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History Of Great Discoveries In Physics

Mahmudov Yusup G'anievich
Doctor Of Pedagogical Sciences, Professor Of "General Physics" Termez State University, Uzbekistan

ABSTRACT

History of great discoveries in physics french scientist AA Beckerel, german physicist VK Rentgen, english physicist, founder of nuclear physics, polish scientists E. Rutherford, french physicists Maria and Pierre Curie, german scientist G. Schmut, Russian chemist D.I. Mendeleev, english physicist and chemist F. Simple, romanian chemist and physicist G.Heveshi, austrian radiochemist and chemist F.Panet, english physicist J.D.Cockroft, Irish physicist E.T.S. Walton, the english physicist-experimenter J. Chedwick, is directly and indirectly associated with the names of the italian scientist E. Fermi.

KEYWORDS

Radioactivity, light, radioactive element, radiochemistry, model, theory, isotope, property, decay, experiment, field, ion, phenomenon, fact, structure, nucleus, transuron element.

INTRODUCTION

Speaking of the history of the discovery of radioactivity, of course, the French scientist A.A. It is natural that Beckerel's name be mentioned. If you read a book on radioactive changes, you will see that it begins with the following words: "In 1896, the French scientist A.A. Shortly before that, Beckerel met the German physicist V.K. The x-ray (x) discovered by X-rays is very interested in light ... "Yes, all this is true, of course.

V.K. It is also true that X-rays discovered rays in 1895 (later named after him), and even that his uranium salts were exposed to sunlight and then placed on a photoplate wrapped in black paper. Indeed, A.A. Beckerel was able to discover that there were special rays, which he himself called uranium rays, and whose intensity (intensity) was directly proportional to the amount of uranium being examined from the salt. But no matter what, the first inventor of these rays was A.A. It was not Bekkerel. Perhaps this phenomenon, i.e. the fact that uranium emits invisible rays, was discovered by A.A. Seventy years before Becquerel, Nasps de Saint-Victor, a young lieutenant in a French army, was watching. We are not mistaken in saying that Victor was unlucky. His article, published in one of the French scientific journals, has been overlooked by scientists for 30 years, surpassing the possibilities and needs of science (not to mention industry). Work in the field of radioactivity research was heated. When Pierre Maria Curie discovered radium and polonium, however, scientists did not have the opportunity to read old journals. Thus, the fame of the discovery of the phenomenon of the elements themselves is A.A. It remained in the name of Beckerel.

The study of this discovered phenomenon has progressed at a tremendous rate. Soon A.A. Beckerel found that the rays emitted from uranium were capable of ionizing the air. He hypothesized that uranium rays bend in a magnetic field and resemble cathode rays in their properties, and proved this to be true in an experiment in 1890. Finally, a few years later, E.J. Rutherford showed that uranium rays can be divided into three components called α, β, γ- rays. Later, it was discovered that a-rays consist of the flux of helium atom nuclei, b-rays consist of electrons, and g-rays are electromagnetic oscillations similar to X-rays, which do not deviate even in the electric field and have a very small wavelength.

The scientific work of Maria and Pierre Curie was extremely important for the development of a new branch of science - radiochemistry. They are A.A. As a result of the continuation and development of Beckerel's scientific work on the natural minerals of uranium, such as uranium (IV, VI) – oxide U_3O_8, that is $UO_2 \cdot 2UO_3$ found to emit much stronger radioactive radiation than pure uranium metal The Curie couple came to the firm conclusion that natural uranium compounds contain a more radioactive substance than uranium. As a result of 2 years of hard work, in 1898 they discovered a new chemical element, polonium, which had the ability to emit light, and in the same year their assistants J. In collaboration with Beman, they discovered the second radioactive element, radium. At the same time in France M. Curie and G. in Germany. Schmidt found that thorium also had uranium-like properties.

New discoveries and data were accumulated at an extremely rapid pace. In 1899, Debery discovered a new radioactive element in uranium minerals - actinium. A year later, E. Rutherford discovered the first radioactive gas (emanation) - thorium - while conducting experiments on thorium preparations. In the same year, other emanations - radon and actinone gases - were also found and released freely.

Discoveries abounded. Scientists have even struggled to find ions in newly discovered elements. Therefore, for example, "uranium-x-one" (UX_1), "Uranium - two - two"(UX_2), "Uranus - zet" (UZ), "Uranium - igrek" (UУ), radium A, B, C etc. names appeared. It was not

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the difficulty of naming the newly discovered elements, but some other serious matter that alarmed the scientists.

At the time of the discovery of the first radioactive elements, the periodic law had a strong place in the science of chemistry, i.e., it was known as one of the basic laws of chemistry. That is why polonium and radium had a strong place in the periodic table, that is, they were known as one of the basic laws of chemistry. Polonium and radium were therefore firmly established from the periodic table, i.e., radium was found to be a barium-like element in terms of its properties, and polonium, after some hesitation, was found to be D. I. Men-deleev was placed in the "dvitellur" box, which he had predicted in 1891. Emanations (radon, toron, and actinone) were included in the top homologues of the zero group. At the same time, any product of radioactive change discovered was considered a new element. However, the number of newly discovered elements in 1910-1915 far exceeded thirty, that is, the number of empty cells in the Mendeleev periodic table. Therefore, it was necessary to find a solution.

