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A Rare Earth Separation by Anion Exchange

E. H. Huffman and R. L. Oswalt

May 2, 1950



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A RARE EARTH SEPARATION BY ANION EXCHANGE

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We have recently found a separation of promethium and europium in tracer quantities by development of their citrate complexes at pH 2.1 on an anion exchange column. No column runs have yet been made using macro quantities of these elements, though batch equilibrations indicate that the resin capacity is satisfactory for this purpose.

A solution of the tracers  $\text{Pm}^{147}$  and  $\text{Eu}^{154}$  in 0.25 ml. of 0.0125M citric acid, adjusted to pH 2.1 with hydrochloric acid (final chloride concentration about 0.003M), was put on a column of 250-500 mesh Dowex A-1 resin 14.9 cm. long and 0.08 sq. cm. cross section. This column had been prepared by treating the original chloride form of the resin with citrate solution of the same concentration and pH. Elution at the rate of 1.5 ml. per hour with the same citrate solution gave the results shown in Fig. 1. The solid curve shows the tracer count without absorber. The broken line extension of the europium section represents the count taken with an absorber of 39.3 mg. per sq. cm., which cuts out the  $\text{Pm}^{147}$  radiation. The count with absorber is multiplied by 3.7 to correct for the partial absorption of the  $\text{Eu}^{154}$  activity. The extension of the promethium section was obtained by difference. The order of elution of these two elements is the reverse of that obtained by cation exchange.<sup>1</sup>

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<sup>1</sup>B. H. Ketelle and G. E. Boyd, J. Am. Chem. Soc., 69, 2800 (1947);  
Edward R. Tompkins and Stanley W. Mayer, ibid., 2859; Mayer and Tompkins, ibid., 2866.

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These investigations are being extended to find the optimum conditions for such separations, to apply them to macro quantities and to the other rare earth elements, and to study the mechanism of the exchange.

This work was done under the auspices of the U. S. Atomic Energy Commission.

Fig. 1.--Elution of promethium and europium  
with 0.0125M citrate solution at pH 2.1.



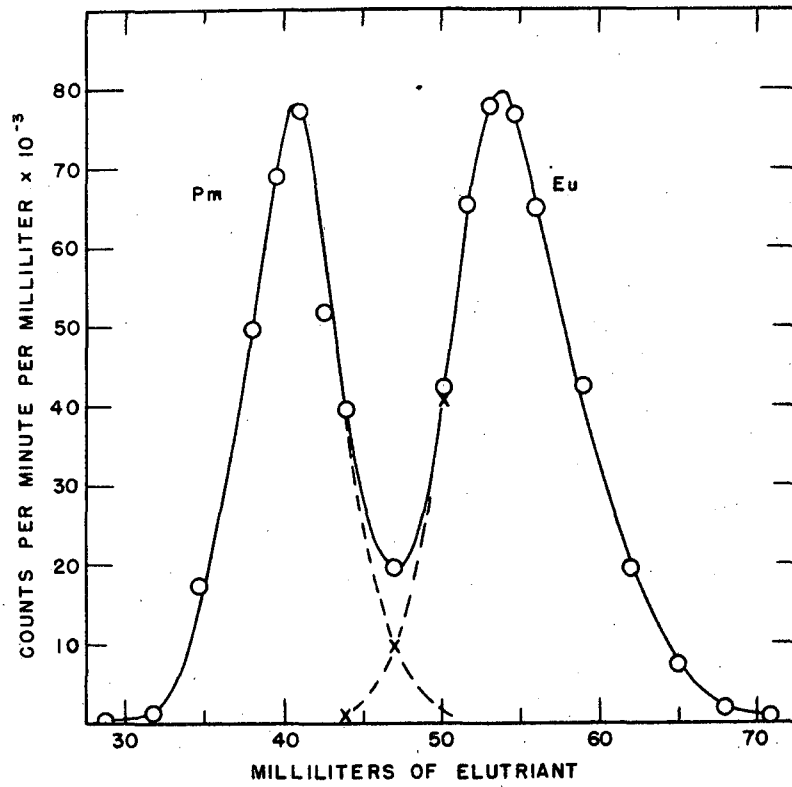


FIG. 1

MU 230

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