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CARRIER-FREE RADIOISOTOPES FROM CYCLOTRON TARGETS XIX. PREPARATION AND ISOLATION OF Pt191 from OSMIUM

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XIX. PREPARATION AND ISOLATION OF Pt<sup>191,193</sup> FROM OSMIUM

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

June 26, 1951

Berkeley, California

CARRIER-FREE RADIOISOTOPES FROM CYCLOTRON TARGETS

XIX. PREPARATION AND ISOLATION OF  
Pt<sup>191,193</sup> FROM OSMIUM\*

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

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June 26, 1951

Radioactive platinum produced by bombardment of osmium with 38-Mev alpha-particles has been isolated without addition of isotopic carrier. The following two radioisotopes of platinum are produced by ( $\alpha, n$ ), ( $\alpha, 2n$ ), and ( $\alpha, 3n$ ) reactions with alpha-particles of this energy: 3-day Pt<sup>191</sup> and 4.3-day Pt<sup>193</sup>. The carrier-free radio-platinum was separated from the target element and from the possible radioisotopes of Ir (from  $\alpha, pn$  reaction) and Re (from  $n, p$  reaction) by a solvent-extraction procedure based on the solubility of chloroplatinous acid in ethyl ether.

A 2 mm layer of C.P. osmium<sup>(1)</sup> powder, supported on a grooved water-cooled aluminum target plate by a 0.25 mil tantalum foil, was bombarded for 40  $\mu$ a-hr. at an average beam intensity of 7  $\mu$ a, in the 60-inch cyclotron at Crocker Laboratory.

The bombarded osmium was dissolved in aqua regia, additional 16 N HNO<sub>3</sub> was added, and the osmium was volatilized as the tetroxide. After the osmium had been volatilized the HNO<sub>3</sub> was destroyed with excess of 12 N HCl. The acid solution containing the active Pt<sup>191,193</sup> was diluted with distilled water to

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(1) The osmium was obtained from Johnson Mathey & Co. Pt was not detected by spectrographic analysis.

make the solution 3 N in HCl, 1 ml of 10 per cent SnCl<sub>2</sub> was added, and the chloroplatinous acid was extracted with ethyl ether which had previously been saturated with 3 N HCl. Under these conditions over 95 per cent of the carrier-free radio-platinum is recovered in the organic phase. The ether layer was washed with 6 N HCl and the activity was quantitatively retained in the organic layer. Twenty mg of NaCl were added to the ether phase and the mixture was evaporated to dryness on a steam bath. The carrier-free Pt<sup>191,193</sup> was redissolved quantitatively in 2 ml of distilled water at pH 6 to give an isotonic saline solution for biological experiments.

The radio-platinum was identified by half-life determinations, absorption measurements, and by chemical separation with carrier. The decay was followed for 40 days and showed the 3.0-day Pt<sup>191</sup>,<sup>(2)</sup> and the 4.3-day Pt<sup>193</sup>.<sup>(2)</sup> Seven days after bombardment the activity showed predominately the 4.3-day period. Aluminum and lead absorption measurements two days after bombardment showed the 0.5-Mev conversion electron and the 0.57-Mev gamma-ray previously reported<sup>(3)</sup> for Pt<sup>191</sup>. An aliquot of the solution was added to a solution containing carrier amounts of Os, Ir, Re, and Pt. The radioactivity was quantitatively recovered in the Pt fraction following chemical separation.<sup>(4)</sup>

We wish to thank Professor G. T. Seaborg for helpful suggestions, the staff of the 60-inch cyclotron at Crocker Laboratory for the bombardments, and Miss Margaret Gee for technical assistance in counting.

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

(3) G. Wilkinson, Phys. Rev. 73, 252, (1948).

(4) A. A. Noyes and W. C. Bragg, A System of Quantitative Analysis For The Rare Elements. The MacMillan Company, New York, (1927).