Densities and Viscosities of (1- Butanol or 2-Butanol + 2,2,4-Trimethylbenzene) Mixtures at High Pressures

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There are many mixtures of interest for the development of next-generation biofuels due to the wide variety of oxygenated additives of renewable origin that can be used but there is a lack of information about their properties. This study focuses on the thermophysical characterization of new blends of 1-butanol or 2-butanol, as oxygenated compounds of renewable origin, and 1,2,4-trimethylbenzene, as aromatic hydrocarbon, through density and viscosity measurements, to contribute to the international effort towards development and use of environmentally sustainable fuels. Densities were measured by means of an automated Anton Paar DMA HPM vibrating-tube densimeter which was automated and has an estimated uncertainty of ± $7 \cdot 10^{-4}$ $g \cdot cm^{-3}$ (k=2) at temperatures below 373.15 K. A vibrating-wire viscometer has been developed for the accurate measurement of viscosities for pure compounds and mixtures over the working range T = (293.15 to 373.15) K and p = (0 to 140) MPa. Rigorous uncertainty calculations gave a standard uncertainty of the dynamic viscosity of ± 0.5%. Densities and viscosities of binary mixtures (1-butanol + 2,2,4-trimethylbenzene) and (2-butanol + 2,2,4-trimethylbenzene) are reported at four temperatures (293.15 K, 313.15 K; 333.15 K and 353.15K) and pressures up to 140 MPa, as first characterization of biofuels. The experimental data are compared with well-known correlations.

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