The Speed of Sound and Density of Hexafluoropropylene at Temperatures between (213 and 473) K and at Pressures up to 400 MPa

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Hydrofluoroalkenes can be considered as alternative fluids for air conditioning, heat pump and refrigeration systems due to their zero ozone depletion potentials and very low global warming potentials. In order to facilitate such applications, knowledge of thermophysical properties is required. Therefore, in this work, the speed of sound in liquid and supercritical hexafluoropropylene (HFP) has been measured in the temperature range (253 to 473) K for pressures up to 400 MPa using a double-path pulse-echo ultrasonic cell with a single 5-MHz ultrasound transducer. The speed of sound in the gas phase has been measured with a spherical resonator at temperatures between (213 and 373) K and pressures up to 10 MPa or the lower of 90 % of the vapour pressure at lower temperatures. In addition, the density of HFP was measured with a vibrating-tube densimeter in the temperature range (283 to 473) K at pressures up to 70 MPa. The overall relative uncertainties are 0.2 % for the speed of sound and 0.05 % for the density, limited mainly by the chemical purity of the sample. The results, together with vapour-pressure data from the literature, should be sufficient to allow for the development a wide-range Helmholtz-energy equation state.