

The results of a typical experiment in which the alpha-particle energies and rate of decay were measured by differential pulse analysis are shown in Fig. 1. The rate of decay was measured by plotting the area under the 7.1-Mev energy peak versus the time of decay of the radioactivity. This peak was observed to decay with a half-life of approximately 45 minutes through a decay factor of more than 10, as shown in Fig. 2. The tailing out of this curve is caused by a relatively high "electronic" background from the "piling up" effects in the amplifier of the intense Cm²⁴² activity.

The presence of the 45-minute radioactivity was observed in four separate experiments. It was observed in the presence of a relatively large amount of unseparated Cm²⁴² (approximately 10⁴ alpha-disintegrations per minute), upon completion of the operation of the first resin column as shown in Fig. 1. The presence of the isotope Bk²⁴³ produced either by (d,n) or (α,2n) reactions in the separate bombardments was not observed after only one column separation because of the closer proximity of the berkelium elution peak to that of curium and the consequent larger amount of curium activity in the berkelium samples. However, after the second column run in which the residual Cm²⁴² radioactivity was separated, it was possible to observe the presence of the separate elution peaks due to the 45-minute activity, Bk²⁴³ and Cm²⁴² in the alpha-particle pulse analyzer. The electron and electromagnetic radiations of the 4.6-hour Bk²⁴³ were also observed by the methods described in reference 10. The best values for the alpha-particle energies and half-life of the 45-minute activity were obtained on the larger samples resulting from the operation of the first resin column. Although samples from the second column run were essentially free of Cm²⁴² contamination, the 45-minute radioactivity had decayed during this additional time interval by a factor of approximately six so that no advantage was gained by the second separation insofar as the radioactivity measurements were concerned. However, important