BASF
Historical Milestones
1865 - 2005

1865

The Birth of the Chemical Industry and the Era of Dyes

1901

The first stage of German industrialization begins in 1835 with the building of the first German railway. At around the same time, customs barriers between the individual German states are abolished, creating an internal German market – a powerful incentive for the growth of new industries such as engineering and iron smelting.

At the same time, the German textile industry, and in particular the mechanized processing of cotton, begins to grow rapidly. Traditional processing methods such as exposing yarn or cotton to sunlight are too time consuming and need to be replaced by faster and more efficient methods. This push for modernization provides the momentum for the development of the fledgling chemical industry. “Chlorine bleach” is the buzzword of the day. Huge amounts of inorganic chemicals such as sulfuric acid, soda ash and chlorinated lime are needed for processing and bleaching.

Soda ash has helped Britain to build the world’s most productive textile industry and the best glass industry. Soda means soap can be manufactured more cheaply. Soap, once a luxury, becomes a basic commodity. Thanks to improved hygiene, the incidence of infectious diseases declines rapidly and average life expectancy doubles. Soda ash becomes a significant object of global trade.

But the textile industry needs dyes too. Existing natural dyes can no longer satisfy growing demand. Justus von Liebig leads the chemical industry’s second growth spurt. In his *Chemical Letters* written in 1844, he makes the bold prediction that a way will soon be discovered to make brilliant dyestuffs or drugs from coal tar. Scientists are busy searching for a way to synthesize the drug quinine.

These efforts are strengthened by calls for improved medical care by the Berlin physician Rudolf Virchow. Experimenting with coal tar in 1856 in an attempt to synthesize the anti-malaria drug quinine from coal tar, the young English chemist William Henry Perkin obtains the first synthetic coal tar dye, aniline purple, named mauveine. Within a short time, chemists throughout Europe discover a whole range of new synthetic dyes from aniline yellow through Bismarck brown to Hofmann violet. Thanks to their beauty and brilliance, the dyes fetch high prices. The discovery of coal tar dyes fuels the spread of a “gold rush” among industrialists, scientists and business people.

Friedrich Engelhorn, owner of a coal gas company in Mannheim, very quickly recognizes the opportunities for coal tar, a by-product of his company's business. In 1861, he begins producing fuchsin (magenta), a red dye, and aniline, the raw material obtained from coal tar. But he has bigger ideas – a company that spans the entire production process, from raw materials and auxiliaries through precursors and intermediates to dyes.
In **1865**, Engelhorn turns his groundbreaking idea into reality. On April 6, he founds a stock corporation in Mannheim under the name Badische Anilin- & Soda-Fabrik. After the planned acquisition of a site in Mannheim falls through, the manufacturing facilities are built on the opposite side of the Rhine River in Ludwigshafen, then part of the kingdom of Bavaria.

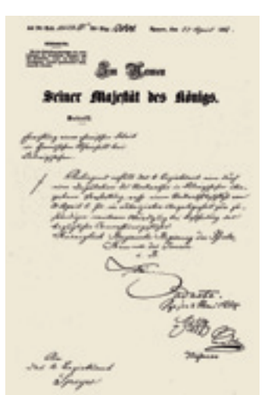
Occupational safety and health care establish a strong company tradition of social welfare.
The first company doctor is hired in **1866**. Twenty years later, the medical department moves into a new infirmary on the site.

In the second half of the 19th century, Ludwigshafen is one of the fastest growing cities in Germany. The housing shortage becomes an urgent social problem. The construction of company housing is mentioned as early as 1865 in BASF's application for an operating license. A year after the company is founded, four buildings are built on the edge of the site, in the extreme southwest. These contain apartments and sleeping accommodation for workers.

Modest beginnings: BASF in 1866

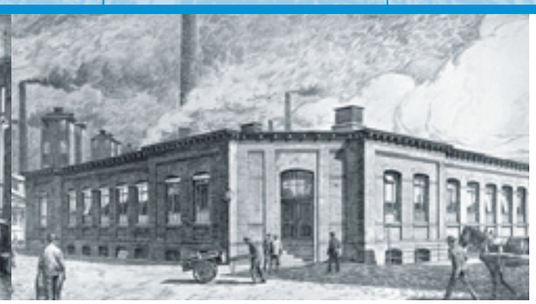
1865 | 1866 | 1867 | 1868 | 1869 | 1870 | 1871 | 1872

The founding fathers: Friedrich Engelhorn, Carl Clemm, August Clemm and banker Seligmann Ladenburg



Tracing the origins of BASF: Royal Bavarian letter dated April 27, 1865.

