

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

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New wide-ranging correlations for the viscosity and thermal conductivity of xenon are presented. Although it is a monatomic gas, which means that accurate theoretical calculations in the dilute gas state are available, its very low thermal conductivity value makes the measurement of this property nontrivial.

In the case of the viscosity, a new correlation is presented based on the most recent theoretical calculations and critically evaluated experimental data. The correlation is designed to be used with an equation of state, and it is valid from the triple point to 750 K, at pressures up to 86 MPa. The estimated uncertainty varies depending on the temperature and pressure, from 0.2 % in the dilute-gas range to 3.6 %. The correlation behaves in a physically reasonable manner when extrapolated to 200 MPa, however care should be taken when using the correlations outside of the validated range.

In the case of the thermal conductivity, the new correlation presented is based on the most recent theoretical calculations and critically evaluated experimental data. The correlation is designed to be used with an existing equation of state, and it is valid from the triple point to 606 K, at pressures up to 400 MPa. The estimated uncertainty varies depending on the temperature and pressure, from 0.2 % in the dilute-gas range to 2.5 %.