Victor Meyer (1848-1897) Chemist

"There are brilliant personalities who, like luminous meteors, pass through the world. Human existence in all its forms and developments is not unfamiliar to them; yet they follow their own path, unconcerned with the world's turmoil everywhere, leaving their marks only to return to the Universe after a rapid victorious run."[1]

(Richard Ernst Meyer)

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Abstract. Victor Meyer (1848-1897) is one of the great organic chemists of the second half of the 19th century. While his extensive experimental work in Organic Chemistry and Physical Chemistry is well known among chemists, little is known about his personal life and his professional career. The aim of this article is to contribute to filling this gap by presenting not only his research activities (aliphatic nitro compounds, oximes, thiophene, aromatic compounds containing iodine, stereochemistry, vapor density determination, pyrochemistry), but also details of his academic career in Zurich, Göttingen, and Heidelberg, as well as his personality and personal life, until his tragic end.

Keywords: Victor Meyer – History of Chemistry – Organic Chemistry – Thiophene – Nitro Compounds – Stereochemistry – Vapor Density.

INTRODUCTION

The laconic title of this article is symbolic: we know from Victor Meyer that he was a chemist, and that he made some important discoveries. Rarely we find a chemist who claims not to know Victor Meyer (1848-1897), given the great number of his important discoveries, especially in Organic Chemistry and in Physical Chemistry which are attributed to him. There is hardly a textbook that does not mention him several times, and there are also no Histories of Chemistry that do not give him space, sometimes briefly, due to the importance of his works. There is no chemist or researcher of a related science who does not know Victor Meyer's works. But it is difficult to find a chemist or someone interested in Chemistry who knows something about the life of Victor Meyer, doubtless one of the most important organic chemists of the second half of the 19th century and, in the opinion of Michael Engel, "the most versatile chemist of his time."[2] Besides the obituaries following his tragic and unexpected death, such as those by Gustav Lunge (1839-1923)[3], Carl Liebermann[4], Paul Jacobson (1859-1923)[5], Otto Nikolaus Witt (1853-1915)[6], or Heinrich Biltz (1865-1920)[7], among others, all from 1897, there is an extensive and detailed biography written by his brother Richard Emil Meyer (1846 Berlin -1929 Braunschweig), professor at the Polytechnic of Braunschweig, "*Victor Meyer – Leben und Wirken eines deutschen Chemikers und Naturforschers*" Leipzig 1917, published in the series "Grosse Männer") by Wilhelm Ostwald (1853-1932)[8]. In 1908, Richard Meyer had already published a 214-page article on his brother[9] in the *Berichte.* The prophetic final sentence of the Lunge's obituary of Victor Meyer was fully confirmed: "his name will be eternally and greatly honoured in the Histories of Chemistry."[10] In London, in 1891, at the jubilee of the Chemical Society, Sir Jocelyn Thorpe (1871-1940), a former student of Victor Meyer, delivered a Memorial Lecture in honour of his master[11]. Outside Germany, there were an anonymous note in *Nature*, in 1897, a very short obituary in the *American Journal of Chemistry* (today the *J. Am. Chem. Soc.*), and in 1916 a biographical article by B. Horowitz[12]. There is also a recent biographical paper by Aleksander Sztejnberg (2022)[13].

FAMILY, ORIGIN, EDUCATION

Victor Meyer was born in Berlin on September 8, 1848, the son of Jacques Meyer (1816-1892), a manufacturer and merchant of fabrics, from a non-orthodox and non-practicing Jewish family, originally from Inowroclaw, in the Hohensalza district, in the then Prussian province of Posen, and of Bertha Meyer (1822-1895) (no familial relation). The couple had four children: Richard, a chemist and professor at the *Technische Hochschule* of Braunschweig; Victor, subject of this article; Otto, who went into commerce and later managed his father's company; and Clara, who married the sculptor Johannes Pfuhl (1848-1914) (a bust of V. Meyer [1902] by Pfuhl is in the Auditorium of Heidelberg University).

In 1858, Richard and Victor, despite their age difference, were enrolled at the *Friedrichwerdersches Gymnasium*, a traditional school in Berlin, founded in 1681 by the "Great Elector" Frederick William, and closed in 1944. In 1865, Victor completed the course and the final examinations, which granted him access to the university. The young man's interests were manifold, spanning both, the exact sciences as well as the arts and humanities. He devoted more time than usual to the study of physics and of mathematics (chemistry was not taught at the *Gymnasium*), but was also engaged with literature, writing poetry; during festivities hold at the *Gymnasium* he participated in the performance of an anonymous humorous play (in the role of a female character, Pauline Lucca [1841-1908], at the time one of the most famous opera singers; the theatrical experience made him consider becoming an actor). With so many interests, it was difficult to him to choose a university course. His father preferred chemistry: a chemist would be important in his textile industry, and his brother Richard had been studying chemistry in Heidelberg since 1863. At his parents' suggestion, he visited his brother in 1865, was charmed by university life, laboratory work, and new discoveries (in Heidelberg, Bunsen and Kirchhoff had invented shortly before, in 1859, the revolutionary analytical technique of spectroscopy). The visit to his brother was decisive: Victor decided to study chemistry.

Still very young, his parents tried to "keep him at home" for a little longer. "At home," he attended a semester of chemistry at the University of Berlin, where he attended in 1865 August Wilhelm Hofmann's lectures. Later that same year, he transferred to Heidelberg, where he could study with the 'greats': Bunsen, Kirchhoff, Helmholtz, H. Kopp, Erlenmeyer. Heidelberg attracted many students at the time, not for the casinos in nearby Wiesbaden and Baden-Baden, as was said jokingly, but because of the excellence of the faculty and the minimal bureaucracy at the University, and where a thesis in Latin was no longer required. He earned his doctorate under Robert Bunsen (1811-1899) in 1867, at the age of 19. Bunsen appointed him his assistant and tasked him with the systematic analyses of mineral waters, a subject that allowed him to show the extreme accuracy and precision of his work. Intending to improve his skills also in Organic Chemistry, he went in 1868 to the *Gewerbeschule* (Trade School) in Berlin, founded in 1824 and the precursor of the *Technische Hochschule* of Berlin (1879), where he stayed until 1871. The school was then directed by Adolf Baeyer (1835-1917) and held a great prestige. At that time, Carl Graebe (1841-1927) and Carl Liebermann (1842-1914), who in 1869 isolated the dye alizarin from the root of madder (*Rubia tinctorum L.*), also worked there. A strong friendship arose between Baeyer and Meyer, which lasted until Meyer's death. At the *Technische Hochschule*, Meyer had the opportunity to demonstrate his rigorous work, his competence in teaching, and his ability to disseminate new chemical knowledge in lectures delivered to an audience of physicians, lectures which later were published. His first publication from Baeyer's laboratory was a paper on the synthesis of aromatic carboxylic acids from sulfonic acids and formates[14], which became significant in Organic Chemistry (1869). He also studied the structure of chloral hydrate[15], discovered by Liebig (1832) and introduced into therapy as a hypnotic in 1869 by Oscar Liebreich (1839-1908). He further researched, among other subjects, disubstituted benzene, dibromobenzene[16], and proposed a then not accepted formula for camphor[17]. Jacobson notes that the diversity of subjects did not allow for a prediction of a future research line but showed already his multiplicity of interests[18].

Figure 1 Friedrichswerdersches Gymnasium, building from 1871/1875, drawing by Richard Bohn, 1878, from Zeitschrift für Bauwesen, year 28, 1878, ed. G. Erbkam. (public domain).

In 1871, he concluded his thesis for *Habilitation* at the University of Berlin, "*Untersuchungen über die Constitution der zweifach substituirten Benzole*"[19] (Studies on the Constitution of Doubly Substituted Benzenes). But fate had other plans for him. Hermann von Fehling (1812-1885), professor at the *Technische Hochschule* of Stuttgart, asked Baeyer to recommend a professor for a second chair of chemistry created at the Polytechnic. Baeyer had no doubts: the candidate was Victor Meyer. Meyer moved to Stuttgart in 1871. He collaborated in the planning of a new laboratory, and there he discovered aliphatic nitro compounds[20] in 1872. His stay in Stuttgart was short-lived. In 1872, the chair of Chemistry at the Polytechnic of Zurich became vacant, with Johannes Wislicenus (1835-1902) moving to the University of Würzburg, replacing there the suddenly deceased Adolf Strecker (1822-1871), who had held the chair since 1870.