E.. Using the atomic model proposed by Rutherford in 1911, the English physicist and chemist F. In 1912, he advanced the whole and logical idea that "elements are not homogeneous" on the basis of the idea that there must be a clear boundary between the radioactive (i.e., nucleus-dependent) properties of simple atoms and their chemical (i.e., electron-dependent) properties. This played the role of a unique compass that showed the right way to conduct new research.

Scientists F. Even before the development of the simple theory, some radioactive "elements" had noticed that their chemical and physical properties were similar, differing only in their radioactive properties. For example, uranium–X_1, radiothorium and ion were found to be inseparable from each other and from the previously known element-thorium. U. Markvald and F. Soddi discovered in 1910 that mesotorium-1 and radium were chemically identical elements that exhibited the same properties in all reactions. In particular, the Romanian chemist and physicist G. With Hevesy, the Austrian radiochemist and chemist F.A. Panet's scientific work was remarkable. These scientists worked for several years using about 20 different methods to separate radium-D from lead, but still could not separate it. As a result of the same work, the idea arose that the inseparable elements were mutually identical. F. Simple theory can be described in modern language as follows. The chemical properties of atoms, their ability to react, depend on the structure of the electron shell, but the phenomenon of radioactivity is a property of the atomic nucleus. It is now known that the atomic nuclei of all elements are made up of protons and neutrons, except that there are no neutrons in the hydrogen nucleus. The number of electrons orbiting the nucleus is equal to the number of protons, and the atomic mass is the sum of the masses of all neutrons and protons in the same nucleus. Atoms with the same number of protons in their nuclei are chemically identical. For example, if an atomic nucleus contains three protons, it will be the nucleus of the element lithium. However, the number of neutrons in nuclei with the same number of protons may also be different. Because neutrons are neutral particles, they cannot change the charge of the

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nucleus and, consequently, the number of electrons orbiting the nucleus. Accordingly, the chemical properties of atoms with the same number of protons will be similar. Consequently, the chemical properties of these atoms are the same, only the atomic masses are different. It has been proposed that atoms with the same number of protons in their nuclei but different numbers of neutrons be called isotopes; The Uzbek meaning of the word is "equally appropriate," meaning that such atoms are placed in a single cell in the Mendeleev periodic table.

Just as atoms with different numbers of electrons differ in their chemical properties, so protons must differ in their half-decay time, for example, if they are radioactive atoms, because the number of neutrons in their nuclei is not the same.

Going a step further, it can be said that the production of radioactive isotopes of stable elements is based on the same isotopic phenomenon.

F. Soddi's theory of isotopy proved to be extremely effective. Based on this theory, scientists have carefully examined the chemical properties of most of the radioactive elements discovered, and found that many of these elements are isotopes of previously known elements. For example, the nuclei of the protons of toron and actinone-radon contain 86 protons and are located in the zero group of the Mendeleev periodic table. UX_1 and turned out to be an isotope of thorium; In addition to the radium discovered by the Curie couple, there are three other isotopes - thorium-x. (ThX), "Mesotorium" (MsTh), "Actinium - x"(AcX) became known. All radioactive isotopes soon took their place in the Mendeleev periodic table. Shortly afterwards, F. Simply and unknowingly, Fayans, relying on the theory of isotope and studying the properties of radioactive radiation, described a law called the law of vibration. According to this law, when an atom of an element forms a new atom due to α - or β -decay, it must change its chemical properties and move elsewhere in the Mendeleev periodic table. If an atom emits α-particles, two chambers in the system must move to the left, and if β -particles emit, one chamber must move to the right. For example, the isotope of uranium, which has a mass of 238 tents, emits an α -particle and turns into an isotope of thorium with a mass of 234:

$$^{238}_{91}\mathrm{U} \xrightarrow{\alpha} {}^{234}_{90}\mathrm{Th}.$$

The isotope of thorium, which has a mass of 234, undergoes a β -change, which in turn becomes a protoctinic isotope with almost the same mass:

$$^{234}_{91}\mathrm{Th} \xrightarrow{\beta} {}^{234}_{90}\mathrm{Pa}.$$

F. Simple and physical and chemical K. The law of displacement of faience made it possible to classify the radioactive elements discovered at that time into isotope families and, in some cases, to predict the existence of new isotopes.

In 1919, E.W. The phenomenon of nuclear change discovered by Rutherford was an important stage in the development of nuclear physics and radiochemistry. Until then, only spontaneous changes could occur in nuclei, and it was assumed that the atomic mass of the element formed as a result of the change was less than or sometimes equal to the atomic mass of the original element. E.. Rutherford manages to prove two facts at once.

