The numerical value R_2 calculated on the basis of the independent atom model cannot be regarded as comparable with experiment, since it neglects the correlations between the positions of the atoms that would be expected to play a decisive role in the fluctuations. For comparison with experiment, it is probably correct to employ the usual formula[6] together with the experimentally observed isothermal compressibility;[7] these give $R_3=1.3\times10^{-10}$, a value that is practically unaffected by crossing the lambda-point. However, this is so small as to be quite unobservable experimentally. The large difference between R_2 and R_3 indicates the importance of correlations in the density fluctuations.

The writer is indebted to Professor J. R. Oppenheimer for several helpful discussions of this subject.

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The Attainment of High Hydrostatic Pressures

In a two-stage cascaded pressure apparatus designed and built by the Geophysical Laboratory hydrostatic pressures were attained in the second inner pressure vessel as predicted from the hypothesis recently published.[1]

In the run made on March 21 with this apparatus a pressure in excess of 200,000 atmospheres was obtained in the second-stage cylinder; no attempt was made to go to higher pressures because this was the limit to which the gages would record. Owing to the jerky behavior of the apparatus with increasing pressure, piston displacement measurements were made only as pressure was released. These measurements indicated that sodium chloride was compressed in excess of 20 percent—perhaps nearer to 30 percent—by this pressure. As a measure of sensitivity the initial volume compressibility to 10,000 atmospheres was obtained as 4.2×10^{-6} which agrees very well with the accepted compressibility of sodium chloride. The Carboloy piston of the second stage was under such high internal stress after this cycle of operations that it shattered on receiving a slight jar.

The first-stage cylinder has two pistons actuated by two presses tied together. One of these pistons is used to develop the hydrostatic pressure in the first-stage cylinder and the second piston is used to force the inner piston down. In the pressure run described above the inner piston diameter was one-eighth inch and the length less than one-quarter inch. The first-stage pressure was about 18,000 atmospheres.

In another run in which the inner piston was made one-half inch long, for a longer stroke, and the first-stage pressure reduced to 15,500 atmospheres the inner piston shattered at about 135,000 atmospheres.

Grateful acknowledgment is made to Dr. J. A. Fleming and Dr. M. Tuve of the Department of Terrestrial Magnetism for their hearty stimulus and cooperation. To Professor F. Bitter of Massachusetts Institute of Technology and Professor P. W. Bridgman of Harvard, we are indebted for the discussions held with them concerning the project involving the use of very high hydrostatic pressures which was begun about a year ago. Our thanks are also due the Carboloy Corporation and others for their kindness in making available to us the necessary alloys and to Mr. F. Rowe who built the apparatus.

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