VICTOR MEYER IN ZURICH, 1872-1884

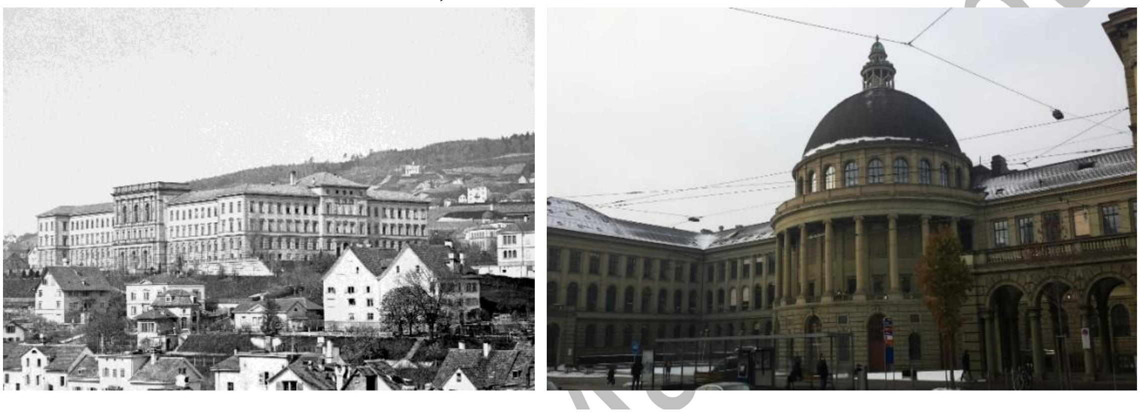


Figure 2 Left: The Zurich Polytechnic, shown is the building by Gottfried Semper (1893-1879), photograph ca. 1880 by an unknown photographer. Baugeschichtliches Archiv, Zurich Polytechnic (public domain). Right: The Zurich Polytechnic after Gustav Gull's (1858-1942) reform, 1915. (Photograph by Thomas Maar).

Karl Kapeller (1816-1888), President of the Swiss Confederation's Council of Education, and in that capacity also of the Polytechnic of Zurich, always sought (and succeeded) in transforming the *Eidgenössische Technische Hochschule* into one of the leading research centres in Europe. He saw in the hiring of Victor Meyer the future presence of a great professor and researcher[21], succeeding Wislicenus, who was a professor there from 1860 to 1872, and Georg Städeler (1821-1871), professor from 1854 to 1870.
Several researchers from the University of Zurich, like Weith and Merz, used to do their research at the laboratories of the Polytechnic. The University of Zurich (founded 1833) was a cantonal institution and had less resources than the Polytechnic, maintained by the Swiss confederation. There was no laboratory at the university until 18644, when the Polytechnic received a new laboratory and the old one was transferred to the university.
From Meyer's perspective, however, there was initially not as much optimism and prospects for a promising future. Upon arriving in Zurich, then a city with approximately 70,000 inhabitants, he felt that he was not well received, encountering indifference and little receptivity from the local population. He arrived with certain reservations. Swiss chemist Adolf von Planta (1820-1895), a student of Liebig and assistant to Kekulé, who resided in Reichenau Castle in the Grisons canton and maintained a laboratory of agricultural chemistry at the Polytechnic of Zurich, wrote to Meyer: "For a Swiss, a chemist who introduces even a single improvement in cheese making is worth more than a chemist authoring 1000 theoretical articles." Meyer admired the work ethic of Swiss people, their continuous activity in production, but, perhaps recalling Planta's observation, he lamented that everything was done having profit in mind[22]. Those

familiar with the history of Switzerland's chemical and pharmaceutical industries would not consider the observation entirely misguided.
Regarding his new work environment, the Polytechnic, founded in 1854, operated in a spacious building of magnificent architecture constructed from 1858 to 1864 by the German architect Gottfried Semper (1803-1879), known for the Dresden Opera and the *Burgtheater* in Vienna. The current appearance of the historic building is due to the renovation completed in 1915 by Gustav Gull (1858-1942). Meyer initially was met with some kind of reservation and suspicion by colleagues and assistants. Exceptions were the professors Wilhelm Weith (1846-1881), later his close friend and confidant, and Victor Merz (1839-1904), born to Swiss parents in Odessa, a student of Liebig in Munich (1861/1862). Merz was actually a professor at the University of Zurich, but collaborated with the Polytechnic. The initial distrust had its reasons: Victor Meyer, an *Ordinarius* (= full professor), was only 23 years old, younger than most of his future students. But Kappeler was convinced of Meyer's competence, and Victor took up his position in Zurich om June 6th 1872.
Initially settled in the house that had belonged to Wislicenus, located in the *Vogelsangstrasse,* in Oberstrass, the northernmost outskirts of the city, Victor Meyer adapted himself gradually to the new context, thanks to his conciliatory and calm temperament, his readiness to help others, his multiple interests, and his hospitality. The apparent indifference of the local population soon disappeared, so that his intellectual and artistic demands led him into the circle around poet and novelist Gottfried Keller (1819-1890), the greatest Swiss writer in German language. At the Polytechnic, quickly emerged a high-level research and teaching group. In a confidence to his brother, Victor Meyer said that the twelve years he spent in Zurich were the happiest of his life.

Figure 3 Victor Meyer (1848-1897) in Zurich. Photograph by unknown author. Courtesy Oesper Collection for the History of Chemistry, University of Cincinnati.

Attaining academic and financial stability, Victor Meyer married in 1873 in Berlin Hedwig Davidson (1851-1923), his childhood friend and daughter of Moritz Davidson (1812-1852), a doctor in Posen (now Poznań, Poland). The couple had five daughters, three born in Zurich: Else, born in 1874 and deceased at the age of seven from septicemia, a heavy blow to Victor and likely one of the causes of his future depression; Grete (1875-19), who married the painter Fritz Widmann (1868-1937); and Hildegard (1879-1965), married to Kurt Stieler (1877-1963), an actor and theatre and film director, from whom she separated in 1922, moving to the Riviera, where she became known as Hilde Stieler, remembered as an expressionist painter and poet ("*Der Regenbogen*", Berlin, 1918).
During his long stay in Zurich, Victor Meyer conducted extensive research in Organic Chemistry and in Physical Chemistry. As we have seen, his scientific contribution however began much earlier, in Baeyer's laboratory in Berlin and at the Polytechnic of Stuttgart. A more detailed description of Meyer's scientific work will be presented later on in this article.

After establishing himself, Meyer returned to work in Zurich, initially revisiting two themes he had already been studying. Since Kekulé presented his benzene formula in 1865, it became important to determine how substituents are positioned in disubstituted benzene compounds (ortho, meta, para), and Meyer participated in these experimental studies, alongside with the independent studies of Wilhelm Koerner (1839-1925) in Giessen (1860) and of Peter Griess (1829-1888) in England. A theme started in Stuttgart, the reaction of alkyl iodides with silver nitrite, obtaining aliphatic nitro compounds, was studied in detail, demonstrating that for an experienced chemist, a simple theme such as aliphatic nitro compounds can lead to a range of new discoveries[23]. Meyer soon noticed the isomerism between aliphatic nitro compounds and organic nitrites, the acidic nature of the -CH_2- group adjacent to NO_2, a way to differentiate primary, secondary, and tertiary nitro compounds (1875, reaction with nitrous acid), "nitrolic"[24] and "pseudo-nitrolic"[25] acids, the behavior of hydroxylamine against nitrous acid, the formation of alkyl-aryl azo compounds. The increased reactivity of the methylene group CH_2 adjacent to the nitro group NO_2 led him to investigate whether there was also increased reactivity of the CH_2 adjacent to other groups such as carboxyl, CO, or –CH_2CH_2COOH etc. Thus, he arrived at nitroso compounds, such as nitrosoacetic acids (nitrosation, substitution of a hydrogen atom by a nitroso group, 1873/1874).