However, the first coal tar dyes are disappointing as they are neither colorfast nor lightfast (i.e., they fade). The traditional natural dyes madder (Turkey red) and indigo continue to dominate the market, but can no longer satisfy growing demand from the textile industry. This calls for intensive chemical research.
In **1868,** BASF appoints the chemist Heinrich Caro (1834 – 1910, chemist at BASF from 1868 to 1889) as its first head of research. The first research activities take place in a laboratory in Mannheim. When the property is sold, research continues in a lab situated next to the main gate of the Ludwigshafen site, the forerunner of the main laboratory.



The company's first onsite medical clinic around 1914: The royal Bavarian medical superintendent Professor Koelsch hails it as a "remarkable facility with treatment, operating and X-ray rooms plus halls for therapeutic gymnastics and medical baths."

In collaboration with Berlin professors Carl Graebe and Carl Liebermann, Heinrich Caro successfully synthesizes the first natural dye in **1869:** Alizarin, a red dye derived from the root of the madder plant, mainly used to dye cotton, becomes BASF's first global success story.
Other new dyes such as eosin, true red and auramine follow.

Samples of dyed fabric created by Heinrich Caro: Alizarin and eosin.

In **1872,** construction begins on the large "Hemshof colony," a development encompassing more than 400 dwellings that provides BASF workers with affordable housing. All the houses in the colony are detached, surrounded by gardens and divided into four apartments each.
The workers' houses have one-and-a-half stories: Each apartment has two parlors, a bedroom, kitchen, two basement rooms and a garden. The houses for supervisors and foremen have two-and-a-half stories, and each apartment has three parlors, two bedrooms, a kitchen, basement room and garden. In addition to the Hemshof colony, housing for white-collar employees is built next to the site in the following years.

Eat-in kitchen in the Hemshof colony around 1914

Social commitment: The first company housing estate in Hemshof around 1880

The successful synthesis of alizarin opens the world's markets to BASF. However, the company still lacks a proper sales organization. It therefore merges with two well-known dye merchants in Stuttgart in **1873,** Knosp and Siegle. BASF has already been channeling most of its sales through these companies as both have worldwide trading networks with more than 5,000 customers. Moreover, they operate their own "control" dyeworks, an applications-oriented department with close contacts to customers. Production facilities and sales offices are set up abroad: in New York in 1873, in Butirki near Moscow in 1877 and in Neuville-sur-Saône, France, in 1878. Siegle's Stuttgart-based pigment production reverts to Siegle in 1889. In 1970, BASF acquires the entire Siegle group in order to expand its pigment operations.

BASF is also involved in the public debate on health and welfare benefits for workers in industry. To safeguard its workers, it establishes a health insurance fund in **1875** that pays sickness benefits solely out of company funds.

In **1876,** Heinrich Caro succeeds in synthesizing a pure blue dye for cotton – methylene blue. A year later, BASF is awarded Germany's first patent for a coal tar dye for methylene blue. However, methylene blue plays an increasingly important role not just in the textile industry but in medicine too. Medical pioneer Robert Koch, for example, uses it to make the tubercle bacillus visible in his research into tuberculosis.

Color sampler

Dye sample case

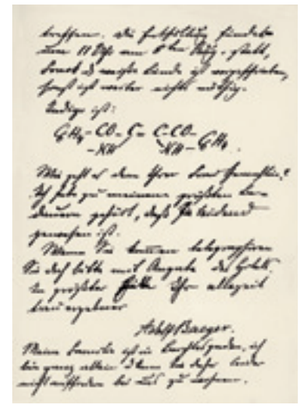
In **1880,** Adolf von Baeyer, a chemist in Strasbourg, successfully synthesizes indigo, the most important natural dye at that time. BASF, together with the Hoechst dyeworks, acquires the rights to exploit the indigo patent, thus joining the race to produce indigo on an industrial scale. For many years, the venture is unsuccessful due to the inability to produce the raw material cost-effectively on a large scale. It is not until 10 years later that Professor Karl Heumann of Zurich discovers an appropriate synthesis method, which is adopted by BASF and Hoechst. But the procedure does not yield sufficient indigo. A second synthesis discovered by Heumann three years later appears to be more successful. BASF also acquires the rights to this procedure, paving the way for the production of indigo on an industrial scale.

