be made by picking values of K/K_0 and calculating the corresponding values of V and P. It is, of course, possible, by eliminating K/K_0, to obtain a formula connecting P and V directly. The result is

$$P = \frac{S}{K_0'} e^{S}$$

$$S = \ln \frac{K}{K_0} = -1 + \left[1 + 2K_0' \ln\left(\frac{1}{V}\right)\right]^{1/2} \qquad \text{(C2}b\text{)}$$

If $K_0' = 0$ the linear, quadratic, and exponential equations reduce to $K = K_0$ yielding the same limiting function

$$V = \exp(-P) \qquad \text{(C3)}$$

It should be noted, however, that equations 10, 9, and C2a lead to the limiting behavior $V \to 0$ as $P \to \infty$, whereas equation C1a unrealistically predicts $V \to \exp(-1/K_0')$.

The results of calculations based on the linear and two exponential assumptions are plotted in Figure 10 for the case $K_0' = 4$, a typical value. At $P = 1$, the values of V are 0.671, 0.785, and 0.618 from (10), (C1), and (C2), respectively. On the other hand, the values of K itself are respectively $5K_0$, $54.5K_0$, and $3.33K_0$. It must be concluded that comparison of volume ratios (or density ratios) in the range $0 < p/K_0 < 1$ is not a highly sensitive test of the behavior of the bulk modulus. This is to be expected, of course, because the volume changes are relatively small. Nevertheless, it seems worthwhile to emphasize this point because of the large changes in K that can possibly accompany small changes in the density.

We remark that even crude measurements of wave velocity in a material that is initially compressed to say 0.8 of its original volume should give more information concerning the behavior of the bulk modulus than can be obtained from relatively precise volume measurements.

As further illustrations, calculations based on the exponential assumptions for α-quartz, aluminum oxide, magnesium, potassium, sodium, and lead are added to Figures 2–7. It is certainly clear that a linear pressure dependence of the bulk modulus gives better agreement than an exponential one.

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