This, and further work, will be reported in detail elsewhere. We acknowledge the technical assistance of Miss A. J. Schirmer.

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MISCELLANY

Sampling of Sub-micron Particles for Electron Microscopy

IN recent work on the attachment of radioactive particles to Aitken nuclei, we have been concerned with the sampling and subsequent examination by electron microscopy of Aitken nuclei in the size-range 0.01–0.1 μ diameter. A thermal precipitator was used for sampling, and the nuclei were at first collected on an electron microscope grid covered by a carbon film, instead of on the usual glass coverslip. Doubts arose as to whether the sample was a uniform one or whether there was preferential deposition over the copper bars of the grid by reason of the increased thermal gradient in the neighbourhood of the bars or by sagging of the carbon film between them. This effect has already been reported by Cartwright¹, who, to obtain uniform samples, used the thermal precipitator with the usual coverslips coated with a 'Formvar' film. After collection of the sample the film was scratched into sections of suitable size, floated off the coverslip in distilled water and placed

Fig. 1. Autoradiograph of thermal precipitator sample of Aitken nuclei, labelled with thorium B, collected on carbon-coated electron microscope grid. ($\times 175$)

Fig. 2. Autoradiograph of simultaneous sample collected on carbon-coated coverslip. ($\times 175$)

on a grid for subsequent examination by electron microscopy. Cartwright observed preferential deposition on the grid bars of dust particles up to a few microns in diameter by means of an optical microscope, but in the present work the Aitken nuclei were too small for optical microscopy, and nuclei deposited over the grid bars could not be seen with the electron microscope.

The technique finally used to test the uniformity of the sample was to mark the Aitken nuclei with atoms of thorium B and then to autoradiograph the samples. Areas where Aitken nuclei were concentrated could then be distinguished by the local concentration of alpha tracks. The autoradiographs shown are from the same thermal precipitator sample taken with an electron microscope grid (Fig. 1) and a coverslip (Fig. 2), both coated with an evaporated film of carbon, on opposite sides of the heated wire. It is apparent that the deposit on the coated coverslip is very much more uniform than that on the grid. Evaporated carbon films were used in preference to 'Formvar' because of ease of production and increased strength in the electron beam.

The method of marking the nuclei with thorium B was to pass filtered air at the rate of 200 cm.³/min. through a solution of 5 mc. of radiothorium (thorium-228) in 40 ml. of 0.05 normal nitric acid. The thoron carried over was then passed into the vessel containing the nuclei to be marked. The short-lived thoron decayed in the vessel to give the thorium B atoms which attached themselves to the nuclei present.

Because of its low sampling-rate, the thermal precipitator is not a very convenient instrument in the present application, and we hope to develop a method of sampling on to carbon-coated coverslips by electrostatic precipitation.

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