Realizations of the Triple Point of Sulfur Hexafluoride in Transportable-Refillable Cells

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We report our first results of SF6 TP realizations performed at NIST using a new series of transportable and refillable triple-point cells. The melting curves are presented at various melted fractions *F* and compared to evaluate the reproducibility and overall uncertainty for the realizations. All samples are derived from a single source of SF₆ with a nominal impurity content below 3 ppm. We obtain a TP temperature of 223.555 87(33) K at *F*=50 % and 223.556 07(34) K at *F*=100 % as a weighted average of realizations using two adiabatic-type cells and two immersion-type cells. Temperatures were derived using a combination of five different SPRTs as calibrated at NIST on the ITS-90. The data are evaluated over a region of the melting plateau for melted fraction *F* between 30 %≤*F*≤80 % with a 0.2 mK wide melting range. The results from the immersion-type cell are used to derive an experimental value for the SF₆ TP static head correction of -11.6(1.7) mK/m. This value implies an initial slope of the p-T equilibrium melting line of 1.55 MPa/K which is in agreement with the value predicted via the Clapeyron equation. The uncertainties of these initial SF₆ TP realizations are limited by uncertainty in the realization of the ITS-90 (0.25 mK), and to a lesser extent, static pressure head effects and by chemical impurities.