Two other important discoveries by Victor Meyer in Organic Chemistry date from his Zurich period, both in 1882: oximes[26], in partnership with his student and collaborator Alois Janny[27], and thiophene. Oximes are formed by the reaction of aldehydes and ketones with hydroxylamine, resulting in aldoximes and ketoximes. Oximes were important "derivatives", and hydroxylamine (discovered by Lossen in 1865) is a reagent in "classic" organic analysis. Ketoximes were the subject of studies on isomerism. Acetoximes were the topic of Janny's doctoral thesis (1883). An important oxime synthesized by Meyer and Janny in 1882 was dimethylglyoxime, introduced into Analytical Chemistry (nickel detection) in 1905 by Lev Chugaev (1873-1922)[28].

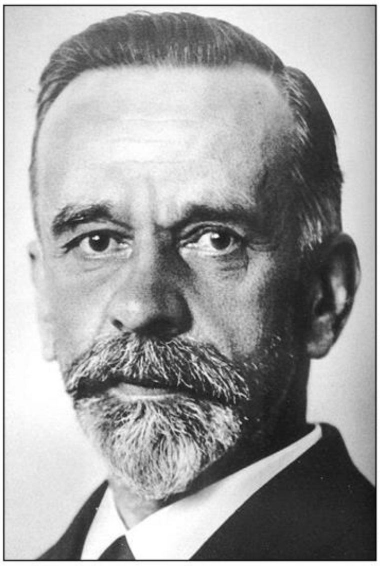


Figure 4 Traugott Sand 1922), Victor Meyer's collaborator. Photograph, ca. 1910, anonymous. Courtesy Oesper Collection for the History of Chemistry, University of Cincinnati.

The story of the discovery of thiophene[29] is anecdotal. A reaction used by Victor Meyer in his classes to qualitatively detect benzene was Baeyer's "indophenin reaction", in which benzene would produce a blue color reacting with a mixture of isatin and sulphuric acid. At an occasion the reaction failed, and it was necessary to find a reason: another compound similar to furan, which was called thiophene, should accompany benzene. With Traugott Sandmeyer (1854-1922), the precision mechanic whom Meyer converted to his assistant and professor, he began to investigate a synthesis for thiophene.

Amidst his successful advances in Organic Chemistry, in 1876 Meyer became suddenly interested in a topic from Physical Chemistry: the determination of the vapour density of a volatile liquid or of a liquid easy to vaporize. Determining vapour density allows the determination of molecular mass. The procedure is simple: the volume of a precisely known mass of a volatile liquid is determined, and by the general gas law, the molecular mass of the substance under study could be calculated. To perform the measurements, Meyer constructed a very simple apparatus (1876), consisting of a tube for evaporation, which ends at the bottom in a bulb containing a heating liquid (water for substances that

evaporate below 100°C). In this tube is placed another tube containing the liquid to be evaporated. Then the entire device is hermetically sealed. At the top of the heating tube, a gas burette measures the volume of gas formed[30]. There are many modern variants of this simple "Meyer apparatus," which has since become widely used in laboratories.
Meyer's successor in Zurich was Arthur Hantzsch (1857-1935), a doctoral student of Johannes Wislicenus. Hantzsch became a professor in Würzburg in 1893, and in Leipzig from 1903 to 1927, invited by Ostwald to succeed Wislicenus, deceased in 1902.

VICTOR MEYER IN GOTTINGEN, 1884-1889

Amidst his numerous activities in Zurich and the planning, in collaboration with Professor Georg Lunge, of a new laboratory, Victor Meyer received an irresistible offer to assume the chair of Chemistry at the University of Göttingen, vacant following the death of Hans Hübner (1837-1884), who had succeeded Friedrich Wöhler (1800-1882) in 1882. This opportunity offered a return to researching and teaching in his homeland, but presented a difficult choice, as Meyer was perfectly adapted to life in Zurich and to his work at the Polytechnic. After a period of rest on the Riviera, due to increasing health problems, Meyer accepted the offer.

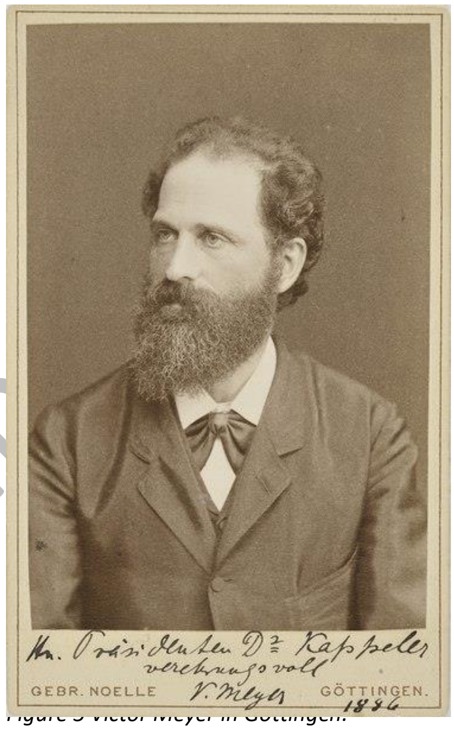


Figure 5 Victor Meyer in Göttingen. Photograph, by Gebrüder Noelle, 1886. Archives of the Library of the Zurich Polytechnic. (public domain).

He arrived in Göttingen in 1885, coming directly from the Riviera, adapting rapidly to the academic, social, and cultural environment of the city. His health was the only concern. In Göttingen, the last two of the couple's five daughters were born: Elisabeth (1885-1940), who married Carl Willmans (1875-1945), a professor of psychiatry in Heidelberg, and Irmgard (1888-1942), married to jurist and judge Guido Leser (1883-1942). Guido Leser and Irmgard Leser commited suicide in Berlin, in October of 1942, to avoid their deportation to the concentration camp of Theresienstadt.
At the Institute of Chemistry in Göttingen Meyer found a group of assistants, including Ludwig Gattermann (1860-1920), Rudolf Leuckart (1854-1899), and Karl von Auwers (1863-1939). From Zurich, he brought Traugott Sandmeyer as an assistant for a year, to continue his research on thiophene. Their first task was to complete researches which that were underway in Zurich; in 1883, Meyer and Sandmeyer synthesized thiophene from acetylene and sulphur[31]. Over the course of 20 years, with various collaborators, Meyer researched thiophene and its derivatives, resulting in many unsuspected discoveries[32]. This early example not only represents exhaustive study (with the resources available at the time) but also signifies a growing specialization in Organic Chemistry, necessary for fully understanding a subject, but potentially stifling the chemist's creativity. All these studies on thiophene culminated in 1888 with the publication of the book "*Die Tiophengruppe*."
Another ongoing research project was the determination of vapor density, which was completed with the participation of Sandmeyer and Gattermann. They conducted vapor density determinations at very high temperatures (pyrochemistry), wherein molecules such as Cl_2 or Br_2 were converted into atoms. Victor even speculated: could we not

fragment atoms if we achieved sufficiently high temperatures? The pyrochemical studies, including those from Zurich, were conducted in collaboration with Carl Langer (+1935). In 1885, Meyer and Langer published the book "*Pyrochemische Untersuchungen*." In 1888, Meyer began planning a new laboratory, next to the Wöhler's historical laboratory (1860), later demolished. The new laboratory had a chimney 20 meters high, for pyrochemical experiments.
Meyer did not get to use his laboratory, as an invitation from Heidelberg came. The laboratory was completed by Otto Wallach (1847-1931), Meyer's successor in Göttingen, and Nobel Prize winner in Chemistry in 1910 for his systematic study of terpenes.

VICTOR MEYER IN HEIDELBERG, 1889-1897
The fame of the University of Heidelberg in the 19th century was largely due to the activity of Robert Bunsen (1811-1899) as a professor from 1852 to 1889, when he retired. Bunsen himself recommended Victor Meyer, his former doctoral student, as his successor. Once again, Meyer did not decide immediately, as he was well-established in Göttingen. Before making a decision, he spent some time in Bordighera, on the Italian Riviera, where he encountered Baeyer, Emil Fischer, Otto Wallach, and researchers from other fields. Finally, on the third invitation, to the dismay of the University of Göttingen, Meyer accepted.
From Göttingen he brought five assistants with him to Heidelberg: Paul Jacobson, Paul Jannasch (1841-1921), Karl von Auwers (1863-1939), Ludwig Gattermann (1860-1920), and Robert Demuth[33]. From Göttingen, he brought also Emil Knoevenagel (1865-1921) and E. Ney. Many of these assistants and doctoral students of Meyer later became professors (Gattermann in Freiburg, Knoevenagel in Heidelberg, Leuckart in Göttingen). Despite already being well-known for his discoveries, Meyer continued to engage in intense activity in Heidelberg. Initially, he still focused on the determination of vapor density, but later he turned exclusively to topics in Organic Chemistry. Initially, he dealt with the positioning of substituents in aromatic compounds, then with two new themes: aromatic compounds containing iodine and stereochemistry. Although already existed methods for introducing iodine into an aromatic ring, the systematic study of aromatic compounds containing iodine promoted by Victor Meyer and his collaborators from 1892 to 1894 represents a thorough investigation of these compounds: iodobenzene, iodosobenzene, iodoxybenzene, iodonium salts, iodobenzoic acid, iodosobenzoic acid, and iodoxybenzoic acid.

