

CONQUER NEW TERRITORIES

RED PIGMENTS ENERGIZED BY

LANXESS
Energizing Chemistry

Experience a **new generation of red iron oxide pigments** and discover color spaces previously unavailable in the market.

X BAYFERROX®
Color for Life.

NEW RED

WELCOME TO NEW COLOR SPACES

LANXESS presents New Red – a new generation of iron oxide pigments based on a completely new production method. The 'Ningbo Process' represents a true leap in innovation and offers special advantages in terms of sustainability and pigment quality. As an extension of our proven **Bayferrox®** portfolio, we are the only company in the world to cover the full spectrum of yellow-shade reds for high quality paints and coatings with New Red pigments. And what's more – for the first time, the new process can also produce red pigments in previously unattainable color spaces.

LEADING THE WAY IN THE FIELD OF RED PIGMENTS

Pioneering developments in the field of inorganic pigments and responsible behaviour towards the environment have a long tradition at LANXESS: the Laux process is an outstanding example of efficient and resource-saving iron oxide production first established 90 years ago at our German site in Krefeld.

The link between sustainability and economy still constitutes a mainstay in the strategy of the Inorganic Pigments business area to this very day. By expanding our technological leadership and constantly improving and perfecting production processes and supply chains, we give our customers a long-term competitive advantage with our innovative sustainability concepts.

New Red builds on this successful tradition – and consistently continues it. Up to now, LANXESS was able to manufacture quality red pigments with the Laux process, however the color spectrum in the range of particularly bright, yellow-shade reds was limited.

Our answer to this challenge: the development of an entirely new process, which offers significant advantages over the traditional Penniman and Copperas production methods for producing yellow-shade red pigments. The 'Ningbo Process' is named after the location of our advanced new manufacturing facility on China's east coast.

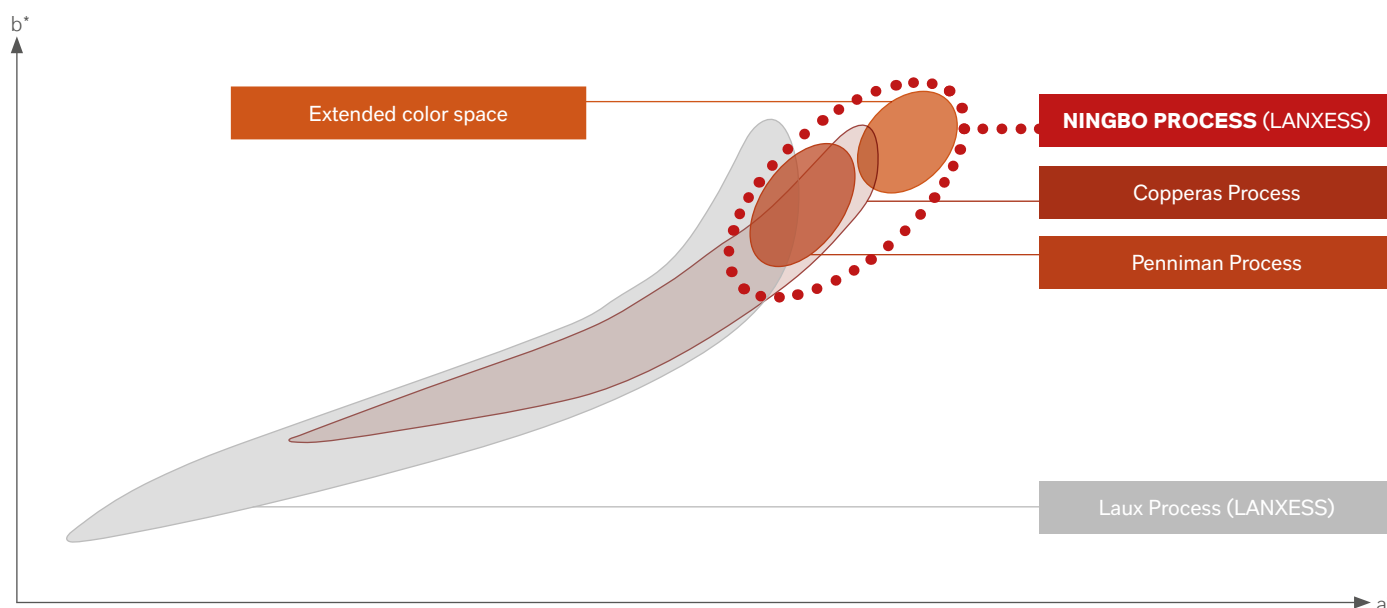


FIGURE 1 | The Ningbo Process for New Red pigment production covers the yellow-shade red color spaces of the traditional Penniman and Copperas processes as well as opening up unprecedented color spaces.



