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Adolf von Baeyer (1835-1917) – The Most Distinguished German Chemist of the Second Half of the XIX Century and the beginning of the XX Century

Adolf von Baeyer (1835-1917) - El químico alemán más distinguido de la segunda mitad del siglo XIX y principios del siglo XX

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ABSTRACT

Adolf von Baeyer (1835-1917) was the most prominent chemists of the second half of the 19th century and the early part of the twentieth century. He is known for his many works in the field of organic chemistry. He was the first to synthesize indigo. He was awarded the Nobel Prize in Chemistry in 1905. The purpose of this paper is to familiarize readers with the important events in the life of Baeyer and his research activities, in particular with selected results of his experimental studies as well as with his selected publications. In addition, literature on his correspondence is given.

Keywords: A. v. Baeyer, Organic chemistry, Synthetic indigo, Nobel Prize, Germany – XIX-XX centuries

RESUMEN

Adolf von Baeyer (1835-1917) fue el químico más destacado de la segunda mitad del siglo XIX y principios del XX. Es conocido por sus numerosos trabajos en el campo de la química orgánica. Fue el primero en sintetizar índigo. Fue galardonado con el Premio Nobel de Química en 1905. El propósito de este artículo es familiarizar a los lectores con los acontecimientos importantes en la vida de Baeyer y sus actividades de investigación, en particular con los resultados seleccionados de sus estudios experimentales, así como con sus publicaciones seleccionadas. Además, se proporciona literatura sobre su correspondencia.

Palabras claves: A. v. Baeyer, Química orgánica, Índigo sintético, Premio Nobel, Alemania - siglos XIX-XX.

*His name evokes in us the memory of that glamorous Epoch
in which the firmly established structure of modern organic
chemistry was performed.
Friedrich Richter, 1935, p. A175*

INTRODUCTION

The important events in the Baeyer's life

He was called “one of the great men of modern organic chemistry” (Smith, 1949, p. 21) as well as “a pioneer of synthetic organic chemistry” (Nagendrappa, 2014, p. 489). “He was the leader of the movement to insure a high quality of chemical instruction throughout all of Germany” (Oesper, 1954, p. 91). One hundred and four years have passed since his death, but in that time very little has appeared in the literature about this most eminent man.

Johann Friedrich Wilhelm Adolf Baeyer (Figure 1), known simply as Adolf Baeyer was born in Berlin on October 31, 1835, and he was the son of Johann Jakob Baeyer (1794-1885), a Prussian military officer and a geodesist, and his wife Eugenie, née Hitzig (1807-1843) (Baeyer, Villiger, Hottenroth, & Hallensleben, 1905a, p. VII).

After graduating from the *Friedrich-Wilhelm-Gymnasium*, Baeyer entered the University of Berlin in 1853, where he studied mathematics with Johann Peter Gustav Lejeune Dirichlet (1805-1859) and physics with Heinrich Gustav Magnus (1802-1870) for the next two years (“Baeyer, Johann Friedrich”, n.d.; Henrich, 1930). After one year of military service (1855-1856), in the last decade of March 1856, he became a student at the University of Heidelberg and began studying chemistry under Robert Bunsen (1811-1899). In his laboratory he met Henry Enfield Roscoe (1833-1915), Lothar Meyer (1830-1895), Adolf Lieben (1836-1914), and Friedrich Konrad Beilstein (1838-1906) (Perkin, 1923, p.1523). He focused first on experimental research in the field of physical chemistry, and then became interested in organic chemistry. Since Bunsen gradually eliminated organic chemistry from his laboratory, in 1857 he decided to work under August Kekulé (1829-1896) in his private laboratory in Heidelberg as his first student.

In April 1858, he returned to Berlin and presented to the University his thesis, in Latin, under the title *De arsenici cum methylo conjunctionibus* for the Degree of Doctor (Perkin, 1923, p. 1524). Then he worked for two years under Kekulé in his new laboratory at the University of Ghent in Belgium. Kekulé was there the successor to the Belgian chemist Jean Servais Stas (1813-1891).

After completing these studies in Ghent in 1860, he returned to Berlin, where he delivered his habilitation lecture on uric acid. Then, he received the appointment of Teacher of Organic Chemistry and Director of the New Organic Chemistry Laboratory in the *Gewerbeinstitut* (Gewerbe Institute), where he worked for twelve years (Meijere, 2005, p. 7836). In the same year, he attended the first ever International Congress of Chemists held in Karlsruhe (Germany) on 3-5 September (Anschütz, 1929, p. 197; “Der Karlsruher Chemiker”, 2021).

