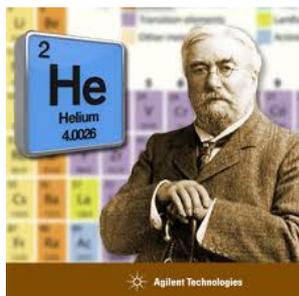


Sun – Part 9 - Discovery of helium



Norman Lockyer



Helium discovered during a solar eclipse

The name of the second element in the periodic table, helium, is derived from the Greek word for the Sun ie helios. This was in recognition of the fact that it was in the Sun's atmosphere that this gas was first detected. It is notable that the discovery of the second most abundant element in the Universe involved several scientists and lasted almost 30 years.

Two astronomers are credited with the initial discovery of helium. In August 1868, the French astronomer Pierre J. C. Janssen travelled to India to measure the solar spectrum during a total eclipse. He studied the spectrum of the light energy passing through a prism. At the time, he noticed bright lines in the spectrum of the chromosphere (atmosphere) which showed this area to be gaseous. Later, he noticed that, also present in the spectrum, was a distinctive bright yellow line. He assumed that the line was of sodium.

The English scientist and astronomer Joseph Norman Lockyer also recorded the same line in the same year. In the 1860s, he became fascinated by electromagnetic spectroscopy as an analytical tool for determining the composition of celestial bodies. In October 1868, he set up a new, relatively powerful, spectroscope and, through the London smog, independently from Janssen, also observed the emission spectrum of the chromosphere, including the same yellow line. Unlike Janssen, Lockyer explored this new finding further. He found that the wavelength was actually slightly less than the lines of sodium and could not be explained by any known material.

During the following years, he worked with the chemist Edward Frankland on this problem. After unsuccessfully testing to see if it was a new type of hydrogen, they concluded that the line could be caused by an unknown element. They named the element helium in recognition of where it had first been detected. It was the first time a chemical element was discovered on an extraterrestrial body before being discovered on Earth. At the time, Lockyer's claim that a new element existed in the Sun was controversial and acceptance of his discovery by the scientific community had to await its discovery on Earth.

In 1882, the Italian Luigi Palmieri found the same line in the spectrum of gases emitted by Vesuvius, in retrospect, the first detection of helium on Earth. It was also found by the American William Hillebrand, in 1889, when he collected the gas given off by the mineral uraninite as it dissolves in acid. However, he attributed the lines to nitrogen.

It was Per Teodor Cleve and Nils Abraham Langer at Uppsala, Sweden, in 1895, who found helium emanating from the uranium ore cleveite. and confirmed that it was the second lightest element. They also collected enough gas to accurately measure its atomic weight.

In the same year, Earth-based helium was also discovered independently in London by the Scottish chemist William Ramsay. Like the Swedes, he treated the mineral cleveite with mineral acids. He was looking for argon, but, after separating nitrogen and oxygen from the gas liberated by sulphuric acid, he noticed a bright yellow line that matched the line previously observed in the Sun's spectrum. Lockyer's claim was vindicated when Ramsay sent him a discharge tube filled with helium gas that he had gathered from his experiment.

Graciously, Hillebrand, despite being so close to being the person who discovered helium on Earth, acknowledged his scientific error and, in a congratulatory letter, formally recognised Ramsay as the discoverer of helium.

Source: Ridpath, I (Ed) (2012) Oxford dictionary of astronomy 2nd ed rev, www.en.wikipedia.org, www.rsc.org, Parson, P and Dixon, G (2013) The periodic table: a field guide to the elements, Aldersey-Williams, H (2011) Periodic tales: the curious lives of the elements.