

alpha-half-life is of the order of 10 years.¹⁷ The amount of curium daughter alpha-radioactivity which was formed by the electron-capture decay of the berkelium isotope indicated that the alpha-decay half-life of the new heavy curium isotope was of the order of 10^2 years. This energy and half-life would agree best with the alpha-decay systematics⁴ if assigned to Cm²⁴³. In this connection it should be pointed out that 30-Mev helium ions used in the lowest energy bombardment of the americium are below the threshold for the $(\alpha,4n)$ reaction in this region so that berkelium isotopes of mass number less than 242 should not have been produced. The observed cross section ($\sim 10^{-26}$ cm²) is of the same order of magnitude as cross sections for the $(\alpha,2n)$ reaction with helium ions of 30-to 35-Mev energy in the production of other heavy isotopes.

When the three alpha-particle groups of the 4.6-hour activity were first observed, the possibility was indicated that more than one isotope of element 97 might be present. This possibility was eliminated as follows: All three groups decayed with 4.6-hour half-life as did the electron-capture radiations. There was no difference in the ratios of the three groups when the energies of the helium ions used in the bombardments were varied. If another isotope has been present in significant amounts, its daughters would have been detected.

It is interesting to consider the explanation of the three groups of alpha-particles. Reference to the half-life vs. energy relationships for the odd atomic number nuclides as given in Fig. 8 of reference 4 shows that an alpha-decay half-life of the order of a day or less might be expected for an isotope of element 97 with an unforbidden transition having a maximum alpha-particle energy of 6.72 Mev. Therefore, alpha-particle decay in the isotope 97²⁴³ is highly forbidden, perhaps by a factor of 10^2 or 10^3 . Since the transition between ground states is highly forbidden, the transition to excited states of the product nucleus

¹⁷Street, Ghiorso, and Thompson, unpublished work.