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Thermophysical properties of *n*-hexadecane + some alkylbenzenes binary mixtures at temperatures from 298.15 K to 318.15 K and atmospheric pressure

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### Abstract

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The thermophysical properties (densities, speeds of sound, refractive indices, and viscosities) for the binary mixtures of *n*-hexadecane with two aromatic hydrocarbons (*iso*-propylbenzene and *tert*-butylbenzene) were measured over the entire range of composition, at several temperatures from (298.15 to 318.15) K and atmospheric pressure,  $p = 0.1$  MPa.

From the experimental results, the excess molar volumes, the isentropic compressibilities, the excess isentropic compressibilities, the deviation in refractive indices, the molar refractions, the excess molar refractions, and the deviation in viscosities were calculated.

A Redlich–Kister polynomial equation was applied in order to correlate the calculated excess and deviations properties of the binary mixtures with composition and the correlation parameters were estimated.

The ability of different theoretical ( $n, \rho$ ) mixing rules (Lorentz-Lorenz, Gladstone-Dale, Arago-Biot, Edwards and Eykman) to predict the refractive index was evaluated.

The experimental viscosities are compared with values calculated by several different equations: Grunberg–Nissan, Katti Chaudry, Hind, Dolezalek, and three-body McAllister model.

The experimental and calculated results are discussed in terms of molecular interactions and structural effects between components of mixtures.

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**Keywords:** *n*-hexadecane, alkylbenzenes, thermophysical properties, molecular interactions

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