

Density Measurements of Squalane Using Single-sinker and Vibrating-tube Densimeters

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Squalane, an oily long-chain alkane (C₃₀H₆₂), has been identified as a promising reference material for viscosity measurements of petroleum fluids under typical reservoir conditions covering high temperatures and pressures. To meet the need for a reliable reference equation, several correlations [1,2,3] for the viscosity and density of squalane have been developed over the last decade, incorporating numerous recent experimental data.

In the case of liquid densities, a significant amount of the underlying data has been obtained using the vibrating tube method, which has certain accuracy limitations when measuring viscous liquids such as squalane. Typically, an automatic built-in instrument correction or some semi-empirical formulas are used to account for the effect of viscosity on the resulting density.

This contribution presents new accurate liquid density data for squalane from 293 K to 453 K and from near ambient pressure up to 20 MPa, measured with a single-sinker magnetic-suspension densimeter, which are considered to be insensitive to sample viscosity. Simultaneously, new data on the same batch of squalane acquired with a commercially available vibrating-tube densimeter (VTD) are presented. The performance of the VTD calibrated with dry air and water using automatic instrument correction for the sample viscosity can thus be evaluated.

The new results are successfully correlated with the Tait equation within an experimental uncertainty of less than 0.01 % and are compared with selected literature data.

References

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