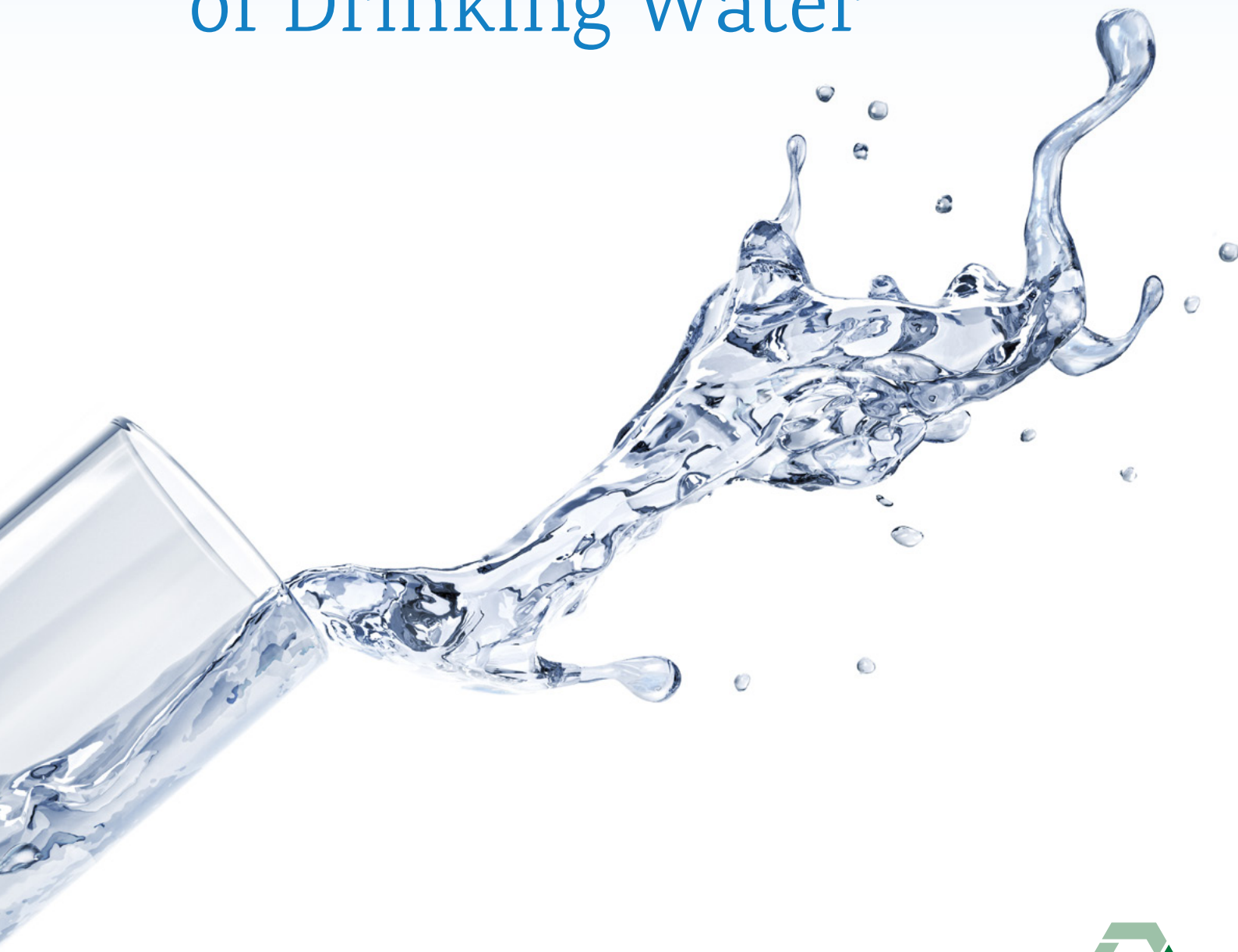
HUBER

ADVANCED MATERIALS

Specialty Solutions for Purification of Drinking Water



Compalox®

ACTIVATED ALUMINA

Ensuring Safe and **Sustainable Water for All**

Freshwater is vital to life for humans and all living organisms and demand continues on a steep upward curve, especially for domestic and municipal use, which is driven by population growth, urbanization, industrialization and economic growth. Freshwater availability, however, is decreasing due to pollution and intensifying water cycles. This has led the United Nations (UN) to declare “Ensure Availability and Sustainable Management of Water and Sanitation for All” as one of the primary UN sustainable development goals.