He married Adelheid (Lida) Bendemann (1847-1910) in 1868. The spouses had three children, a daughter, Eugenie (1869-1952), and two sons: Hans (1875-1941) and Otto (1877-1946). Eugenie married the German chemist Oscar Piloty (1866-1915). Hans was Professor of Orthopedic Surgery in Heidelberg and Otto became Professor of Physics at the *Landwirtschaftliche Hochschule* in Berlin (Perkin, 1923, p.1546; “Adolf von Baeyer”, 2021).



Fig. 1. A. v. Baeyer (1835-1917) (“Adolf von Baeyer”, 1905)

In 1872, he went to Strassbourg, where he started working as Professor of Chemistry (1872-1875) at the newly founded German University *Kaiser-Wilhelms-Universität Straßburg* (Kaiser Wilhelms University of Strasbourg) (Stadler & Harrowfield, 2011, p. 2074). In 1875, he was invited to the Chair of Chemistry at the University of Munich. He became the successor of Justus von Liebig (1803-1873), and he worked there for forty years to the time of his retirement in the 1915. In addition to conducting experimental research, he delivered the lectures in organic chemistry as well as the elementary lectures in inorganic chemistry (Perkin, 1923, p. 1531). “In Munich he was the founder of the world's biggest research school in organic chemistry” (Reinhardt, 1998, p. 249).

He died on August 20, 1917, at his country house in Starnberg at the age of eighty-two. He was buried in the Waldfriedhof in Munich (Henrich, 1930, p. 1248; Oesper, 1954, p. 91; “Adolf von Baeyer”, 2021).

Baeyer's participation in the scientific celebration abroad

In 1900, Baeyer took part in the Berlin conference devoted to the 200th Anniversary of the *Königlich Preußischen Akademie der Wissenschaften* (Royal Prussian Academy of Sciences). Figure 2 is a photograph made during this celebration (“200th Anniversary of Berlin”, 1900). The American biochemists Benjamin Harrow (1888-1970) inserted this photo on the one of first pages of his book entitled *Eminent Chemists of Our Time*. He also wrote that it “showing several eminent chemists was taken at one of the international scientific gatherings” (Harrow, 1920, p. 8).

