

Compressed-Liquid Density Measurements of Binary Mixtures of Dimethyl Ether + Pentane

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Compressed-liquid densities of three compositions of the binary mixture dimethyl ether + pentane have been measured with a vibrating U-tube densimeter. Measurements were made from 270 K to 390 K and 1.0 MPa to 50 MPa. The overall combined uncertainty ($k=2$) of the density data is $0.81 \text{ kg}\cdot\text{m}^{-3}$. Data presented here have been used to improve a previously formulated Helmholtz energy equation of state. The newly derived parameters are given. The polar + non-polar nature of the dimethyl ether + pentane system presents modeling challenges. The interactions of such pairs are often more different than straight-chain hydrocarbon pairs upon which many equations of state base their mixing parameters. The compressed-liquid density measurements presented in this work were thus undertaken to provide non-saturation data for the dimethyl ether + pentane system with the goal of developing an equation to more accurately predict thermophysical properties for this mixture. Additionally, the data serve for further improvement of equations of state in predicting the properties of mixtures that include polar + non-polar interactions.