

Latent Heat of Evaporation of Liquid Helium

EARLY last year¹, Prof. E. F. Burton gave the results obtained by Messrs. Wilhelm and co-workers for the viscosity of liquid helium at three temperatures, attention being directed to the marked change as HeI is transformed into HeII.

The data, however, possess a further interest. In 1934, I showed that the molar latent heat of evaporation, L , can be calculated, with the aid of an equation similar to the Clausius-Clapeyron equation, from viscosity data at temperatures near the boiling point². The equation is:

$$L = 9.2 R \frac{T_1 T_2}{T_2 - T_1} \log_{10} \eta_1 / \eta_2,$$

where R is the gas constant (1.985) and η_1 , η_2 are the viscosities at the absolute temperatures T_1 and T_2 .

Taking Burton's values, namely, $\eta_1 = 27 \times 10^{-5}$ at 2.3°K. and $\eta_2 = 11 \times 10^{-5}$ at 4.2°K. , we find:

$$L = 36.2.$$

If now we calculate L with the aid of the Clausius-Clapeyron equation using the data of Onnes, as given by Mellor in his "Comprehensive Treatise, etc.", namely, $p_1 = 760 \text{ mm.}$ at -268.71°C. and $p_2 = 565 \text{ mm.}$ at -269.03°C. , we find,

$$L = 31.3.$$

As this latter temperature range is slightly higher than the former, a somewhat smaller value for L is to be expected than in the first calculation. Bearing this in mind, and remembering also the extreme experimental difficulty in carrying out measurements with liquid helium, the close agreement between the two values of L is remarkable.

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¹ NATURE, 135, 265 (1935).

² Trans. Far. Soc., 31, 542 (1935).

Points from Foregoing Letters

THE isotopic weights and 'packing fractions' for atoms of silicon (mass 28), phosphorus (31), sulphur (32) and chlorine (35 and 37) have been obtained by Dr. F. W. Aston with his 'second-order focusing' mass-spectrograph, by comparing doublets (atoms and groups of atoms having the same mass/charge ratio). Dr. Aston directs attention to an unexplained discrepancy between his results in the case of the O_2CH_4 doublet and those of Bainbridge and Jordan.

A curve showing the absorption, in different thicknesses of boron, of the neutrons which produce gamma-ray activity in silver, is submitted by E. H. S. Burhop, R. D. Hill and A. A. Townsend. This curve indicates the presence of two components (with absorption coefficients of 8.1 and 0.24 $\text{gm.}^{-1} \text{cm.}^2$ respectively) and differs from the curves obtained from the absorption of neutrons which excite the 22- and 138-second activities in silver. The authors suggest that the nucleus may possess two systems of energy levels, corresponding to the emission of electrons and of gamma radiation respectively.

By irradiating silver with neutrons, first directly and then through a paraffin screen, Prof. G. Guéhen finds that three radioactive substances of half-life 50, 30 and 150 seconds, approximately, are produced. Apparently the first, which may be rhodium of mass 104, is produced by fast neutrons, the second by slow neutrons and the third by both fast and slow neutrons. Previous investigators have reported activities of 22, 26, 40, 138 and 154 seconds.

A simplified procedure for determining accurately the boiling point of a liquid (by the comparative method of Świątosławski) is described by Dr. M. Wojciechowski. If the pressure cannot be adjusted exactly to one atmosphere, a second pair of observations is made at a pressure only slightly different, so that the variation of the boiling point with respect to pressure can be assumed to be linear, and the necessary correction can then be made.

Depolarization factors of 0.10 and 0.17 have been obtained for the 3019.0 and 1343.9 Raman lines respectively in ethylene gas by S. Bhagavantam. This

high degree of polarization is in accord with the origin of these lines. In the Raman spectrum of this gas, besides the intense lines, two weak lines which do not correspond to fundamentals but which were obtained by Bonner in the liquid have also been recorded.

M. Nicolet directs attention to the fact that from the numerous values recently proposed for the heat of dissociation of carbon monoxide, only the value $D(\text{CO}) = 9.1 \text{ e.v.}$ is in good agreement with theoretical and observational knowledge of the composition of the atmospheres of late-type stars.

The hydrogenation-reduction of vitamin B_1 by platinum-black and by hydrosulphite is described by F. Lipmann. The author formulates the reaction on the assumption that the reduction takes place at the double bond closest to the nitrogen atom with four valency bonds.

That chlorophyll (ethyl chlorophyllide) is reversibly oxidized by ferric chloride with change in colour to greenish-yellow and quenching of fluorescence is shown by experiments carried out by Drs. E. Rabinowitch and J. Weiss. They find that the oxidation is greatly favoured by illumination, which is important in view of the part played by chlorophyll in photosynthesis.

The behaviour of the coloured cells in a young dog-fish, under illumination, is described by H. Waring, who finds four types of cells as against three types described in the adult fish. The author considers that in some fishes (sharks, rays, etc.) there is no direct control of the colour cells but that the 'paling' effect is in some way connected with the activity of the anterior lobe of the pituitary gland.

ERRATUM. In the second paragraph under this heading in NATURE of December 5, p. 976, for "From the interchangeability of lactic dehydrogenase from heart muscle with alcohol dehydrogenase . . ." read "From the interchangeability of lactic co-dehydrogenase from heart muscle with alcohol co-dehydrogenase from yeast . . ."