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Volumetric behavior of HFO-1234ze(E) + acetone liquid mixture at 303.2 K.

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Abstract (less than 300 words)

Hydrofluorocarbons (HFC) have been widely used as refrigerants, forming agents and spray propellants. However, hydrofluoroorefins (HFO) are now considered to be an alternative for HFC because of zero ozone depletion potential (ODP) and its quite low global warming potential (GWP) [1].   The authors have investigated bubble point pressure [2,4], liquid density [3] and dielectric constant [4], for the mixtures of conventional propellant, propane or dimethyl ether (DME) with some organic solvents.   However, there are few experimental data for the mixtures containing (E)-1,3,3,3-Tetrafluoropropene (HFO-1234ze(E)) except for the bubble point pressure reported previously [2].

In this study, the density was measured for a liquid mixture of HFO-1234ze(E) + acetone at 1.0 MPa and 303.2 K, and the volumetric behavior of mixture was investigated for the mole fraction dependence of the excess molar volume.

Density of mixture was measured by oscillation of U-shaped tube densimeter (Anton Parr 512P).   The density of mixture was estimated by Oscillation period of U-shaped tube filled with liquid mixture. The densimeter was calibrated with butane[5] and water[6] at 1.0 MPa and 303.2 K.

The density of liquid mixture for HFO-1234ze(E) + acetone studied monotonously increased with increasing mole fraction of HFO-1234ze(E) at 1.0 MPa and 303.2 K.   The excess molar volume of this liquid mixture studied showed to be negative in the whole range of mole fraction of HFO-1234ze(E), and a minimum was seen around 60 mol% of HFO-1234ze(E).   This may suggests that an attractive force among HFO-1234ze(E) and acetone will be important role of volumetric behavior in liquid mixture of HFO-1234ze(E) + acetone at 1.0 MPa and 303.2 K.

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