1873 | 1874 | 1875 | 1876 | 1877 | 1878 | 1879 | 1880

BASF's factory in Butirki near Moscow

Price list cover

From the Imperial Patent Office, founded in 1877: The first German dye patent protects the production process for methylene blue.



The first copy of the indigo formula in a letter written by Adolf von Baeyer to Heinrich Caro on August 3, 1883

A local telephone network is set up in Ludwigshafen in **1882.** The first subscriber to be connected is the Badische Anilin- & Soda-Fabrik. It is also the first phone connection in Bavaria. Three years later, BASF establishes a telephone switchboard at its Ludwigshafen site.

In connection with Bismarck's social security system, BASF introduces the first company health insurance plan in **1884.** It does much more than the law requires. The new plan represents a major step forward and features a significant improvement in the protection of workers' families at a time when a breadwinner's long illness could threaten the livelihood of families.

In **1887,** a small three-kilowatt generator powering two arc lights at the Rhine quay and in the coal storage area marks the dawn of the age of electricity at the Ludwigshafen site. BASF is self-sufficient in electricity until 1938 – by which time BASF has 121,000 kilowatts of generator capacity. After this date, RWE, a public utility, supplies additional power.

To manufacture anthraquinone-sulfonic acid, the basic substance for alizarin dyes, BASF needs growing volumes of fuming sulfuric acid (oleum). The key suppliers are vitriol distilleries in Bohemia, which cannot keep pace with rising demand: Oleum becomes scarce and expensive. Rudolf Knietsch (1854 – 1906, chemist at BASF from 1884 to 1906) develops an economical alternative process in **1888.** His sulfuric acid contact process makes BASF the largest sulfuric acid producer in the world at this time. At the same time, the way is paved for catalytic processing. In the same year, Knietsch introduces another groundbreaking invention: liquefaction of chlorine, a gaseous element. Until then such efforts had been frustrated by the exceptional aggressiveness of the substance. Now it becomes possible to store, transport and process chlorine, an important raw material for the chemical industry, in liquid form. Its purity and easy transportability in gas bottles makes the product a bestseller for the expanding company.

BASF's switchboard already has 20 operators in 1921.

Chlorine liquefaction – a sketch of this major invention in Rudolf Knietsch's laboratory journal

1881 | 1882 | 1883 | 1884 | 1885 | 1886 | 1887 | 1888

BASF in 1881: Belching smokestacks

BASF's sulfuric acid plant around 1914

Rudolf Knietsch

There are now 18 small laboratories at the Ludwigshafen site. Most, however are ancillary operations conducting trials and experiments, and some are even housed in huts – not a good basis for efficient research, which, even then, is necessary to keep up with the fierce competition for national and international trademarks, patents and process expertise. Research requires a more efficient organization and more staff. A dedicated research building is urgently needed. BASF builds its “main laboratory” next to the administrative headquarters in **1888.** At the same time, an analytical laboratory and pilot plant for small-scale trials are set up. A company patent lab headed by Heinrich Caro is also established in the main laboratory to handle domestic and international patent issues.

Indigo – “King of Dyes”: The decisive patent is granted in 1890.

In January **1890,** a patent office, later to become the patent department, is established after Caro’s departure. A letter circulated by the management says: “From today, all patent matters will be attended to by Dr. Glaser, assisted by attorney Hecht, in the patent office.” The patent department is responsible for formulating, submitting and defending patent applications, handling trademarks as well as dealing with patent disputes with competitors. Between 1877 and 1888, 60 patents resulting from the company’s research activities are registered in Germany. Between 1889 and 1900, the number of patent registrations rises to 468.

The multitude of newly developed dyes means customers in the textile industry need comprehensive care and advice. The various applications and production dyeworks on the site can no longer meet this demand. As a result, a central technical dyeworks facility is established in **1891,** the forerunner of BASF’s technical service center (AWETA).

Eugen Sapper (1858 – 1912, chemist at BASF from 1883 to 1887 and 1890 to 1912) discovers the catalytic phthalic acid process, allowing phthalic acid, which is used to produce numerous dyes, to be produced more simply and more economically.

In **1892,** BASF begins building Europe’s first public sanatorium for company employees with tuberculosis in Dannenfels in the Palatinate. A convalescent home is built in Kirchheimbolanden in 1904. In Albersweiler-St. Johann, a rest home for the wives and children of BASF blue and white collar workers opens in 1914. A convalescent center in Kirnhalden in the Black Forest opens its doors to BASF employees in 1920/21.

