Hydral® Precipitated and Hymod® Surface-Treated Alumina Trihydrate (ATH)

“FLAMES AND SMOKE DON’T LIKE US”

• Non-Halogen
• Flame Retardance and Smoke Suppression
• Superior Electrical Performance
• High Chemical Purity
• Precise Rheology and Compounding Control
• Advanced Surface-Treatment Technology
• Physical and Mechanical Property Optimization
• Global Availability
The Bauxite manufacturing operation has the largest digestion capacity in North America dedicated exclusively to the chemical sector. Its central U.S. location meets the Just-in-Time requirements of compounders and producers across North America. In addition, Huber’s experienced global logistics team enables Huber ATH products to reach many regions of the world competitively.

Huber’s non-halogen Hydral® product line is globally recognized as consistently high in quality and cost-effective. The Hydral and Hydral® Coat ATH flame retardants and smoke suppressants afford Huber a long production horizon, with a ready expansion for growth. The technical advancement of sub-micron grades through the development of Huber’s Hydral Coat ATH product line has led the flame retardant additives market to new capabilities for rheology control and flame retardant efficacy.

The Bauxite operation is one of four Huber ATH production plants, each with an outstanding reputation for producing high-performing ATH grades. Huber’s manufacturing footprint is also supported by a modern technical laboratory specializing in ATH and fire retardant applications.

Hydral® Precipitated Alumina Trihydrate (ATH)

The Huber Specialty Hydrates Team based in Bauxite, Arkansas has more than 50 years of manufacturing experience producing world-class precipitated alumina trihydrate (ATH) products designed to meet stringent property and performance specifications.
**Hymod® Treated ATH: Provides Unparalleled Surface-Treatment Advantages and Performance Capabilities**

Surface-modification technology is one of the core competencies of Huber’s fire retardant additives business. Our non-halogen Hymod® ATH product line has been a global leader for several decades in terms of performance and pushing the boundaries required for improved mechanical and processing properties.

We achieve optimized product modification conditions based on staged product development and manufacturing scale-up. To meet the demanding requirements of our customers, we continue to look for opportunities to develop new products and to improve the quality and performance of our surface-modified materials.

Our surface-treatment science laboratory, pilot plant and two manufacturing facilities are dedicated to serving customers requiring surface-modified grades of ATH and magnesium hydroxide (MDH). These facilities are located in Fairmount and Kennesaw, Georgia. If existing surface-treated products do not meet your requirements, Huber will work with you to design the ideal product for your specifications.

**Key Benefits of Huber’s Surface-Treated Hymod ATH Products**

- ✓ Improved Compatibility with Polymers
- ✓ Better Wet-Out
- ✓ Lower Viscosity, Higher Loadings
- ✓ Higher Throughput Rate
- ✓ Reduced Absorption of Expensive Additives
- ✓ Improved Cure Properties
- ✓ Better Hydrophobicity
- ✓ Improved Mechanical Properties

**Huber’s Fire Retardant Additives Manufacturing and Technical Facilities**

AN ARRAY OF SURFACE-TREATED FIRE RETARDANT ADDITIVES ARE PRODUCED AT THE FAIRMOUNT, GEORGIA OPERATION.

CONE CALORIMETER AT THE FAIRMOUNT TECHNICAL CENTER PROVIDES CRITICAL ASTM E1354 FIRE TESTING CAPABILITIES.

PRECIPITATED ATH GRADES ARE MANUFACTURED IN BAUXITE, ARKANSAS. DIGESTER COLUMNS PROVIDE HOLDING TIME TO COMPLETE THE DISSOLUTION OF THE ATH IN THE CAUSTIC SOLUTION.

PRODUCTION PROCESS FOR HYNOD® SURFACE-TREATED ATH AT THE KENNESAW, GEORGIA FACILITY.
Primary Applications for Huber’s Precipitated and Surface-Treated ATH Products

**Wire and Cable**
Hydral® precipitated ATH products are designed to have high purity and low conductivity. This allows them to be used in the insulation layer and in jacketing compounds for wires with varying voltage requirements.

**Rubber**
Huber has a variety of precipitated and ground ATH grades used in rubber compounds, providing varying degrees of reinforcement and fire retardance.

**Synthesis**
Hydral® 710 precipitated ATH is very pure and used as an aluminum source in the synthesis of products such as color pigments.

**Foam Insulation**
Precipitated ATH products such as Hydral 710 have very narrow particle size distributions. Hydral products are used in foam insulation applications to provide both fire retardance and consistent cell size.

**Silicone Rubber Reinforcement**
Silicone rubber is inherently fire retardant, but it has relatively poor tear resistance. Hymod® M9400 SP vinyl silane-treated ATH was specifically designed to improve electrical and mechanical properties and fire retardance in demanding silicone rubber applications such as high voltage insulators.

