

becomes probable even though the total difference in energy involved is less, so it is reasonable to have low energy alpha-groups of intensity comparable to the ground state transition. This is not unreasonable for a nucleus with an odd nucleon (proton) like Bk<sup>243</sup>.

It is also interesting to consider the relationship between energy and the half-life for electron capture. The disintegration energy of Bk<sup>243</sup> may be calculated by means of the closed cycles and used to estimate a half-life for electron capture by the method of Thompson.<sup>5</sup> The disintegration energy so obtained gives a half-life of considerably less than one hour if applied to the curve<sup>5</sup> which includes most of the data. The new isotope appears to represent a case whose electron-capture decay is more forbidden than most of the other heavy odd-even type nuclei. This situation is, of course, fortunate insofar as the identification of the new element is concerned. If the isotope Bk<sup>243</sup> had not been forbidden with respect to decay by electron capture, the identification of the new element might have been delayed until even more rapid chemical separations and techniques could be developed. The other isotopes of berkelium formed in the present bombardments are presumably all shorter-lived than Bk<sup>243</sup>.

#### SUMMARY

An isotope of element 97 (berkelium, symbol Bk) has been produced and identified. This isotope probably has the mass number 243 as produced in the reaction  $\text{Am}^{241}(\alpha, 2n)\text{Bk}^{243}$ . It decays predominantly by electron capture with a half-life of  $4.6 \pm 0.2$  hours and exhibits ~0.1 percent alpha-particle decay branching. The alpha-particles are of three groups, the maximum energy being 6.72 Mev (30 percent). The other two energy groups are 6.55 Mev (53 percent) and 6.20 Mev (17 percent). The bombardments were made with 30- to 35-Mev helium ions in the Berkeley Crocker Laboratory 60-inch cyclotron. The chemical separations were made using a combination of precipitation methods and high temperature ion