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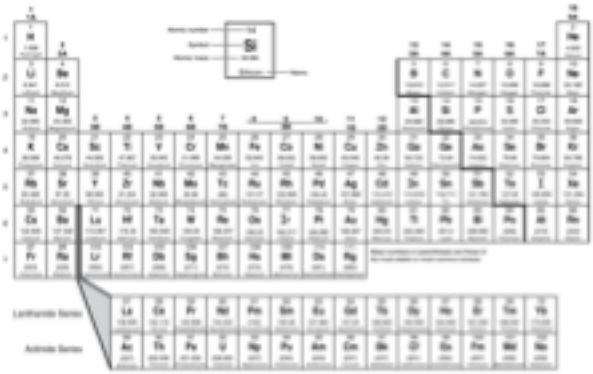
READING SCIENCE!

The Creation of the Modern Periodic Table



1 You may have already heard the name Dmitri Mendeleev, the Russian chemist who is often given the credit for the creation of the modern Periodic Table. He did play a critical role in the formation of the Periodic Table as his original elemental table was very similar to the one that you use today. However, he did not come to this conclusion by himself. There was a long history of discoveries that led to Mendeleev's creation, and there were even more discoveries after his death that led to the final version of this all important resource. Let us recount this journey.

2 Almost 3,000 years ago, there were people who studied nature, known as natural philosophers, who attempted to understand how natural systems worked. Aristotle was one of these natural philosophers, and in 330 BC, he deduced that all matter was made of four "elements": earth, air, fire, and water. This is not quite as elementary as it may seem, as the elements that he deduced do in fact pertain to both the states of matter that we know today and the energy required to create chemical reactions.

3 It wasn't until the 1700s that "modern" advancements in science began. Antoine Lavoisier, often referred to as the "Father of Modern Chemistry," used these types of scientific philosophies along with the scientific method to produce some groundbreaking discoveries. In the late 1700s, Lavoisier not only was able to make the distinction between metals and nonmetals (an important future distinction on the Periodic Table), but also was able to identify and name over 30 elements. In 1789, he published the first modern chemistry textbook. This book included the first accurate definition of the Law of Conservation of Mass, a critical concept that aids in the process of chemical analysis.

4 The scientific method continued, as Jöns Jakob Berzelius created a table in 1828 based upon the atomic weights of the known elements. In order to better recognize those elements, he gave them symbols, or letters. In 1829, a scientist named Johann Döbereiner saw patterns of elements with similar properties. He grouped elements into triads. For example, he saw that chlorine, lithium, and iodine formed a triad (elements in modern groups.) The science of chemistry continued to advance. In 1864, a man named John Newlands used the then 56 known elements to expanded on Döbereiner's triad patterns. He saw that there were even more similarities between the elements, specifically between the 1st and 9th elements. He called these similarities the "Law of Octaves" (elements in modern periods.) He grouped these elements into 11 groups based on similar characteristics.

5 1864 became a very important year for the creation of the modern Periodic Table, as yet another scientist named Lothar Meyer made contributions to its early form. He developed a version of the table using the pattern of the valence electrons of 28 of the 56 known elements. Then, in 1869, he took all of this information and created a Periodic Table of the 56 known elements based on other elemental properties, such as atomic weight.

6 In this same year, 1869, Dmitri Mendeleev created his own table. So why does Mendeleev's table receive so much credit? His table was also based on atomic weights, but it was the way that he arranged this information that made his table so valuable. He arranged the elements in a "periodic way," which means that elements with similar properties were placed underneath each other. The elements with lower atomic weights were placed on the top row, and the elements with heavier atomic weights were placed below them. This led to the first Periodic Table form just like the one you use today. There were gaps in Mendeleev's table, but those gaps would soon be filled by future discoveries. The truly interesting thing is that as modern science was able to fill these gaps, the form of his table did not need to be altered. Mendeleev had gotten it right!

7 In 1894, a man named William Ramsay discovered the noble gases. In 1913, Henry Moseley calculated the atomic number of each of the known elements, discovering that the properties of elements relied only partially on their atomic number. He found that the number of electrons in an atom were what actually contributed chemical properties, and so it was shown that the form of the Periodic Table is based on electron properties and not on atomic mass. However, Mendeleev's form still held. The final two pieces of the puzzle came in 1932, when James Chadwich discovered neutrons, and in 1945, when Glenn Seaborg discovered the lanthanides and actinides.

1 Who was known as the "Father of Modern Chemistry," and who created the first chemistry textbook?

A Jöns Jakob Berzelius

B Dmitri Mendeleev

C Antoine Lavoisier

D Lothar Meyer

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2 Dmitri Mendeleev created an early version of the Periodic Table based on atomic mass. What is the modern Periodic Table form based on?

A Atomic number

B Electron properties

C Atomic size

D The date that the element was discovered

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3 Dmitri Mendeleev and Lothar Meyer created similar elemental tables in 1869. Why was Mendeleev's table "more valuable" to modern science than Meyer's table?

A Mendeleev ordered his table in a periodic way.

B Meyer did not include atomic weights.

C Mendeleev used more elements.

D There were gaps in Meyer's table.

4 In 1913, a scientist named Henry Moseley discovered that the properties of elements relied partially on what?

A Their color

B Their atomic mass

C The number of electrons

D Their atomic size

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5 Which scientist discovered that elements could be grouped into "triads," or elements with similar properties?

A James Chadwich

B Aristotle

C William Ramsay

D Johann Döbereiner

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6 A scientist named John Newlands discovered an early pattern on the Periodic Table regarding similarities between the 1st and 9th elements. What did he call this pattern?

A The Law of Periodicity

B The Law of Octaves

C The Law of Elements

D The Law of Trends