

During the nineteenth century, chemists began to categorize the elements according to similarities in their physical and chemical properties. The end result of these studies was our modern periodic table.

Johann Dobereiner

In 1829, he classified some elements into groups of three, which he called triads. The elements in a triad had similar chemical properties and orderly physical properties.

(ex. Cl, Br, I and Ca, Sr, Ba)

Model of triads

1780 - 1849



John Newlands

In 1863, he suggested that elements be arranged in "octaves" because he noticed (after arranging the elements in order of increasing atomic mass) that certain properties repeated every 8th element.

Law of Octaves

1838 - 1898




John Newlands

| | | | | | | |
|----|----|----|----|----|----|----|
| H | Li | Be | B | C | N | O |
| F | Na | Mg | Al | Si | P | S |
| Cl | K | Ca | Cr | Ti | Mn | Fe |

Newlands' claim to see a repeating pattern was met with savage ridicule on its announcement. His classification of the elements, he was told, was as arbitrary as putting them in alphabetical order and his paper was rejected for publication by the Chemical Society.

1838 - 1898 Law of Octaves

John Newlands

His law of octaves failed beyond the element calcium. WHY?

Would his law of octaves work today with the first 20 elements?

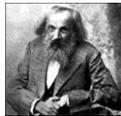
1838 - 1898 Law of Octaves



Dmitri Mendeleev

In 1869 he published a table of the elements organized by increasing atomic mass.

1834 - 1907

Lothar Meyer

At the same time, he published his own table of the elements organized by increasing atomic mass.

Periodic Table of the Elements

*Lanthanide Series
*Actinide Series



1830 - 1895

Periodic Table of the Elements

*Lanthanide Series
*Actinide Series

Elements known at this time

- Both Mendeleev and Meyer arranged the elements in order of increasing atomic mass.
- Both left vacant spaces where unknown elements should fit.

So why is Mendeleev called the "father of the modern periodic table" and not Meyer, or both?

Mendeleev...

- stated that if the atomic weight of an element caused it to be placed in the wrong group, then the weight must be wrong. (He corrected the atomic masses of Be, In, and U)
- was so confident in his table that he used it to predict the physical properties of three elements that were yet unknown.

After the discovery of these unknown elements between 1874 and 1885, and the fact that Mendeleev's predictions for Sc, Ga, and Ge were amazingly close to the actual values, his table was generally accepted.

However, in spite of Mendeleev's great achievement, problems arose when new elements were discovered and more accurate atomic weights determined. By looking at our modern periodic table, can you identify what problems might have caused chemists a headache?

*Lanthanide Series
*Actinide Series

Ar and K
Co and Ni
Te and I
Th and Pa

Henry Moseley

In 1913, through his work with X-rays, he determined the actual nuclear charge (atomic number) of the elements*. He rearranged the elements in order of increasing atomic number.

*"There is in the atom a fundamental quantity which increases by regular steps as we pass from each element to the next. This quantity can only be the charge on the central positive nucleus."

1887 - 1915



Henry Moseley

His research was halted when the British government sent him to serve as a foot soldier in WWI. He was killed in the fighting in Gallipoli by a sniper's bullet, at the age of 28. Because of this loss, the British government later restricted its scientists to noncombatant duties during WWII.

Glenn T. Seaborg

After co-discovering 10 new elements, in 1944 he moved 14 elements out of the main body of the periodic table to their current location below the Lanthanide series. These became known as the Actinide series.

Actinide Series

| | | | | | | | | | | | | | |
|----|----|---|----|----|----|----|----|----|----|----|----|----|----|
| Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lr |
|----|----|---|----|----|----|----|----|----|----|----|----|----|----|

1912 - 1999



Glenn T. Seaborg

He is the only person to have an element named after him while still alive.

"This is the greatest honor ever bestowed upon me - even better, I think, than winning the Nobel Prize."

1912 - 1999

