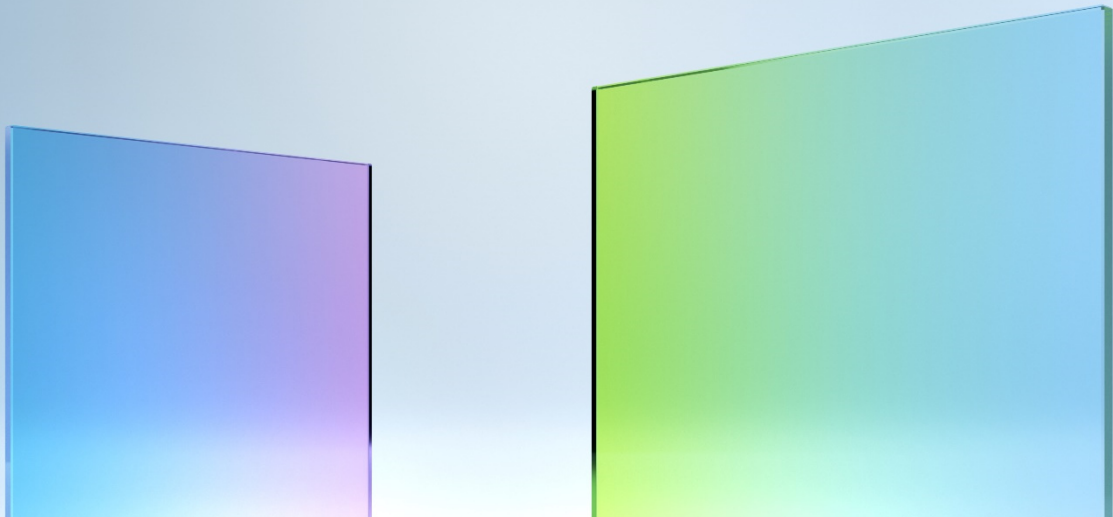




Ceramics and Glass



Lohtragon[®]

Crystallizing Solutions

Info Sheet Lohtragon®

Ceramics and Glass: Our Contribution to Your Excellence

The global market for ceramics and glass is a dynamic and multifaceted sector that plays an essential role in a wide range of industries. From construction and automotive to healthcare, medical devices and electronics, these materials offer unique properties that make them invaluable in diverse applications. Lohtragon® offers dedicated high-quality precursors for glass and ceramics – your solution for excellence in these application fields.

Why Choosing Lohtragon® Precursors for Ceramics and Glass?

With Lohtragon® you benefit from a proven high purity product range manufactured at our German production sites, the option for joint in-house developments and tailor-made solutions, as well as an extensive service set-up – all leading to your added-value:



Your Benefits

- ◆ Select from our range of high purity products serving various functions for ceramics and glass
- ◆ Experience precise process control alongside a sensitive setting of your formulation parameters
- ◆ Benefit from highest qualities, functional enhancements, and longevity of your end products
- ◆ Obtain reproducible product features based on our batch-to-batch consistency
- ◆ Comply with regulatory market requirements, including highest standards for medical ceramics
- ◆ Increase your overall process efficiencies and product quality

We understand that every business is unique, and we are dedicated to provide you with the best possible solutions to meet your requirements. To achieve this, we offer two distinct options:

- ◆ **Established Lohtragon® Products:** These are tested solutions that have proven to perform. Our established Lohtragon® products have undergone years of research, development, and refinement. By choosing one of these products, you can rely on our expertise and benefit from solutions that are delivering exceptional results.
- ◆ **Joint Lohtragon® Product Developments:** If your specific needs or unique challenges are not fully met by our existing Lohtragon® range, we are glad to collaborate with you in a joint Lohtragon® product development. This approach allows us to create a custom solution that aligns perfectly with your business objectives. Our team of experts will work closely with you to understand your needs and goals.

Regardless the option you choose, be it our established Lohtragon® products or a joint Lohtragon® development, we are committed to supporting you. We look forward to working with you to achieve your business goals. Your satisfaction and success are our top priorities, and we are here to help you every step of the way.