WHAT'S NEW WITH NEW RED

LANXESS redefines the possibilities of iron oxide based paints and coatings with New Red pigments. In addition to color spaces of the classic Penniman and Copperas types, the New Red range also includes pigments with higher red and yellow values than any other iron oxide red pigments currently commercially available (FIGURE 1). This is made possible by the innovative Ningbo Process technology. It includes the use of selected raw materials, a precisely controlled process management of pigment synthesis reaction from a seed with defined particle structure as well as modified pigment synthesis.

Using different pigment intermediates, almost any target in the yellow-shade red color space illustrated can be achieved (FIGURE 2). The required color shade of the individual intermediates can be adjusted by exact control of the pigment structure. No other iron oxide-production process offers such a flexible and precise manufacture of color shades.

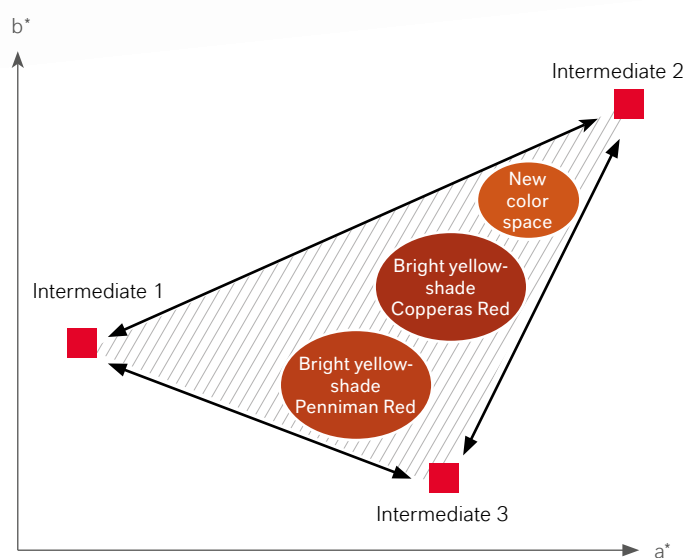


FIGURE 2 | New Red color space – combining different pigment intermediates to produce the New Red pigments from LANXESS.

NEW REDS – ALL THE BENEFITS AT A GLANCE

The New Red pigments from LANXESS impress with their ecological benefits and technical features in the areas of color development, dispersibility, VOC emissions and viscosity. Discover the most important technical features of the New Red product line in the overview below!

RED, REDDER, NEW RED COLOR DEVELOPMENT

New Red Pigments with a hitherto unparalleled extreme of yellow-shade color space show a significantly higher chroma C^*_{ab} than conventional yellow-shade iron oxide red pigments which are produced by the Copperas or Penniman processes – both in full shade and in reduction (FIGURE 2).

As part of the test series, chroma C^*_{ab} was determined in a medium oil alkyd system (FIGURE 3). With the same quantity of pigment added, a significantly higher red value was detected in the reduction than with other comparable products currently on the market.



FIGURE 3 | In the test system based on alkyd resin, the extremely yellow-shade New Reds comprise a significantly higher proportion of red than similar red pigments from the Copperas and Penniman processes.

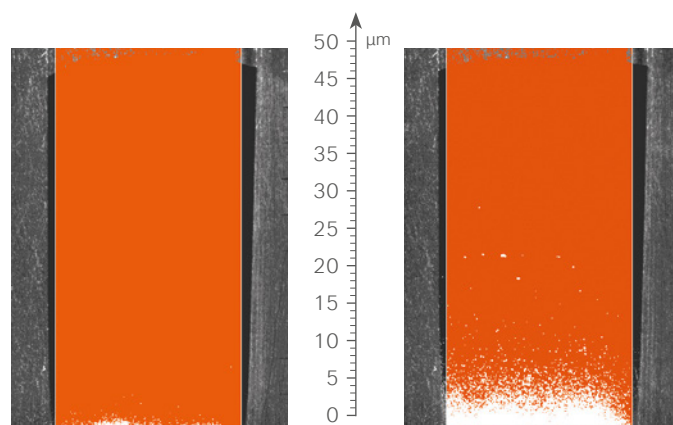


FIGURE 4 | On the grindometer scale, the use of New Red products (left) shows a significant reduction of pigment agglomerates compared to a calcined haematite pigment (right) in a comparable color space.

