

Why Helium Ends in “-ium”

William B. Jensen

Department of Chemistry, University of Cincinnati
Cincinnati, OH 45221-0172

Question

Why does helium have the ending “-ium” usually reserved for metals?

Henry A. Bent
5816 Solway Street
Pittsburgh, PA 15217

Answer

The story of the element helium begins with the independent discovery by the British astronomer, Norman Lockyer (figure 1), and the French astronomer, Pierre-Jules-Cesar Janssen (1824-1907), of an unidentifiable line in the spectra of the solar prominences observed during the eclipse of 1868. Because the bright yellow line was close to the D1 and D2 lines of sodium, it was designated D3. In order to identify the lines in his spectral data, Lockyer enlisted the help of the prominent British chemist, Edward Frankland (1825-1899). Their laboratory work showed that the majority of the observed solar lines were due to hydrogen, though often modified by changes in temperature and pressure (1). The D3 line, however, could not be reproduced in the laboratory. As a result, Lockyer concluded that it belonged to a unknown element for which the name “helium” (from the Greek, *helios*, meaning “sun”) was contrived.

Most biographies of Lockyer claim that he coined the name (2), whereas other sources attribute it to Frankland (3). However, this latter claim is unlikely, as we know from private correspondence that Frankland did not support the helium hypothesis (4). Well aware of the large number of spurious elements proposed in the chemical literature, he felt that the line would eventually be found to belong to hydrogen under more extreme conditions of temperature and pressure. Further complications arise from the fact that Lockyer never seems to have formally proposed the name “helium” in a published paper nor is it mentioned in his various books (5). However, it appears to have been common knowledge in British scientific circles and was referred to by others in various lectures and books (6).

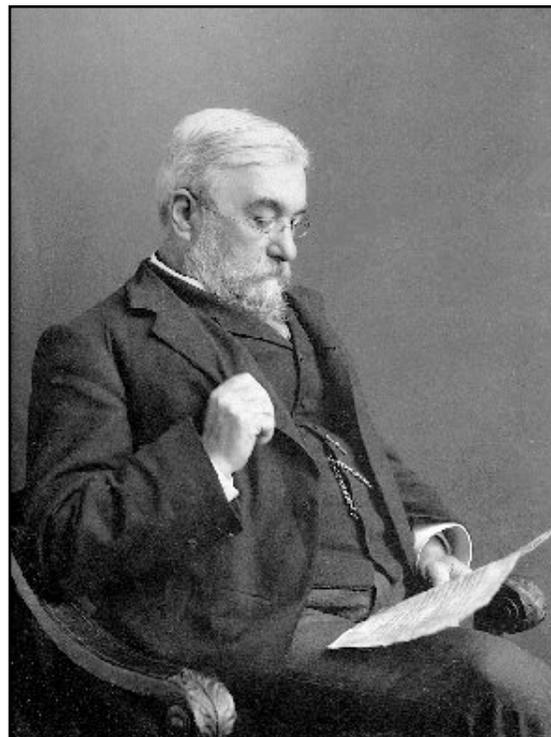


Figure 1. Joseph Norman Lockyer (1836-1920).

As is well known, terrestrial helium was finally isolated by Sir William Ramsay (figure 2) in 1895 from the occluded gases in uranium minerals. Ramsay's laboratory notebooks reveal that he originally named the new gas “krypton” (7). However, after Sir William Crookes (1853-1925) informed him that the yellow line in the spectrum of the new gas was identical to that of Lockyer's helium, Ramsay deferred to Lockyer's name choice, no doubt because of Lockyer's prominence in the British scientific community, and instead reused krypton for one the heavier noble gases that he later isolated in collaboration with Morris Travers.