**Catalysts**
Precipitated ATH has the purity and fine particle size needed for some catalyst applications.

**Polyvinyl Chloride (PVC)**
Polyvinyl chloride (PVC) resin contains chlorine, which makes PVC more fire retardant than other thermoplastic resins. However, when PVC burns, it results in a high degree of smoke, and smoke generation is of increasing concern for fire retardant regulators. Hydral precipitated ATH grades act as both a fire retardant and smoke suppressant in flexible PVC. For special applications, Huber recommends the use of Hymod® M9400 SF surface-treated ATH.
**Huber’s Precipitated and Surface-Treated ATH Product Portfolio**

<table>
<thead>
<tr>
<th>Precipitated and Treated ATH Offerings</th>
<th>Treatment</th>
<th>Treatment Type</th>
<th>D50</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydral® 710</td>
<td>Untreated</td>
<td></td>
<td>1</td>
<td>Wire and Cable Insulation and Jacketing; Thermoplastics; Rubber; Foam Insulation</td>
</tr>
<tr>
<td>Hydral® PGA-SD</td>
<td>Untreated, Higher in Bulk Density</td>
<td></td>
<td>1</td>
<td>Wire and Cable Jacketing; Thermoplastics; Rubber</td>
</tr>
<tr>
<td>Hydral® Coat 8</td>
<td>Untreated</td>
<td></td>
<td>0.8</td>
<td>Wire and Cable; Foam Insulation</td>
</tr>
<tr>
<td>Hydral® Coat 7</td>
<td>Untreated</td>
<td></td>
<td>0.7</td>
<td>Rubber; Thermoplastics</td>
</tr>
<tr>
<td>Hydral® Coat 5</td>
<td>Untreated</td>
<td></td>
<td>0.5</td>
<td>Rubber; Thermoplastics</td>
</tr>
<tr>
<td>Hymod® M9400 SP</td>
<td>Treated</td>
<td>Vinyl Silane</td>
<td>1</td>
<td>Wire and Cable; Peroxide Cured Silicone Rubber</td>
</tr>
<tr>
<td>Hymod® M9400 SG</td>
<td>Treated</td>
<td>Alkyl Silane</td>
<td>1</td>
<td>Wire and Cable; Platinum Cured Silicone Rubber</td>
</tr>
<tr>
<td>Hymod® M9400 SF</td>
<td>Treated</td>
<td>Phenyl Silane</td>
<td>1</td>
<td>Wire and Cable; PVC</td>
</tr>
<tr>
<td>Hymod® M9400 SA</td>
<td>Treated</td>
<td>Amino Silane</td>
<td>1</td>
<td>Wire and Cable</td>
</tr>
</tbody>
</table>

* Median Particle Size, Microns

**How Huber’s Precipitated and Surface-Treated ATH Products Function**

ATH decomposes in an environmentally-friendly mechanism known as dehydration. This endothermic reaction results in the formation of two non-toxic ingredients – aluminum oxide, which forms an inert residue, and water, which dilutes the smoke (see illustration below).

![Diagram of ATH decomposition](image)

**The Physical Properties of Huber’s Precipitated and Surface-Treated ATH Product Offerings**

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form</td>
<td>Powder</td>
</tr>
<tr>
<td>Particle Morphology</td>
<td>Hexagonal Platelet</td>
</tr>
<tr>
<td>TAPPI Brightness (Ground ATH)</td>
<td>90 – 92</td>
</tr>
<tr>
<td>TAPPI Brightness (Precipitated Grades)</td>
<td>97</td>
</tr>
<tr>
<td>Specific Gravity, g/cm³</td>
<td>2.42</td>
</tr>
<tr>
<td>pH Value</td>
<td>9 – 10</td>
</tr>
<tr>
<td>Mohs Hardness</td>
<td>2.5 – 3.5</td>
</tr>
<tr>
<td>Refractive Index</td>
<td>1.57</td>
</tr>
<tr>
<td>Decomposition Temperature</td>
<td>472°F / 220°C</td>
</tr>
<tr>
<td>Heat of Decomposition, cal/g</td>
<td>280</td>
</tr>
<tr>
<td>Theoretical Loss on Ignition, %</td>
<td>34.6%</td>
</tr>
</tbody>
</table>

Huber’s untreated and surface-modified ATH products are non-halogen and non-toxic. There are numerous advantages and benefits, including:

- Non-Abrasive; Easy on Equipment
- Source of Aluminum in the Production of Color Pigments
- Chemically Inert; Solvent Resistant and Water Resistant
- Thermally Conductive
- Economical
Huber’s Technical Expertise
A team comprised of highly-regarded chemists and technicians at Huber’s Technical Center in Fairmount, Georgia develop products and provide application technical support for the fire retardant additive marketplace. Huber’s technical and commercial expertise is the foundation to developing innovative products that meet the exacting performance requirements for each application.

J.M. Huber Corporation: Over a Century of Advancing Technology
Huber Specialty Hydrates, LLC and Huber Engineered Materials are part of the J.M. Huber Corporation, one of the largest family-owned companies in the United States. J.M. Huber Corporation is a broadly diversified multinational company that combines imagination, inspiration and innovation to enhance the performance of thousands of consumer and industrial products across a variety of industries. Huber Specialty Hydrates, LLC and Huber Engineered Materials develop engineered specialty ingredients that enhance the performance, appeal and processing of a broad range of products used in industrial, paper and consumer-based applications.

Huber’s comprehensive line-up of Hydral® and Hymod® ATH products offer the flame retardant and low-smoke properties you need for your next application. We are your flame retardant and smoke suppression expert offering consultative selling, product use guidance and a dedicated technical team for strong customer focus and support. Before things heat up, contact us today. Let us recommend the perfect precipitated or surface-modified ATH solution for your application.

Huber’s Fire Testing Capabilities
- ASTM E1354: Cone Calorimeter
- ASTM D7309: Microscale Combustion Calorimeter
- ASTM E662: NBS Smoke Chamber
- ASTM D3806: Two-Foot Tunnel
- ASTM D2863: Limiting Oxygen Index
- UL 94: Horizontal and Vertical Burn Tests
- ASTM E648: Radiant Panel

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