Fluoride and arsenic together are the two most significant inorganic contaminants in drinking water, posing serious health risks to humans. While surface waters and shallow groundwaters generally have low impurity levels, groundwater can naturally contain these contaminants. Geological sources are the main reason for fluoride and arsenic in groundwater. Additionally, mining, agriculture and industry sources can contribute significantly.

Fluoride levels in groundwater can range from <0.01 mg/l to 4 mg/l, depending on the area. Unlike arsenic, fluoride is beneficial at low doses (around 1 mg/l) and is even added to drinking water in some regions. However, the World Health Organization (WHO) sets the guideline values for fluoride in drinking water at 1.5 mg/l. Levels above this can increase the risk of dental fluorosis and, at even higher levels, skeletal fluorosis.

Arsenic is a well-known toxin and carcinogen. Groundwater arsenic levels can vary widely from <10 µg/l up to thousands of µg/l in some areas. The WHO’s provisional guideline value for arsenic in drinking water is 10 µg/l.

The increasing presence of these contaminates underscores the urgent need for more efficient defluorination and dearsenation solutions to ensure safe and sustainable water for all.

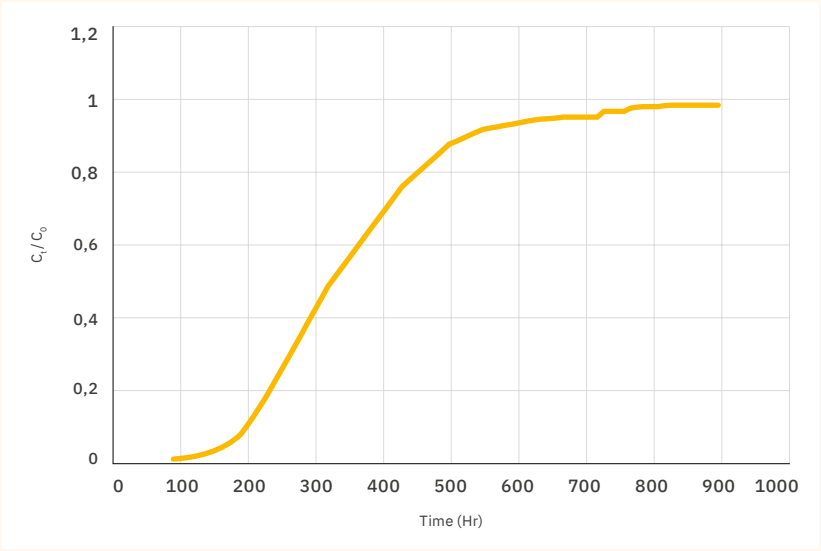
Compalox®: **Removing the Key Contaminants for Water Purification**

Fluoride Adsorption

Huber's Compalox® activated alumina exhibits an **adsorption capacity** of 5.3 mg of fluoride per g of Compalox, which is significantly above other activated alumina adsorbents on the market.

It is able to effectively remove fluoride from drinking water. At fluoride concentrations of 5 mg/l and at a flow rate of one bed volume per 30 minutes, Compalox® is able to remove over 97% of fluoride from the solution during the first 150 hours.

Breakthrough occurs at approximately 200 hours.



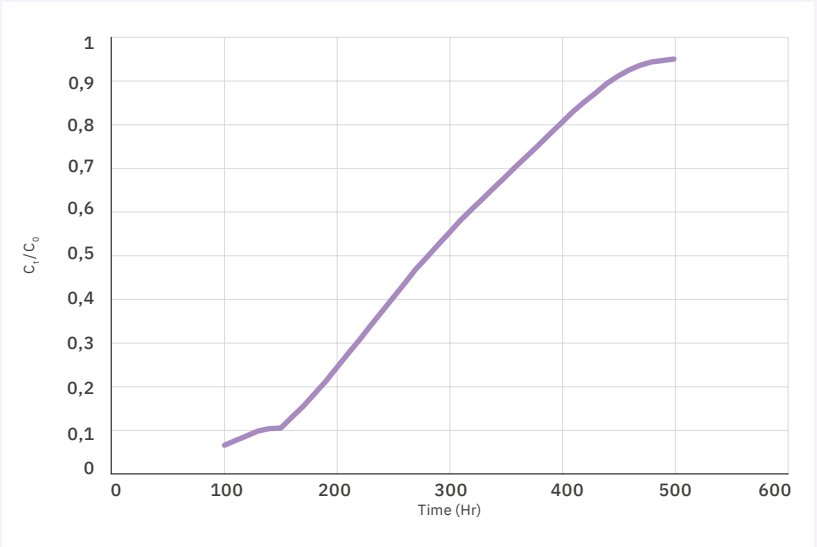
The **breakthrough point** is defined as the time at which the effluent concentration reaches 10% of the influent concentration, i.e., Ct/C0=0.1.

