322(16)31552-5
DOI: doi: 10.1016/j.molliq.2016.08.076
Reference: MOLLIQ 6237

To appear in: *Journal of Molecular Liquids*

Received date: 14 June 2016
Revised date: 18 August 2016
Accepted date: 19 August 2016

Please cite this article as: Dana Dragoescu, Magdalena Bendová, Zdeněk Wagner, Daniela Gheorghe, Volumetric, acoustic and optical properties for binary mixtures of nitroethane with chloroalkane at temperatures between 298.15 K and 318.15 K. Comparison with theories, *Journal of Molecular Liquids* (2016), doi: 10.1016/j.molliq.2016.08.076

Volumetric, acoustic and optical properties for binary mixtures of nitroethane with chloroalkane at temperatures between 298.15 K and 318.15 K. Comparison with theories.

Dana Dragoescu[*] [a], Magdalena Bendová [b], Zdeněk Wagner [b] and Daniela Gheorghe [a]

[a] *„Ilie Murgulescu" Institute of Physical Chemistry, Romanian Academy, Splaiul Independentei 202, 060021 Bucharest, Romania*

[b] *Institute of Chemical Process Fundamentals, Czech Academy of Sciences, v. v., Rozvojova 135, 16502 Prague 6, Czech Republic*

Abstract

In a continuation from a previous work, experimental densities, speeds of sound, and refractive indices data, for eight binary liquid mixtures of nitroethane with 1,1,2,2-tetrachloroethane, 1,1,1-trichloroethane, trichloromethane, 1,2-dichloroethane, 1,3-dichloropropane, 1,4-dichlorobutane, 1-chlorobutane and 1-chloropentane were measured in the temperature range of (298.15 - 318.15) K and at atmospheric pressure. From the measured data the derived properties, such as the excess molar volumes, the isentropic compressibility, the deviations in isentropic compressibility, the deviations in refractive indices, the molar refractions and the deviations in molar refractions data have been calculated. The excess properties of the binary mixtures were correlated by the Redlich–Kister type polynomials using a robust regression along the gnostic influence function. Speed of sound and isentropic compressibility data have been compared with calculated values from Jacobson free length theory (FLT), Nomoto's relation (NR), Zhang Junjie's relation (JR), Van Deal's ideal mixing relation (IMR), Impedance dependence relation (IDR) and Schaaff's collision factor theory (CFT). The ability of different theoretical (n,ρ) mixing rules (Lorentz–Lorenz, Gladstone–Dale, Arago–Biot, Edwards and Eykman) to predict the refractive indices was evaluated. The experimental and calculated results are discussed in terms of molecular interactions and structural effects between components of mixtures.

KEYWORDS: Densities; Excess Molar Volumes; Speeds of sound; Refractive indices; Nitroethane; Chloroalkanes.

[*] Corresponding author: Email: ddragoescu@chimfiz.icf.ro; Tel: +40 213167912; Fax: +40 213121147