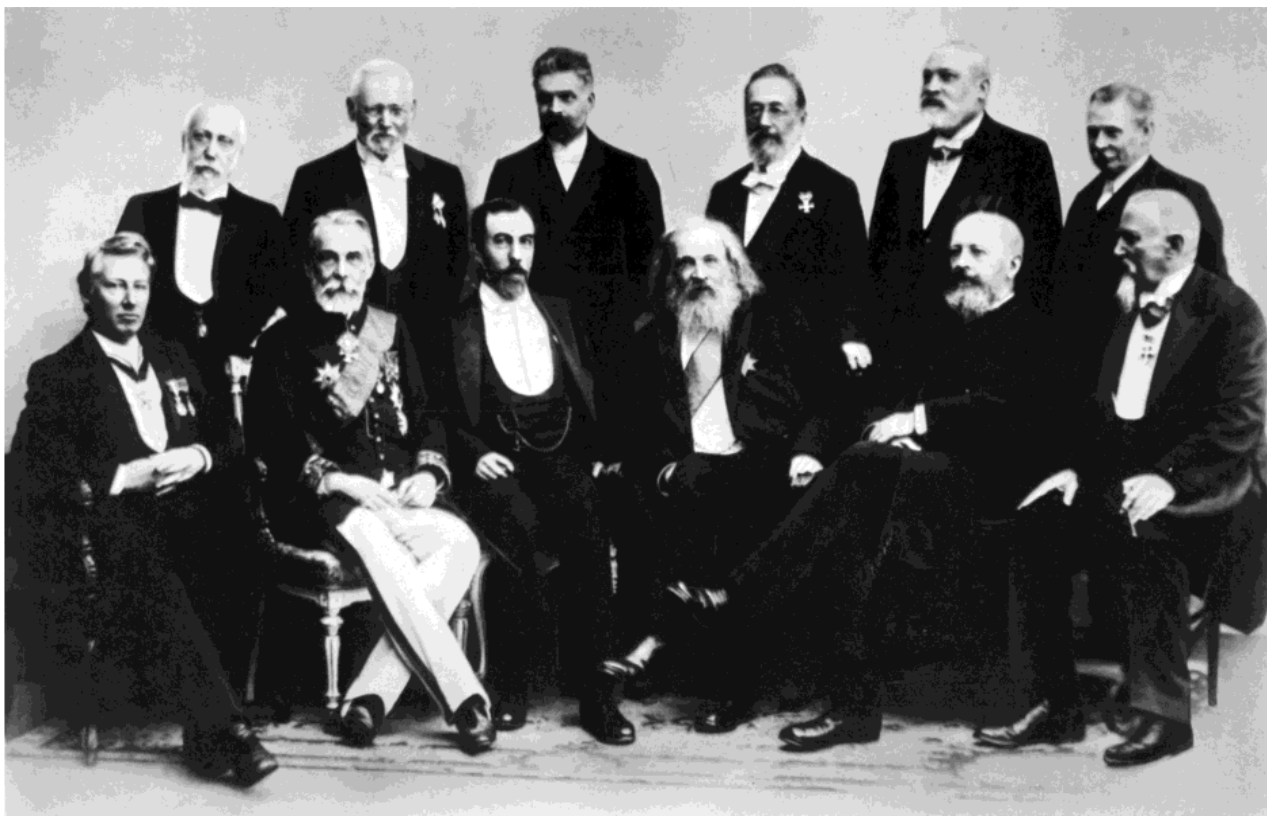


Fig. 2. Baeyer with the group of the prominent chemists ("200th Anniversary of Berlin", 1900).

Photograph was published by Harrow thanks to the kindness of the Dutch chemist Ernst Julius Cohen (1869-1944) (Donnan, 1948). Baeyer is sitting second from the right. To his left is the Italian chemist Alfonso Cossa (1833-1902) (Kauffman & Molayem, 1990). To his right are the Russian chemist Dmitri Ivanovich Mendeleev, who discovered the Periodic Law in 1871 (Boeck & Zott, 2007; Sztejnberg, 2018), the British chemist Sir William Ramsay (1852-1916), who found neon, argon, krypton, and xenon in air and was awarded the Nobel Prize in Chemistry in 1904 (Tilden, 1918), the Russian - German chemist Friedrich Konrad Beilstein (1838-1906) (Sztejnberg, 2021a), and the Dutch chemist Jacobus Henricus van't Hoff (1852-1911), who won the Nobel Prize in Chemistry in 1901 ("Jacobus H. van't", 2021). From the left to right are standing: the German chemist and historian of chemistry Albert Ladenburg (1842-1911), (Sztejnberg, 2021b), the Danish chemist Sophus Mads Jørgensen (1837-1914) (Kauffman, 1992), the Finnish chemist and historian of chemistry Edvard Hjelt (1855-1921) (Kauffman & NiiNistö, 1998), the German chemist Hans Heinrich Landolt (1831-1910) (Pribram, 1911), the German chemist Clemens Alexander Winkler (1838-1904), who discovered germanium in 1886 (Volke, 2004), and the British chemist and historian of chemistry Sir Thomas Edward Thorpe (1845-1925) (Tutton, 1925).

Baeyer's works

The list of Baeyer's works includes two hundred and seventy-eight papers that appeared in print for forty-eight years from 1857 to 1905 (Baeyer et al., 1905a, pp. CXIX-CXXXII). His articles presenting the results of his experimental studies were published mainly in *Berichte der deutschen chemischen Gesellschaft* and *Justus Liebigs Annalen der Chemie*. His experimental studies were conducted in laboratories in Heidelberg, Ghent, Berlin, Strasbourg and Munich.

Baeyer's first two papers *Notiz über idiochemische Induction* and *Ueber das Methylchlorür* were published in 1857 (Baeyer, 1857a; Baeyer, 1857b). The first of the presented articles dealt with the problems of physical chemistry, and the second - organic chemistry. Both papers described the results of research carried out by him in the *chemischen Universitäts-laboratorium* (Chemical University Laboratory) in Heidelberg. In the following years, he focused solely on research in the field of organic chemistry.

