Podcast Script – History of the Periodic Table.

Hello,

This podcast comes to you today from Dhahran, Saudi Arabia, sponsored by Scramling Science. Today’s topic is History of the Periodic Table.

Science by its nature likes to organize. The Greeks for instance organized its views of nature by its philosophy and even had an order and organization for their elements of air, water, fire, and earth.

The need for more exact methods of organization were growing in the mid to late 1800’s due to the increase in the number of known elements.

As early as the 1820’s a scientist named Johann Dobereiner organized the known elements into triads. Groups of three elements where the middle one had properties that were the average of the other two. There were several holes in this idea but it showed that there were patterns to be seen in the study of the elements.

In the 1860’s Stanislao Cannizzaro followed up on the work of his countryman, Amedeo Avagadro to show that it was possible to find exact weights of various atoms.

John Newlands came up with the Law of Octaves, which showed that every 8th element had similar properties. For example, Lithium is element 3 and has similar properties to the element Sodium, which has an atomic number of 11.

The works of these three were all well and good, but it was the work of Dmitry Mendeleev in the mid-1860’s that determined the beginnings of the periodic table. Mendeleev believed so strongly about his findings that he created a periodic chart that not only included all the known elements at the time, but predictions for elements that were yet to be discovered. In order for his chart to work, there needed to be blank places in his chart. If not, the trends would not be seen. At the time of Mendeleev, there were elements being found all the time. Mendeleev correctly predicted that his blank places were simply elements that were not yet discovered.

To give his ideas more credence, he predicted the properties of several of these elements. As luck would have it, these elements of Scandium, Gallium, and Germanium were all discovered and when they were experimented on, it was determined that they had physical properties very similar to what was predicted by Mendeleev.

Mendeleev’s chart was based on atomic weight and not atomic number. Atomic number was not discovered until about 1915 by Henry Moseley. In contrast, methods to determine relative weights of elements were well known by Mendeleev’s time.

When Moseley discovered the proton, it was now possible to assign an atomic number (the number of protons in an atom’s nucleus) to each element. Though the two methods and results are similar it is clear that this was a better way of organizing elements than atomic weights were.

Today’s periodic chart is based on atomic number.

This now gives us the periodic law: The physical and chemical properties of the elements are periodic functions of their atomic numbers.

With the rearrangement of elements on the chart, elements are now found in columns of similar properties.

For example the Alkali metals are in the column to the far left of the chart. They are all soft metals, reactive in water.

Unknown at the time were the Noble Gases. Their lack of reactivity made them difficult to observe, but in a span of about 30 years all of the Noble gases were discovered and it was decided to put them all in a column to the far right of the current periodic chart.

Over time, more elements were discovered; some natural and some man-made. As more modifications were made to the chart, we now end up with what we now see in our textbooks and on our classroom walls – the modern periodic chart.

Glenn Seaborg was credited with the idea of taking out the rare-earth elements and placing them at the bottom of the chart. These are also sometimes called the inner-transition elements.

There is a central committee responsible for organization of the sciences. It is called IUPAC (I – U – P – A – C ) which stands for the International Union of Pure and Applied Sciences. Their latest change in the periodic chart is to label each group from 1 to 18, so the column which starts with Hydrogen would be Group 1 all the way to the other side, which is the group which starts with Helium and it is called the Group 18. However, in practice, these are not usually used. Chemists either will use their names such as the Noble Gases or the Halogens, or they will use the old numerical names such as the group that starts with Oxygen being called the Group VI elements. Many prefer this method because it conveys more information. The VI refers to the number of valence electrons which is an important aspect of the atom.

Periodicity is the idea that the chart is arranged in such a way that atoms in the same Group will have similar properties. The Alkali Metals for instance, all form +1 ions, they are all reactive in water, and are very soft and easily cut. The Noble Gases are all atoms with a filled outer shell and therefore naturally stable. This stability means that they don’t need other atoms to form bonds with to achieve a greater stability.

I hope you enjoyed today’s Podcast and found it entertaining and educational, and helped you with your understanding of History of the Periodic Table. Remember that you can get more information on this topic from the class website or you can always send me a note on either FaceBook or via email. Refer back to this topic when needed, courtesy of Scramling Science.