

Solubility and High Pressure Density of HFE-7500 in N-Alkanes

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Hydrofluoroethers (HFEs) have been proposed recently as useful alternatives to replace traditional fluorochemicals (CFCs and PFCs), due to their friendly environmental profile and suitable thermophysical properties. Some of these compounds are being already used for instance in semiconductor industry, as cleaning agents or coolant fluids. HFEs offer useful safety and performance properties, and they have an excellent environmental profile because they have a zero ozone depletion potential (ODP), low global warming potential (GWP) indices and short atmospheric lifetime. Moreover, their physical properties, as low water solubility and high vapour pressure, suggest that they represent no threat to aquatic systems. Among HFEs, those which contain an aliphatic chain separated from a perfluorinated chain (the so called segregated HFEs) stand out, but scarce information of their thermophysical properties and phase behaviour is found in literature. In this work, experimental liquid-liquid equilibria (LLE) of mixtures of 2-trifluoromethyl-3-ethoxydodecafluorohexane (HFE-7500) with n-alkanes (C18-C12) from 258.15 to 313.15 K and atmospheric pressure are presented. LLE has been determined using a jacketed glass cell with a magnetic stirrer and temperature stabilized with a fluid bath, whose temperature stability was ± 10 –2 K. After the sample attained thermal equilibrium, the phases were allowed to split and small samples were taken from each phase with a syringe. The compositions were determined by measuring their densities using an Anton Paar DSA 5000 densimeter. It has been observed that the immiscible region increases with the length of the alkane chain and the decreasing temperature, as expected. The volumetric behaviour of the mixture of HFE 7500 + n-octane has been measured as well, in a pressure range from atmospheric to 25 MPa, at 298.15 and 313.15 K. Density was determined with an Anton Paar DMA 4500 vibrating tube densimeter, connected to an Anton Paar 512P high pressure measuring cell.