In 1858, he "carried out well-known work on the organo-arsenic compounds" (Japp, 1898, p. 100; Baeyer, 1858a; Baeyer, 1858b). These experimental studies were carried out by him in the *Privatlaboratorium von A. Kekulé* (Private Laboratory of A. Kekulé) in Heidelberg. The British chemist William Henry Perkin (1838-1907), in his *Baeyer Memorial Lecture* (1923), wrote about Baeyer's discovery of one such compounds as follows:

"Baeyer continued his researches on cacodyl trichloride, and during the course of these experiments he accidentally discovered arsenic methyl chloride. Not grasping the dangerous nature of the substance he had made, he investigated its odour, with the result that he fainted and nearly lost his life" (p. 1524).

In the years 1859-1860, the results of his experimental studies at the University Chemical Laboratory in Ghent were presented in four articles that appeared in *Bulletins de l'Académie royale des sciences, des lettres et des beaux-arts de Belgique* (Baeyer, 1859a; Baeyer, 1859b; Schlieper & Baeyer, 1860) and in *Justus Liebigs Annalen der Chemie* (Baeyer, 1860). The objects of his research interest were allophanic acid ($C_2H_4N_2O_3$), as well as new derivatives of picric acid ($C_6H_3N_3O_7$) and of uric acid ($C_5H_4N_4O_3$).

The results of his study of the uric acid group at the *organischen Laboratorium der Gewerbeinstitute* (Organic Laboratory of the Gewerbe Institute) in Berlin were published in 1863-1864 in three of his articles in *Justus Liebigs Annalen der Chemie* (Baeyer, 1863a; Baeyer, 1863b; Baeyer, 1864).

In 1869, he together with Adolph Emmerling (1842-1906) synthesized an indole (C_8H_7N) (Baeyer & Emmerling, 1869). In 1872, he began to study the condensation reactions of such groups of compounds as aldehydes and phenols (Baeyer, 1872).

In 1870, he published an article under the title *Ueber die Wasserentziehung und ihre Bedeutung für das Pflanzenleben und die Gährung* (About Dehydration and its Importance for Plant life and Fermentation) (Baeyer, 1870). Perkin (1923) thinks that this article "is full of the most interesting and remarkable theoretical views" (Perkin, 1923, p. 1526). Moreover, he wrote:

"In this communication, the brilliant and entirely novel suggestion is made that the formation of sugar in the plant is due to the reduction of carbonic acid, in the green leaves and under the influence of light, to formaldehyde, which then undergoes condensation with the formation of grape sugar" (p. 1526).

In the 1870s, he began collaborating with the industrial chemist Heinrich Caro (1834-1910) from the *Badische Anilin- & SodaFabrik* (Baden Aniline and Soda Factory - BASF) at Ludwigshafen. This resulted in the publication of six joint articles in *Berichte der deutschen chemischen Gesellschaft* in 1874-1877. Researchers focused on the synthesis of anthraquinone ($C_{14}H_8O_2$) derivatives from benzene (C_6H_6) and phthalic acid [$C_6H_4(COOH)_2$] derivatives (Baeyer & Caro, 1874a; Baeyer & Caro, 1875), on the action of nitrous acid (HNO_2) on dimethylaniline [$(CH_3)_2C_6H_3NH_2$] (Baeyer & Caro, 1874b; Baeyer & Caro, 1874c), and on the preparation of indole from derivatives of aniline ($C_6H_5NH_2$) (Baeyer & Caro, 1877a; Baeyer & Caro, 1877b).

His article describing the preparation of nitrosobenzene (C_6H_5NO) and nitrosonaphthalene ($C_{10}H_7NO$) was published in 1874 (Baeyer, 1874). In 1885, he synthesized phloroglucinol ($C_6H_6O_3$) (Baeyer, 1885) “by the action of heat on the sodium derivative of malonic ester” (Perkin, 1923, p. 1534). His first article on the study of the terpene group was published in 1893, and the last in 1899 (Baeyer, 1893; Baeyer, 1899). Within six years, he published a total of twenty-five articles devoted to this group of chemical compounds.

