

Reference Correlations of the Viscosity and Thermal Conductivity of Tetrahydrofuran from the Triple Point to High Temperatures and Pressures

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Tetrahydrofuran (THF, C₄H₈O), also known as diethylene oxide, oxolane, or 1,4-epoxybutane, is a five-node cyclic ether (CAS number 109-99-9). It is used as a solvent, reaction medium, and in the production of elastic construction materials, elastomers, and thermoplastics. As it is a polar molecule, it is entirely miscible in water and hence it is also employed in the formation of hydrates.

Very recently a fundamental equation of state in terms of the Helmholtz energy for THF was published [1], valid from the triple-point temperature up to 550 K and pressures up to 600 MPa. The equation of state enables the calculation of all thermodynamic properties in the liquid, vapor, and supercritical regions including saturation states.

There is currently no reference correlation for the viscosity or the thermal conductivity of THF, probably due to the fact that the equation of state has only recently been published.

Hence, new wide-ranging correlations for the viscosity and thermal conductivity of THF based on critically evaluated experimental data are presented. All experimental data have been categorized into primary and secondary data according to the quality of measurement, the technique employed, and the presentation of the data, as specified by a series of criteria. The primary data are employed for the development of the reference correlations, while the secondary data are only used for comparison reasons. The viscosity correlation is valid from the triple point to 400 K and up to 160 MPa pressure, while the thermal conductivity correlation is valid from the triple point to 350 K and 20 MPa pressure.

References

1. F. Fiedler, J. Karog, E.W. Lemmon, M. Thol, *Int. J. Thermophys.* 44:153 (2023)