HIGH PERFORMANCE STANDARD DISPERSIBILITY

The proportion of primary particles is significantly increased by intensive milling. This finishing step, known as micronization, is critical for the rapid incorporation of the pigment in the respective paint or coating system. Thanks to the use of advanced milling equipment, the dispersibility of the New Reds complies with the proven Bayferrox® High Performance Pigments milling standard.

After only 15 minutes dispersion in a long-oil alkyd using a high-speed dissolver, the number of visible pigment agglomerates is significantly reduced on the grindometer block (FIGURE 4). This has the advantage that the energy requirement for the separation of the agglomerates can be reduced significantly when processing New Red pigments.





EXCELLENT ECO-EFFICIENCY VOC EMISSIONS

In addition to modern binder systems, the use of wetting and dispersing additives without volatile organic components (VOC) is important to comply with statutory limits. The New Red pigments bind VOC-free polyacrylate-based additives effectively and safely. Compared to additives containing VOCs, high color development can be achieved even at low addition levels (FIGURE 5). Tests have shown that to achieve the same color saturation C_{ab}^* , the addition of additives can be reduced by up to 80 %.

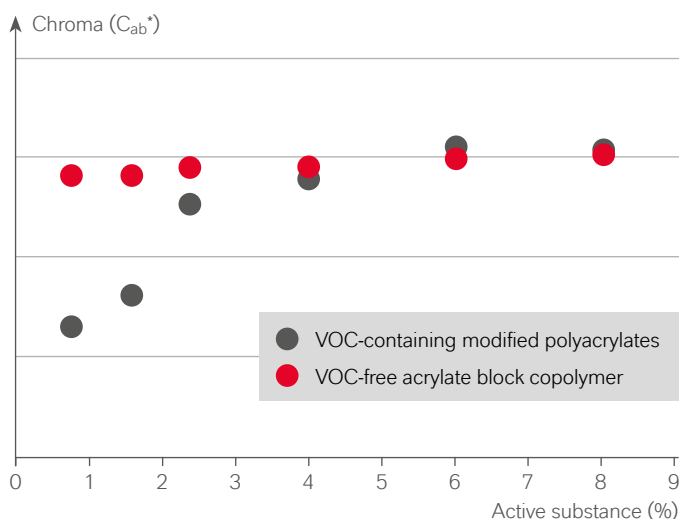


FIGURE 5 | New Reds already show good color development when small amounts of VOC-free additives are added.

CONSTANT FLOW BEHAVIOUR VISCOSITY

An important quality criterion for iron oxide pigments is their ability to guarantee constant flow behaviour even at high concentration. To assess the viscosity behaviour, our New Reds were used in a universal pigment concentrate with a pigment content of 61.5 %. Internal measurements have shown that an approximate Newtonian flow behaviour develops when the shear stress is uniformly increased (FIGURE 6).

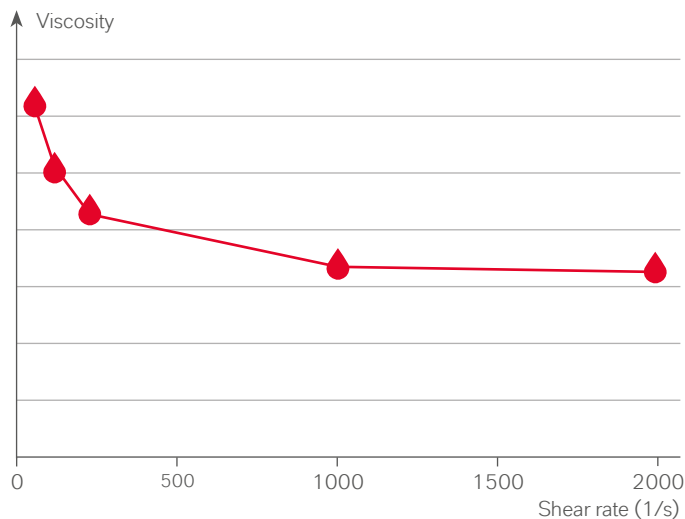


FIGURE 6 | The viscosity behaviour of pigment concentrate containing New Red shows an approximately Newtonian flow behaviour.