Heinrich Brunck, the “father” of BASF’s social policy: On his 25th service anniversary 1894, “his” workers present him with a decorative commemorative memento.

1888 | 1889 | 1890 | 1891 | 1892 | 1893 | 1894 | 1895

BASF’s new main laboratory: More room for research

Veranda in Dannenfels, Europe’s oldest TB sanatorium, 1916

After 17 years of intensive research and 18 million gold marks in costs – more than BASF's share capital at that time – BASF successfully launches its synthetic "pure indigo from BASF" in **1897,** winning the race to manufacture the "king" of natural dyes. A profitable market is expected to develop. However, indigo soon has to make way for an in-house rival. BASF's colorfast and lightfast indanthrene dyes are increasingly replacing indigo. Indigo experiences a renaissance in the mid-1960s, when blue jeans become fashionable for an entire generation and indigo becomes a pillar of BASF's dye business for a second time.

From the Annual Report **1898:** "Of all our new products, synthetic indigo is the most important. The expectations, which we had hoped existed on the basis of the product's outstanding properties and its potential for acceptance and sales volumes, have been completely fulfilled. The results of practical trials soon convinced customers of the huge advantages offered by the new indigo and its applications. Any doubts raised about the nature of the synthetic product compared with natural indigo in order to discredit the synthetic product had to, and were, dispelled."

Dye labels for the Indian and Chinese markets: Labels are particularly important for selling dyes abroad. The sumptuous motifs on tin cans wrapped in glassine paper serve as identifiers for the many end users in export countries who cannot read.

From the Paris World's Fair catalog **1900:** "Badische Anilin- & Soda-Fabrik is without question the largest chemical producer in the world. At its site in Ludwigshafen on the Rhine it employs 148 scientifically trained chemists, 75 engineers and technicians, and 305 commercial staff. The number of employees, which amounted to 30 in 1865, the year the company was founded, has risen steadily and totaled 6,207 on January 1, 1900."

1900 sees the construction of the second major housing colony. According to an excerpt from the Annual Report: "Land prices in the immediate vicinity of the site have soared unjustifiably. Speculators have made it virtually impossible to acquire large parcels of land. We have sought a solution and found one.
We have purchased a large estate (Limburger Hof) right next to the railway station in Mutterstadt, which is linked to our site by railway and is only 8 kilometers away. Here we plan to build a workers' colony which we will be able to expand as required. Workers will be able to get directly to the factory from there using specially organized trains."

BASF's *Gesellschaftshaus* opens at the end of December.
The social center includes dining and social rooms for senior management, a library with reading room for workers and a hall for festive events. The company's social policy it represents is described as follows: "The management of BASF already demonstrated in the company's early years that the responsibilities it has toward its workers and salaried staff are not restricted to the payment of wages and salaries on a scale determined by overall economic conditions… Many types of responsibilities had to be fulfilled. They were initially restricted to the plant and covered accident prevention measures and sanitary and hygiene measures. The latter were soon extended not only beyond the plant but to family members too, covering assistance for housing, health care, medical treatment and prevention. Nor did they stop at physical welfare, but also included improving the economic situation of workers and promoting their cultural and intellectual welfare. Foundations and funds were established to secure as far as possible the long-term future of the workforce, to help them in difficult situations and in this way encourage and foster a sense of attachment to the company."

The company's social policy is initially driven by a sense of paternalistic care on the part of management. But BASF soon adopts the demands of contemporary social philosophy and acts accordingly: Welfare benefits for workers should be seen not as a handout, but as a legal entitlement.

René Bohn (1862 – 1922, chemist at BASF from 1884 to 1920) discovers a new blue dye in **1901.** Indanthrene blue RS surpasses indigo in colorfastness and lightfastness. The high-quality vat dyes (water insoluble textile dyes) developed from it provide colorists with new applications for dyeing and printing textiles.
The introduction of indigo and indanthrene gets a decisive boost from reducing and vatting agents "hydrosulfite conc. BASF" and Rongalit, which convert the dyes into a water-soluble form during the dyeing process.

1896 | 1897 | 1898 | 1899 | 1900 | 1901

Price list cover 1896

"Built for its senior management and workers": BASF's *Gesellschaftshaus*

Cover page of a company brochure