When an attempt was made to obtain accurate corrected values for the geomagnetic effect alone, it was found that the necessary experimental data did not exist. The previously used temperature correction[4,5] presupposes at least a very high correlation between sea-level temperature and the altitude of the 100-mb. level, which is not proved. On the other hand, this correlation could mask a geomagnetic effect extending beyond the knee, the correlation between sea-level temperature and latitude being of the order of 0·9 and more.

The height of the meson-producing layer will depend not only on latitude and season but also on other local meteorological and geographical factors, distribution of land and sea, mountains and so on. To achieve a reliable and accurate correction, it is clearly necessary to obtain simultaneous cosmic ray and high-atmosphere data at the same locality. A new world-wide survey made under these conditions might reveal that some of the unexplained features of Compton's can be explained as a 'local atmospheric effect' and do not represent a variation in primary intensity.

Results obtained during the 1948 cruise of the *Wyatt Earp*, the ship of the Australian Antarctic Expedition, will be published shortly in the *Australian Journal of Scientific Research*. The measurements extend to within 200 miles of the magnetic south pole.

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June 8.

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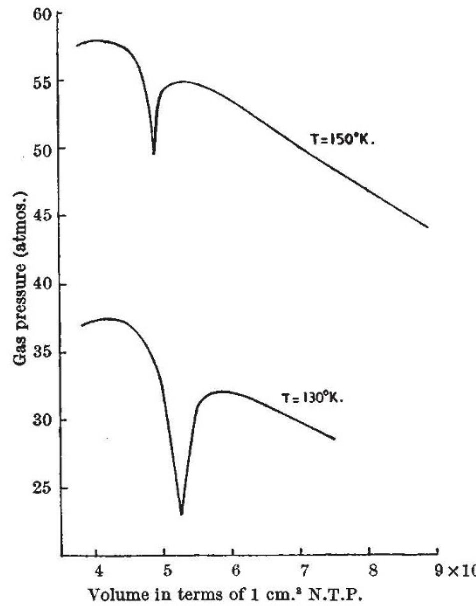
An Approximate Equation of State

IN a previous communication which appeared in *Nature*[1], Prof. Max Born and Dr. H. S. Green gave an account of a general kinetic theory of condensed matter (see also refs. 2–5). A new equation of state was derived which covers both phases, liquid and gas. Some numerical results (to be published in detail elsewhere) have now been obtained.

The theory shows that the difference between the liquid and the gas corresponds to the existence or non-existence of real roots of a certain transcendental equation. This was in the original form an integral equation, but has now been reduced, by using a suitable expansion, to an algebraic equation with a unique analytic continuation, so that the definition of the complex roots is unambiguous.

The theory of condensation developed by Mayer[6] and others[7,8] is confirmed by the present theory to the extent that a divergence of the cluster series is found, which is intimately associated with the process of condensation. Concerning the exact point at which this divergence occurs, detailed calculations do not confirm Mayer's contention that it happens at the density of the saturated vapour. The isotherm is continued into the metastable region above this density, rising to a maximum and falling to a subsequent minimum as the density is increased, much in the way foreshadowed by van der Waals more than fifty years ago. The point of divergence is found to be at the minimum of this curve, which separates the metastable states of the liquid from those of the gas.

A numerical computation has been carried out for argon using the Lennard-Jones[9] potential; two isotherms have been calculated, one for the empirical critical temperature ($T = 150°$ K.) and one for a lower one ($T = 130°$ K.). The accompanying graph shows the result.



Concerning the absolute values, one can compare the experimental critical point with the situation of the maximum in the gas region of the first curve. The results are given in the table, for 1 cm.^{3} of gas at N.T.P.

	Experimental	Calculated
Pressure	50 atmospheres	54 atmospheres
Volume	0·0034 cm.^{3}	0·0052 cm.^{3}

A conspicuous feature of the curves is the fact that for small volumes they do not ascend steeply but have a maximum and fall again. This may be due to the crudeness of the approximation actually employed (namely, only the first three roots of the transcendental equation were taken into account). But it seems to be quite possible that it is an indication of another range of unstable states separating the liquid from the solid. This has to be investigated.

Exact numerical prediction would need a great amount of computation. It seems more important to use the same method for calculating the radial distribution function, which can be compared directly with X-ray experiments. This will be done in a paper in due course.

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