The fits for f(v) and g(v) define the (e-p-v) equation of state and allow calculation of Hugoniots centered on, and isentropes passing through points on the p=0 isobar in the (p-v) plane. The discontinuous change in slope of the g(v) function at v = 1.01316 cc/g is manifest in the shape of these curves in the neighborhood of this volume.

V. CALCULATIONS

Construction of Hugoniot Curves and Isentropes

The Hugoniot curves centered on p = 0 at -20°C, 25°C, 158.5°C, and 256°C were calculated directly with Eq. 14. The isentropes passing through p = 0 at 25°C, 158.5°C, 256°C, and 296°C were constructed by integrating Eq. 15 numerically with a Runge-Kutta technique. The -20°C, 158.5°C, and 256°C Hugoniots and the 296°C isentrope are shown in Fig. 4. The 25°C Hugoniot and the 25°C and 296°C isentropes are shown in Fig. 5.

Calculation of Temperature

Equation 9 was used to calculate the temperature along the isentropes passing through 25°C and 296°C on the atmospheric isobar. The values of temperature along these isentropes are listed in Table II. Calculation of temperature at points where isentropes intersect the 25°C Hugoniot defines values of shock temperature along this Hugoniot curve. The point of intersection (T_c = 522.1°C, p_c = 58 kbar, v_c = 0.661 cc/g) of the 296°C isentrope and the 25°C Hugoniot is the highest point on the 25°C Hugoniot where shock temperature can be calculated with the present data. The temperature on the 25°C Hugoniot below 58 kbar can be calculated with the isentropes lying to the left of the 296°C isentrope. The temperature where the 256°C isentrope intersects the Hugoniot is 456.7°C, and the temperature where the 158.5°C isentrope intersects the Hugoniot is 291.5°C.

It is not possible to calculate temperature on the 25°C Hugoniot above 58 kbar without making further assumptions. The temperature along the Hugoniot above 58 kbar was calculated with constant C_v rather than by extrapolating the low pressure data further. The equation for shock temperature[2] above a point (T_c,v_c) on a Hugoniot centered at (p_o = 0, v_o),