25°C and one atmosphere pressure, iron has the bcc structure. Shock velocity measurements[4] and static electrical resistance measurements[5] have shown a phase transition at 130 kbars. JAMIESON and LAWSON[6] found a single strong line in an X-ray spectrum of the high pressure phase which was interpreted to indicate that it is *hcp*. We found strong lines corresponding to the 101, 110, 110 lines and weaker lines located consistent with interpretation as 112, 002 and 103.

Figure 6 shows a typical plot of 101 line vs. pressure. In Table 2 are listed V/V_0 for both *bcc* and *hcp* phases, as well as values for c, a and c/a for the *hcp* phase. V/V_0 values are plotted in Fig. 7. The transition is quite sluggish and compressibility values were obtained for the *bcc* phase well

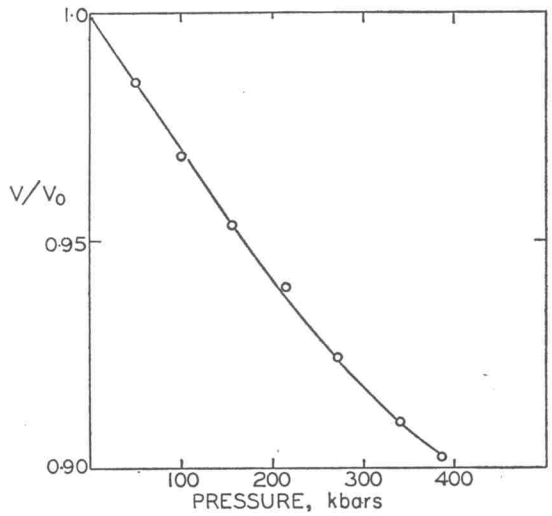

FIG. 4. Fractional change in volume vs. pressure for ruthenium.

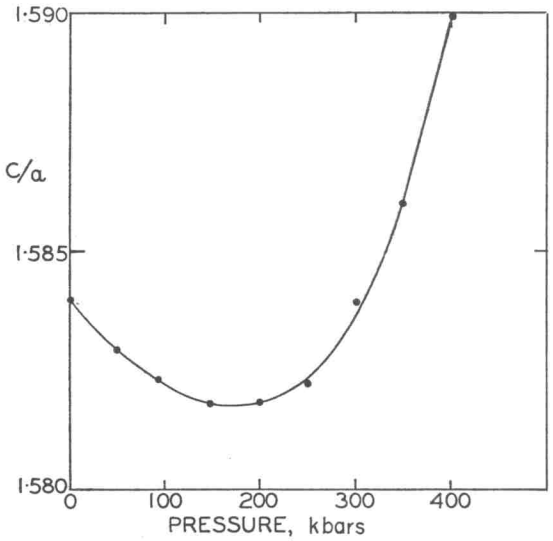

FIG. 5. Lattice parameter ratio c/a vs. pressure for ruthenium.

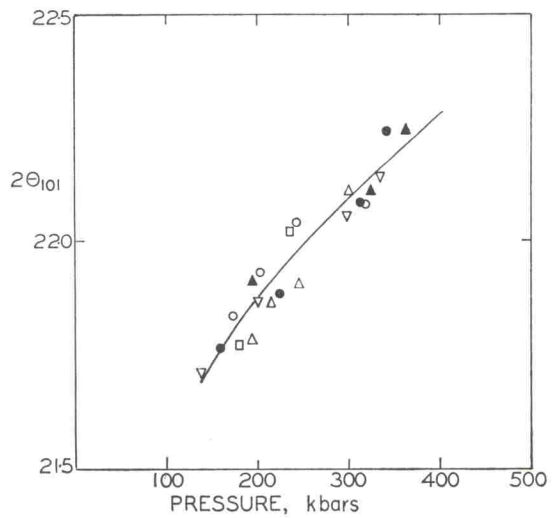

FIG. 6. Diffraction angle $2\theta_{101}$ vs. pressure for *hcp* iron.

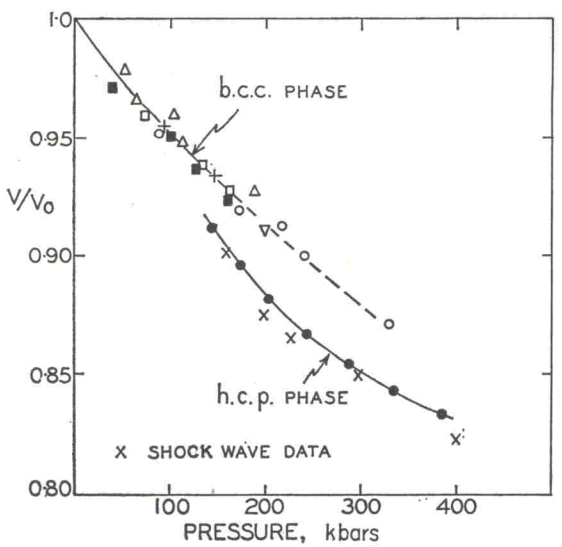

FIG. 7. Fractional change in volume vs. pressure for iron.

beyond its region of stability, in one case to over 300 kbars. It can be seen that the densities obtained from shock wave measurements coincide exactly with out results for the *bcc* phase, and check very reasonably for the *hcp* phase.

As can be seen from Table 2 and Fig. 8, c/a is about 1·645 at 150 kbars and decreases rather rapidly with increasing pressure, reaching a value of 1·580 at 400 kbars. This high compressibility of the $1/c$ axis corresponds to a relatively rapid expansion of the Brillouin zone in the $1/c$ direction and a relatively slow expansion in the $1/a$ direction. In the absence of any other information one could interpret this to mean a rather strong interaction of the Fermi surface with the 100 faces of the Brillouin zone, corresponding to the close approach of the Fermi surface and the zone boundary.[7]

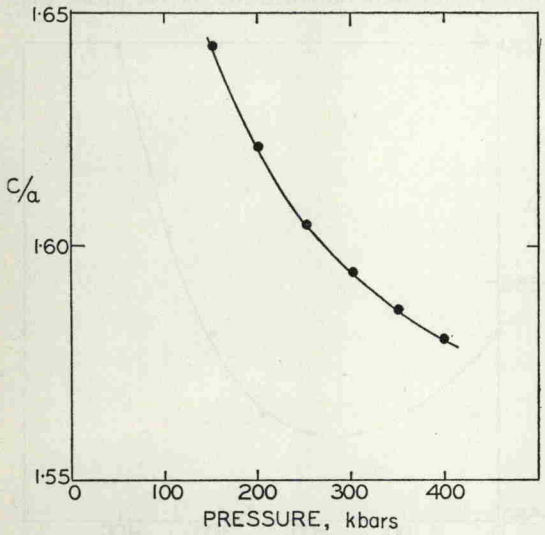

FIG. 8. Lattice parameter ratio c/a vs. pressure for *hcp* iron.

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