

Speed of Sound Measurements on Select Ternary Refrigerant Mixtures

Aaron Rowane^{1, C}, Karim Al-Barghouti^{2, S} and Ian Bell¹

¹*NIST, Boulder, CO, U.S.A.*

²*Chemical and Petroleum Engineering, University of Kansas, Lawrence, Kansas, U.S.A.*
aaron.rowane@nist.gov

Experimental speed of sound data for R-444A, R-457B, and R-407C, measured with a dual-path pulse-echo instrument, are presented from 230 K to 345 K to a maximum pressure of 30 MPa. The standard uncertainties in temperature and pressure were 10 mK and 0.014 MPa, respectively. The combined expanded uncertainty in the speed of sound ranged from 0.04% to 0.1% of the measured speed of sound value. Weaker echo signals were encountered as the system approached the critical region resulting in a decreased signal-to-noise ratio. To maintain a low uncertainty in the speed of sound measurement, the number of echoes averaged was increased from a minimum value of 256 to 4096. Upon completion of the measurements, the data were compared to the latest empirical mixture models available in REFPROP for all blends.