

Properties of Engineering Liquids Based on Hydrofluoroethers – Modeling and Experiments at 0.1 MPa

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Hydrofluoroethers (HFEs), belonging to the family of so-called Novec fluids introduced by the 3M company, are technically interesting liquids with several favorable properties like zero ODP, low GWP, dielectric behavior, and low viscosity. The HFE liquids have application potential as heat transfer media or cleaning agents in the electronics industry, cooling of high-performance computing, or as admixtures in refrigerant blends. In this presentation, we summarize the efforts of our international team in describing the thermophysical properties of a series of five HFE liquids ranging from HFE-7000 to HFE-7500. The experiments covered include measurements of density at 0.1 MPa using the single singer buoyancy technique [1] and the vibrating tube densimeter [2] and of surface tension using the du Noüy ring and Wilhelmy plate methods [1]. The influence of isomeric composition of HFE-7100 and HFE-7200 on the liquid density was recently described [2]. In the theoretical research, the predictive equations of state of PC-SAFT [1] and Peng-Robinson type were employed in the modeling of VLE and a full set of volumetric and caloric properties [3]. Recently, the force field for the selected HFEs has been derived from ab-initio calculations and used for the MD simulations of a set of transport properties including the thermal conductivity, dynamic viscosity, and self-diffusion coefficient [4]. Current activities include measurement of transport properties and their prediction using entropy and density scaling.

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References

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