A NEW BENCHMARK FOR IRON OXIDE PRODUCTION

LANXESS Inorganic Pigments Group represents a consistent combination of environmental responsibility, efficiency and quality. In line with these objectives, and based on our 90 years of experience, we have once again set a milestone in the production of synthetic iron oxide pigments at our new production facility in Ningbo, China. It is the world's most modern plant of its kind and another key element in our global production network. Here, the newly developed Ningbo Process is being used for the first time.

This innovative technology allows unique and high-quality red iron oxide pigments – the so-called New Reds – to be manufactured in an environmentally friendly way. It enables us to offer our worldwide customers an impressive measure of security for the future and to lay the foundation for sustainable success. See for yourself!

PREMIUM QUALITY



- **The latest plant technology** ensures that the New Reds are of a consistently high quality in line with the Bayferrox® global standard.
- Modern milling systems can also produce New Reds which meet **Bayferrox® High Performance quality standards**.
- Testing and documentation of product properties in customer-specific systems by the **in-house application laboratory**.

PIONEERING ENVIRONMENTAL STANDARDS



- The Ningbo Process ensures the **full purification of all oxides of nitrogen emitted**, including the particularly environmentally harmful laughing gas, that are generated during the traditional Penniman process.
- Using innovative process and plant technology as well as heat recovery, **energy demand is reduced by up to 80 %**.
- **Efficient wastewater treatment** allows the processed water to be completely cleaned. 80 % is recycled back into production.

GLOBAL RELIABILITY



- Implementation of increasingly stringent **environmental regulations** leads to further consolidation within the Chinese pigment industry and a shortage in pigment capacity.
- The Ningbo Process meets and exceeds the **highest environmental standards** and gives our customers the security to plan ahead.
- A synthesis capacity of 25,000 t in red iron oxide pigments and a mixing and milling capacity of 70,000 t will ensure **reliability on a global scale**.

NEW COLOR SPACES



- **New Red pigments** can be synthesized precisely and flexibly to meet required color ranges.
- This allows the targeted production of yellow-shade red pigments in **new color spaces** that cannot be achieved by any other production methods available on the market to date.
- The traditional **Penniman and Copperas color ranges** can also be achieved – flexibly and sustainably.



Reaction area – the heart of the new Ningbo Process, allowing a highly flexible production of a broad range of synthetic red iron oxide pigments.



Modern laboratory facilities enable detailed process and product testing to ensure the world-class Bayferrox® quality standard.



Latest storage and packaging equipment at the site ensures a high level of quality and reliable product delivery to our customers worldwide.



Wastewater treatment and recycling techniques meet the highest environmental standards and exceed all existing regulatory requirements.



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Health and safety information

Appropriate documentation was compiled with information on the health and safety measures that have to be observed in handling the LANXESS products mentioned in this brochure. For materials mentioned here that are not LANXESS products, the operational hygiene and other safety measures recommended by the respective manufacturers must be observed. Before working with these products, you must read and familiarise yourself with the available information on their dangers, proper use and handling. This point is of decisive importance.

Information is available in various forms: such as safety data sheets, product information and product labels. Please contact your LANXESS representative in Germany or the Department of Regulatory Affairs and Product Safety of LANXESS Deutschland. For business in the USA, please contact the LANXESS Product Safety and Regulatory Affairs Department in Pittsburgh, Pennsylvania.

Information on Regulatory Compliance

For some end use purposes of the products found in this brochure, the applicable regulations must be observed, including those of the FDA, BfR, NSF, USDA and CPSC. If you have any questions regarding the approval status of these products, please contact your representative at LANXESS Deutschland GmbH or the Department of Regulatory Affairs and Product Safety of LANXESS Deutschland GmbH or, for business in the USA, your representative at LANXESS Corporation, the LANXESS Regulatory Affairs Manager in Pittsburgh, Pennsylvania.

How and for which purposes you utilise our products, our technical support and our information (oral, written or through product assessments) is beyond our control. The same applies for suggested formulations and recommendations. Therefore it is indispensable that you check our products, our technical support and our information for their suitability for the intended processes and purposes. The application-specific analysis must encompass at least suitability tests in regard to technical as well as health, safety and environmental aspects. Such testing has not necessarily been done by us. Unless agreed to otherwise in writing, all products are sold exclusively in accordance with our general terms and conditions for sale and delivery. Information and technical support are provided without warranty (we reserve the right to make changes at any time). It is expressly agreed that you release us from any possible liability resulting from the use of our products, technical support and information due to fault, contract or other reasons and that you assume this liability yourself.

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