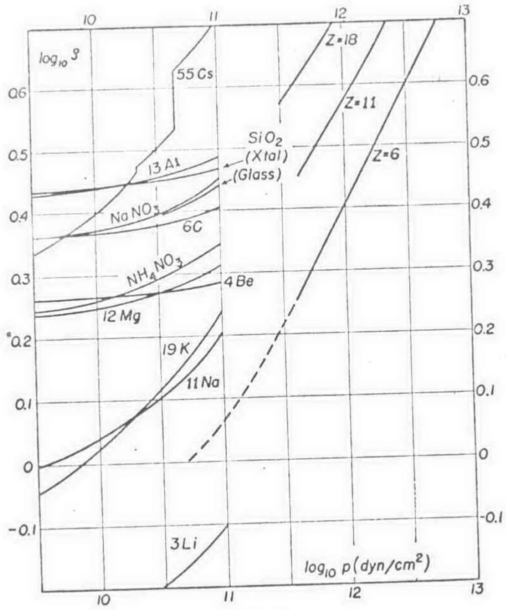

FIG. 1.

logarithmic diagram. The curves on the right are obtained from quantum theory. They are based on a Thomas-Fermi-Dirac model of the electronic density in a closest packed, cubic, monatomic lattice. The curves have been drawn mostly on the basis of the computations of Feynman, Metropolis, and Teller (*2*);

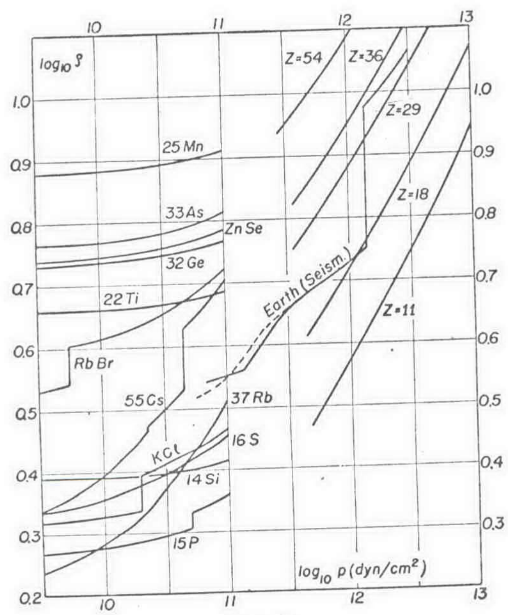

FIG. 2.

some use has also been made of the earlier results of Slater and Krutter (*3*), and of Jensen (*4*). These curves contain only one parameter, the atomic number, *Z*, of the constituent element. All available theoretical evidence indicates that the curve should be reasonably accurate at pressures of a few million atmospheres and above, beginning at somewhat higher pressures for the lighter, and at somewhat lower pressures for the heavier, elements. It is fairly easy to interpolate between the measured values at low pressures, and the limiting computed values at very high pressures; the resulting uncertainty in determination of the true density should hardly exceed 15–20% anywhere.

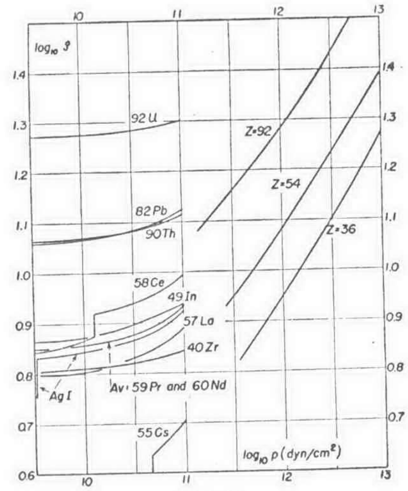

FIG. 3.

These densities refer to zero temperatures, but, at a pressure of a million atmospheres and above, the internal energy of compression is so large that thermal energies are negligible in comparison, up to a few thousand degrees. Correspondingly, the expansion at melting is very small at these pressures, and the curves should also be applicable to such substances as molten iron, assumed to exist in the earth's core.

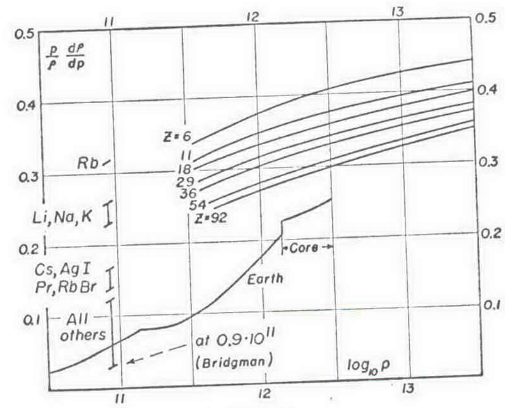

FIG. 4.

In Fig. 2 there also is shown a curve, representing the density variation inside the earth, computed by Bullen (*5*) from seismic data. The dashed part shows a modification proposed by Gutenberg (*6*). It is seen that the curve corroborates the usual assumption that the earth's outer part, the mantle, consists mainly of silicates, whereas the central part, the core, consists of iron. It is extremely difficult to reconcile this curve