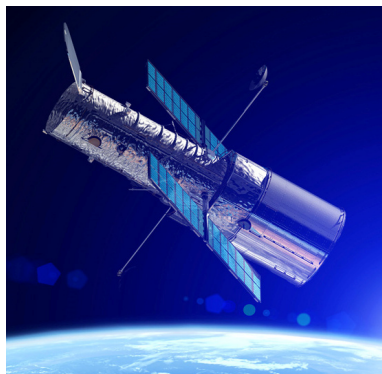
Ceramics and Glass: Our Contribution to Your Excellence

Ceramics: Diverse Functions of Lohtragon® Products

Ceramics are particularly known for their high temperature resistance, electrical and thermal insulation properties, corrosion resistance, bio-inertness, and more. Precision and sensitivity are crucial for their manufacturing, and Lohtragon® metal salts emerge as the preferred choice due to their remarkable purity, precise production methods, and rigorous quality control. Here is an extract of how Lohtragon® can empower your ceramic formulation:

- ◆ **Coloration**
- ◆ **Sintering Aid / Fluxing Agents**
- ◆ **Thermal Stability**
- ◆ **Hardness**
- ◆ **Electrical Insulation / Thermal Shock Resistance**
- ◆ **Chemical Resistance**

The diverse functions of Lohtragon® metal salts in ceramic applications make them essential key components for the ceramic manufacturing. Set your desired ceramic effect and select from our proven range or reach out to us.



Case Study: **High-quality low thermal expansion glass-ceramics with Lohtragon® C36**

Our Lohtragon® C36 based on Magnesium Carbonate has proven properties to produce glass-ceramics with very low thermal expansion. One of its key functions is effectively degassing the ceramic melt, minimizing the presence of undesirable flaws such as bubbles throughout the sintering process. This not only enhances the overall quality of the glass-ceramics but also ensures their dimensional stability, making them ideal for applications where thermal performance is critical.

Case Study: **Stable and durable ceramic pigments – Lohtragon® V28 as first choice for ceramic printing**

Lohtragon® V28 based on Ferric Sulfate is a proven precursor to produce ceramic inkjet colors for ceramic printing. It provides iron ions that are essential for the formation of stable and durable pigments, used to achieve various colors and patterns on ceramic products. Its special particle structure, mixed with the inkjet ink, lead to a well-printable and precise ink formulation. Compared to traditional ceramic pigment production methods, involving heavy metals, ferric sulfate-derived pigments are considered more environmentally friendly.



Ceramics and Glass: Our Contribution to Your Excellence

The Lohtragon® Product Selector for Ceramics

Product	Used substance	Functions
Lohtragon® B92	Ammonium Formate Solution	<ul style="list-style-type: none"> ◆ Reducing agent to minimize colored metal impurities in ceramics for an optimum control of unwanted ceramic colorations
Lohtragon® K14	Aluminum Hydroxide Acetate	<ul style="list-style-type: none"> ◆ Mordant for the effective setting and fixing of dyes ◆ Aluminum oxide deposition on ceramic surfaces to obtain protective ceramic layers ◆ Steer glazing effects on ceramics ◆ Chemical resistance enhancer
Lohtragon® L87	Aluminum Lactate Solution	<ul style="list-style-type: none"> ◆ Mordant for the effective setting and fixing of dyes ◆ Aluminum oxide deposition on ceramic surfaces to obtain protective ceramic layers ◆ Steer glazing effects on ceramics ◆ Chemical resistance enhancer
Lohtragon® L36	Calcium Hydroxide	<ul style="list-style-type: none"> ◆ Stabilizer for colors in ceramic glazes ◆ Fluxing agent for highly efficient sintering processes ◆ Flocculate ceramic slurries
Lohtragon® K02	Copper(II) Acetate 1-hydrate	<ul style="list-style-type: none"> ◆ Coloring agent for particular light-stable green to blue hues in ceramic glazes ◆ High purity Copper source for catalytic active ceramics
Lohtragon® K01	Copper(II) Hydroxide Carbonate	<ul style="list-style-type: none"> ◆ Coloring agent for particular light-stable green to blue hues in ceramic glazes ◆ High purity Copper source for catalytic active ceramics
Lohtragon® C97	Ferric Ammonium Citrate Solution	<ul style="list-style-type: none"> ◆ Highly water-soluble precursor in the production of ceramic inkjet colors for ceramic printing (terracotta shades)
Lohtragon® C05	Ferric Citrate	<ul style="list-style-type: none"> ◆ Precursor in the production of ceramic inkjet colors for ceramic printing (terracotta shades)
Lohtragon® V28	Ferric Sulfate	<ul style="list-style-type: none"> ◆ Precursor in the production of ceramic inkjet colors for ceramic printing (terracotta shades)
Lohtragon® O19	Ferrous Oxalate	<ul style="list-style-type: none"> ◆ Coloring agent for highly light-stable blue hues
Lohtragon® K19	Magnesium Acetate 4-hydrate	<ul style="list-style-type: none"> ◆ White coloring agent for sanitary ware ceramics
Lohtragon® C36	Magnesium Carbonate	<ul style="list-style-type: none"> ◆ Degassing of ceramic melts ◆ Electrical insulation / thermal shock resistance ◆ Fluxing agent ◆ Thermal stability ◆ Chemical resistance enhancer
Lohtragon® C35	Magnesium Hydroxide	<ul style="list-style-type: none"> ◆ Degassing of ceramic melts ◆ Electrical insulation / thermal shock resistance ◆ Fluxing agent ◆ Thermal stability ◆ Chemical resistance enhancer
Lohtragon® C46	Magnesium Oxide	<ul style="list-style-type: none"> ◆ Electrical insulation / thermal shock resistance ◆ Fluxing agent ◆ Thermal stability ◆ Chemical resistance enhancer