The second major theme was stereochemistry, a term coined by Meyer in Göttingen in 1888. Abandoning the idea of a 'point-like' atom and considering that the atom has volume and dimensions (1890), the empirical aspect entered into problems related to the spatial structure of chemical compounds, for example, in "steric hindrance" (1894), a concept developed in parallel with Carl Adam Bischoff (1855-1908), who was then a professor at the Polytechnic of Riga. An example of this "steric hindrance" is as follows: benzoic acid easily reacts with alcohols to form esters; however, 2,4,6-trimethylbenzoic acid does not react because the volume occupied by the three methyl groups prevents the approach of the alcohol. For a time, this effect was called 'Meyer's rule'. Meyer also observed, with Auwers (1890), that there can be hindrances to free rotation (*Beschränkte Drehbarkeit*) of single bonds - C - C -.[34] Meyer thus pioneered the study of 'steric hindrance' and was the first to present van't Hoff's theory of the tetrahedral carbon in the university lectures.

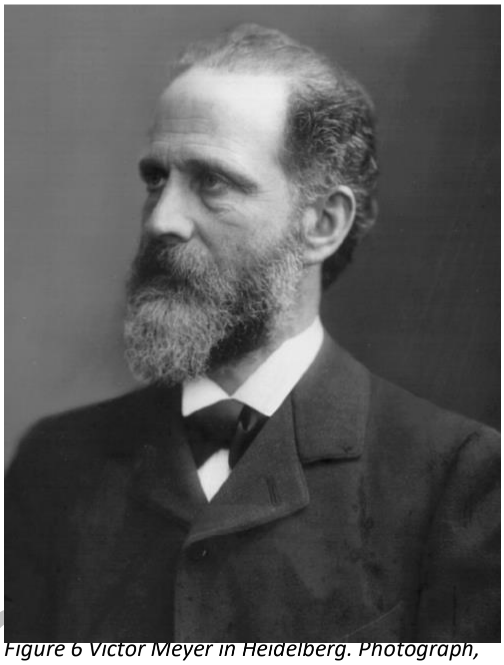


Figure 6 Victor Meyer in Heidelberg. Photograph, F. Langbein & Co., 1890. Archives of the Heidelberg University (public domain).

Victor Meyer's successor in Heidelberg was Theodor Curtius (1857-1928), a doctoral student of Kolbe in Leipzig (1882), a notable researcher of nitrogenous organic compounds, who held the position until his retirement in 1926.

THE PUBLICATIONS

Victor Meyer wrote easily, and due to his great interest in literature, elegantly about non-chemical subjects. In chemistry, his first book dates to his time in Zurich, co-authored with Frederick Pearson Treadwell (1857-1918), professor of Analytical Chemistry, titled "*Tabellen zur Qualitativen Analyse*" (Tables for Qualitative Analysis, 1884, Bern, 8th edition 1918). His most important work was a new textbook on Organic Chemistry, "*Lehrbuch der Organischen Chemie*", 5 volumes, co-authored with Paul Jacobson (1859-1923), published in 1883. Regarded as the best text on the subject since Kekulé's famous work (7 volumes, 1859/1887), it went through several editions following Meyer's death, overseen by Jacobson. A new edition appeared in 2023. In 1888, Meyer published "*Die Thiophengruppe*" (The Thiophene Group), an early example of the specialization that would later dominate chemistry. "*Pyrochemische Untersuchungen*"(Pyrochemical Investigations), with Carl Langer, dates from 1885. This was followed in 1890 by "*Ergebnisse und Ziele der Stereochemischen Forschung*" (Results and Objectives of Stereochemical Research) and the pamphlet "*Chemische Probleme der Gegenwart"* (1890, Chemical Problems of the Present), spanning just 42 pages. The literary character and elegant writing style are evident in "*Aus Natur und Wissenschaft*" (From Nature and Science, Heidelberg, 1882) and in the account of a holiday trip, "*Märztage auf dem Kanarischen Archipel*" (March Days in the Canary Archipelago, Leipzig, 1893).

THE TRAGIC END

The end of the great chemist was tragic. Already in his Zurich days, his – imperceptible – sensitive temperament led to frequent episodes of depression, a persistent insomnia, and after each semester, extreme exhaustion from his intensive work pace. Vacations and trips revived him, but the cycle repeated each semester. It is supposed that doctors prescribed him large quantities of medications. Bromine and chlorine vapours, along with exposure to other reagents, must also have seriously affected his health. Exhaustion from overwork, severe neurasthenia, chronic insomnia, recurring depressions, fear of losing his mental faculties – all led to his suicide on the night of 7-8 August 1897. Returning from a party, he retired to his room, requesting not to be disturbed until morning. When the door was forced open, he was found dead, still in his party attire, with a vial of cyanide in his hand. In the pocket of his jacket was found the formidable long poem "*Sturz und Erhebung*" (Fall and Ascent), written by Meyer himself in 1884/1885, which begins[35]:

"Wer bist du
Schecklich blickender Dämon,
Drohende Furie, die in das Herz mir
Bohrend dringt mit glühender Spitze,
Dass ich des Nachts vom weichen Lager
Aufschnelle – bebend, bedeck mit Angstschweiss,
Das Auge trocken, stier, todsuchend der Blick?
Wehe mir, ich kenne dich!
Verzweiflung ist dein Name,
Entsetzen dein Hauch!"

Or, translated into English:

"*Who are you,*
You, terrible oppressive demon
Of threatening fury that in the heart
Penetrates me with burning spear,
As soon as at night on my soft bed
I shudder – trembling, covered in the sweat of fear,
Dry eye, fixed gaze seeking death!
Woe is me, I recognize you!
Despair is your name,
Horror your breath!"

An example of how little was known about Victor Meyer appears in the obituary published in the *American Journal of Chemistry*: "It is generally believed that the indirect cause of his death was overwork. He was repeatedly warned to conserve his strength, but his innate desire to be active was uncontrollable[36]." This is only part of the truth. Victor Meyer was buried in the *Bergfriedhof*, in Heidelberg, in the presence of Bunsen, Baeyer, friends, and a representative of the Grand Duke of Baden. In 1885, Victor and his wife converted to Christianity, not for religious conviction, but to facilitate social and academic advancement. Victor Meyer was a member of the Academies of Berlin and Munich, the Leopoldina Academy, the Scientific Societies of Göttingen and Uppsala, and received the Davy Medal from the Royal Society in 1891 for his method of determining vapor densities at high temperatures. From the Grand-Duke of Baden he received the title of *Geheimrat* (privy councillor). He served as president of the German Chemical Society in 1897.

