theory, both counters A and B should be nearly 100 per cent efficient. We suggest that the observed lower efficiency of counter B is due to the formation, by attachment, of negative ions in methylene bromide. This hypothesis would also explain the large plateau slope of this counter. Assuming, to a first approximation, that none of the negative ions causes counts, it can be shown that the coefficient of electron attachment α is given by

$$\alpha = \frac{dr_r}{dr} / \{(1 - r_r) \log (1 - r_r)\},$$

where r_r is the ratio of the efficiency of counter B to that of counter A for β-particles entering the counter at a distance r from the centre wire.

By means of this equation, using the measured values of r_r, α/p has been calculated as a function of Z/p, where p is the partial pressure in mm. of mercury of the methylene bromide in the counter, and Z is the field-strength in volts/cm. The results obtained are of the same order of magnitude as those obtained for bromine by means of the diffusion method developed by V. A. Bailey[3]. This lends some support to the hypothesis adopted to explain the low efficiency of counter B.

Further measurements are being made using counters containing other gas mixtures. A more detailed account of this work will be published later.

In conclusion, we wish to thank Prof. V. A. Bailey and Dr. R. E. B. Makinson for their interest and advice, and to acknowledge the receipt of a Commonwealth Research Grant from the Research Committee of this University.

J. H. Carver
G. K. White

Department of Physics,
University of Sydney.
Sept. 23.

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[2] Korff, "Electron and Nuclear Counters" (D. van Nostrand Co., New York; Macmillan, London, 1946).
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Vaporization of Titanium

The rate of evaporation of titanium wires *in vacuo* has been measured over the temperature-range 1,650–1,800° K. The results can be expressed as

$$\log_{10} ET^{1/2} = \frac{-2{\cdot}07 \times 10^4}{T} + 7{\cdot}70,$$

where E is expressed in gm. cm.$^{-2}$ sec.$^{-1}$.

It follows thermodynamically that the latent heat of vaporization in this temperature-range is 95 k.cal. per mole. This value is unlikely to be in error by more than 5 per cent.

In the course of the work the variation of total radiation with temperature was incidentally determined, and found to be proportional to $T^{4{\cdot}4}$, the emissivity at 1,700° K. being about 30 per cent of that of a black body.

The work is being continued.

L. G. Carpenter

22 Manor Road,
Farnborough,
Hants.

Frank R. Reavell

12 Dunsdon Avenue,
Guildford, Surrey.
Aug. 23.

Shape Factor in Particle-Size Measurement

We have had occasion to separate alumina powder into uniformly sized groups for testing fuel filters, and to measure the particle-size microscopically. It seemed likely that a measurement of a linear dimension together with a factor describing the shape of the particles would be the most useful parameters to correlate with filter performance, since whether a particle will pass through the filter apertures will depend upon both size and shape. It was accordingly decided to use Feret's statistical diameter[1].

The degree of uniformity of the powder is derived from the coefficient of variation K, obtained by dividing the standard deviation by the mean of the diameters. K is made up of the desired coefficient of variation K_1 due to scatter in size, and K_2 due to deviation from spherical shape, which makes the measured diameter depend on the orientation.

K_2 varies from zero for particles of circular profile to 0·484 for needle-like particles. A value for K_2 is obtained by measuring the diameter of a number of particles in four orientations, spaced at intervals of 45°. The four diameters of each particle are divided by their mean. K is then the standard deviation from unity of all the quantities obtained in this way. Use of K_2, once obtained for a given type of particle, enables the variation in size to be determined from the relation

$$K^2 = K_1^2 + K_2^2.$$

A. E. W. Austen
K. R. Gilbert

Research Department,
C.A.V., Limited,
Acton, W.3.
Sept. 23.

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Tropospheric Propagation on Lower Radio Frequencies

In recent years the subject of tropospheric propagation of the very high radio frequencies has received considerable attention, but very little work appears to have been done at other parts of the radio spectrum; generally, in fact, the effect is referred to as occurring 'over 30 Mc./s.'. This is no doubt largely due to the over-riding effect of ionospheric propagation on the lower frequencies. Recent tests, of a qualitative nature, which I have made, however, suggest that tropospheric effects should not be ignored, even on frequencies below 1,000 kc./s.

My attention was first directed to this fact during some tests at 59 Mc./s. between my amateur station (*G6DH*) at Clacton-on-Sea, Essex, and that of Mr. E. Early (*F8ZF*) at Boulogne-sur-Mer, a distance of some ninety miles, almost entirely over sea water. In these tests a frequency of approximately 3·6 Mc./s. was used for communication purposes. It was observed that on days when the 59 Mc./s. signal was of good strength (under the meteorological conditions now easily recognized as being suitable for this form of propagation) the general level of the 3·6 Mc./s. signal was also higher than on a day when tropospheric conditions were 'poor'.

Unfortunately, automatic recorders were not available; but the results obtained were sufficient to show an undoubted correlation between the 3·6 and 59 Mc./s. signals and meteorological conditions, as the