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Radiation Laboratory

Contract No. W-7405-eng-48

CARRIER-FREE RADIOISOTOPES FROM CYCLOTRON TARGETS

XIX. PREPARATION AND ISOLATION OF $Pt^{191,193}$ FROM OSMIUM

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

June 26, 1951

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XIX. PREPARATION AND ISOLATION OF $Pt^{191,193}$ FROM OSMIUM*

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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

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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 (α,n), (α,2n), and (α,3n) reactions with alpha-particles of this energy: 3-day Pt^{191} and 4.3-day Pt^{193}. The carrier-free radio-platinum was separated from the target element and from the possible radioisotopes of Ir (from α,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(1) powder, supported on a grooved water-cooled aluminum target plate by a 0.25 mil tantalum foil, was bombarded for 40 μa-hr. at an average beam intensity of 7 μa, in the 60-inch cyclotron at Crocker Laboratory.

The bombarded osmium was dissolved in aqua regia, additional 16 N HNO_3 was added, and the osmium was volatilized as the tetraoxide. After the osmium had been volatilized the HNO_3 was destroyed with excess of 12 N HCl. The acid solution containing the active $Pt^{191,193}$ was diluted with distilled water to

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

(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 $SnCl_2$ 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 radioplatinum 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 $Pt^{191,193}$ 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^{191},(2) and the 4.3-day Pt^{193}.(2) 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(3) for Pt^{191}. 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.(4)

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. Brag, A System of Quantitative Analysis For The Rare Elements. The MacMillan Company, New York, (1927).