Ceramics and Glass: Our Contribution to Your Excellence

Medical Ceramics: High Quality Products for Highest Safety Standards

With the Lohtragon® competence to manufacture high purity metal salts we provide the precondition for ceramic raw materials requiring highest safety and quality standards – especially important for medical implants and dental ceramics. Our Lohtragon® range adheres to stringent regulatory guidelines and is rigorously tested to meet quality standards before entering the market, ensuring that medical ceramic products made from them are reliable, durable, and above all, safe for use.

- ◆ **Dental ceramics** are used extensively for restorative and prosthetic dental treatments, providing durable and biocompatible solutions that seamlessly blend with natural teeth. Specific metal salts are used, that are compatible with oral tissues and resembling natural teeth in appearance.
- ◆ Ceramics are considered indispensable for **medical implants** – e.g., knee implants, hip implants and dental prostheses such as crowns, veneers and bridges – due to their low wear rate and their biocompatibility.



Case Study:

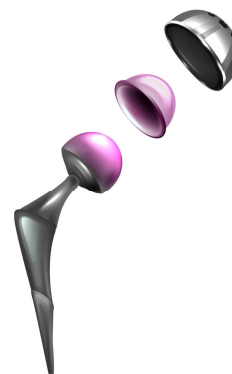
Lohtragon® S38 – An excellent choice for natural-looking dental ceramics

The usage of our Lohtragon® S38 based on Ferric Saccharate as a coloring agent allows the precise achievement of natural, off-white shades, which contribute to the optimal aesthetic result of dental ceramics. The achieved color proves to be stable and uniform after the firing step, surpassing the conventional agents in terms of color accuracy and reliability, resulting in aesthetically pleasing and long-lasting restorations.

Case Study:

Lohtragon® C46 – Zirconia ceramics with high mechanical strength

Our Lohtragon® C46 based on Magnesium Oxide is used as decisive stabilizer and auxiliary material in the production of Zirconia ceramics. It contributes to the stabilization of the high-temperature Zirconia modification, resulting in a superior final product, characterized by its robust mechanical properties.



Discover our Lohtragon® precursors for medical ceramic applications and contact us for further information.

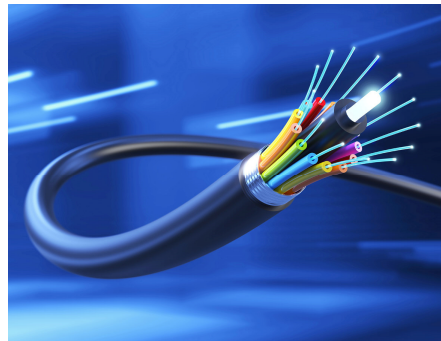
The Lohtragon® Product Selector for Medical Ceramics

Product	Used substance	Functions
Lohtragon® L09	Aluminum Lactate	<ul style="list-style-type: none"> ◆ Binder for the production of orthopedic implants ◆ Supports the hardening process of dental ceramics
Lohtragon® L36	Calcium Hydroxide	<ul style="list-style-type: none"> ◆ Binder and plasticizer in the formulation of dental ceramics, pH regulator, creating an unfavorable environment for bacteria, sealing effect
Lohtragon® L35	Calcium Phosphate	<ul style="list-style-type: none"> ◆ Metal and plastic implants for compatibility reason ◆ Bone substitute
Lohtragon® S38	Ferric Saccharate	<ul style="list-style-type: none"> ◆ Off-white coloring agent for natural-looking dental ceramics
Lohtragon® C46	Magnesium Oxide	<ul style="list-style-type: none"> ◆ Stabilizer and auxiliary material for Zirconia ceramics

Ceramics and Glass: Our Contribution to Your Excellence

Glass: Empower Your Formulations with Lohtragon®

Glass is a versatile material with applications ranging from windowpanes and eyewear to fiber optic cables and solar panels. Its transparency, high melting point, and recyclability make it indispensable in both everyday life and specialized industrial settings. With ongoing innovations like smart glass, the glass market continues to evolve, promising increased functionality and efficiency.



For the glass production, metal salts cover various functions, including coloration, strengthening, UV protection, and chemical resistance. Different Lohtragon® metal salts are introduced into the glass batch to achieve specific effects in the final glass product – all contributing to the creation of beautiful and functional glass products:

- ◆ **Coloration**
- ◆ **Opacifier**
- ◆ **Sintering Aid / Fluxing Agent**
- ◆ **UV Protection**
- ◆ **Durability Enhancement**

The various functions of Lohtragon® products make them key ingredients for an efficient glass manufacturing.

