

The Discoverers of the Isotopes of the Platinum Group of Elements: Update 2014

A resolution of the discovery circumstances of ^{195}Os plus new isotopes found for Ru

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Further to a previous update (1), a new investigation of the discovery circumstances of ^{195}Os by Juan Flegen (2) has shown that Baró and Rey almost certainly discovered this isotope in 1957 (3, 4). A previous suggestion that they had only observed the isotope ^{81}Rb was due to a misunderstanding which was only resolved by a critical assessment of the papers of Rey and Baró by Birch *et al.* (5). In addition Reed *et al.* (6) have identified an isomer of ^{195}Os by determining the half-life on the bare nucleus, Os^{76+} . They obtained 32^{+154}_{-16} m for the half-life which NUBASE 2012

(7) normalised to a value of 2 ± 1.7 h. The details surrounding the discoveries of ^{195}Os isotopes are summarised in **Table I**. In addition the new isotopes ^{85}Ru and ^{86}Ru have been discovered at the RIKEN Nishina Center in Japan (8) with the discovery circumstances summarised in **Table II**. **Table III** shows the total number of isotopes to date for each platinum group element.

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Table I
The Discoverers of the ^{195}Os Isotopes

Mass number	Half-life	Decay modes	Year of discovery	Discoverers	References
195	6.5 min	β^- ?	1957	Baró and Rey	3, 4
195m	2 h	β^- ?, IT?	2012	Reed <i>et al.</i>	6

Table II
New Isotopes of Ruthenium

Mass number	Half-life	Decay modes	Year of discovery	Discoverers	References
85	ps	EC + β^+ ?	2013	Suzuki <i>et al.</i>	8
86	ps	EC + β^+ ?	2013	Suzuki <i>et al.</i>	8

ps: Particle stable (resistant to proton and neutron decay)

EC: Orbital electron capture in which the nucleus captures an extranuclear (orbital) electron which reacts with a proton to form a neutron and a neutrino, so that the mass number of the daughter nucleus remains the same but the atomic number decreases by one

β^+ : Beta or proton decay for nuclear deficient nuclides is the emission of a positron (and a neutrino) as a proton in the nucleus decays to a neutron. As with EC the mass number of the daughter nuclide remains the same but the atomic number decreases by one. However this decay mode cannot occur unless the decay energy exceeds 1.022 MeV (twice the electron mass in energy units)

Table III

Total Number of Isotopes and Mass Ranges Known for Each Platinum Group Element to 2014

Element	Number of known isotopes	Known mass number ranges
Ru	40	85–124
Rh	38	89–126
Pd	38	91–128
Os	43	161–203
Ir	42	164–205
Pt	44	166–209

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John W. Arblaster is interested in the history of science and the evaluation of the thermodynamic and crystallographic properties of the elements. Now retired, he previously worked as a metallurgical chemist in a number of commercial laboratories and was involved in the analysis of a wide range of ferrous and non-ferrous alloys.