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Science, Chemistry

Aaron Wong History and Development of the Periodic Table Period 11 The most basic arrangement of the periodic table was in 1649. By this time, many elements have been known but the first scientific discovery of an element was in 1649. Hennig Brand discovered phosphorus, the first element discovered through scientific inquiry. He attempted to create a Philosopher's Stone which was supposedly able to turn metals into pure gold. During his experiment, he heated residues from boiled urine, and a liquid dropped out and turned into flames. This was the first discovery of phosphorus. During the next 200 years were when chemists started to recognize patterns in properties of elements and gained much knowledge about the properties and compounds of them. In the late 1700s, the first extensive list of elements was created. It was created by Antoine Lavoisier, a French chemist. The first list contained 33 elements and was distinguished between metals and non-metals, dividing the few known elements into four classes. He devised a naming system for the discovery of new elements. Additionally, Antoine Lavoisier was the first chemist to define an element as a substance that cannot be broken down by chemical means. His findings greatly contributed and impacted many chemists and their ideas on elements. It helped them start to categorize and understand the elements more thoroughly. In 1803, John Dalton developed an atomic theory based off the fact that elements were combined with each other according to different ratios by weight. As a part of his theory, Dalton built a scale of atomic weight based on the hydrogen atom. John Dalton calculated the first relative weights of atoms and compounds. In 1808, he published a list of elements along with their atomic weights. Around 1810 to 1830, JÃ¶ns Jakob Berzelius, a Swedish

chemist, developed a table of atomic weights that contained all of the elements known to that date. He also introduced and incorporated letters to symbolize elements. These letters abbreviated the elements based off their Latin names. Before this, symbols from the early Greeks and alchemists were used to symbolize elements. Berzelius became most famous for this series of experiments that demonstrated the fact that the elements in substances are held together in definite proportions by weight. This became known as the law of constant proportions. Through these experiments, Berzelius was also able to discover many new elements such as cerium, selenium, thorium and many more. With all of these elements, he determined the atomic weights of almost all of them and created his own table of atomic weights. In the table, he used oxygen as a standard of weight and set its weight equal to exactly 100. During the 1820s, Johann DÃ¶bereiner, a German chemist, discovered the existence of families of elements with similar chemical properties. He grouped these elements in triads, group of threes. The appearance and reactions of the elements in a triad were similar to each other. He first found that Strontium had about the average properties of Calcium and Barium, and grouped these three together accordingly. Not only did DÃ¶bereiner find chemical patterns of the elements in the triad, but also physical patterns. He stated that the atomic mass of the middle element of the triad was almost equal to the average atomic mass of the first and third element. Furthermore, Johann went on and tested if the other properties of these triads were similar, such as their specific gravity and affinity, and they were. He ended up discovering two other triads. The halogen triad of chlorine, bromine and iodine and the alkali metal triad of lithium, sodium, and

potassium. His discovery of the triads gave other scientists a clue that relative atomic masses were important when arranging the elements. In 1862, a French geologist, A. E. Beguyer de Chancourtois, published the first geometric representation of the elements. He drew a list of the elements on a cylinder arranged by atomic weight. There was a continuous spiral around the cylinder and it was separated into 16 parts. Chancourtois ordered the elements by increasing atomic weight and with similar elements lined up vertically. He wrote the atomic weights on the surface of the cylinder with a circumference of 16 units, which was the approximate atomic weight of oxygen. The resulting helical curve brought similar elements onto corresponding points above or below one another on the cylinder. From this he proposed that " the properties of the elements are the properties of numbers." He was the first scientist to see elements when they were arranged in order of their atomic weights. He saw that the similar elements occurred at regular atomic weight intervals. This was the first geometric representation of the periodic law. His diagram contained ions and compounds as well so it was not a correct representation of the elements. In 1863, John Newlands, an English chemist, classified the 56 known elements into 11 groups based on similar properties. He arranged all the elements into a table in order of relative atomic mass. Newlands noticed that any element’s chemical properties were similar to the eight element following it in the table. This was known as the Law of Octaves. 1869 lothar meyer, Dmitri Mendeleev 1895 lord Rayleigh 1898 william ramsey 1911 ernest Rutherford 1938 henry Moseley 1940 glenn seaborg