Comments and Communications

Gravimetric Thermal Precipitator

I was interested to read the account by Kethley, Gordon, and Orr (*1*) of their thermal precipitator for aerobacteriology, since it is similar to one that I have been using in this laboratory for some years as a gravimetric dust sampler for animal inhalation experiments. The design of this instrument is shown in Fig. 1, from which it will be seen that it is of very simple construction. The aluminium hot plate (H) is secured to the aluminium case (N) by the steel sampling tube (A) (steel is used to reduce heat conduction) and nut (B). The heater coil (E) of nichrome tape is covered by an asbestos disc (D), which is secured by the plastic sleeve (C). The ends of the coil are silver soldered to copper wires (F) which are soft soldered to the terminals (G). The aluminium collecting plate (J) is secured by the knurled screw-ring (K) and rubber washer (L), the purpose of which is to take up small dimensional changes resulting from thermal expansion. The gap (O) between the hot and cold plates is about 0.015″ but need not be exact. It is best made by assembling the instrument and then facing the edge of the case and hot plate in one process on a lathe to ensure accurate parallelism.

Details of the performance of the instrument have not previously been published because there are a number of points yet to be worked out, but the following general observations may be of interest.

The performance of a thermal precipitator is governed almost entirely by the power input, and is independent within wide limits of temperature, air gap, or any features of design except those which ensure that as much as possible of the power input is transmitted as heat across the air gap, and that the air flow is uniformly distributed in it. These points can be readily demonstrated by making use of a heater plate with three adjustable projecting screws, and precipitating magnesium oxide smoke on to a glass surface so arranged that it can be watched from outside. It can then be seen that, for a given volumetric flow rate, the diameter of the deposit is fixed by the power input; so long as the deposit is smaller than the hot plate it may be presumed that precipitation is complete. The width of the gap can be varied from 0.005 to 0.0625 in. without appreciably affecting the diameter of the deposit, but if the plate is not parallel to the glass, the deposit will not be circular and dust will escape beyond the edge of the plate at one side. The diameter of the plate affects the diameter of the deposit, but does not affect the power required for complete precipitation at a given flow rate, which for a flow of 100 ml/minute is about 10 watts. It is interesting to compare this with the power required for the thermal precipitator of Green and Watson (*2*) which is about 1 watt for a flow of 6–7 ml/minute, and it would be valuable to have the corresponding

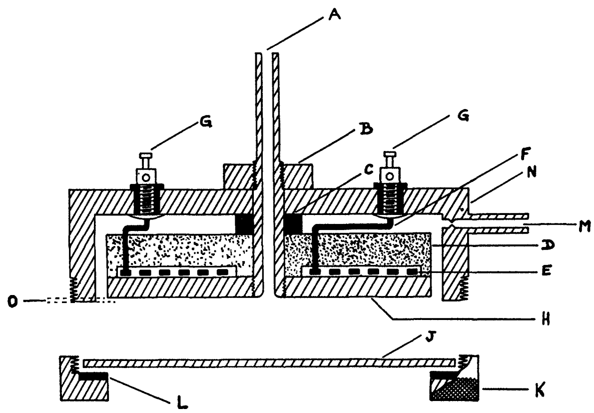

Fig. 1. Gravimetric thermal precipitator.

relationship for the instrument described by Kethley *et al.* and also that previously described by Bredl and Grieve (*3*). I have not attempted to measure the temperature of the hot plate since I found that the performance of the instrument was largely unaffected by whether it was water or air cooled. The temperature of the hot plate is controlled by that of the "cold" surface, and since the effectiveness of thermal precipitation varies inversely as the absolute temperature of the system, water cooling is not worth while unless, as in the case of Kethley *et al.*, it is desirable to keep the temperature of the whole system as low as possible.

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Cosmic Cloud Hypothesis of the Origin of the Solar System

Under the above title Palmer (*1*) has recently very severely criticized all present-day theories on the origin of the solar system. As Palmer quotes from one of my papers and from a personal letter from me to him, I felt it worth while to consider the questions which he raises in his letter.

As I see the issues involved, there are two separate