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CARRIER-FREE RADIOISOTOPOES FROM CYCLOTRON TARGETS
II. PREPARATION AND ISOLATION OF Cd\textsuperscript{109} FROM SILVER

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CARRIER-FREE RADIOISOTOPES FROM CYCLOTOM TARGETS.
II PREPARATION AND ISOLATION OF Cd\textsuperscript{109} FROM SILVER\textsuperscript{1}


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The radionuclide, Cd\textsuperscript{109}, produced by the nuclear reaction Ag\textsuperscript{109}(d,2n)\textsuperscript{3}, has been isolated without added isotopic carrier by a solvent-extraction procedure based on the selective solubility of cadmium pyridine thiocyanate in chloroform. Radioactive palladium, 13-hr. Pd\textsuperscript{109}, produced by the reaction Ag\textsuperscript{109}(n,p), was allowed to decay out prior to the separation of 185-day Cd\textsuperscript{109}. This activity, however, is not extracted with cadmium and the method may be used in isolating 6.7 hr. Cd\textsuperscript{107} from an un-aged target.

The target was a block of spectrographically-pure silver\textsuperscript{4} (1/4 in. thick), soldered to a water-cooled copper plate. It was bombarded with 19 Mev deuterons for a total of 100 \(\mu\)a-hrs. in the 60-inch cyclotron at Crocker Laboratory. The bombarded surface of the silver was removed from the target by milling off to a depth of 1/8 in.

The silver turnings were dissolved in a minimum volume of 16 N H\textsubscript{2}N\textsubscript{O}\textsubscript{3} and the solution was evaporated to dryness on a steam bath. The AgN\textsubscript{O}\textsubscript{3} plus activity was

(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) A. C. Helmholz, Phys. Rev., 70, 982 (1946)
(4) The silver was obtained from Johnson Mathey & Co. Cadmium was not detected by spectrographic analysis.
dissolved in 25 ml of H₂O and the silver was complexed with excess NH₄CNS. The solution was adjusted to pH 5 with sodium acetate and the Cd¹⁰⁹ was extracted with chloroform containing 5% pyridine. This procedure, originally developed for the separation of micro amounts of cadmium, quantitatively extracted Cd¹⁰⁹ from solutions containing presumably less than 10⁻⁸ grams of stable cadmium.

To remove traces of silver, the chloroform phase was evaporated to dryness on a steam bath, redissolved in 2-3 ml of 1% H₂SO₄, and extracted with .005% dithizone in chloroform. The final solution of Cd¹⁰⁹ contained less than one microgram of silver.

A small portion of the activity was added to a solution containing silver and cadmium in carrier amounts, and the silver was precipitated as AgCl. 99% of the activity remained in the supernatant.

Absorption measurements in aluminum showed conversion electrons of approximately 0.1 Mev and the 22 Kev X-ray of the Ag¹⁰⁹ daughter. These data agree with the previously reported values.

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