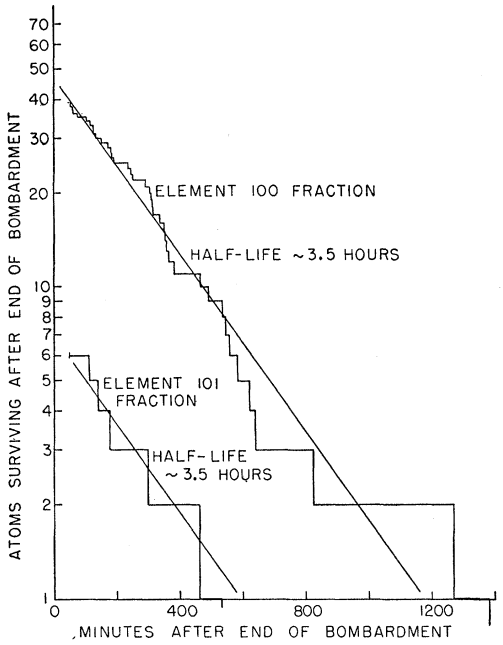

FIG. 2. Spontaneous fission decay curve of element 100 and element 101 fractions.

100 fractions was found to be approximately the same, perhaps 3 to 4 hours as shown in Fig. 2.

Obviously there is insufficient evidence to define the mass numbers concerned in this experiment. However, recent experimental observations of the spontaneous fission decay rates[3] of odd-nucleon types indicate that they are hindered by factors of thousands. If we then apply this principle to this experiment it is tempting to draw the following conclusions. By an (α,n) reaction on 99^{253} we have produced the isotope 101^{256} which decays by electron capture with a half-life of the order of a half hour to 100^{256}; this isotope then decays by spontaneous fission with a half-life of the order of 3 to 4 hours. (Since no alpha activity is observed we can rule out the 3.2-hour isotope 100^{254} as being responsible for the spontaneous fission activity on the basis of its known alpha-to-fission ratio of 1550.) In a total of eight separate experiments we have isolated only 17 atoms of 101 so it has not yet been possible to demonstrate this proposed genetic relationship between 101^{256} and 100^{256}. However, another experiment[4] has shown shown that 100^{256} does have a spontaneous fission half-life of about 3 hours.

The proof that these experiments resulted in the identification of element 101 is as follows:

1. Only the very heaviest elements decay by spontaneous fission with such short half-lives.

2. The elution position immediately ahead of element 100 shows that the chemical properties are those of an element heavier than 100, and probably 101 rather than 102.

3. By this method of production, it would not be possible to produce an element above 101.

We would like to suggest the name mendelevium, symbol Mv, for the new element in recognition of the pioneering role of the great Russian chemist, Dmitri Mendeleev, who was the first to use the periodic system of the elements to predict the chemical properties of undiscovered elements, a principle which has been the key to the discovery of the last seven transuranium (actinide) elements.

We should like to acknowledge the fact that this work was greatly facilitated by the reshaping of the magnetic field of the Crocker Laboratory 60-inch cyclotron so as to secure a more concentrated ion beam. This modification was successfully carried out under the expert supervision of G. B. Rossi. We should like to express our appreciation to C. A. Corum for his expert collaboration in the design of the special deflector channel probe used in these bombardments. To G. B. Rossi, W. B. Jones, and the crew of the 60-inch cyclotron, we extend our thank for their patience and careful manipulation of the machine which made the bombardments successful. We should like to thank T. O. Parsons, R. Silva, and A. Chetham-Strode for their considerable assistance. We should also like to express our appreciation to Professor J. G. Hamilton, director of the Crocker Laboratory, for his help and and cooperation and to Professor E. O. Lawrence for his continued interest in this program of research.

* This work was performed under the auspices of the U. S. Atomic Energy Commission.

[1] The 99^{253} target atoms were made by intense neutron bombardment of Cf^{252} and the subsequent beta decay of Cf^{253}. We would like to thank the personnel of the Materials Testing Reactor in Idaho for their very expeditious handling of this bombardment.

[2] Choppin, Harvey, and Thompson (unpublished information).

[3] Unpublished data in this laboratory.

[4] Choppin, Harvey, Thompson, and Ghiorso, following Letter [Phys. Rev. 98, 1519 (1955)].