One of his best known researches was describing the first indigo ($C_{16}H_{10}N_2O_2$) synthesis and giving this compound the correct formula (Baeyer, 1883). He described this discovery in his *Zur Geschichte der Indigo-Synthese* (On the History of Indigo Synthesis) (1900) as follows:

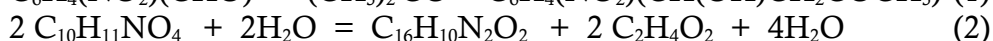
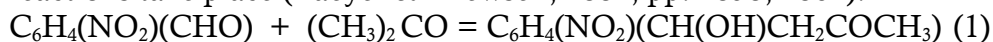
“On occasion of the attempts to prepare the orthonitrophenyl acetic acid aldehyde, I boiled the bromide of the orthonitrocinnamic acid with alkalis and observed the formation of some indigo. The further pursuit of this reaction led to the discovery of orthonitrophenylpropionic acid and the preparation of indigo from it. The first patent on this invention was taken on March 19, 1880, the first scientific publication was in December of the same year [(Baeyer, 1880)]” (p. LV).

Roscoe (1906) about the importance of Baeyer's discovery of indigo wrote:

“Of all recent discoveries in synthetic chemistry, that of the artificial production of indigo by Baeyer is perhaps the most interesting and important—interesting because it points the way to the manufacture of valuable products which hitherto have only been found in vegetable or animal organisms; important from a national point of view because it has already placed the Indian indigo industry in a precarious position” (p. 219).

On March 16, 1880, Baeyer signed a contract with BASF, which ensured the industrial production of synthetic indigo. The German historian of science Carsten Reinhardt (1998) wrote about the most favorable terms of cooperation with this company, which he negotiated, namely: “This provided him with 100,000 Marks and a share of 20 per cent of the profits” (Reinhardt, 1998, p. 250). In May 1880, he was appointed “overall head of the indigo research work done at Ludwigshafen and Munich” (Reinhardt, 1998, p. 251).

In 1882, Baeyer and Viggo Drewsen (1858-1930) described a method of synthesizing indigo from *o*-nitrobenzaldehyde [$C_6H_4(NO_2)(CHO)$] and acetone [$(CH_3)_2CO$], with the formation of a condensation product [$C_6H_4(NO_2)(CH(OH)CH_2COCH_3)$] (1). As a result of the condensation product ($C_{10}H_{11}NO_4$) reaction with water, indigo ($C_{16}H_{10}N_2O_2$) is formed (2). The following reactions take place (Baeyer & Drewsen, 1882, pp. 2858, 2861):



In the history of organic chemistry, Baeyer's name was written in the name of reaction called the *Baeyer–Villiger oxidation*. In 1899, he with Victor Villiger (1868-1934), first discovered this reaction (Baeyer & Villiger, 1899), which relies on synthesis of esters “from ketones with retention of configuration” (Hassner & Strumer, 1994, p. 13). The reaction takes place “in the presence of hydrogen peroxide (or of a peracid)” (Stadler & Harrowfield, 2011, p. 2074).

In 1905, a two-volume edition of the book under the title *Adolf von Baeyer's Gesammelte Werke* (Adolf von Baeyer's Collected Works) was published (Baeyer et al., 1905a; Baeyer, Villiger, Hottenroth, & Hallensleben, 1905b). Both volumes of this book contain a total of 278 reprints of his papers.

Baeyer's last article entitled *Untersuchungen über das Dimethylpyron* (Investigations on the Dimethyl Pyrone), was published in 1915 in *Justus Liebigs Annalen der Chemie* (Baeyer, Piccard, & Gruber, 1915). He was then eighty years old.

Literature on Baeyer's Correspondence

In 1960, a 45-page book in French was published in Brussels, which contained a collection of Baeyer's letters to his friend Stas (Baeyer, Stas, & Gillis, 1960). He also corresponded with Caro. In 1978, Evelin Wiedenmann's two-volume doctoral dissertation was published in Munich, in which she included their correspondence (Wiedenmann, 1978a; Wiedenmann, 1978b), containing a total of 284 letters written from May 1883 to July 1890 (Reinhardt & Travis, 2000, p. xxi). Three letters of thanks from Baeyer to Caro was published in a book entitled *Heinrich Caro. Reden und Vorträge* (Heinrich Caro. Speeches and Lectures). For instance, in the first letter, he thanks him for his election as an honorary member of the Association of Germans Chemists (Caro, 1913, pp. 107, 188, 231).

Regine Zott is the editor of the collection of correspondence between Baeyer and Wilhelm Ostwald (1853-1932), with whom he maintained close relations. The book was published in 2002 in Münster (Germany) (Zott, 2002, pp. 125-246).