Case Study: Lohtragon® K19 for Clear and Defect-free Glass

Characterized by a high purity and optimized flow properties, our Lohtragon® K19 based on Magnesium Acetate aids in the homogenization of the glass melt. It supports to distribute the various components of the glass mixture evenly, and to reduce the formation of bubbles and inclusions, both resulting in a more uniform and high-quality glass product. A reduced melting point allows the glass to melt and fuse at lower temperatures, increasing process efficiencies. It is thus the ideal raw material choice for applications requiring clear and defect-free glass products.

The Lohtragon® Product Selector for Glass

Product	Used substance	Functions
Lohtragon® B92	Ammonium Formate Solution	◆ Reducing agent to minimize colored metal impurities in glass to optimum control unwanted discolorations
Lohtragon® L36	Calcium Hydroxide	◆ Fluxing agent
Lohtragon® K02	Copper(II) Acetate 1-hydrate	◆ Coloring agent for particular light-stable green to blue
Lohtragon® K01	Copper(II) Hydroxide Carbonate	◆ Coloring agent for particular light-stable green to blue
Lohtragon® S38	Ferric Saccharate	◆ Coloring agent for highly light-stable brownish hues ◆ UV filter
Lohtragon® O19	Ferrous Oxalate	◆ Coloring agent for highly light-stable blue hues
Lohtragon® K19	Magnesium Acetate 4-hydrate	◆ Fluxing agent
Lohtragon® C36	Magnesium Carbonate	◆ Decrease thermal expansion of the glass to avoid glass fracture due to punctual heat stress ◆ Contributes to the reduction of the linear expansion coefficient in glass (glass-ceramics) ◆ Fluxing agent ◆ Degassing of glass melts ◆ Opacifier for opaque glass coloration
Lohtragon® C46	Magnesium Oxide	◆ Decrease thermal expansion of the glass to avoid glass fracture due to punctual heat stress ◆ Contributes to the reduction of the linear expansion coefficient in glass (glass-ceramics) ◆ Opacifier for opaque glass coloration

The information given in the document corresponds to our current knowledge. We warrant in the frame of our General Terms and Conditions of Sale that our products are manufactured in accordance with the specifications. However, we disclaim any liability with regard to the suitability of our products for a particular purpose or application or their compatibility with other substances. Tests have to be performed by the customer who also bears the risk in this respect. Nothing herein shall be construed as a recommendation to use our products in conflict with third parties' rights.

Ceramics and Glass: Our Contribution to Your Excellence

Do You Face Specific Requirements?

With your specific requirements and a growing demand for high purity alternatives, benefit from our Lohtragon® offering, tailored to your specific needs in ceramics and glass. Select from our established Lohtragon® portfolio with a proven track record of success or collaborate with us for joint Lohtragon® product developments. Our experts will work closely with your team to create custom solutions that align with your business objectives. Throughout the process, expect transparency, collaboration, and support to ensure your satisfaction and success.

Established Products

We offer an established, broad portfolio of metal salts, proven to perform, specifically addressing the needs of industrial markets.

By choosing Lohtragon® products, you benefit from direct manufacturer sourcing and our “Made in Germany” quality and reliability promise.

Joint Developments

We are specialized in joint developments to provide you with the raw materials that fully match your application requirements and that perfectly support your product launches.

From concept phase to tailored product optimization, we are your partner to solve any development challenge.

Expert Services

Technical advice and an extensive service set-up complete our offering to fully support you in all areas, for maximum convenience and satisfaction.

Rely on services from our application technology, regulatory affairs, logistics, quality departments and more.

Get in touch with us and experience the Lohtragon® contribution to excellence in ceramics and glass.

Contact

Connect directly with our Lohtragon® experts in our German headquarter.



+49 5155 63-5888
contact@lohtragon.com
www.lohtragon.com

Lohtragon® – A Brand of Dr. Paul Lohmann®

For over 135 years, the company Dr. Paul Lohmann has been able to establish and maintain its leading position as an international manufacturer of mineral and metal salts that meet the highest quality standards. The product range includes over 400 different salts, from Aluminum to Zinc, in a total of over 7,000 different specifications.

Dr. Paul Lohmann® supplies its specialty salts worldwide to customers in the pharmaceutical industry, food sector, food supplements, cosmetics and – under the Lohtragon® brand – to customers in industrial applications.

Lohtragon® stands for unique competences in manufacturing, optimizing and developing metal salts for a broad variety of industrial market segments. Established in diversity, tailor-made for you, your application and your process - our solution for your challenges!