INTRODUCTION

The transuranium elements number 96, curium, and 95, americium, were discovered in 1944, the first by Seaborg, James, and Ghiorso,[1] the second by Seaborg, James, and Morgan.[2] The search for transcurium elements was begun by us in the fall of 1945. It was anticipated[3] that element 97 as ekaterbium in the actinide transition series would possess oxidation states (III) and (IV) with properties similar to curium in the (III) oxidation state and to plutonium (IV) in its (IV) oxidation state. It was more difficult to estimate the oxidation potential of the (III) ——→ (IV) couple but it was expected that element 97 would be somewhat easier to oxidize than terbium (III) which is not oxidizable to higher states in aqueous solution at all. The salient point is that if element 97 could not be converted to an oxidation state higher than (III) in solutions it would be extremely difficult to separate in a short period of time from rare earth elements and from the actinide elements from which it must be produced. Americium is very difficult and curium probably impossible to oxidize above the (III) state in aqueous solution.[3] In other words, it appeared that it might be necessary to use tedious rare earth separations in order to separate and identify the new element, the isotopes of which do not exist in nature and whose neutron-deficient isotopes as produced by alpha-particle and deuteron bombardments would have short half-lives as a result of considerable instability towards alpha-particle emission and electron-capture decay.

In view of the fact that sufficiently intense beams of energetic particles of nuclear charge greater than two have never been available, it is obvious that

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[1] G. T. Seaborg, R. A. James, and A. Ghiorso, National Nuclear Energy Series, Plutonium Project Record, Vol. 14B, "The Transuranium Elements: Research Papers," Paper No. 22.2 (McGraw-Hill Book Co., Inc., New York, 1949).

[2] Seaborg, James, and Morgan, ibid., Paper No. 22.1.

[3] Seaborg, Nucleonics 5, No. 5, 16 (1949).