Molar Heat Capacity at Constant Volume [C_v] for 1,1-Difluoroethane (R152a) and 1,1,1-Trifluoroethane (R143a) from the Triple-Point Temperature to 345 K at Pressures to 35 MPa

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Molar heat capacities at constant volume [C_v] for 1,1-difluoroethane (R152a) and 1,1,1-trifluoroethane (R143a) were measured by using an adiabatic calorimeter. Temperatures ranged from their triple points to 345 K, and pressures were as high as 35 MPa. Measurements were conducted on liquid in equilibrium with its vapor and on compressed liquid samples. The samples were of high purity, verified by chemical analysis. For the samples, calorimetric results were obtained for two-phase [$C_v^{(2)}$], saturated liquid [C_σ or C_x'], and single-phase [C_v] molar heat capacities. The C_σ data were used to estimate vapor pressures for values less than 0.1 MPa by applying a thermodynamic relationship between the saturated liquid heat capacity and the temperature derivatives of the vapor pressure. In the course of these measurements, determinations of the triple point temperatures ($T_{tr,R152a}$ = 154.56 ± 0.02 K, $T_{tr,R143a}$ = 161.34 ± 0.03 K) and the enthalpies of fusion ($\Delta H_{f,R152a}$ = 1.57 ± 0.02 kJ·mol^{-1} at T_{tr}, $\Delta H_{f,R143a}$ = 5.85 ± 0.07 kJ·mol^{-1} at T_{tr}) were made for these substances. The principal sources of uncertainty are the temperature rise and the change-of-volume work adjustment. The expanded uncertainty encompassing 95% confidence limits for values of C_v is estimated to be 0.5%, for $C_v^{(2)}$ it is 0.3%, and for C_σ it is 0.5%.