The German chemist Richard Anschütz (1852-1937), professor of chemistry at the University of Bonn, about the Baeyer's departure from Ghent in 1860 and his friendship with Kekulé, wrote in his book (1929) the following:

“In the spring of 1860, Baeyer ... left Ghent and his teacher [Kekulé], who became a his good friend, to do his habilitation in his hometown, Berlin. Soon afterwards he was given the newly created teaching position for organic chemistry in the local industrial institute. Baeyer maintained contact with Kekulé by letters. During their time together in Heidelberg and Ghent, the two friends had got used to talking to one another unreservedly about their scientific plans and work. ... I received from Baeyer's son, Mr. ... Hans von Baeyer, ... at my request, Kekulé's letters to his father from the years 1860-1866, give a pleasant insight into the friendly relationship between Kekulé and his first pupil” (p. 169).

In 1906, Sir H. E. Roscoe published in his autobiography (1906) an English translation of the congratulatory letter from Munich dated March 1904, which he received from his friend Baeyer on the occasion of his Graduation Jubilee on April 22, 1904. A fragment of this letter is as follows:

“HIGHLY HONOURED FRIEND, Among the many Anniversaries in his own career a man of Science may live to see, there is only one which we in Germany are in the habit of celebrating: it is the fiftieth return of the day on which he took his Doctorate, the first step in his Academic career. ... When I entered Bunsen's

Laboratory in the Easter of 1856 as a novice of twenty years of age the sight of the wealth of chemical appliances was so overwhelming that I nearly burst into tears. Bunsen appeared to me like a being from another world, and Roscoe, his co-worker, who had taken his degree two years before, as one sent from a distant sphere. To be their equal was the highest object of my ambition. How am I to describe the delight that seized me when Bunsen proposed, in my second Semester, as an acknowledgment on his part of good progress made, that I should work on “Idio-Chemical Induction,” a theme, in some measure, complementary to your photo-chemical researches? My anticipations were not realised, but your investigations made a deep impression on my mind and had a lasting influence upon my subsequent life. ... Thus, my highly-honoured Friend, twice during my life have you influenced my action and helped me to find the right path. My congratulations to you on this day of your jubilation spring therefore from a grateful heart, and as such will, I trust, not be unwelcome” (pp. 413-414).

The Fischer-Baeyer correspondence (157 letters from the years 1889-1915) is preserved in the Emil Fischer Papers stored in the Bancroft Library at the University of California, Berkeley (“Finding Aid to”, n.d., pp. 26-27).

CONCLUSION

Adolf von Baeyer was the most eminent chemist of the first half of the nineteenth century and the early part of the twentieth century. He played a huge role in the development of organic chemistry. “His important discoveries stamp him as an experimenter of the first rank. He also excelled as an interpreter of organic reactions” (Henrich, 1930, p. 1231). The results of his numerous experimental studies have been published in German and Belgian scientific journals.

He “led research groups at three institutions: the *Gewerbeinstitut* in Berlin (1860-72), the University of Strassburg (1872-75) and the University of Munich (1875-1915)” and “his successive laboratories” were “major breeding grounds of chemical talent during the last quarter of the nineteenth century” (Fruton, 1990, pp. 118-119).

In 1884, he was elected an honorary member of the American Academy of Arts & Sciences (“Book of Members”, n.d.). He became a correspondent of the French Academy of Sciences on May 3, 1886, and then a foreign associate on January 31, 1910 (“Les membres du”, 2013). He was elected a foreign corresponding member of the Imperial Academy of Sciences in St. Petersburg on December 5, 1892 (“Rossiyskaya akademiya nauk”, 2007).

In 1877, he became full member of the *Bayerische Akademie der Wissenschaften* (Bavarian Academy of Sciences). He was awarded the Bavarian Maximilian Medal for Science and Art in 1891 and Pour le mérite Medal in 1895 (“Deceased members. Prof.”, 2021). In 1881, the *Royal Society of London* conferred on him the Davy Medal “for his synthesis of indigo” (“Award winner: Davy”, n.d.). In 1903, the German Chemical Society awarded him the *Liebig-Denkmünze Prize* (“Liebig-Denkmünze. Gesellschaft”, 2021).

He was elected a Foreign Member of the *Royal Society of London* on December 10, 1885 (“List of Fellows”, 2020. p. 6). In the same year, in recognition of his services to Germany, he was granted a hereditary title, which gave him the right to place the particle “von” in front of his surname (“Kratkiy ocherk istorii”, n.d.).

