BAYFERROX®
color for life.

Inorganic pigments from LANXESS Corporation in North America

LANXESS

A company with strong roots — for a strong future

The business activities for LANXESS have a long and well-established history. The company's roots actually go back to 1863, the year Bayer was founded in Germany. In the mid-1950s, Bayer entered the US marketplace when a joint-venture company called Mobay Chemical Corporation was created. From those early roots in Pittsburgh, Pennsylvania, the company went through numerous name changes. The first change came over 30 years later when we became Mobay Corporation, a Bayer USA Inc. Company. Shortly thereafter we were known as Miles Inc., followed by Bayer Corporation before becoming Bayer Chemicals Corporation. In 2004, as a result of a reorganization of Bayer AG, most of its chemical activities, synthetic rubber, fibers, and around one third of its plastic businesses were carved out and transferred to a newly established firm, LANXESS Deutschland GmbH. Pronounced Lāng´-sess, the parent company, LANXESS AG, was split off from Bayer AG in January 2005 and has since been listed on the German stock market.

During all these changes in the corporation, personnel transitioned seamlessly. For the personnel who transferred with the various LANXESS businesses, the change to LANXESS was equally uneventful, even though it included moving into new headquarters in the USA.

Today, LANXESS is headquartered in Germany and has offices in many countries around the world, including the USA and Canada. The company is organized in four business segments: Performance Chemicals, Chemical Intermediates, Engineering Plastics, and Performance Rubber, which are subdivided into numerous business units. With over 20,000 employees at many international production sites and agencies in all the key economic regions, LANXESS helps ensure that our business partners receive optimal support in their markets. Production and sales are just as globally aligned as research and development.

The Inorganic Pigments Group (IPG) business unit, part of the Chemical Intermediates segment, manages the worldwide inorganic pigment activities for LANXESS and offers customized solutions for a variety of products like colored concrete building materials, paints and surface coatings, plastics, rubber, and paper. Specialty products are used in the toner, ceramics catalyst, and water treatment industries.

Fig. 1: The Krefeld-Uerdingen, Germany site around 1880

History of LANXESS' pigments

Natural iron oxide pigments have been around since prehistoric times, as demonstrated in the cave paintings created around 30,000 years ago that are still visible today in southern France, southern Spain and northern Africa. In recent decades however, these pigments, which have a limited range of colors, have not been able to meet various market application requirements, performance characteristics, or quality and some purity requirements. Therefore, iron oxide pigments — like Bayferrox® — started to be produced synthetically about 80 years ago.

In 1877, the chemist Dr. Edmund ter Meer built a small factory that made synthetic dyes outside the gates of the town of Krefeld, Germany (Fig. 1). The factory was expanded in 1913 to produce aniline, a raw material that plays an important role in dye production. In the manufacturing process used at that time, nitrobenzene was reacted with metallic iron to produce the desired aniline. During this process, the iron was converted into iron oxide, which remained as an unusable by-product. Following a process modification in 1925, engineers and chemists succeeded in turning the iron oxide residue into a yellow or black iron oxide pigment with very high tinting strength. Thus, 1925 marked the beginning of the production of synthetic iron oxide pigments by the Laux process in Krefeld-Uerdingen. At the time, nobody would have guessed that over 80 years later this factory would be the largest in the world where iron oxide pigments are synthetically produced (Fig. 2).

Fig. 2: The production site in Krefeld-Uerdingen, Germany

A further milestone in the development of the LANXESS pigments business was the introduction of the brand name Bayferrox, which is a registered trademark of Bayer AG, Germany. Since its introduction in 1976, the name Bayferrox is synonymous with high quality iron oxide pigments.

The expansion of this and other production plants in subsequent years, and the building of strategically located custom blending and packaging facilities, were aimed at increasing production capacity and improving the range of services for local customers. Today, Bayferrox pigments are produced on 2 continents, and there are 5 other custom blending and packaging operations around the world, including one in Pennsylvania.

Fields of application for inorganic pigments from LANXESS

The Colortherm® pigments are produced synthetically along side the Bayferrox pigments. Special after-treatments of the iron oxide pigment particles create these unique pigments that have high heat stability for specific applications that require higher processing temperatures.

LANXESS also produces Chrome Oxide Green pigments in Germany for a wide range of applications. The Bayoxide technical oxides are produced using our various manufacturing techniques and are used in demanding technical applications rather than for their coloring characteristics.