HIS STUDENTS

Victor Meyer had many students, in Zurich, in Göttingen and in Heidelberg, but surprisingly few of them reached prominent positions, despite the renown of Heidelberg University at the time and the very high level of Victor Meyer's research. Many of his doctoral students as well as collaborators in his numerous research projects no longer appear in texts on the History of Chemistry, except perhaps in histories of local interest – a matter we do not know. Among his compatriots, there are a few exceptions, chemists who had respectable careers, perhaps the most notable is Traugott Sandmeyer (1854-1922) in Zurich, remembered to this day for the Sandmeyer reaction (1884). Also mentioned are Emílio Noelting (1852-1922), professor at the School of Chemistry in Mulhouse, a dye specialist (originally from the Dominican Republic, son of a German merchant); Casimir Wurster (1864-1913), known for "Wurster's red"; in Göttingen, Heinrich Biltz, Emil Knoevenagel (1865-1921), Ludwig Gattermann (1860-1920); in Heidelberg, Max Bodenstein (1871-1942) and Karl von Auwers (1863-1939), who already had a doctorate with Hofmann, all frequenters of the History of Chemistry. Victor Meyer had many English and North American students, but few have a particular interest in the History of Chemistry; others pursued activities in related fields. Among the English students, Sir Jocelyn Field Thorpe of the *Imperial College London* (teacher of Sir Christopher Ingold [1893-1970], establishing a link between the *Imperial College*, a fuel specialist; John Joseph Sudborough (1869-1963), professor at the *Indian Institute of Technology* in Bangalore (1911/1926) and author of a textbook on Organic Chemistry (1912); among the North Americans, Forris Jewett Moore (1867-1926) of the *MIT*, Francis Benedict (1870-1957), who became a nutrition specialist, and Francis Despard Dodge (1868-1942), an specialist in essential oils. With Wilhelm Michler (1846-1889), assistant and eventual substitute for Victor Meyer in Zurich, Meyer's influence reached Latin America: after a trip to Buenos Aires and southern Brazil in 1881, Michler was a professor at the Polytechnic School of Rio de Janeiro (1881/1889)[37], studying fats and vegetable oils.

VICTOR MEYER'S SCIENTIFIC WORK

Judging by the mere enumeration of the topics addressed by Meyer in his research, one cannot perceive the extent of his work in Organic Chemistry. It is a characteristic of the astute researcher to foresee, like in a chess game, the next steps of his work. Victor Meyer's immense scientific output in just over twenty years of academic life allows us to assess the loss his premature death was to science.

Aliphatic Nitro Compounds ("Nitroparaffins")

Aromatic nitro compounds had been known since 1835, when Eilhard Mitscherlich (1794-1863) obtained nitrobenzene by nitration of benzene. This compound was of enormous importance in the history of Organic Chemistry, as Nikolai Zinin (1812-1880) obtained aniline by reduction of nitrobenzene (1842). Aniline, through the formation of diazonium salts (1858, Peter Griess, 1829-1888) leads to azo compounds and dyes, and by Sandmeyer's reaction to a variety of substances, being a key piece in organic synthesis. For example, in 1875 Victor Meyer obtained, with his student G. Ambühl, the first aromatic-aliphatic[38] compound, benzene-azo-nitroethane,
C_6H_5-N=N-CH_2CH_2-NO_2. Aliphatic hydrocarbons, however, cannot be nitrated: nitric acid fragments the carbon chain.

In 1872, at the Polytechnic School of Stuttgart, Victor Meyer and his collaborator Stüber[39] developed a process to obtain aliphatic nitro compounds, a substitution reaction: they treated amyl iodide with silver nitrite ($AgNO_2$) and obtained a compound with the formula $C_5H_{11}NO_2$, which Meyer named nitropentane (Meyer's reaction). That same year, Hermann Kolbe (1818-1884), in Leipzig, obtained nitromethane using the same process, but unlike Meyer, he lost interest in the subject and published his work three months later. Meyer continued to explore the topic for 20 years, from various angles[40]. For example, he quickly recognized the isomerism between aliphatic nitro compounds and organic nitrites. After Conrad Laar (1853-1929) defined the concept of tautomerism in 1885, and with Meyer discovering the acidic nature of the hydrogen atom adjacent to the NO_2 group, it was realized that aliphatic nitro compounds are tautomers of nitronic acids, discovered by John Ulric Nef (1861-1915) in 1894 (Nef reaction[41]) (and apparently already in 1893 by Dmitri Konovalov [1856-1929]).

Victor Meyer's research group continued to study nitro compounds in Göttingen and Heidelberg. In 1875, they developed a method to differentiate primary, secondary, and tertiary[42] nitro compounds. Primary nitro compounds form a red solution of nitrolic acid with nitrous acid in ether, turning red in basic medium; secondary nitro compounds form a blue solution of a nitro-nitroso compound (pseudonitrole) with nitrous acid; tertiary nitro compounds do not react under these conditions.

The discovery of oximes.

Hydroxylamine was a frequent reagent in Meyer's hands. In 1882, with Alois Janny, he discovered oximes through the reaction of hydroxylamine with aldehydes and ketones, forming aldoximes and ketoximes, respectively[43]. Oximes feature a C = N bond, which gives rise to geometric isomerism, studied in 1887 by Ernst Beckmann (1853-1923) in Leipzig. The rearrangement of ketoximes to lactams[44] was termed by Victor Meyer as the "Beckmann rearrangement" in 1886.

Thiophene.

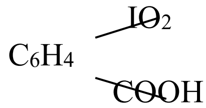
As we saw earlier, the history of the discovery of thiophene is anecdotal. In his classes, Victor Meyer used to demonstrate a qualitative detection of benzene with Baeyer's "indophenin reaction", where benzene would turn blue with a mixture of isatin and sulphuric acid. In one class, benzene did not turn blue; it was a highly pure benzene obtained from the decarboxylation of benzoic acid, whereas the benzene typically used was extracted from coal tar. Initially it was thought that an "activated benzene" caused the colour, but a rigorous analysis led to the discovery of a new heterocyclic compound, similar to pyrrole and furan, which was named thiophene. Meyer and Sandmeyer developed a synthesis for thiophene in 1883, starting from acetylene and sulphur.

Still in the field of thiophene, Meyer attempted to synthesize a thiophene homologue containing five carbons ("pentathiophene"), starting from thiodiglycol, but without success: he obtained bis(2-chloroethyl)sulphide in 1886[45]. This compound was not new; it had been synthesized in 1860 by Frederick Guthrie (1833-1886), and the study of its toxicity cost Albert Niemann (1834-1861) his life. Known as "mustard gas", it became the infamous chemical warfare agent '*yperite*' used during World War I by the Germans in Ypres (1917) and by the Allies in Cambrai (1918). Its chemotherapic activity was discovered in the 1940s (Alfred Gilman, [1908-1984]). In total, Victor Meyer and his collaborators published 106 articles on thiophene, in five years of research (1883/1888), supplemented by 25 articles from other research groups, such as the Volhard-Erdmann synthesis, starting from sodium succinate and P_2S_7. Jacob Volhard (1834-1910) was a professor in Halle, and Hugo Erdmann (1862-1910) was his student, later professor in Halle and at the Berlin Polytechnic. With all this material, Victor Meyer published his book "*Die Thiophengruppe*" in 1888 in Braunschweig.

Aromatic Compounds Containing Iodine.

The introduction of iodine into aromatic rings became easier with the Sandmeyer reaction. There were earlier, much more difficult methods, developed by Heinrich Hlasivetz (1825-1875) and Paul Weselsky (1828-1889), (1869)[46], by Kekulé, and by Paul Schutzenberger (1829-1897) in 1862. From 1892 to 1894, in Heidelberg, Victor Meyer studied, with a group of students, still unknown compounds - aromatic compounds containing iodine: iodobenzene, iodosobenzene, iodoxybenzene, and iodonium salts, iodobenzoic acid, iodosobenzoic[43] acid, and iodoxybenzoic acid. Of all these compounds, iodosobenzoic acid had the greatest consequences for the study of Organic Chemistry [47].

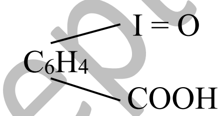
It is interesting to observe how experimentation at that time led to a logically grounded chemical reasoning, despite apparent contradictions[48]. For example, Meyer and his collaborator W. Wachter observed that adding nitric acid to o-iodobenzoic acid resulted in a compound containing no nitrogen, and the determined formula $C_8H_5O_2I$ suggested an oxygen atom bonded to iodine. This fact was the starting point for several studies conducted over several years. The resulting acid, $C_8H_5O_2I$, has oxidizing power: heating it with HCl releases chlorine, treating it with KI in acidic medium releases iodine, and the ortho-iodobenzoic acid is formed again. It can conclude that oxygen is combined with iodine, which becomes trivalent. The formula for iodosobenzoic acid is then, in our notation $C_7H_5IO_3$.

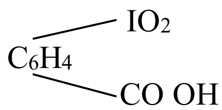


The low stability of this structure led several researchers to suggest not confirmed cyclic formulas.

