### Long-Lived Radioactive Silver

Several reports of a long-lived activity induced in silver by slow neutrons have appeared recently. Mitchell refers[1] to a weak activity of about 3 months half-life: Alexeeva gives the figure 1.2 to 2.0 years[2] (amended in a private communication to 300±90 days); Reddemann and Strassmann quote[3] a half-life equal to 190±40 days, with observations extending for 3 months, and have shown the activity to be chemically identifiable with silver, so that it must be ascribed to either $Ag^{108}$ or $Ag^{110}$.

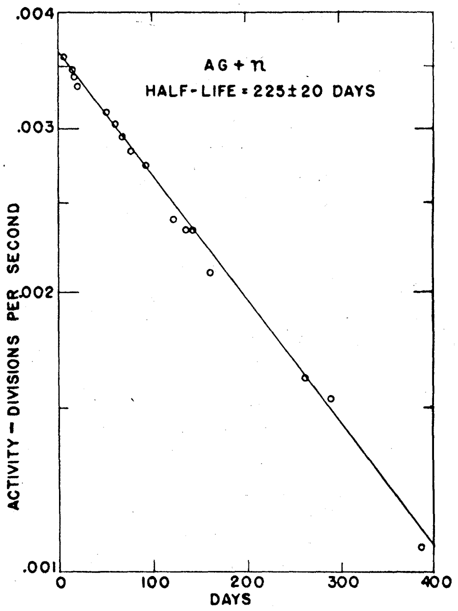

FIG. 1. Decay of radioactive silver.

We wish to add further confirmation to this neutron-induced activity and to give the half-life with somewhat greater precision, after having followed the decay for over a year. Our value is 225±20 days, as may be seen from Fig. 1.

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[1] A. C. G. Mitchell, Phys. Rev. **53**, 269 (1938).
[2] K. Alexeeva, Comptes Rendus U.R.S.S. **18**, 553 (1938).
[3] H. Reddemann and F. Strassmann, Naturwiss. **26**, 187 (1938).

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### Cosmic-Ray Particles of Intermediate Mass

A Geiger-counter placed inside a cloud chamber and coupled by means of a coincidence circuit to a second counter placed above the chamber has been employed to increase the probability of observing cosmic-ray particles near the ends of their ranges, and thus to provide information concerning the mass and stability properties of the particles of intermediate mass. One photograph obtained by this method showing a positively charged particle of $H\rho = 1.7 \times 10^5$ gauss cm, which after traversing the counter emerges with an energy low enough for it to be brought to rest in the gas of the chamber, is of special interest and is reproduced in Fig. 1.

The gas in the chamber consisted of $\frac{2}{3}$ helium and $\frac{1}{3}$ argon at a combined pressure of 1 atmosphere, which together with the alcohol vapor corresponds in stopping power to about 0.5 atmosphere of air. Partly for this reason and partly because of a lower light intensity used in these experiments the tracks are somewhat fainter than those normally obtained. The specific ionization of the particle of Fig. 1 before it traverses the counter, although not accurately measurable, is greater than that of a fast electron.

Although four independent mass estimates can be made from the data provided by the photograph, the most accurate value is to be obtained merely from the initial $H\rho$ of the particle and the thickness of matter traversed before it comes to rest. Both of these quantities can be accurately measured; in particular the track is sharp and an accurate curvature measurement is possible.

The details of the computation and a discussion of the errors of measurement will be deferred until the thickness of matter traversed has been accurately measured after breaking the counter. The uncertainty in the final estimate will probably lie more in the theoretical relation between energy loss and velocity than in the experimental measurements themselves. The final determination should be considerably more accurate than any so far made. From the best guess we can make at present as to the thickness of matter traversed in the counter, the mass appears to be about 240 electron-masses. The other three determinations of the mass, (1) by the relation between the specific ionization and the value of $H\rho$ for the upper portion of the track, (2) by the ionization and $H\rho$ below the counter, and (3) by the $H\rho$ and residual range below the counter, all give values consistent with the one above. The initial energy of the particle before it traverses the counter is 10 Mev and the energy with which it emerges is about 210,000 ev. It is perfectly clear that this particle cannot possibly have either electronic or protonic mass (see caption to Fig. 1).

An interesting feature of the photograph is the fact that the particle is actually observed to come to rest in the gas of the chamber. No completely certain evidence of a subsequent disintegration can be found on the photograph. There are, however, three droplets which appear on the left-hand image, which is the direct view, and also on the right-hand mirror image. Stereoscopic observation shows that these droplets line up so as to indicate a short segment of an electron track emanating from the point in the gas at which the particle came to rest and directed toward the counter. Because of the relatively weak light used in these experiments electron tracks are very faint. These droplets may therefore indicate that the particle after coming to rest disintegrated by the emission of a positive electron.