The use of a compromise name, such as “helon” or “helion,” does not seem to have occurred to anyone. Since Lockyer apparently never formally proposed the name in print, we do not know why he chose to use a metallic ending. Possibly because of its close association with the lines of sodium, he assumed it would also

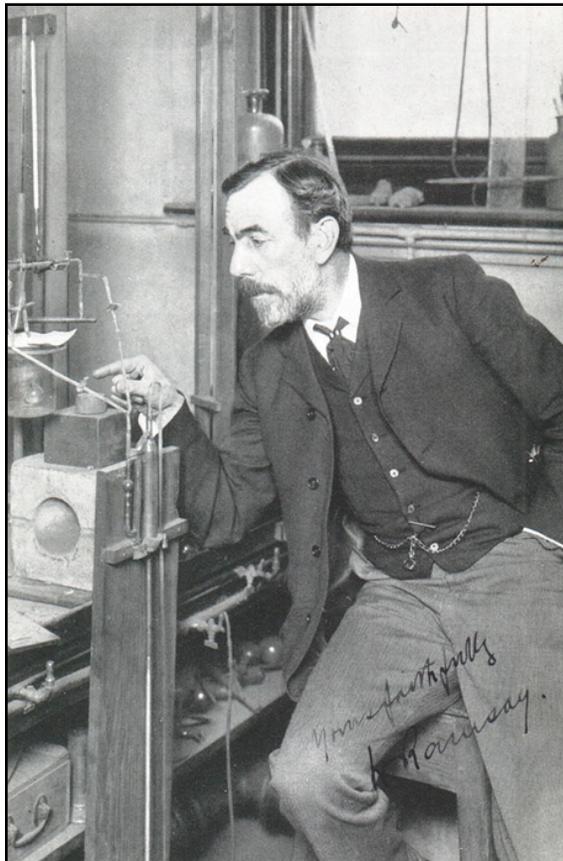


Figure 2. William Ramsay (1852-1916).

be a metal, but more likely, as an astronomer, he was unaware of the finer points of chemical nomenclature. This supposition is supported by the fact that, as a result of his own spectroscopic studies of Ramsay's new gas, Lockyer became convinced that it was a mixture of helium and yet another nonmetallic gas which he called "asterium," thus compounding his initial chemical *faux pas* (8).

Literature Cited

1. E. Frankland, N. Lockyer, "Researches Upon Gaseous Spectra in Relation to the Physical Constitution of the Sun," *Proc. Roy. Soc.*, **1869**, *17*, 288-291, 453-454; *Ibid.*, **1869**, *18*, 79-80.

2. See T. M. Lockyer, W. L. Lockyer, *Life and Work of Sir Norman Lockyer*, Macmillan: London, 1928, p. 42; and

A. J. Meadows, *Science and Controversy: A Biography of Sir Norman Lockyer*, MIT Press: Cambridge, MA, 1972, p. 60.

3. See C. A. Young, *The Sun*, Appleton: New York, NY, 1881, p. 88; and W. Ramsay, *The Gases of the Atmosphere*, 4th ed., Macmillan: London, 1915, pp. 234-235.

4. Letter from Frankland to Lockyer of 9 September 1872. Quoted in Meadows, reference 2, pp. 59-60.

5. No published source is cited for the proposed name in any of the various histories of the discovery of the chemical elements found on my shelves, nor in any of the biographies of Lockyer, nor in Lockyer's own historical account of the discovery of helium. See N. Lockyer, "The Story of Helium," *Nature*, **1896**, *53*, 319-322, 342-346. The name helium is also not listed in the indices of Lockyer's books, *The Spectroscope and Its Applications* (1873) and *The Chemistry of the Sun* (1887).

6. The helium hypothesis was first referred to in public by Lord Kelvin in his BAAS address of 1871 and again by W. B. Carpenter in his address of 1872. It is also mentioned in Young, reference 3, p. 88.

7. M. W. Travers, *A Life of Sir William Ramsay*, Arnold: London, 1956, Chap. 8.

8. N. Lockyer, "On the Appearance of the Clevite and other New Gas Lines in the Hottest Stars," *Proc. Roy. Soc.*, **1897**, *62*, 52-66.

Do you have a question about the historical origins of a symbol, name, concept or experimental procedure used in your teaching? Address them to Dr. William B. Jensen, Oesper Collections in the History of Chemistry, Department of Chemistry, University of Cincinnati, Cincinnati, OH 45221-0172 or e-mail them to jensenwb@ucmail.uc.edu

2009 Update

Shortly after the publication of this column, James Espenson of Iowa State brought to my attention a footnote on page 108 of the second edition (1953) of Linus Pauling's introductory textbook, *General Chemistry*, which reads:

The ending "ium," which is otherwise used only for metallic elements, is due to Lockyer's incorrect surmise that the new element was a metal. "Helion" would be a better name.