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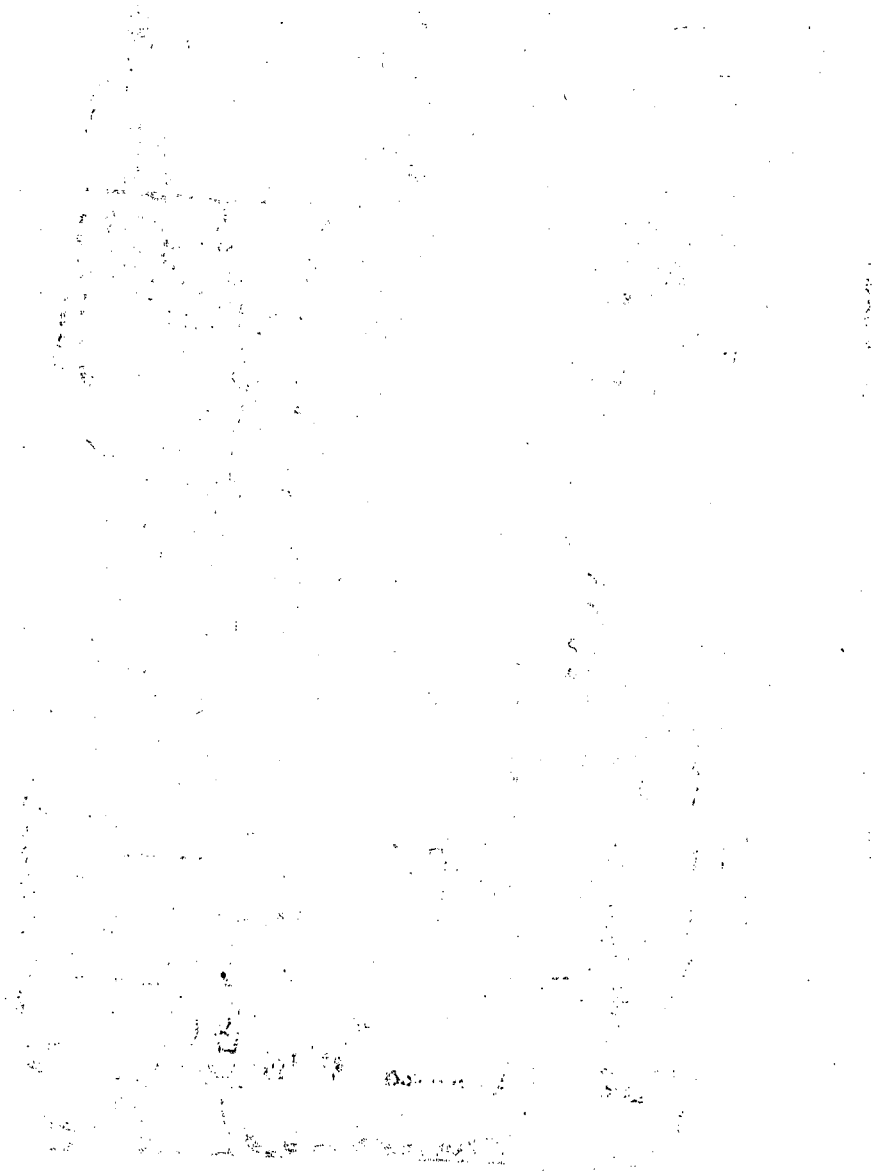

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CARRIER-FREE RADIOISOTOPES FROM CYCLOTRON TARGETS XVI. PREPARATION AND ISOLATION OF Pd^{103} FROM RHODIUM

Jeanne D. Gile, Herman R. Haymond, Warren M. Garrison and Joseph G. Hamilton

February 19, 1951

Berkeley, California

CARRIER-FREE RADIOISOTOPES FROM CYCLOTRON TARGETS
XVI. PREPARATION AND ISOLATION OF Pd^{103} FROM RHODIUM*

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Crocker Laboratory, Radiation Laboratory, and Divisions of Medical Physics, Experimental Medicine, and Radiology; University of California, Berkeley and San Francisco, California

February 19, 1951

The 17-day Pd^{103} was prepared[1] from rhodium by the nuclear reaction $Rh^{103}(d,2n)Pd^{103}$ using the 20-Mev deuteron beam of the 60-inch cyclotron at the Crocker Laboratory. In the procedure described below, the Pd^{103} is isolated in the carrier-free state from the target element and from the 41-day Ru^{103} which is produced concurrently in low yield by the (n,p) reaction. "Palladium-free" rhodium foil[2], 20 mil thick, was clamped to a water-cooled aluminum target plate and bombarded for a total of 155 μa-hr at an average beam intensity of 10 μa. The bombarded rhodium metal (approx. 1 gm) was fused with excess potassium acid sulfate and the resultant mass was leached with water. A small amount of insoluble material which did not carry activity was removed by centrifugation. The supernatant solution was made 6 N in hydrochloric acid by the addition of appropriate amounts of 12 N hydrochloric acid and sodium chloride. Five milligrams of selenium as selenous acid was added, and the solution was saturated with sulfur dioxide. The resultant precipitate of elemental selenium, which carried over 99 percent of the Pd^{103}, was separated from solution by centrifugation, washed with water, dissolved, and reprecipitated. The final selenium precipitate containing the Pd^{103} was

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*This document is based on work performed under Contract No. W-7405-eng-48-A for the Atomic Energy Commission.

[1] G. T. Seaborg and I. Perlman, Rev. Mod. Phys. 20 585 (1948)

[2] Spectrographic analysis showed less than .01 percent palladium.

dissolved in 36 N sulfuric acid, transferred to an all-glass distilling flask and distilled at 200°C. with the addition of 9 N hydrobromic acid. The residue which contained all of the Pd^{103} activity was evaporated to dryness on 40 mg of sodium sulfate. The activity dissolved quantitatively in 5 ml of water.

The activity was followed for 80 days and showed only the assigned 17-day half-life[3,4]. The x-radiation had a half-thickness in aluminum of 200 mg/cm^2 which agrees closely with the previously observed value[5]. The activity was further identified by chemical separation through the use of added palladium, rhodium and ruthenium carriers.

We wish to thank Professor G. T. Seaborg for helpful suggestions, Mr. T. Putnam, Mr. B. Rossi and the crew of the 60-inch cyclotron for bombardments and Miss Margaret Gee for assistance in counting.

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[3] A. R. Brosi, Plutonium Project Report, Mon N-150 (July 1946)

[4] D. E. Mathews and M. L. Pool, Phys. Rev. 72 163 (1947)

[5] H. F. Gunlock, M. L. Pool, Phys. Rev. 74 1264 (1948)