First, it proved that nuclear transformations could be made artificially, even from non-radioactive atoms. For example, he showed that the nuclei of nitrogen atoms interact with α-particles (helium nuclei) to form two new nuclei, the oxygen and hydrogen nuclei.

$$^{14}_{7}N + ^{4}_{2}He \rightarrow ^{17}_{8}O + ^{1}_{1}H.$$

Second, the mass of the nucleus of the oxygen atom formed is three units greater than the mass of the original atomic nucleus. By carrying out this experiment, humanity will for the first time be able to voluntarily change the structure of the nucleus, creating new elements. Subsequent experiments have shown that the nuclei of fluorine, sodium, and other elements also interact with α -particles. Man's dream of converting chemical elements into each other has become a reality. Fifteen years later, in 1934, French scientists F. Jolio and I. Curie demonstrated the power of modern science to the whole world. They showed that radioactive isotopes found in nature could be formed under laboratory conditions.

These scientists As a result of Rutherford's repeated experiments irradiating various elements with α -particles, they were able to identify the following phenomenon: aluminum plate- α - assuming that the following nuclear reaction occurs when ammonium is irradiated with α-particles, assuming that none of the radioactive isotopes with a half-life of 3 minutes is irradiated with α-particles after irradiation with particles, and later proved its validity in practice:

$$^{27}_{13}Al + ^{4}_{2}He \rightarrow ^{30}_{15}p + ^{1}_{0}n.$$

As a result of this nuclear reaction, an artificial radioactive isotope of phosphorus is formed, leaving a single neutron. The resulting phosphorus isotope is unstable and becomes a stable isotope of silicon according to the following equation:

$$^{30}_{15}P \rightarrow ^{30}_{14}Si + \beta^{+}.$$

Although E.. Rutherford, F .; Jolio and I. Although the Curies demonstrated with their experiments the real possibilities of forming stable and unstable new isotopes of chemical elements, their extremely important experiments for science yielded almost no benefit in practice. After all, in order to carry out such nuclear reactions, large-energy a-particle sources are needed. In addition, many elements were not "pierced" by these arrows.

But these challenges did not stop scientists. In 1930, the English physicist J.D. Cochroft argued that accelerated positively charged hydrogen ions — protons — could enter nuclear reactions in the same way as α-particles. J.D. Cockroft In 1932, the Irish physicist E.T.S. In collaboration with Walton, he developed the first accelerator for positive ions. The researchers then observed the formation of α-particles by irradiating lithium atoms with a stream of hydrogen nuclei.

$$^{7}_{3}Li + ^{1}_{1}H \rightarrow 2^{4}_{2}He.$$

But nuclear chemistry and technology really only developed after neutrons were used as "bullets" for nuclear reactions. In the early 1930s, when irradiated with beryllium a-particles, it was discovered that radiation that did not change its direction in an electric or magnetic field formed, and that the ability of these rays to pass through bodies was even greater than that of g-rays. These rays were called "beryllium rays." E.. Rutherford's student, the English physicist-experimenter J.

Chedwick set out to examine these rays; he soon proved that the masses of "beryllium rays" consist of a stream of uncharged particles equal to the mass of a proton.

$$^{9}_{4}\text{Be} + ^{4}_{2}\text{He} \rightarrow ^{12}_{6}\text{C} + ^{1}_{0}\text{n}.$$

These particles were discovered by British physicist-experimenter J. Chedwick called them neutrons. Italian scientist E. Even in Fermi's early experiments on the irradiation of various elements with neutrons, it is clear that neutrons are preferable to particles of other elements in carrying out nuclear reactions. Neutrons do not have an electric charge, so when they are sent to an object, the atomic nuclei of that object do not resist the motion of the neutrons (e.g., they resist the motion of α-particles). It should be noted that humanity has been able to create transient elements only through the use of neutrons. Plutonium from turansuran elements is now widely used in engineering. In 1942, fission chain reactions of heavy element nuclei took place, and neutrons contributed to the continuation of these reactions. Because of this feature, neutrons have become popular around the world.

REFERENCES

1. Шпольский Э.В. Атомная физика. Том первый. Введение в атомную физику. -М.: Физматгиз, 1963. -593 с.
2. Корсупский М,И. Атомное ядро. -М.: Физматгиз, 1961.
3. Заборенко К.Б, Радиоактивность. -М,: Детгиз, 1953.
4. Коттон Э. Семья Кюри и радиоактивность. -М,: Атомиздат, 1964.
5. Крамере Х, Строение атома и теория Бора. -М. -Л,, 1956.
6. Мурин Н.А, Введение в радиоактивность. ЛГУ, 1955.
7. Ферми Э, Элементарные частицы. Госиплитиздат. -М., 1953.
8. Маҳмудов Ю.Ғ. Нобель мукофоти лауреатлари (адабиёт, физика, кимё, физиология ва медицина, иқтисодиёт, тинчлик учун). Ўқув-услубий қўлланма. Қайта нашри. –Тошкент:Ноширлик ёғдуси, 2020.
9. Mahmudov Yu.G. Laboratory work on determination of electrical conductivity of cotton fiber. European journal of Research and Reflektion in Educational Sciences. Vol. 8 No. 2.2020. ISSN 2056-5852. (-Buyuk Britaniya,02.2020.)
10. Imanov B.B. Lesson and its analysis as factor of increasing the qualiyy of education. European scholar Journal. Available online at// www.scolarzest.com. Vol. № 1 January 2021 ISSN: 2660-5562.