Arsenic Adsorption

Huber's Compalox® activated alumina exhibits an **adsorption capacity** of 0.18 mg of arsenic per g of Compalox, which is significantly above other activated alumina adsorbents on the market.

Compalox® effectively removes fluoride from drinking water. At arsenic concentrations of 0.28mg/l and at a flow rate of one bed volume per 20 minutes, Compalox® removes over 95% of arsenic from the solution during the first 80 hours.

Breakthrough occurs at approximately 150 hours.



The **breakthrough point** is defined as the time at which the effluent concentration reaches 10% of the influent concentration, i.e., Ct/CO=0.1.

Compalox®
Activated Alumina:
The Superior Solution for Safe and Efficient Drinking Water Purification

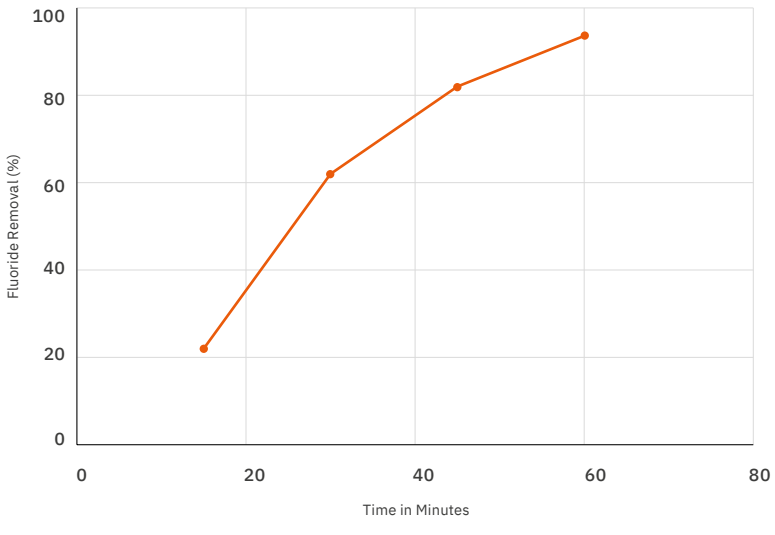
Compalox® activated alumina is the ideal solution to remove fluoride and arsenic impurities enabling access to safe drinking water for everyone around the world.

The Value:
Key Benefits of Compalox®

Rapid Adsorption Kinetics:

Compalox® exhibits rapid adsorption kinetics, outperforming other activated aluminas. Static adsorption tests indicate that a contact time of just 60 minutes is sufficient to achieve >90% removal of contaminants such as fluoride.

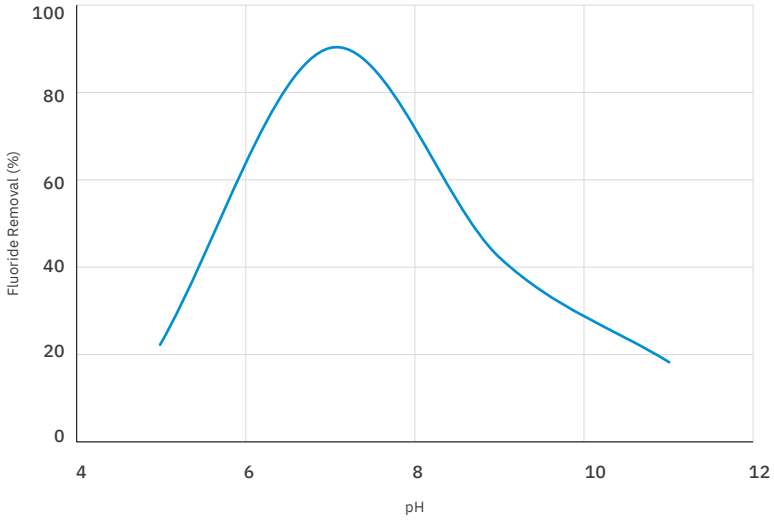
Contact Time For Fluoride Removal (Static Test)



Batch test with 1 g of Compalox, 5 mg of fluoride per l

pH Stability:

Compalox® performs best at a neutral pH of 7, maintaining stable pH levels during adsorption. This stability is crucial for drinking water applications.



