linear $U_s - u_p$ approximation, are $K_0^S = 3.19 \pm 0.39$ Mb and $(\partial K^S/\partial P)_T = 2.6 \pm 0.7$. These values are consistent with those indicated for garnet hpp in a preliminary report by *Ahrens and Graham* [1972], in which a Birch-Murnaghan isentropic equation of state was used in analyzing the Hugoniot data. The isentrope for garnet hpp, calculated from the above values by using the Murnaghan equation of state,

$$P(\rho) = K_0^S/\beta^T\{[(\rho/\rho_0)^{\beta^T}] - 1\} \quad (19)$$

where $\beta^T = (\partial K^S/\partial P)_T$, is indicated in Figure 4.

In the introduction to this paper it was pointed out that a significant fraction of the upper mantle is likely to occur in the garnet structure. The primary result of the shock Hugoniot experiments on the Salida garnet is the transformation into an apparent ilmenite-like phase at relatively low pressure. The implications of this observation on the constitution of the lower mantle are important. For example, *Ringwood* [1969] has set up a model depicting the most probable variation of mineralogy with depth for the pyrolite composition on the basis of experimental data and crystal chemical inferences. Below the 650-km seismic discontinuity, he suggests a homogeneous region to 1050 km composed of 36% ilmenite solid solution, (Mg, Fe)SiO_3-(Al, Cr, Fe)$_2O_3$; 55% strontium plumbate structure, (Mg, Fe)$_2SiO_4$, or, alternatively, (Mg, Fe)SiO_3 ilmenite and (Mg, Fe)O; 6.5% perovskite, $CaSiO_3$; and 2.5% calcium ferrite, $NaAlSiO_4$. When this particular model is considered, it is possible that up to 91% by weight of the silicates in this region of the mantle could be in the ilmenite structure. The results of the present work provide experimental verification that upper mantle silicates are likely to occur in the ilmenite structure within this region of the lower mantle. Furthermore, the extent of the garnet hpp stability field from the shock wave data suggests that ilmenite would be stable in the lower mantle to at least 1500 km.

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