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CARRIER-FREE RADIOISOTOPES FROM CYCLOTRON TARGETS XXII. PREPARATION AND ISOLATION OF Fb203 FROM THALLIUM

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Publication Date

1951-07-18

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Radiation Laboratory

Contract No. W-7405-eng-48

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XXII. PREPARATION AND ISOLATION OF Pb^{203} FROM THALLIUM

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

July 18, 1951

Berkeley, California

CARRIER-FREE RADIOISOTOPES FROM CYCLOTRON TARGETS

XXII. PREPARATION AND ISOLATION OF
 Pb^{203} FROM THALLIUM*

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

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July 18, 1951

The 52-hour Pb^{203} , produced by the reaction $Tl^{203}(d,2n)Pb^{203}$ has been isolated in the carrier-free state from a Tl target without the addition of stable lead carrier.

The target consisted of a 2 mm layer of Tl_2O_3 powder held on a grooved water-cooled copper plate by a 0.25 mil platinum foil and was bombarded with 19-Mev deuterons in the 60-inch cyclotron at the Crocker Laboratory. Lead was not detected by spectrographic analysis (less than 0.01 per cent) in the Tl_2O_3 powder used for the target. The beam current was limited to 5 μ a to avoid volatilization of the target powder from over-heating during bombardment.

After bombardment, the Tl_2O_3 powder was dissolved in 1 N HNO_3 . The solution was saturated with SO_2 gas to reduce the thallic ion to the thalious state, following which the solution was heated to expel the excess SO_2 . Ten mg of ferric ion was added and the solution was made basic by the addition of NH_4OH . The precipitated $Fe(OH)_3$, which carried most of the Pb^{203} , was removed by centrifugation, washed twice with dilute NH_4OH and once with water, and dissolved in 1 N HNO_3 . Five mg of inert thallic ion was added to the solution as holdback carrier and the whole process was repeated. The process was repeated again without the addition of inert thallium. The third $Fe(OH)_3$ precipitate

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

was dissolved in 6 N HCl and the iron removed by four extractions with equal volumes of ethyl ether. After the addition of 25 mg of NaCl the solution was heated to dryness and then dissolved in water to give a solution of isotonic saline at pH 4 containing the carrier-free radio-lead, which was subsequently used for biological investigations.

Identification of the isolated activity was confirmed with an aliquot of the preparation by a chemical separation using milligram quantities of thallium, lead and mercury. The decay curve, over a period of four half-lives, and the absorption curves in aluminum and lead agreed with published data.⁽¹⁾⁽²⁾⁽³⁾ The 68-minute Pb^{204} which results from deuteron bombardment of thallium,⁽³⁾⁽⁴⁾ was allowed to decay out prior to this separation.

We wish to thank Professor G. T. Seaborg for reviewing the manuscript, Mr. T. Putnam, Mr. B. Rossi and the staff of the 60-inch cyclotron for bombardments, and Miss Margaret Gee for technical assistance.

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