Batch test with 1 g of Compalox, 5 mg of fluoride per l

Temperature:

Compalox® operates effectively at ambient temperatures.

Turbidity:

There is no change in turbidity, making Compalox® the ideal choice for water treatment, as it doesn't affect the clarity of the water.

Total Dissolved Solides (TDS):

Compalox® does not release any soluble substances into the treated water, ensuring the purity of the water remains intact.

Regeneration Procedure:

- The Regenerating Process involves using NaOH (a few bed volumes) followed by neutralization with sulfuric acid and fresh water. The final step includes neutralization with sulfuric acid or HCl.
- Number of Regeneration Cycles depends on operating conditions, as Compalox® can sustain long operation times and a high number of regeneration cycles.

Water Use Certificate:

Huber's Compalox is certified by ISEGA to be safe to use for treatment of drinking water.

Selectivity of Activated Alumina:

Compalox® shows high selectivity for various ions such as OH- > H2AsO4- > Si(OH)3O- > F- > HSeO3- > TOC > $SO4^{2-}$ > H3AsO3. Sulphates and chlorides does not impact its capacity.

Cost Effective Solution:

Cost for Huber's Compalox® activated alumina is well below other adsorbents due to high adsorption capacity, especially for fluoride removal. Compalox® is one of the best cost-in-use materials on the market.

The Compalox®
Product Properties

Chemical Analysis
(Average Value in Weight Percent)

AL_2O_3	92%
SiO_2	0.02%
Fe_2O_3	0.02%
TiO_2	0.005%
Na_2O	<0.4%
Loss On Ignition	8%

Physical Properties

Specific Surface Area (m^2/g)	230–320
Water Absorption % (Static)	
10% Relative Humidity	5.5
60% Relative Humidity	17.6
Bulk Density (kg/m^3)	950
Specific Gravity (g/cm^3)	3.1
Pore Volume (cm^3/g)	Total 0.35
Breaking Strength (N) (with Pfizer Tablet Hardness Tester)	
1–15mm	ca. 30
3mm	ca. 80
5mm	ca. 150

Available Product
Grade Granular Sizes

Compalox® AN/V-801	0.3 – 1.0 mm
Compalox® AN/V-802	0.3 – 2.0 mm
Compalox® AN/V-813	1.0 – 3.0 mm
Compalox® AN/V-827	2.5 – 6.5 mm

Other sizes can be produced upon request.

Huber
Advanced Materials

Huber Advanced Materials, a Strategic Business Unit of J.M. Huber Corporation, is a leading supplier of specialty alumina, halogen-free fire retardants, smoke suppressants, and organic matting agents and carriers. Our materials are used in numerous products, improving the safety of millions of people around the world, and protecting our environment.

Our Vision

Leading in innovative and sustainable material solutions.

Our ambition is to be a leader in our markets, and our engine for successful growth is providing innovative and sustainable solutions to our customers. Halogen-free flame retardant and specialty material solutions are our core business offerings, from which we are expanding into adjacent specialty markets and products.

Our Mission

Winning with our customers and employees by creating and delivering halogen-free flame retardant and specialty material solutions while living the principles of our family business.

We create value-added customer solutions and deliver reliable service to our customers with the right systems and processes in place. We help our customers and employees win by helping them to grow and succeed. And we are proud to be a family-owned business.

Innovation

Huber Advanced Materials is committed to delivering real value to customers and consumers through high-impact solutions, driven by customer insights and deep technical application expertise. Two world class R&D centers (Fairmount, Georgia, US; and Bergheim, Germany) provide fully equipped analytical and pilot scale laboratories and a pilot plant, which offer tailored technical support to our customers.

Our quality promise:
At Huber, Quality is an integral part of our company policy. An integrated Management System is in place and ensures that quality standards are maintained in all aspects of the company.

Quality

Our commitment is to never compromise on the quality of our products and services. We empower our people to protect customers and our communities by achieving quality through dedication, passion, and leadership.

