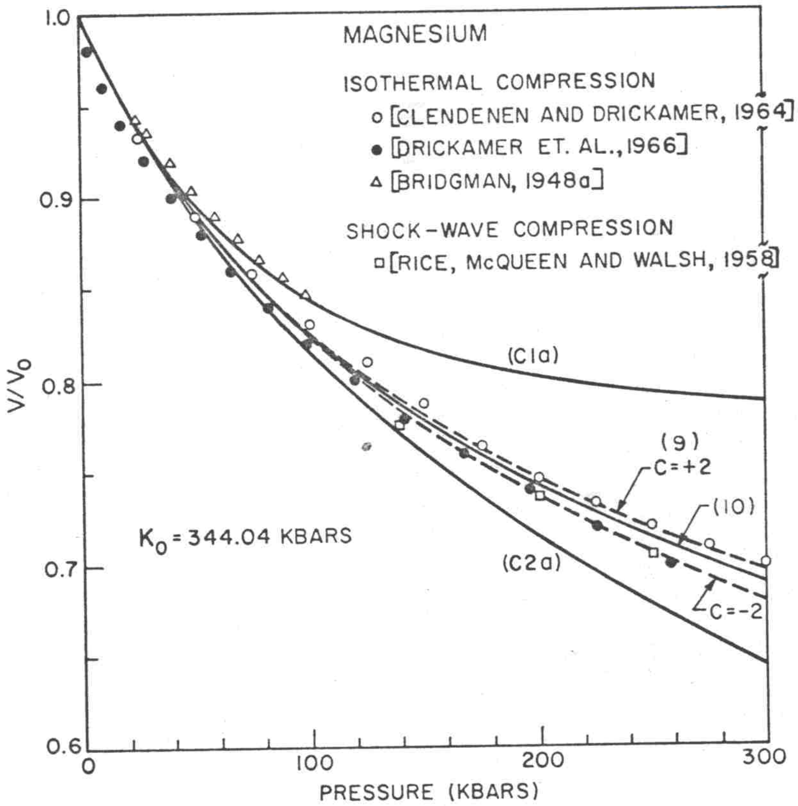

Fig. 4.

$C = -2$, corresponding to $K_0'' = -4.8 \times 10^{-12}$ cm^2/dyne. In spite of the impressive agreement, it should be mentioned that a phase transition at about 160 kb makes questionable any extrapolation from the low-pressure region into the high-pressure region.

The effect of varying m is shown in Figure 8 where we have plotted the calculated curves for aluminum oxide out to 5000 kb. Using values of m equal to 1, 2, and 3, equation 9 is plotted for $C = -1$. In addition, we have plotted the curves for $m = 4.2$, 5.2, 6.2, and $C = +1.0$. One can readily observe that the six curves are distinguishable only for extreme pressures. Also, as $C \to 0$ for given K_0' and m, either $a \to \infty$ or $K_0' = m$, and in both cases the limiting expression for K/K_0 becomes independent of m. We may therefore conclude that the value of m does not appreciably affect the volume calculation when $|C|$ is small.

As a final point of interest, Figure 9 compares typical results from equation 9 with results based on a quadratic approximation to the bulk modulus, given by

$$\frac{K}{K_0} = 1 + K_0'P + \tfrac{1}{2}CP^2$$

The extrapolation formula predicted by this quadratic approximation is obtained in a manner similar to that given in Appendix B for equation 7. That is

$$V = \exp\left[-\int \frac{dP}{\frac{1}{2}CP^2 + K_0'P + 1}\right]$$

$$= \left\{\frac{[CP + K_0' + (r)^{1/2}][K_0' - (r)^{1/2}]}{[CP + K_0' - (r)^{1/2}][K_0' + (r)^{1/2}]}\right\}^{1/(r)^{1/2}} \qquad (11$$

where $r = (K_0')^2 - 2C > 0$. For $r = 0$ and $r < 0$ the volume equation becomes

$$V = \exp\left(\frac{2}{CP + K_0'} - \frac{2}{K_0'}\right) \qquad (11a$$

and