611h The Heat of Condensation of Supercooled D_2O

Shinobu Tanimura, Barbara E. Wyslouzil, Mark Zahniser, Joanne Shorter, David Nelson, and Barry McManus

We used a tunable diode laser absorption spectrometer and a static pressure probe to follow changes in the temperature, vapor phase concentration of D_2O, and static pressure during condensation in a supersonic nozzle. Using the measured static pressure ratio p/p_0 and mass fraction of condensate g as inputs to the diabatic flow equations, we determined the centerline temperature of the flow during condensation. The temperature derived this way is reasonably sensitive to the values assumed for the heat of condensation of D_2O. After correcting for the temperature gradient across the boundary layers, the temperature determined from p/p_0 and g agreed with the temperature determined by the laser absorption measurements within our experimental error (±2 K). It is the agreement between the two separate temperature measurements that lets us constrain the temperature dependence of the heat of condensation of supercooled D_2O down to 210 K.