



Almatis Calcined Aluminas

Analytical Methods

Chemical Analyses

Impurities for Calcined and Reactive Aluminas such as Na_2O , CaO , Fe_2O_3 , and SiO_2 are determined with an ICP-AES. Samples are prepared for the ICP by dissolving the alumina in a heated mixture of sulfuric and phosphoric acid.

Moisture / Loss On Drying (L.O.D.)

Moisture is determined either by CEM Microwave Moisture instrument or heating to 105 °C in a drying oven. The weight loss is expressed as a wt-% of the original sample weight.

Loss On Ignition (L.O.I.)

L.O.I. is the weight loss of a fully dried sample heated to constant weight at 1100 °C, expressed as a wt % of the dried sample.

Particle Size Distribution (PSD) – Sieve Analysis

The Alpine air screen is used to determine the percent greater than 63 microns for **Unground and Ground** Calcined Aluminas. For sieves at or finer than 45 microns, **Ground** Calcined and Reactive Aluminas are wet sieved using potable water to effectively pass the material through the fine sieves. The coarse residue left on the sieve is dried and weighed to obtain the wt-% coarser than the sieve.

CILAS 1064 Laser Diffraction

The PSD of fine Calcined and Reactive Aluminas is measured in a Cilas 1064 Laser Diffraction. In this method a powder sample is ultrasonically dispersed in an aqueous solution with sodium metaphosphat. The Cilas method allows the determination of the PSD from the diffraction behavior of a laser beam.

Primary Crystal Size d50 – Compacité Cilas

The alumina is milled down to primary crystals in a Fritsch “Pulverisette” mill (12 minutes). The d50 is determined in the Cilas 1064 Laser Diffraction, as above.

Compacité

Compacité is a measure of green density of a fully ground alumina without any additives. The alumina is milled in a Fritsch “Pulverisette” mill and then pressed in a die of 25.3 mm diameter at $30\text{N/mm}^2 = 30\text{ MPa}$ (approx. 4400 psi).

Specific Surface Area (B.E.T.)

This determination is based on the theory of Brunauer, Emmet and Teller (B.E.T.), calculating the surface area from the low temperature absorption of nitrogen gas onto the powder surface. The test is done on a Micromeritics “Gemini” apparatus (measurement unit in m^2/g).



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Ceramic Properties

Fully ground aluminas are pressed at 90 MPa (~13,000 psi) or 5000 psi (~35 MPa) in a 25.3 mm (~1 inch) diameter die to form compacts for measuring green density. The compacts are heated at a controlled ramp rate and held at the firing temperature appropriate for the material, 1540, 1600, 1620, or 1670 °C, to determine the fired density and shrinkage. Density is the ratio of weight to volume of the green compact or fired body. Shrinkage is the reduction in diameter expressed as a percent of the original (green) compact diameter.



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