Six years earlier, in 1886, Conrad Willgerodt (1841-1930), at the University of Freiburg, obtained the first polyvalent aromatic compound containing iodine, (dicloro)iodobenzene, $C_6H_5ICl_2$ in today's notation, obtained by adding chlorine to iodobenzene[49]. Willgerodt continued to study this subject and in 1892 obtained iodosobenzene, C_6H_5IO,[50] from the above compound. Willgerodt also studied meta- and para-iodosobenzene, but their properties differed greatly from those of the ortho-derivative. This "territory invasion" sparked a brief controversy between Meyer and Willgerodt. Meyer acknowledges Willgerodt's priority in the discovery of (dicloro)iodosobenzene and would also concede priority for iodosobenzene if it were not for the differences in properties of the compound obtained by Willgerodt, which leads him to dispute these results[51].

Victor Meyer and Christoph Hartmann continued this research, synthesizing in 1893 iodoxybenzene acid[52] from iodosobenzoic acid:





Experiments conducted in collaboration with Chr. Hartmann led to a new group of compounds, iodonium salts (analogous to ammonium and sulfonium salts) [53]: treating iodosobenzene successively with sulfuric acid, KCl, and other reagents, the following sequence is obtained:

$$C_6H_5IO \rightarrow \rightarrow \quad C_6H_5I + C_6H_4IO_2 \quad \rightarrow \rightarrow \quad (C_6H_5)_2\text{-I-OH}$$

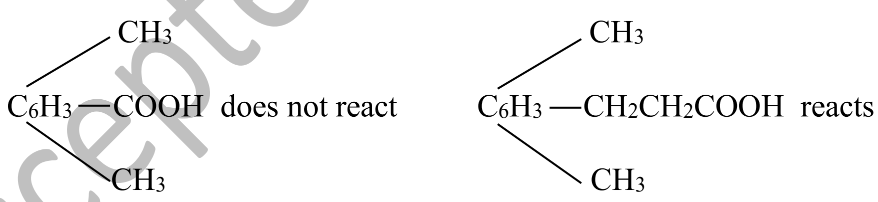
Stereochemistry

Victor Meyer's last comprehensive research theme was stereochemistry. He coined the term "stereochemistry" himself in 1888. Starting from 1894, his investigations revolved around what would later be called "steric hindrance". Meyer was a pioneer in studying stereochemical effects on reaction mechanisms, and along with van't Hoff and Wislicenus, he elevated stereochemistry to a scientific status, advocating for the three-dimensional structures of organic compounds. Carl Adam Bischoff (1855-1908), a professor at the Polytechnic of Riga, was a partner in these investigations. Even before his systematic studies on steric hindrance, Meyer observed in 1890, with his collaborator Karl von Auwers (1863-1939), that there were restrictions on free rotation around a single C-C bond due to the presence of bulky substituents (*Beschränkte Drehbarkeit*)[54]. Decades later, these studies led to conformational analysis, a subject researched by Sir Derek Barton (1918-1988) and by Odd Hassel (1897-1981), who were awarded the Nobel Prize in Chemistry in 1969. Interestingly—or perhaps not—neither Barton nor Hassel mentioned the pioneer Victor Meyer in their respective Nobel Lectures, as if current knowledge did not rely on prior discoveries...

But let us start with the early experiments by Victor Meyer's team, which involved aromatic carboxylic acids, many of which were then still unknown and had to be synthesized; the property studied was the higher or lower yield in their esterification[55]. A multitude of compounds and reactions led to the "ester law" or Meyer's Law[56], which enabled not only the determination of structures but also the production of very specific compounds.

Meyer observed that benzoic acid yields 92% ester during esterification, whereas mesitylbenzoic acid yields only 9%. This was attributed to the presence of three methyl groups in the latter case, which hindered esterification; however, durylbenzoic acid, an isomer of mesitylbenzoic acid, yielded 90% ester. Thus, the different ester yields were due to another factor. Polyaromatic carboxylic acids entered the scene: pyromellitic acid (1,2,4,5-tetracarboxybenzene) forms four esters, while the isomer prehnitic acid (1,2,3,4-tetracarboxybenzene) forms only two esters. The reason for the lack or low yeld of certain esterifications was the large volume of groups in the ortho position to the carboxyl group, considered in three dimensions: CH_3, and carboxyl itself[57]. Many other aspects can be considered: mesitylcarboxylic acid forms minimal amounts of ester, but mesitylacetic acid forms esters easily[58].

There are many more situations explained by stereochemistry, but a detailed exploration of these situations is not within the objectives of this article. Nonetheless, it should be mentioned that esterification occurs when the carboxyl group is distant from bulky groups that hinder the reaction.



Also in the formation of keto-oximes can occur steric hindrance, among other reactions examined by Victor Meyer and his collaborators.

Determination of Vapor Density

By measuring the vapor density of substances, it is possible to determine their molecular mass, and various methods existed for this purpose. The first to use vapor density comparisons to determine molecular weights was Jean-Baptiste Dumas (1800-1884) in 1826, for liquids and solids that were easy to evaporate. Due to many uncertainties about atoms and molecules, this method initially did not attract much attention. It allowed the determination of vapor density for substances with boiling points below mercury's evaporation point. Dumas's method was improved by Henri Etienne Saint-Claire Deville (1818-1881) and Louis Joseph Troost (1825-1911), for temperatures up to 1400°C, by Carl Graebe and others, to allow for the determination of vapor density of substances with higher boiling points.

Victor Meyer developed a method to determine vapor density, and consequently molecular mass, at high temperatures. The idea is simple: determine the volume of a precisely known mass of a volatile liquid without losses, and using the general gas law, calculate the molecular mass of the substance under study. To determine vapor density, Meyer constructed an apparatus, also very simple. An evaporation tube ends at the bottom with a bulb containing a liquid heating bath (water for substances that evaporate below 100°C). Inside the tube, another tube contains the exact amount of liquid to be evaporated. The entire device is hermetically sealed. At the top of the heating tube, a gas burette is attached to measure the volume of gas formed[59]. There are many modern variants of this simple "Meyer apparatus," which became widely used in laboratories. Meyer intended to work above the boiling point of sulphur (444.6°C) and used mercury or Wood's metal (an alloy of Bi, Pb, Cd, and Sn)[60] as the heating material.

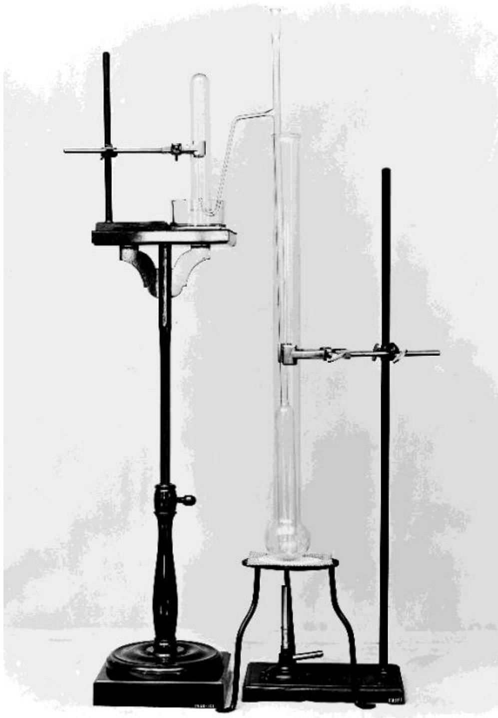


Figure 7 Victor Meyer's Apparatus for vapor density determination. Courtesy Wellcome Foundation, London.

Widely used in its time, the method was later replaced by others, such as tonometry, cryoscopy, and ebulliometry.

