

In the case of lanthanum hydroxide, excellent carrying was obtained regardless of whether potassium hydroxide or ammonium hydroxide was used for precipitation of the carrier. In the absence of oxidizing agents, the 4.6-hour radioactivity was not carried by the insoluble sulfides of copper and bismuth precipitated in 0.3M HCl; and in strong hydrochloric acid, it was not adsorbed by the anion exchange resin Dowex A-1. By means of the use of various oxidizing agents including mixtures of cerium (III) and cerium (IV), the 4.6-hour activity was found to have behavior so near to that of cerium as indicated by carrying or non-carrying with zirconium phosphate and ceric iodate that the oxidation potential for the couple $\text{Bk (III)} \longrightarrow \text{Bk (IV)} + e^-$ must be about -1.6 volts on the scale where the hydrogen-hydrogen ion potential is zero.¹⁶ These results may be summarized thus: element 97 has properties closely resembling those of cerium, particularly with regard to its oxidation potential. However, differences between berkelium and cerium were observed in the properties of the tripositive oxidation state where berkelium is more like terbium (III), as shown by resin column separations. With 13M HCl, of course, relatively large differences between berkelium (III) and all rare earths were observed.

DISCUSSION OF RESULTS

The experiments and results which have been given provide the evidence for the discovery of an isotope of element 97. That the 4.6-hour activity observed in the experiments is beyond reasonable doubt an isotope of element 97 is proved by the following essentially independent means:

(1) Its separation in the "eka-terbium" position expected for element 97 in elutriant fractions from the Dowex-50 resin column with ammonium citrate as the eluting agent. The relative spacing between berkelium and its actinide neighbors is remarkably similar to the relative spacings between the homologous lanthanides.

¹⁶W. M. Latimer, Oxidation Potentials (Prentice Hall, Inc., New York, 1938).