In 1905, he was awarded the Nobel Prize in Chemistry “in recognition of his services in the advancement of organic chemistry and the chemical industry, through

his work on organic dyes and hydroaromatic compounds" ("Adolf von Baeyer", 2021).

In the introduction to the first volume of a book entitled *Adolf von Baeyer's Gesammelte Werke*, his autobiography entitled *Erinnerungen aus meinem Leben. 1835-1905* (Memories from My Life. 1835-1905) was published (Baeyer et al., 1905a, pp. VII-XX, XXVIII-XXXI). His memoirs under the title *Meine wissenschaftlichen Arbeiten in den Jahren 1865 bis 1905* (My Scientific Work from 1865 to 1905) are also included in the introduction (Baeyer et al., 1905a, pp. XXXVIII-XXXVI). His lecture entitled *Zur Geschichte der Indigo-Synthese* given at the Ceremony of the German Chemical Society on October 20, 1900, was published next (Baeyer et al., 1905a, pp. XXXVIII-LV).

In 1932-1952, a two books have been written about Baeyer. The first was written by the Swiss chemist Hans Rupe (1866-1951) and was published in 1932 in Stuttgart (Rupe, 1932). In 1952, the first biographical book about him in German was published by the Wissenschaftliche Verlagsgesellschaft also in Stuttgart. It was written by Karl Schmorl and appeared under the title *Adolf von Baeyer, 1835-1917* (Schmorl, 1952). John Read (1953), in his review of this book in *Nature*, wrote:

"The book ... is the first comprehensive biography of Baeyer ... gives a concise and documented review of his contributions to organic chemistry; but it is chiefly remarkable for a good deal of new material, including some interesting illustrations, relating to Baeyer's ancestry, family circumstances and personality" (p. 319).

After Baeyer, not only his papers survived. In addition, several of his portraits and photos were produced. One of them was included in Anschütz's book (Anschütz, 1929, p. 67). Three other photo are from The Edgar Fahs Smith Chemistry Collection ("Adolf von Baeyer", 1906;"Adolf Baeyer. Part", 191-; "von Baeyer. Part", 1907). One of the reproduction of a photo taken around 1902, shows him, probably in his Munich laboratory ("Adolf von Baeyer", 1902). Another photograph shows him at the age of 37 ("Adolf von Baeyer", 1872). There is also a photogravure with his portrait, made after an oil painting by the German painter Franz-Seraph von Lenbach (1836-1904) ("Adolf Bayer. Part", 1900-1920). Another photo taken in October 1877 shows him among his students and colleagues in his laboratory in Munich. In front row, from the left to right are sitting: Otto Fischer (1852-1932), Jacob Volhard (1834-1910), Baeyer, and Emil Fischer (1852-1919) ("Baeyer in his", 1877). His portrait can also be found in a book written by the American chemist Henry Monmouth Smith (1868-1950) (Smith, 1949, p. 21). Baeyer with group of his friends at his Villa in Starnberg, taken on October 6, 1895, was published in an article by Friedrich Henrich's in *Journal of Chemical Education* (Henrich, 1930, p. 1243). Another photograph, taken around 1868 at the *Gewerbeakademie* in Berlin, shows 33-year-old Baeyer and his assistants Carl Graebe (1841-1927) and Carl Liebermann (1842-1914) (Reinhardt & Travis, 2000, p. 147).

In addition to portraits, photos, and oil painting, the bust of Baeyer was made in honor of his 70th birthday by the German sculptor Adolf von Hildebrand (1847-1921). It was in the Library of the State Chemical Laboratory in Munich ("Baeyer, Johann Friedrich", n.d.). The photo of the bust was published in an article by Henrich (1930, p. 1245).

On October, 20, 1922, the Baeyer's Monument was unveiled. It was located at the entrance to the State Chemical Laboratory in Munich ("File: A.v. Baeyer", 1922). It was made by the German sculptor Hermann Hahn (1868-1945) (Henrich, 1930, p. 1246).

The name of this remarkable German chemist is loudly heard in the chemists milieu in Germany. There is one award associated with his name. The Prize *Adolf von Baeyer Denkmünze* is awarded by the *Gesellschaft Deutscher Chemiker* (Society of German Chemists) for “recognition of outstanding research in the field of organic chemistry. The prize is endowed with a gold medal and € 7,500” (“Prizes and Awards”, n.d.).

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