Bayferrox pigments have been used in a wide variety of applications across the globe. On the one hand, they are used to color concrete and concrete products, architectural paints, plastics, plus rubber and paper products. On the other hand, they boast a number of important physical and chemical properties that allow their use in applications that are not necessarily color-related.

The following tables give some examples of the variety of applications for the inorganic pigments produced by LANXESS.

	Inorganic Pigments from LANXESS			
Applications	Bayferrox	Chrome Oxide Green	Colortherm	Bayoxide
Building materials	●	●		
Paints and coatings	●	●	●	
Glass	●	●		●
Rubber	●	●	●	
Ceramics	●	●		●
Cosmetics	●	●		
Plastics	●	●	●	
Paper	●	●	●	

	Technical Applications							
	Brake linings	Refractory industry	Photo chemicals	Foundry products	Catalysts	Polishes	Toners	Drinking water treatment
Bayoxide	●	●	●	●	●	●	●	●

The production of iron oxide pigments

The LANXESS Bayferrox, Colortherm and Chrome Oxide Green pigment manufacturing sites have been continually updated to meet current environmental standards and the ever-increasing quantity and quality demands of our customers. For the historical reasons described earlier, the Laux process is the main production method for synthetic iron oxide pigments manufactured by LANXESS (Fig. 3).

The pigment slurry that results by the reduction of mononitrobenzine with scrap iron chips is freed of unreacted iron residues and washed to eliminate salts. Through careful drying, yellow and black pigments are obtained directly, while red pigments are produced through the oxidizing calcination of black raw pigments in rotary kilns. In addition to this Laux process, some products are produced using either the Penniman or Precipitation process, where iron oxide pigments are precipitated from iron salt solutions under air oxidation (Fig. 3).

Responsible Care and ISO Certification

Integrated into a long tradition of responsible chemical production, LANXESS is fully committed to the Responsible Care® initiative, and in Germany and the USA operate a certified environmental, health, safety, and security management system in line with ISO® 14001. This means that the inorganic pigments from LANXESS are produced with maximum regard for the conservation of the environment and optimum use of resources.

All Bayferrox manufacturing sites have ISO 9001-2000 certification, which means that each step in the process has been detailed to help assure our customers the best quality pigment possible. LANXESS is extremely proud that our meticulous detail in manufacturing Bayferrox pigments has been recognized with ISO certification.

Bayferrox pigments are non-toxic, physiologically safe and, because of their insolubility in water, pose no known risk to the environment. They are lightfast and weather stable, and meet or exceed the ASTM® C979 specifications for use in coloring concrete products.

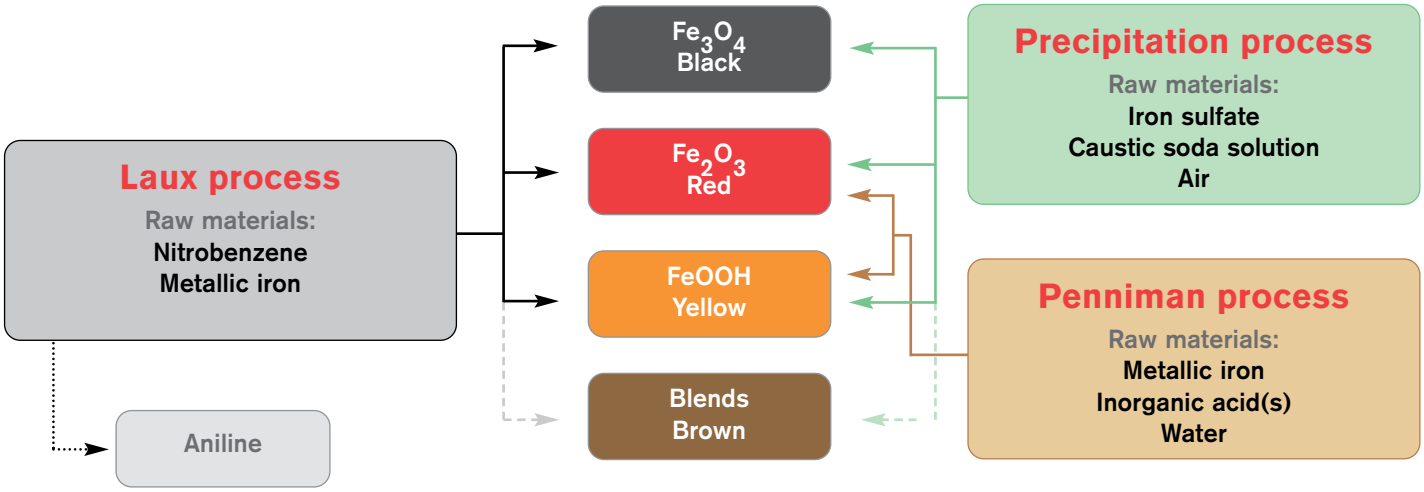

Fig. 3: Schematic representation of the three different Bayferrox production processes

