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CARRIER-FREE RADIOISOTOPES FROM CYCLOTRON TARGETS
VII - PREPARATION AND ISOLATION OF V^{48} FROM TITANIUM

Herman R. Haymond, Roy D. Maxwell, Warren M. Garrison and Joseph G. Hamilton

September 1949

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CARRIER-FREE RADIOISOTOPES FROM CYCLOTRON TARGETS
VII - PREPARATION AND ISOLATION OF V^{48} FROM TITANIUM¹

Herman R. Haymond, Roy D. Maxwell², Warren M. Garrison and Joseph G. Hamilton.

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V^{48} can be prepared³ by the reactions $Ti^{47}(d,n)V^{48}$ and $Ti^{48}(d,2n)V^{48}$. The present paper reports a chemical procedure used in isolating carrier-free V^{48} from a titanium target which had been bombarded with 19 Mev deuterons in the 60-inch cyclotron at Crocker Laboratory. The carrier-free V^{48} was separated from the target element and from milligram amounts of calcium and scandium which were added as hold-back carriers for the radioisotopes⁴ produced concurrently by the reactions; $Ti^{48}(d,\alpha p)Ca^{45}$, $Ti^{46}(d,2p)Sc^{46}$.

The Ti target (C.P. metal powder supported on a copper target plate with 0.25 mil Ta foil) was bombarded for 200 μ a-hr. at a maximum beam intensity of 20 μ a. After aging for 24 hours, the Ti powder (approximately 1 gm.) was dissolved in a minimum volume of 36 N H_2SO_4 and the solution was evaporated to dryness. 5.0 gm of Na_2CO_3 and 0.1 gm. of $NaNO_3$ were added and the mixture was fused at 500°C. for 30 minutes. The sub-micro amount of V^{48} , presumably as vanadate, was extracted from the insoluble titanium oxide by repeated washings with cold water. To remove any Ca and Sc activities which may have been extracted with the V^{48} , the solution was acidified with HCl, 10 mg of Ca and Sc were added and precipitated from 1 M Na_2CO_3 . The supernatant containing the V^{48} was neutralized with 12 N HCl and evaporated to dryness. The V activity was separated from most of the NaCl by

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- (1) This document is based on work performed under the auspices of the Atomic Energy Commission.
 - (2) Lieutenant Colonel, U. S. Army, now stationed at Walter Reed Hospital, Washington, D. C.
 - (3) H. Walke, Phys. Rev. 52 777 (1937)
 - (4) G. T. Seaborg and I. Perlman, Rev. Mod. Phys. 20 585 (1948)

extraction with approximately 5 ml of 12 N HCl. The HCl solution containing the activity and milligram amounts of NaCl was evaporated to dryness and diluted with water to give an isotonic saline solution of carrier-free V^{48} which was used in biological tracer studies.

The V^{48} was identified by the assigned⁵ 16-day half-life and by the 0.7 Mev positron and 1.33 Mev gamma ray which have been reported³. Chemical separations with added Ca, Sc, Ti and V carriers further identified the activity as V^{48} .

We are grateful to the staff of the 60-inch cyclotron for bombardments and to Professor G. T. Seaborg for his interest and helpful suggestions.

(5) W. C. Peacock and M. Deutsch, Phys. Rev. 69 306 (1946)

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