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THE SEPARATION OF YTTRIUM AND EUROPIUM WITH ANION EXCHANGE RESINS

C.E.HIGGINS AND W.H.BALDWIN

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C. E. Higgins and W. H. Baldwin

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THE SEPARATION OF YTTRIUM AND EUROPIUM WITH ANION EXCHANGE RESINS[1]

C. E. Higgins and W. H. Baldwin

(1) This document is based on work performed for the Atomic Energy Commission at the Oak Ridge National Laboratory.

The separation of yttrium and europium tracers[2] by selective elution from

(2) B. H. Ketelle and G. E. Boyd, J. Am. Chem. Soc. 69,2800(1947).

cation exchange resins depends upon the formation of anionic complexes of these metals. The separation of such metals as niobium and tantalum[3], zirconium and

(3) K. A. Kraus and G. E. Moore, J. Am. Chem. Soc. 71,3855(1949).

niobium[4][5] by selective elution of their anionic complexes from the anion

(4) R. E. Wacker and W. H. Baldwin, ORNL-635, March (1950).

(5) K. A. Kraus and G. E. Moore, J. Am. Chem. Soc. 73,9(1951).

exchanger Dowex-1 suggested the separation of yttrium and europium tracers by the use of anion exchange resins.

Experimental

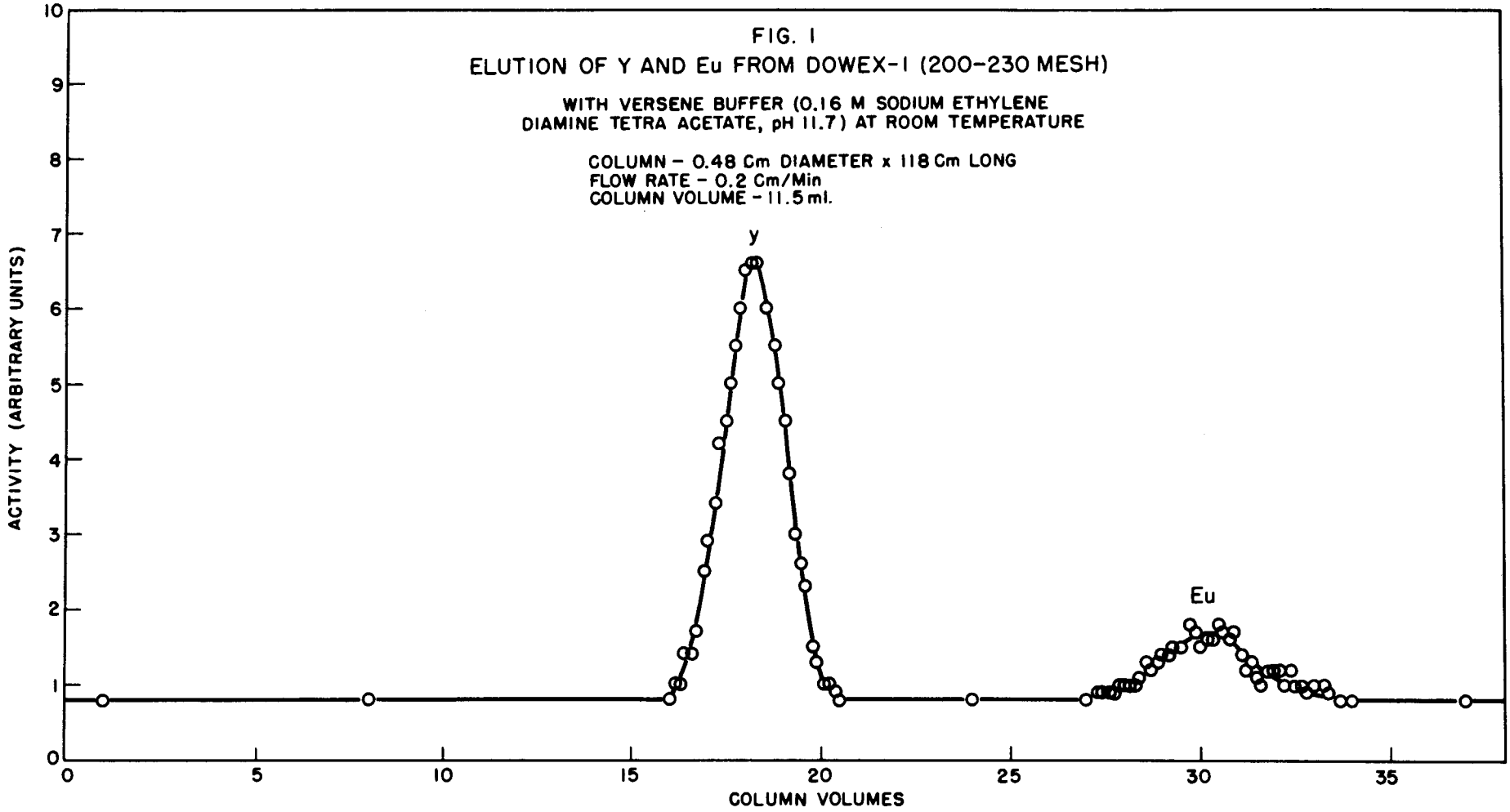
Y^{91} tracer was isolated from a mixture of fission products and was purified by elution from a Dowex-50 resin column (100 x 0.5 cm) with 0.24M citrate buffer

at pH 3.0. The europium tracer was prepared by a long term bombardment, with neutrons, of purified natural europium in the ORNL reactor. The tracer was purified by elution from a Dowex-50 resin column with 0.24M citrate buffer at pH 3.0.

Ethylene diamine tetra-acetic acid (Versene) was purified by dissolving the sodium salt in water, acidifying with HCl to precipitate the free acid, washing free of HCl and crystallizing from hot water. The acid was dissolved in NaOH before using.

Dowex-1 resin was wet-screened and particles of 200-230 mesh were packed into the column 118 cm long by 0.48 cm diameter. The resin in the column was washed first with 1M HCl then with water until the washings were acid free and then with 0.16M Versene at pH 11.7 until the effluent was the same composition as the solution being introduced into the column.

The mixed tracers in 0.5 ml of 0.16M Versene at pH 11.7 were placed on top of the column of Dowex-1 resin (118 x 0.48 cm; 11.5 ml free column volume) and eluted with 0.16M Versene at pH 11.7 by downward flow (0.2 ml/sq. cm/min.) at room temperature. The effluent was monitored continuously for activity and identification of the elements in the peaks of activity was established by the use of absorption and decay curves.

The peak of the yttrium activity occurred at 18 column volumes while that for the europium occurred at 30 column volumes. This degree of separation is comparable to that found by elution from Dowex-50 resin columns with citrate buffer at pH 3.0 at room temperature and slightly less than that found at elevated temperatures.

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