Nuclear Properties of 100^{256}

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THE nuclide 100^{256} has been made by neutron irradiation of 99^{255} in the Materials Testing Reactor. One purpose of this experiment was to determine the most probable mass assignment of the isotope of element 101 which has been produced recently.[1]

Since the irradiated sample had been made earlier from Pu^{239} by successive neutron captures,[2] it was principally 99^{253}. A short bombardment and fast chemical separation of the 100 fraction from the 99 fraction was used to minimize the amount of 100^{254} which would grow in from its 36-hour 99^{254} parent. The

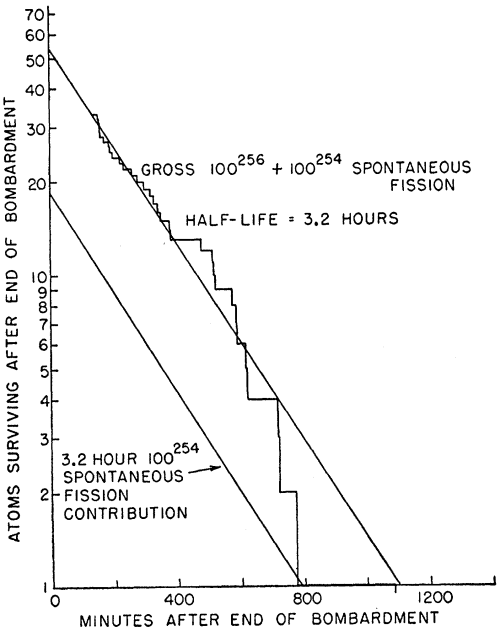

FIG. 1. Spontaneous fission decay of 100^{256}.

rapid chemical isolation was achieved by the use of precipitation and ion-exchange procedures.[3] Even then 17 000 disintegrations of 7.2-Mev alpha particles of 100^{254} and several hundred of 7.1-Mev 100^{255} (from the β^- decay of 99^{255}) were observed with a gridded alpha ionization chamber and a 50-channel differential pulse-height analyzer. This prevented observation of the alpha particles of 100^{256} (predicted to be of the order of 6.9-Mev energy) which would be in much lower abundance. However, a total of 33 spontaneous fission events occurred in the 100 fraction which was well outside the probability of the number of such events (10.8 ± 3) expected from 100^{254} based on the measured alpha-to-spontaneous-fission ratio of 1550 for this nuclide.[4] The additional events are attributed to the nuclide 100^{256}. The spontaneous fission half-life was found to be approximately 3 to 4 hours (Fig. 1). The reaction sequence was:

$$99^{255}(n,\gamma)99^{256} \xrightarrow{\beta^-} 100^{256} \xrightarrow{\text{S.F.}}.$$

The predicted value[5] of the alpha half-life indicates that the alpha-to-spontaneous-fission ratio of 100^{256} must be on the order of 0.04. As the initial amount of 99^{255} was known from the measured amount of 100^{255} in equilibrium with it just prior to bombardment, the pile neutron capture cross section of 99^{255} could be calculated to be about 40 barns. A similar experiment performed several months ago gave results which agreed with those reported here.

An irradiation of a small amount of 100^{255} in an attempt to produce 100^{256} gave one spontaneous fission probably attributable to this nuclide. This experiment set an upper limit of 100 barns on the capture cross section of 100^{255}.

Acknowledgment is due to the personnel of the Materials Testing Reactor for their valuable cooperation. We wish to express our appreciation of the continued interest of Dr. G. T. Seaborg.

[1] Ghiorso, Harvey, Choppin, Thompson, and Seaborg, preceding Letter [Phys. Rev. **98**, 1518 (1955)].
[2] Choppin, Thompson, Ghiorso, and Harvey, Phys. Rev. **94**, 1080 (1954).
[3] Thompson, Harvey, Choppin, and Seaborg, J. Am. Chem. Soc. **76**, 6229 (1954).
[4] Unpublished data from this laboratory.
[5] Glass, Thompson, and Seaborg, J. Inorg. Nuc. Chem. **1**, 3 (1955).

Nature of the Neutral Secondary Particle Produced in the Decay of the $K_{\pi 2}$-Meson*

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THERE are a number of experimental results which, when combined, furnish strong evidence for the existence of a charged K-meson whose mass is near that of the τ meson (965 m_e) and which decays according to the scheme,

$$K_{\pi 2} \rightarrow \pi + \pi^0. \quad (1)$$

This particle is also referred to as the charged counterpart of the θ^0 meson and as the χ meson.

We report five S-events obtained with the Massachusetts Institute of Technology multiplate cloud chamber which can be interpreted according to scheme (1) and which afford additional evidence that the neutral decay product is a π^0 meson.[1] The data concerning these events are presented in Table I, which we now discuss.

(*1*) *Charged secondary particles.*—Column 3 lists the observed ranges of the charged secondaries. Because of the uncertainty introduced by the finite thickness of the last plate most ranges are specified in terms of a lower and upper limit. These limits have been narrowed by using visual estimates of relative specific ionization to estimate corresponding limits of the residual range. In events 92 136 and 105 596 a single value for the range is given because a decay electron which is associated with the stopped secondary allows a more accurate determination.

The secondary momenta in Column 4 are derived from the range values in Column 3 using the range energy relation for copper given by Aron *et al.*[2] The measured composition of the plates is 85 percent copper and 15 percent zinc. From these momentum values we calculated the corresponding values of the primary