



# Calcined Alumina Powder: Essential to Many Industries

Calcined alumina powder, also known as calcined aluminium oxide, is a kind of aluminium oxide powder produced by calcinating alumina hydrate at high temperatures. During the calcination process, alumina hydrate loses its crystal water and is dehydrated, leading to a phase transition from boehmite or gibbsite to gamma alumina. Calcined alumina powder is a commercially important industrial product with various applications.

## Properties and Characteristics of Calcined Alumina Powder

Calcined alumina powder has high purity, good chemical stability, high strength, and excellent heat resistance. Its main properties and characteristics include:

- Purity: Commonly above 99% alumina content. High purity enables its use in applications requiring chemical inertness and stability.
- Particle Size: [.Calcined alumina powders](#) sizes depending on production process and intended applications. Finer particles offer better sinterability and density in final products.
- Surface Area: Typical surface area ranges from 3-10 m<sup>2</sup>/g. Higher surface area improves sinterability and reactivity.
- Hardness: Mohs hardness of 9 makes it very hard and wear resistant. It can be used for applications requiring abrasion resistance.
- Thermal Stability: Remains chemically and dimensionally stable at high temperatures up to 2100°C in air. Excellent refractory material for high temperature applications.
- Density: Typical density is 3.95-4.1 g/cm<sup>3</sup> depending on particle size distribution and purity levels.
- Acid and Alkali Resistance: Highly chemically inert. Unaffected by acids and alkalis making it suitable for demanding chemical environments.

## **Use of Calcined Alumina Powder in Industries**

Due to its unique combination of properties, calcined alumina powder finds extensive use across many industries:

### **Refractories Industry**

Alumina is one of the most important refractory materials used in lining furnace walls, tubes, bricks due to its high temperature strength and corrosion resistance up to 2100°C. It is used in production of cement, steel, glass, petrochemicals and more.

### **Abrasives Industry**

Its hardness and wear resistance make it very effective as an abrasive. Used in production of grinding wheels, lapping and polishing compounds, cut off wheels, refractory coatings and more.

### **Ceramics Industry**

Acts as a hard filler and bonding agent. Used in manufacturing electrical porcelains, alumina cutting tools, sanitary ware, tableware and more. Provides strength and corrosion resistance to final products.

### **Electronics Industry**

Its insulation properties and chemical inertness make it suitable for thin film ceramics, varistors, piezoelectric transducers. Also used as filler or dielectric material in hybrid circuits.

### **Refractory Cements**

Alumina powder is mixed with hydrated lime to produce refractory castable cements for high temperature insulating applications.

### **Automotive Catalyst Supports**

Honeycomb ceramic supports for automotive catalytic converters are made using alumina due to its thermal shock resistance and mechanical strength.

### **Bio Ceramics**

Its biocompatibility makes it valuable for bio ceramics applications such as bone implants, hip joints and dental materials. Chemically inert and compatible with body tissues and fluids.

## **Preparation Methods for Calcined Alumina Powder**

There are different methods employed for industrial scale production of calcined alumina

powder depending on raw material beneficiation requirements:

- Bayer Process

Alumina trihydrate (ATH) obtained from bauxite ore through the Bayer process is calcined in rotary kilns or multiple hearth furnaces to produce alpha alumina. Most common production route.

- China Clay Process

Kaolin clay is processed through various steps including calcination to produce calcined alumina.

- Sulphate Process

Bauxite is processed using sulfurous acid to produce aluminum sulphate which on calcination yields alumina.

- Neutralization Process

Aluminum hydroxide obtained through neutralizing soluble aluminum salts like aluminum chloride solution is dried and calcined.

- Other Methods

Direct causticization of aluminum solutions, water leaching, acid leaching and anodizing are some other methods.

Calcination is usually done at 1000-1500°C to convert meta-alumina or boehmite to alpha alumina polymorph having high strength, corrosion resistance and surface area. Proper control of calcination conditions and particle size distribution during processing is critical for desired properties of the final powder.

calcined alumina powder is an industrially significant advanced ceramic material due to its varied properties and wide ranging applications. Its production involves selection of appropriate raw material beneficiation technology and optimized calcination process control. Calcined alumina powder plays an essential role in enabling advanced technologies across many strategic industries.

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Priya Pandey is a dynamic and passionate editor with over three years of expertise in content editing and proofreading. Holding a bachelor's degree in biotechnology, Priya has a knack for making the content engaging. Her diverse portfolio includes editing documents across different industries, including food and beverages, information and technology, healthcare, chemical and materials, etc. Priya's meticulous attention to detail and commitment to excellence make her an invaluable asset in the world of content creation and refinement.

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