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The History of Element 43 - Technetium

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Letters

The History of Element 43—Technetium

The article "From Masurium to Trinacrium: The Troubled Story of Element 43" by Roberto Zingales *(1)* is the best story so far published about the history of element 43—technetium. There is, however, one paragraph on the right column of page 226 that is questionable. The anonymous news item in *Journal of Research of the National Institute of Standards and Technology (2)*, referred to in ref *39* of the article erroneously as by P. H. Van Assche and J. T. Armstrong, cannot stand up to the well-documented assertion of the well-established physicist Paul K. Kuroda (1917–2001) in his paper, "A Note on the Discovery of Technetium" *(3)* that the Noddacks did not discover technetium, then known as masurium. More about this matter can be found in Kuroda's book, *The Origin of Chemical Elements and the Oklo Phenomenon (4),* and the book *Ida Noddack (1896–1978). Personal Recollections on the Occasion of 80th Anniversary of the Discovery of Rhenium (5)* recently published by the writer and available from Laval University Bookstore "Zone" in Quebec City.

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The author replies:

Since the publication in this *Journal* of my paper on the discovery of element 43 *(1)*, I have received a few letters questioning the correctness of the next to last paragraph, in the section entitled *Nemesis*.

In a first draft, the story I wrote ended with the acknowledgment of the discovery to Segrè and Perrier, and with their proposal to name element 43 *technetium*. Just before the manuscript had been submitted, I found some additional documents *(2, 3)*, which likely misled me, suggesting that, owing to the recently discovered presence of minute amounts of technetium in pitchblende produced from spontaneous ^{238}U fission *(4)*, the Noddacks could have effectively been the first to find measurable amounts of element 43, as the ores they had analyzed contained uranium too.

This idea has been put forward from the Belgian physicist Pieter van Assche *(5)* who tried an *a posteriori* analysis of their data to show that the detection limit of Noddacks' analytical method could have been 1000 times lower than the 10^{-9} value reported in their paper *(6)*.

This value of the Noddacks' residue composition has been used by a NIST scientist, John T. Armstrong, to simulate the original X-ray spectrum *(3)*. Without any reference of where the original data have been published, Armstrong claims a close similarity between the simulated spectra and the original one, giving a *compelling* support to the Noddacks' identification of fission masurium, based on spectral data. These statements have had a wide circulation on the Web.

After having read my paper, Gunter Herrmann from the University of Mainz sent me a copy of his paper *(7)*, where, by means of a keen examination, he showed that van Assche's arguments appear to be developed ad hoc, to arrive with some forcing to a previously established result. Indeed, as shown from Kenna and Kuroda *(4)*, the ^{99}technetium content expected in a typical pitchblende (50% uranium) is about 10^{-10} g/kg of ore, and, as uranium was never more than about 5% in Noddacks' columbite samples, the amount of element 43 could not exceed 3×10^{-11} μg/kg of ore *(8)*. It is clear that such a low quantity could not be weighed, nor give X-ray lines of element 43 that could be clearly distinguished from the background noise. The only way to detect its presence is to carry out radioactive measurements, a technique that the Noddacks did not use *(8)*, but Segrè and Perrier did.

I am deeply indebted to George B. Kauffman, Fathi Habashi, Gunter Herrmann, and Jean Pierre Adloff, who provided me with additional information and convinced me to better consider the published material on the so-called Noddacks' rehabilitation and to correct with this letter my gross mistake, for which I apologize.

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7. Herrmann, G. *Nucl. Phys.* **1989**, *A505*, 352–360.
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