

Aluminum Chemicals

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Abstract

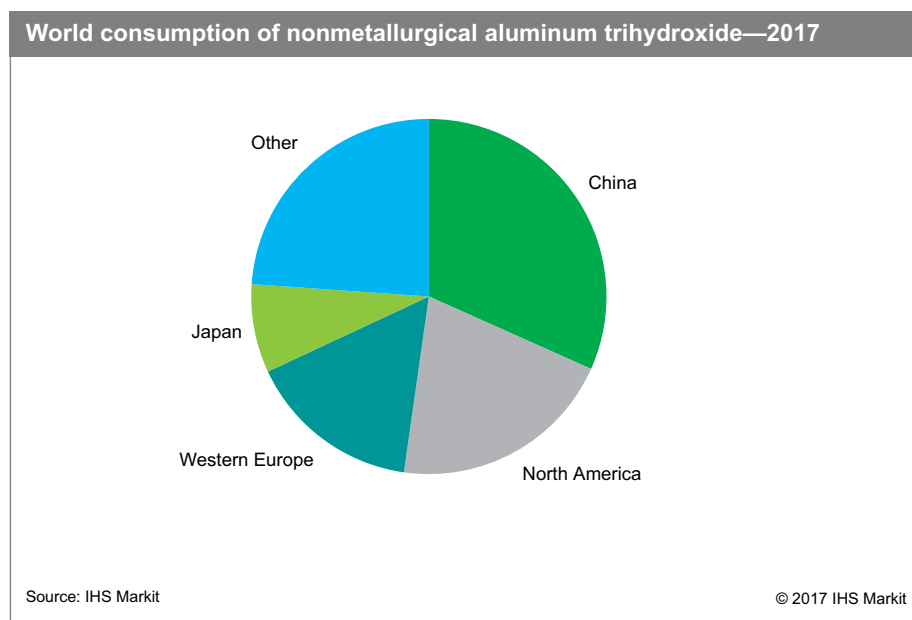
The principal products covered in this report are alumina trihydrate (ATH), aluminum oxide, aluminum chloride, aluminum sulfate, alumina silicate, and sodium aluminate.

Alumina trihydrate is typically produced from bauxite via the Bayer process; the vast majority of production is calcined and used for aluminum metal production. This report focuses on the chemical markets for alumina trihydrate and on the markets for the other mentioned aluminum chemicals that may be, but are not always, derived from alumina trihydrate.

In 2016, about 95% of the production of alumina was further processed to produce primary aluminum metal. Based on the alumina production of the first half of 2017, there will be a significant production increase for the year. Over the last five years, production of alumina and primary aluminum metal has increased by 3.5–5.0%, year on year.

In 2017, about 62% of nonmetallurgical ATH is consumed to produce aluminum chemicals—aluminum sulfate, aluminum fluoride, aluminum chlorides (including polyaluminum chloride), and sodium aluminates. The majority of these chemicals are used in drinking water purification and wastewater treatment or in pulp and paper production.

The following pie chart shows consumption of nonmetallurgical alumina trihydrate in chemical applications by region:



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Important alumina trihydrate end uses include use as

- Raw material for production of aluminum-containing chemicals, such as Al_2O_3 , AlCl_3 , $\text{Al}_2(\text{SO}_4)_3$ and NaAlO_2
- Flame retardants and reinforcement fillers in plastics, elastomers, adhesives and other products
- Filler pigments and coatings in papermaking
- Precursor for production of activated and other specialty aluminas

China continues to be the world's leading consumer of alumina trihydrate, accounting for 32% of the total consumption in chemical applications. The total does not include the calcined material that is used for refractories, ceramics, and abrasives, which are not studied in this report.

Major applications for aluminum compounds other than alumina trihydrate include

- High-quality papermaking (iron-free, white-grade of $\text{Al}_2[\text{SO}_4]_3$)
- Electrolyte flux in aluminum metal smelting (aluminum fluoride)
- Surface treatment of titanium dioxide (sodium aluminate)
- Water treatment (sodium aluminate, alum, polymerized and aqueous AlCl_3)
- Pulp and paper (sodium aluminate, alum)
- Detergent builders (crystalline aluminosilicates)
- Catalysts (crystalline aluminosilicates, Al_2O_3 , anhydrous AlCl_3 , sodium aluminate)
- Pharmaceuticals (hydrous AlCl_3)
- Molecular sieves (crystalline aluminosilicates)

Flame retardants and fillers are forecast to show the strongest growth over the next five years, with global consumption of ATH for this application increasing at 3–4% per year in 2017–22. ATH is the largest flame retardant by volume, globally, accounting for 38% of total flame retardant consumption. This market is dominated by higher-value and higher-purity grades, obtained mainly by reprecipitating or finely milling ATH. Its addition to plastics and other materials takes advantage of both its flame retardancy and filler properties.

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