Pyrochemical Investigations

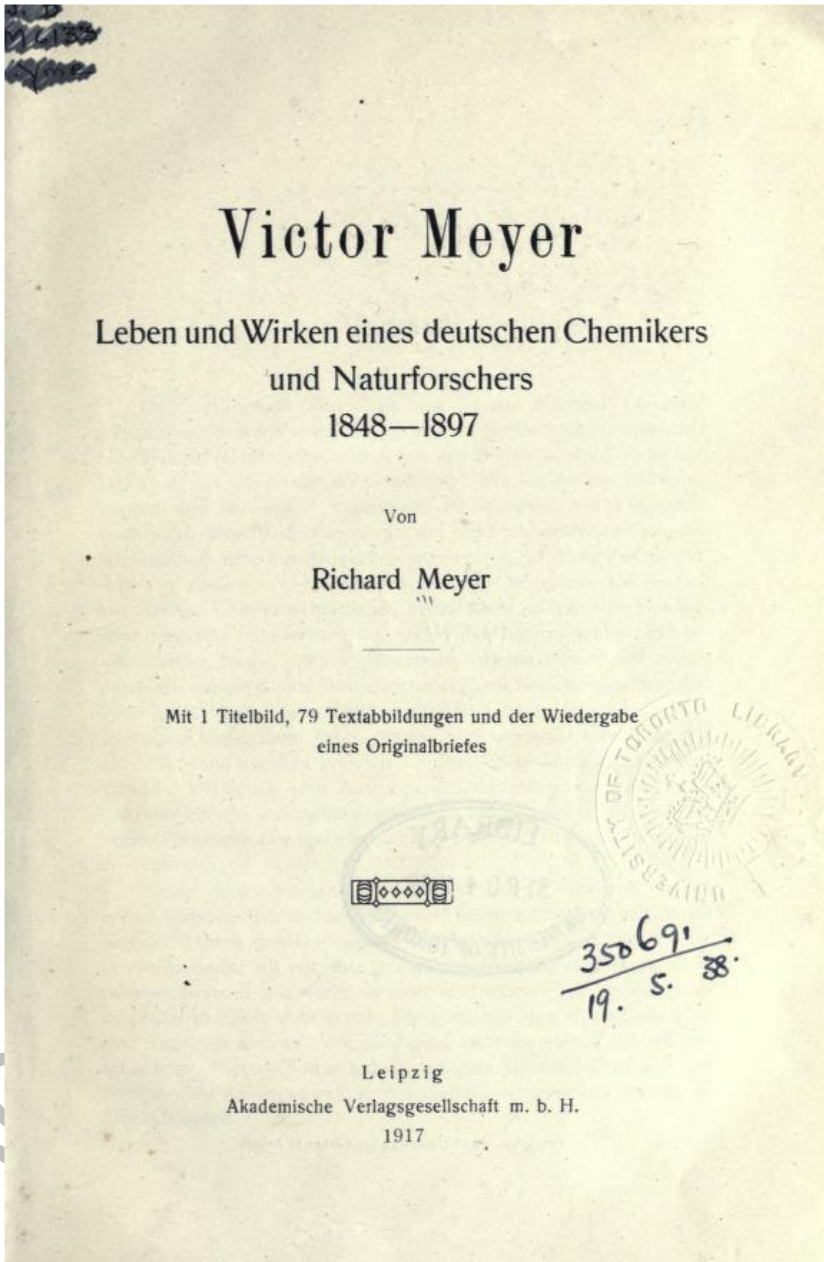
Pyrochemical investigations (at high temperatures) are somewhat a continuation of determining molecular masses by measuring vapor density, initially focusing on "substances for which molecular mass determination was of great theoretical importance." These substances were essentially inorganic substances and elements with structures not yet definitively established. The first substance analysed was phosphorus pentasulfide, P_2S_5: the vapor density was determined at high temperatures and in a nitrogen atmosphere. Determining the formula for indium chloride, $InCl_3$, allowed for the correct placement of indium (an element discovered in 1863 at the Freiberg School of Mines by Ferdinand Reich and Theodor Richter) in the periodic system[61]. Other substances studied included[62]: Sn_2Cl_2, $ZnCl_2$, Fe_2Cl_6, Sb_4O_6, $CdBr_2$.

Many doubts were thus clarified. The dissociation of the iodine molecule, I_2, was also studied, a subject definitively clarified by Max Bodenstein (1871-1942) in the context of photochemistry.

The determination of molecular masses by measuring vapor density was initiated by Victor Meyer in Zurich in 1876, then interrupted, resumed in Göttingen (construction of a special laboratory), and in Heidelberg. The innovation introduced in Heidelberg was working at two temperatures: vaporization at very high temperatures and measuring density at room temperature. Meyer and Heinrich Biltz published a historical account (1889)[63].

Other Investigations

The investigations discussed above do not exhaust Victor Meyer's interests in Organic Chemistry and Physical Chemistry. In high-temperature chemistry, there is the study of partial combustion of gases and many publications that do not fit into Meyer's major research projects, which Richard Meyer in his biography calls *Verschiedenes* (= various), without going into greater detail[64]. We will also not delve into more details, although some interesting topics are mentioned, such as: a synthesis of phenylhydrazine from


Victor Meyer

Leben und Wirken eines deutschen Chemikers
und Naturforschers
1848—1897

Von

Richard Meyer

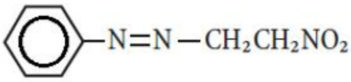
Mit 1 Titelbild, 79 Textabbildungen und der Wiedergabe
eines Originalbriefes

Leipzig
Akademische Verlagsgesellschaft m. b. H.
1917

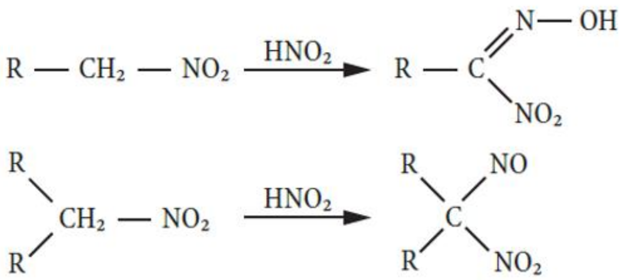
Figure 8 Frontispiece of Victor Meyer's biography, 1917, by his brother Richard Meyer (1846-1926).

diazonium salts[65] (1883), obtaining and studying the properties of 2-nitroethanol[66] (1890), or, contrary to van't Hoff and Baeyer, confirming that the carbonyl group in glucose is aldehyde and not ketonic (1880).

TABLE1 - REACTIONS MENTIONED IN THE TEXT - MODERN REPRESENTATION

a) 

benzo - azo - nitroethane
(aryl - alkyl - azo compound)

b) 

mitrolic acid

pseudo-nitrolic acid

c) 

iodosobenzoic acid

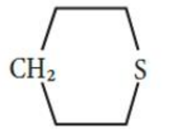
iodoxibenzoic acid

d) $C_6H_5I \xrightarrow{Cl_2} C_6H_5Cl_2 \longrightarrow C_6H_3IO$ iodosobenzene

e) $C_6H_3IO \xrightarrow{H_2SO_4} \xrightarrow{KCl} C_6H_5I + C_6H_4I_2 \longrightarrow \longrightarrow$

$(C_6H_5)_2 - I - OH$

f) 



thiodiglycol

bis(2 - chlor o ethyl) sulfide

penthiophene

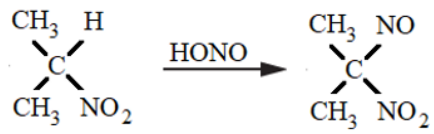
TABLE 2 - REACTIONS MENTIONED IN THE TEXT
MEYER'S REPRESENTATION

a) $CH_3 \cdot CH \cdot NO_2$
$\qquad N_2 \cdot C_6H_5$

benzo-azo-nitro ethane
(am aryl-alkyl-azo compound)

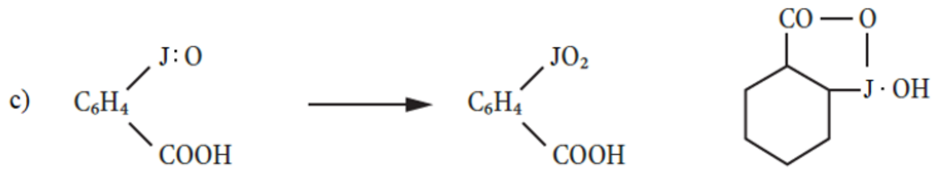
b) $CH_3 \cdot CH_2 \xrightarrow{HONO} CH_3 \cdot C = N\text{-}OH$
$\qquad NO_2$

nitrolic acid



pseudonitrolic acid

c)



