liquid compressibilities were inferred by a considerable extrapolation Keesom and Keesom's 1933 data. Our calculated σ_s values (obtained multiplying our $\mathscr{L}_0$ values by 0.093) are higher than Egelstaff and London by 6.8% at 3.0° K, 6.8% at 3.5° K, 15% at 4.0° K, 26% at 4.5° K, and 680 at 5.0° K. Egelstaff and London also measured σ_s for cold neutrons (45° for angles of scatter of 4.6° to 12.3° at liquid helium temperatures of 1.5 to 5.2° K. Their experimental data have been extrapolated to zero angle plots of σ_s against $\sin^2(\theta/2)$, and are shown as lying close to their calculat σ_s values. At 3.19° K and below, these plots are nearly horizontal straig lines, and their extrapolated intercepts unambiguous. At higher temperatur however, we believe the extrapolation, allowing for possible curvature at low angles, could equally well pass through our calculated σ_s values.

5. CONCLUSIONS

The experiments reported here have given accurate information about t diagram of state of liquid helium in a region not covered previously. Th provide the first direct measurements of the liquid compressibility. T results have been used to calculate the ratio of heat capacities γ, of liqu He^4 at 3.0, 3.5, and 4.0° K where first sound velocities u_1 are known. At 4. and 5.0° K, γ may also be obtained from these results when u_1 results beco available. These results also permitted calculations of the limiting liqu structure factor to be made over the region covered, for zero-angle scatteri of X rays and of slow neutrons.

REFERENCES

ATKINS, K. R. 1959. Phys. Rev. **116**, 1339.
ATKINS, K. R. and STASIOR, R. A. 1953. Can. J. Phys. **31**, 1156.
DE BOER, J. and 'T HOOFT, A. 1961. Proc. Seventh Intern. Conf. on Low Temperatu Physics (Toronto, Ont.), p. 510.
BRICKWEDDE, F. G., VAN DIJK, H., DURIEUX, M., CLEMENT, J. R., and LOGAN, J. K. 196 J. Research NBS, **64A**, 1.
BRILLOUIN, L. 1922. Ann. Phys. **17**, 88.
CUTHBERTSON, C. and CUTHBERTSON, M. 1910. Proc. Roy. Soc. A, **84**, 13.
——— 1932. Proc. Roy. Soc. A, **135**, 40.
EDWARDS, M. H. 1956. Can. J. Phys. **34**, 898.
——— 1957. Phys. Rev. **108**, 1243.
——— 1958. Can. J. Phys. **36**, 884.
EDESKUTY, F. J. and SHERMAN, R. H. 1957. Proc. Fifth Intern. Conf. on Low Temperatu Physics and Chemistry (Madison, Wis.), p. 102.
EGELSTAFF, P. A. and LONDON, H. 1957. Proc. Roy. Soc. A, **242**, 374.
GOLDSTEIN, L. 1951*a*. Phys. Rev. **83**, 289.
——— 1951*b*. Phys. Rev. **84**, 466.
GOLDSTEIN, L. and REEKIE, J. 1955. Phys. Rev. **98**, 857.
GOLDSTEIN, L. and SOMMERS, H. S. 1956. Phys. Rev. **101**, 1235.
GORDON, W. L., SHAW, C. H., and DAUNT, J. G. 1954. Phys. Rev. **96**, 1444.
KEESOM, W. H. 1942. Helium (Elsevier, Amsterdam).
KERR, E. C. 1957. J. Chem. Phys. **26**, 511.
SOMMERS, H. S., DASH, J. G., and GOLDSTEIN, L. 1955. Phys. Rev. **97**, 855.
TWEET, A. G. 1954. Phys. Rev. **93**, 15.
ZERNICKE, F. and PRINS, J. 1927. Z. Physik, **41**, 184.