

Thermal Conductivity and Viscosity Measurement of Low GWP Refrigerants

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Hydrofluoroolefins (HFOs) have been taken for account as candidates of next generation refrigerant due to their lower GWP compared with HFC refrigerants. In order to replace the alternative refrigerants, accurate physical properties are essential for design the refrigeration/air-conditioning or high-temperature heat pump system. There are, however, very limited experimental data of the transport properties compared with the thermodynamic properties. In the present study, thermal conductivity and viscosity of low-GWP refrigerants are measured in wide ranges with a transient hot-wire method and a tandem capillary tubes method, respectively. In the measuring the thermal conductivities, short (60mm) and long (120mm) platinum wires with diameter of 0.015 mm were used as the line heat source in order to eliminate the contact resistance of the wire ends. The viscosities are obtained by measuring the pressure drops flowing test fluid under laminar flow condition inside two different length capillary tubes (50 and 100 mm) with same diameter connected in series to eliminate the pressure drop at both inlet and outlet of the tubes. This study also deals with development of correlation of the thermal conductivity and the viscosity based on the experimental data using an extended corresponding states (ECS) model. The results show that there are good agreement between the predictions and the present measurements.