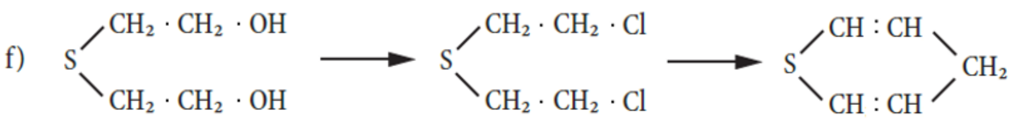
iodosobenzoic acid — iodoxibenzoic acid — cyclic form

d) $C_6H_5J \xrightarrow{Cl_2} C_6H_5J \cdot Cl_2 \longrightarrow C_6H_5 \cdot J \cdot OH$ iodosobenzene

e) $C_6H_5 \cdot JO \xrightarrow{H_2SO_4} \xrightarrow{KCl} C_6H_5J + C_6H_4J_2 \longrightarrow$

$(C_6H_5)_2 \cdot J \cdot OH$ iodonium salts

f)

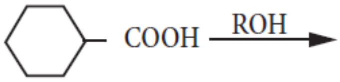


thiodiglycol — bis(2 - chlor o ethyl) sulfide — penthiophene

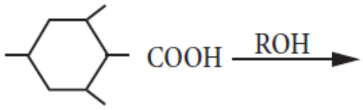
(J is the symbol for iodine in older German literature)

TABLE 3 - STEREO CHEMISTRY

a)

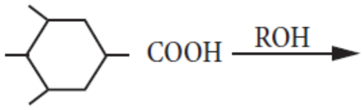


reacts, 92%



difficult, 9%

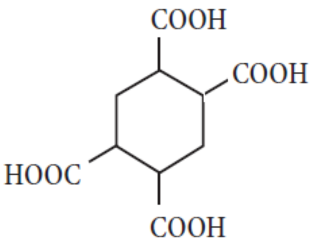
mesytilic acid



reacts, 90%

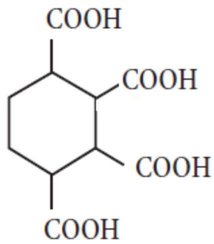
durylic acid

b)



pyromellitic acid

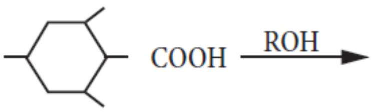
forms tetra-esters



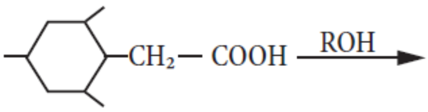
prehnitive acid

forms diesters

c)



difficult reaction (9%)



easy reaction

mesytilic acetic acid

[Victor Meyer's notation]

CONCLUSION

The extensive experimental work of Victor Meyer did not, for the most part, arouse much interest in the researcher Victor Meyer himself. Yet, his numerous works, carried out in just over twenty years, allow him to be listed alongside names like Wurtz, Friedel, Kolbe, Claisen, Curtius, Wislicenus, Butlerov, and others, who, in the typology of Thomas Kuhn, are categorized as "normal" scientists. These individuals were extremely productive but did not spark "small revolutions" in the *corpus* of Organic Chemistry, unlike Laurent, Gerhardt, Liebig, Wöhler, Kekulé, Hofmann, or Baeyer. Many reasons could be pointed out to explain the lack of interest in Meyer as a character, but in all cases, he would remain an exception. Of simple origin, with a calm and conciliatory temperament, interested in literature and music, and a lover of walks and travels—much like many other chemists of his time—Victor Meyer remains an exception.

Even though the human side of scientists deserves respect and consideration, it can be said that Meyer's work has remained and continues to be relevant, aside from some details that escape those who do not master the German language, in which he published all his research. The best way to conclude his biography is to recall a passage from his pamphlet "Current Chemical Problems," which demonstrates his precise understanding of the evolution of Chemistry. After discussing the relatively recent origin of Chemistry (for him, at the end of the 18th century—a common view at the time and still today) and Kant's opinion about Chemistry (not a "true science" because it lacks mathematization), he outlines the great advances in Chemistry:

"...the admirable successes of atomic theory and structural doctrines; the synthesis of the most complicated organic compounds; the beneficial multiplication of our pharmaceutical arsenal; the total restructuring of our industrial activity; the planned mode of production, which a renowned technologist called the obtaining of 'gold from waste.'"

It is a hymn of praise to Chemistry in front of scientists who rely exclusively on Mathematics and Physics[67].

SOME WORDS ABOUT RICHARD MEYER (1846-1926)

We would not have so many details about the life, personality, and scientific production of Victor Meyer if it were not for the extensive biography dedicated to him by his brother Richard Meyer. As Richard was also a chemist, it was easy for him to explain Victor's research projects, from the various places where he worked. Out of familial respect, the final aspects concerning Victor's illness and tragic death are not explored in the biography, which remains pragmatic and impersonal, despite the abundance of letters and documents dissected in it.

Richard Emil Meyer was born in Berlin in 1846. He studied Chemistry at the University of Berlin with Heinrich Rose, Gustav Magnus, and Franz Leopold Sonnenschein (1817-1879), a specialist in Analytical Chemistry and forensic chemistry, in whose laboratory he conducted his experimental studies. In 1865, he transferred to Heidelberg, where he was a student of Kirchhoff, Kopp, and Helmholtz. Finally, he defended his doctoral thesis in Göttingen under Hans Hübner in 1868: a study on the element indium, discovered a few years earlier. Before becoming a professor of Chemical Technology (1889-1918) and Chemistry (1899-1918) at the Polytechnic of Braunschweig, he was a professor of Physics and Chemistry at a cantonal school in Chur, Switzerland, and defended his Habilitation in 1886 with Baeyer in Munich. He researched various subjects (fluorescein and fluorescence, phthaleins, acetylene polymerization) and dedicated himself to scientific dissemination and the history of Chemistry. He passed away in Braunschweig in 1926[68].

SOME WORDS ABOUT HILDE STIELER (1879-1965)

Hildegard, the third of Victor Meyer's five daughters, was born in Zurich on March 29, 1879. With a talent for music and poetry, she studied piano in Munich, where she met the actor Kurt Stieler (1877-1963), whom she married in 1902, and subsequently accompanied him in his performances in Leipzig and Berlin. Since 1917, she published her first expressionist poems in the expressionist and socialist magazine "*Die Aktion*" and in other magazines. She separated from Stieler in 1922 (divorce in 1926), and went to live with the painter Erich Klossovski (1875-1949) in Paris and later on the Riviera, in Saint-Cyr-sur-Mer and in Sanary-sur-Mer, where she passed away. Through marriage to the former monk and Dutch writer Robert de Witt, she acquired Dutch citizenship. She left volumes of poetry ("*Der Regenbogen*"), 1919; "*Die Edelkomparsin von Sanary*" (2007, translated from French; encounters with Rilke, Alma Mahler, Aldous Huxley, Thomas Mann), novels, and paintings in the expressionist style. Thus, the love for literature always demonstrated by Victor survived for many decades through the pen of his daughter. Here is one of Hilde Stieler's expressionist poems, "*Weihe*"[69] (= Consecration):

WEIHE

Mitten im Lärm von Allen, die lügen im Lachen
und im Reden,
Unvermutet ward mir das Geschenk eines
Lächelns voll Zartheit und Güte.
Ich will nicht mehr Gott im Flammenbusche
suchen.
Nicht im Sehnen nach fragwürdigen Wunder
nutzlos vergehn.
Nein, ich will fortan Gottes Offenbaren darin
erkennen.
Das mir im Dunkel ein Auge lächelt.

Or, in the English translation:

Amidst the noise of everyone who lies while smiling,
and talking,
Unexpectedly there came to me the gift
of a smile full of gentleness and kindness.
I no longer want in the burning bush to seek for God.

Not on the pursuit of doubtful miracles
disappear without purpose...
No, I want now the presence of God to recognize
when in the darkness looks at me a smiling eye.

FINALE

The reader may find it strange that this article, which presents the pragmatism of empirical results and the disguised logic of each set of experiments, ends in verses. However, upon reading the verses carefully, we observe that they complement the epigraph of the article. Yes, the footprints of one's own path transubstantiate into personal feelings before metaphysical entities—concrete footprints and sensitive stances. There is no absolute separation between the empirical, the rational, and the sensitive, and the whole of our biography also shows this continuity in a certain way. The daily life of the scientist discussed here was filled with poetry and expressiveness, and as soon as the opportunity arose to reveal them, they appeared—even in the long term and after a long time...

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