

WHAT INCREDIBLE THINGS DOES THE PERIODIC TABLE OF CHEMICAL ELEMENTS KEEP?

What do you know about the periodic table of chemical elements? Do you know how many elements it contains nowadays? Moreover, do you know how many elements it contained two hundred years ago?

We all know the myth that D.I. Mendeleev saw the periodic table in his dream. However, it is not true. The periodic table of chemical elements was discovered by systematization of these elements according to their atomic weight by the Russian scientist in the second half of the 19th century, or to be more exact in 1869.

However, there are a few exceptions, which are related to the atomic weight of the elements: *Argon and Potassium, Cobalt and Nickel, Tellurium and Iodine, Protactinium and Thorium*. These four pairs of elements have the inverted order of their atomic weight. This phenomenon is due to the fact that in each of these four pairs the atomic weight of the mixture of isotopes with a lower atomic number is bigger than for the element with a higher atomic number [2, p. 13].

The main components of the periodic table are periods and groups. The horizontal rows of the table are called periods. They coincide with the energy levels or the principle quantum number. Also the higher the quantum number is, the higher the energy of electron is. The vertical rows of the table are known as groups. They are divided into main *A-groups* and side *B-groups*. The number of group equals to the number of outer electrons.

The discovery of new elements was the main idea of the scientists of the last centuries. In those days many of the common elements had been known since antiquity, some of them had been obtained not long before the periodic

table was compiled, and the last ones were obtained when the periodic table had already existed. Thus, the more science and technologies were developed, the more elements were discovered.

Do you know how the unknown elements were first obtained? So let's talk about it!

For example *Fluorine*. It was first discovered in 1886 by the French chemist *Henri Moissan*. He obtained the gas by the electrolysis of a solution of KF in liquid HF, but his experiments to get the pure fluorine took several years [2, p. 49]. As time passes, it has been established that fluorine is the most reactive element of all. The high reactivity is due to the fact, that its molecule has a low binding energy, while the chemical bond in many of its compounds is extremely strong. The distinctive feature of fluorine is that it is a strong oxidizing agent in all reactions due to its high electronegativity [1, pp. 310-311].

The next interesting element is *Gallium*. It is the first element that was predicted by D.I. Mendeleev. The French scientist *P. Lecoq De Boisbaudran* first obtained gallium in 1885 [4].

In nature we can find only 92 elements from the periodic table. The remaining elements which atomic number is higher than 92 have radioactive properties and don't exist in free state in nature, but they are synthesized in the laboratories.

Only nine elements such as *Darmstadtium*, *Roentgenium*, *Copernicium*, *Nihonium*, *Flerovium*, *Moscovium*, *Livermorium*, *Tennessine* and *Oganesson* have been obtained and added to the periodic table in the last thirty years. Such a small number of discovered elements is due to the fact that all light and simple elements were obtained before. Another problem is that all heavy elements are radioactive during the reaction they emit radioactive particles. Because of it all these elements have a fairly short half-life. For example, *the nuclei of the Oganesson atom decompose within milliseconds of being created* [5, p. 20].

The last element, that was added to the periodic table, was *Tennessine*. It happened in Dubna in 2009. To obtain this element scientists used the isotope of *Berklium-249* and *Caicium-48 isotope ions*. The atom has seven outer electrons, this means that it belongs to the Halogen subgroup. As *Tennessine* has been recently obtained we can only assume its properties [3].

So, all these discoveries have led to the fact than in our time as many as 118 elements are known. To discover new elements we need the most advanced laboratories in the whole world [5, с. 19].

To sum up, Dmitry Ivanovich Mendeleev made the periodic table of chemical elements and set the periodic law. The scientist made an amazing discovery at that time. It made it possible to predict the discovery of new elements. Even when Mendeleev made the first periodic table, he left blank cells, knowing that later scientists would fill in the blanks.

His periodic law allows us to see the change of variation in radius, electronegativity, the structure of the outer shell. It helps us to understand how substances will react with other ones based on their chemical properties.

References

1. Ахметов, Н. С. Общая и неорганическая химия: учеб. для вузов / Ахметов Н. С. — М.: Высш. Шк., Изд. Центр «Академия», 2001. — С. 21, 310-311.
2. Левкевич, И. В. Английский язык / English: учебное пособие / Левкевич И. В., Мойсейчик Л. В., Радиевская В. А. — Минск: Народная асвета, 2019. — С. 13, 49
3. Теннессин [Электронный ресурс]. — Режим доступа: http://kontren.narod.ru/x_el/info117.htm. — Дата доступа: 24.12.2021.
4. Открытие новых элементов [Электронный ресурс]. — Режим доступа: <https://www.sstu.ru/nauka/iypt/otkrytie-novykh-elementov/>. — Дата доступа: 24.12.2021.

5. Rau, M. The number game: extending the periodic table / M. Rau // Science in School. — Winter 2012. — № 25. — С. 18-21.