tive procedure. The required thermodynamic data used in the calculations here are those quoted in Table 1 of the paper by Miller and Schuele [6]. The differences in the values of the pressure derivatives are small but real. These differences can become significant at high pressures. In the course of calculation it was also found that the temperature derivatives of the volume compressibility of lead did not change significantly with pressure to 3 kbar. For example, the values at 1 bar and 3 kbar are 0.00013×10^{-11} and 0.00012×10^{-11} cm²/dyn deg. The pressure derivatives of the specific heat at both 296 and 195 °K are similarly negligible.

Tables 3 and 4 present the adiabatic elastic constants of calcite and rutile as a function of pressure at 298 °K. These tables indicate that the two sets of estimates for these constants are in good agreement. Hence, they suggest that the ultrasonic travel-time data as a function of pressure at 298 °K, thermal expansion coefficients data, and the ultrasonic data as a function of temperature at one atmosphere and the specific heat value at 298 °K on the one hand, and Bridgman's compressibility measurements on calcite and rutile on the other, are consistent. The values of a and b appear in Bridgman's equation

$$\frac{V - V_0}{V_0} = -a\,P + b\,P^2\,. \tag{17}$$

We present the values of a and b for calcite as obtained from the iterative procedure and those determined by Bridgman [9] in Table 5. The differences in the estimates of b are evident. Since at low pressures their effects are negligible, the two sets of elastic constants values in Table 3 agree remarkably with each other. A similar statement may be made for rutile.

These calculations demonstrate that the iterative procedure presented in this paper accurately estimates the values of the elastic constants of a solid at high pressure from the ultrasonic measurements when the concomitant compressibility measurements are either unavailable or unreliable. Moreover, the procedure provides an indirect method by which to compute the values of specific heats and linear thermal expansion coefficients as a function of pressure and temperature provided the ultrasonic measurements are made as a function of pressure at more than two temperatures. The accuracy of these estimates is limited only by the precision of the sound measurements as a function of pressure and temperature and of linear thermal expansion coefficients and specific heat measurements as a function of temperature at one atmosphere. If and when it becomes

Table 5

The coefficients a and b in Bridgman's equation of state (17) (units of a are 10^{-12} cm²/dyn and units of b are 10^{-24} cm²/dyn) for calcite at 298 °K

Compressibility	Present work		Bridgman	
	a	b	a	b
100	0.277	0.60	0.273	0.24
001	0.847	3.6	0.822	2.9
Volume	1.401	5.98	1.367	3.9

possible to measure the values of linear thermal expansion coefficients and specific heats of a solid at high pressure with precision, the present procedure would continue to provide us with a check for the consistency of these measurements with the other relevant data on the solid.

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