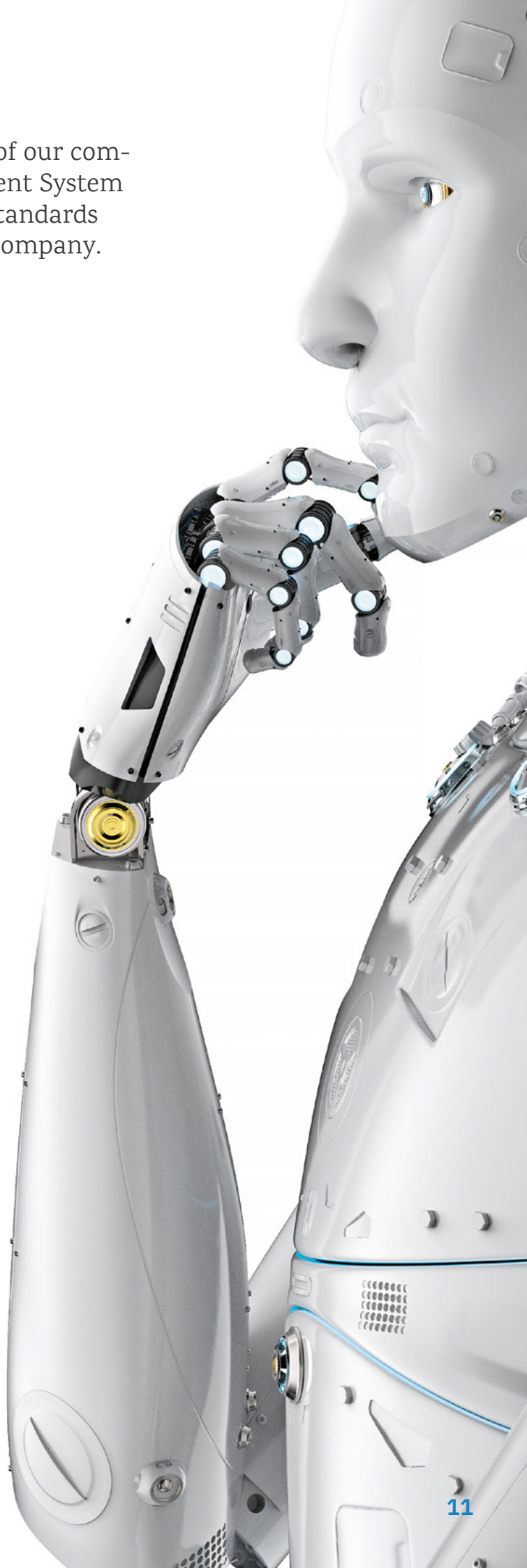
We take great pride in the quality of the specialty solutions we produce, and in our strong commitment to superior customer service and technical support. Efficient process control systems and systematic sampling and analysis of chemical and physical properties, both during production and on finished goods, are important features of our quality assurance system. All of our production sites are qualified according to ISO 9001:2015 (Quality Management Systems).

Sustainability

J.M. Huber Corporation set bold and impactful sustainability goals in its Vision 150 Integrated Business Strategy. As a member of the World Business Council for Sustainable Development (WBCSD), Huber is working to achieve net-zero emissions, protect earth's ecosystems and achieve a more equitable future. This includes a transition to renewable energy, and a decarbonization plan aligning with science-based targets through innovative technological advances. Huber continually assesses the sustainability performance of its supply chain partners to ensure that we are aligned in People, Planet & Profit objectives.

Huber Advanced Materials is proud it has completed Life Cycle Analyses (LCAs) for its major product portfolio, which we share with customers upon request.

At Huber, our Environmental, Social and Governance (ESG) approach to sustainability is integrated into our overall business strategy. In recognition of Huber's strategy execution, we are proud to participate in EcoVadis and US Best Managed Company programs and have earned high ratings for our continuing emphasis and efforts.



Our global **footprint**

Huber Advanced Materials is a global leader in activated aluminas, halogen-free fire retardants and smoke suppressants, thermal management solutions, specialty aluminum oxides and organic matting agents.

We deliver ideal application solutions to enhance the performance, appeal and processing of a broad range of industrial, agricultural and consumer products.

Our innovation, advanced technologies, unique expertise, unsurpassed customer focus and technical know-how give us the edge to keep meeting the dynamic needs of tomorrow.

For more information about our complete line of innovative and sustainable Compalox® solutions for water purification, which assists in ensuring a pure and safe water supply globally, contact us today.

Americas

Fairmount, GA
Atlanta, GA
Kennesaw, GA
Marblehead, IL
Bauxite, AR

Europe

Bergheim, Germany
Breitenau, Austria

Asia Pacific

Qingdao, China

2
R&D Centers

6
Manufacturing Plants

3
Customer Care Centers

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