Service after the sale

LANXESS offers comprehensive expert technical advice for using our inorganic color pigments in a wide variety of applications. This includes pigment metering system recommendations for concrete and concrete product manufacturers. The range of advice covers both proven standard products plus a large variety of innovative specialties to comply with particular customer requirements.

We are particularly proud of the Bayferrox Color Workshop. This program began in 1991 and has become an annual program. For 3 days, customers are provided education and laboratory training on Bayferrox and its use in concrete applications. It is the only program of this kind in North America.

Service does not apply only to using the products we produce. With LANXESS, service includes marketing and sales support. The Bayferrox website (www.Bayferrox.com) for North America makes available all product literature, material safety data sheets (MSDS), and product information sheets on Bayferrox and Chrome Oxide Green pigments. For architects, builders, developers and specification writers, it is a vital portal for specifying Bayferrox for their next project where they can view some interesting application photography and see what many standard Bayferrox colors look like in concrete.

Ordering products from LANXESS Corporation is easier than ever. For personalized service, call 1-800-LANXESS (526-9377) to talk to a customer service representative. But for our Bayferrox customers who want to order material 24/7, LANXESSDirect™ on line service is a web-based customer information warehouse where customers can access their account information online, plus place and track orders electronically. They can view the invoice for their order, and order a Certificate of Analysis (COA) or MSDS on any product they have ever ordered. LANXESSDirect service is a convenient tool that enables customers to monitor their account and order information with LANXESS Corporation.

Our pigment product range

LANXESS is the largest manufacturer of synthetic iron oxide pigments in the world, and is a major player in many market segments. The palette of Bayferrox and Chrome Oxide Green pigments is extensive. In each basic color group, there is a variety of pigments with similar color shades, and each shade is very carefully controlled during manufacturing for color consistency. (Fig. 4). In addition to products that are available globally, LANXESS offers custom colors and packaging options that meet local market demands.

Fig. 4: Range of colors to the inorganic pigments from LANXESS

LANXESS offers a wide range of special products within the Bayferrox and Chrome Oxide Green product lines. This includes pigments that are higher in purity for food-grade and cosmetic applications; micronized red, yellow, black, and green pigments for the paint and plastics industries; and pigments that are heat stable for higher than normal processing temperatures.

Below (Fig. 5) is a brief overview of the application-related inorganic color pigments available from LANXESS in the USA, marketed under the names Bayferrox, Colortherm, and Bayoxide.

Product line	Field of application
Bayferrox powder and granular pigments	For the construction, paint, and plastics industries.
Bayferrox Z grades	High-purity pigments for cosmetics and food grade (FDA) applications
Colortherm pigments	Heat-resistant pigments for coloring plastics and paints
Bayoxide grades	High-grade iron oxides/chrome oxides for technical applications

Fig. 5: Product range and fields of application

Global service

With pigment production or custom blending and packaging facilities in the United States, Germany, the UK, Spain, Brazil, China, and Australia, LANXESS and our inorganic pigments can be found all across the globe. Our goal is to satisfy all our customers, wherever they are. To do this, we focus on the pooled experience of our employees and our regional agencies, where specialists are constantly working on optimal solutions for their customers. The service begins with wide-ranging information and consulting, and covers all aspects of order processing and customer support, resulting in a long-lasting and trusting relationship.

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Health and Safety Information. Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling the LANXESS products mentioned in this publication. Before working with any of these products, you must read and become familiar with the available information on their hazards, proper use, and handling. This cannot be overemphasized. Information is available in several forms, e.g., material safety data sheets and product labels. Consult your LANXESS Corporation representative or contact LANXESS's Product Safety and Regulatory Affairs Dept., Pittsburgh, PA.

Note: The information contained in this bulletin is current as of September, 2006. Please contact LANXESS to determine if this publication has been revised.

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