

Thermal Conductivity Measurement of 1,1-difluoroethane (R152a) + trans-1,3,3,3-tetrafluoropropene (R1234ze(E)) Mixtures from 283 to 363 K at Pressures to 20 MPa

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Trans-1,3,3,3-tetrafluoropropene (R1234ze(E)) is a new synthetic working fluid with zero ozone depletion potential (ODP) and low global warming potential (GWP), which was screened out as a promising alternative working fluid for refrigeration systems. Comparing with the single component, its mixtures have better adaptability. This study provides fundamental data on the transport properties of this refrigerant mixture in order to evaluate the feasibility of using the mixture in refrigeration systems. Thermal conductivity data for a binary system of {1,1-difluoroethane (R152a, CAS NO. 75-37-6) + trans-1,3,3,3-tetrafluoropropene (R1234ze(E), CAS NO. 1645-83-6)} were measured between (283 and 363) K in the pressure range up to 20 Mpa with 1,1-difluoroethane mass fractions of 0.10, 0.30, 0.50, 0.70 and 0.90, respectively. The experiment was conducted using the transient hot-wire method with single oxidized tantalum hot wire. The performance of the apparatus was tested by measuring the thermal conductivity of saturated liquid toluene from (283 to 363) K, which agreed with recommended values with a maximum deviation of 0.71%. The expanded uncertainty of the thermal conductivity data was less than $\pm 2.0\%$ with the coverage factor $k=2$. The experimental data of the mixtures were correlated as functions of temperature, pressure, and mass fraction, respectively.