Volumetric Properties Under Pressure of the Binary System Di-Isopropyl Ether + 1-Hexene at Temperatures up to 353.15 K and at Pressures up to 100 MPa

Adil Shriyer, Natalia Muñoz-Rujas and Fernando Aguilar
Electromechanical Engineering, Universidad de Burgos, Burgos, Spain

José J. Segovia
Grupo de Termodinámica y Calibración TERMOCAL, Universidad de Valladolid, Valladolid, Spain

Eduardo A. Montero [C, S]
Electromechanical Engineering, Universidad de Burgos, Burgos, Spain
emontero@ubu.es

A knowledge of the thermophysical properties of liquid mixtures, like non-polluting automotive fuels, under a broad range of operating conditions is of utmost importance for the petrochemical industry. Such fuels usually contain oxygenated compounds (alcohols, ethers) and hydrocarbon mixtures. From a practical point of view, the data are useful for the design and operation of mixing, storage, and process equipment. The branched ether DIPE, pure or mixed with alkanols or alkanes, has been recommended as a high octane blending agent for motor gasoline. Ether + alcohol mixtures are of interest as model mixtures for gasoline in which the ether acts as a non-polluting, high octane number blending agent. Despite this interest, density data of binary mixtures containing ether + hydrocarbon at pressures other than the atmospheric pressure are very scarce in the literature. The density of the binary mixture DIPE + 1-hexene has been measured under pressure and reported in this work using a vibrating tube densitometer. Experimental densities for the compressed liquid phase of the binary system DIPE + 1-hexene have been measured at, 298.15, 313.15, 333.15 and 353.15 K and at nineteen isobars up to 100 MPa. For each composition, the experimental values were correlated using a Tait-type equation. Furthermore, the excess molar volume and the isothermal compressibility were calculated from the density data.

This paper is part of the Doctoral Thesis of A. Shriyer. The authors acknowledge support for this research to the Inter-university Doctorate Program on Engineering Thermodynamics of Fluids University of Valladolid-University of Burgos (A. Shriyer, doctorate mobility at the University of Valladolid, 2015)