

Global Aggregate Test Methods

Chemical Analysis

Impurities such as Na_2O and SiO_2 are determined on the feedstock for Tabular Alumina and Spinel with an ICP-AES. Samples are prepared for the ICP by dissolving the alumina in a heated mixture of sulfuric and phosphoric acids.

The metallic iron content of all Tabular Alumina and Spinel finished products is determined by means of a magnetic analyzer or a Soluble Fe_2O_3 test. The Soluble Fe_2O_3 method determines the amount of soluble iron in crushed Tabular Alumina by digesting a sample in hot, diluted 1:1 hydrochloric acid to effect dissolution of the iron. The digested sample is then filtered and Fe_2O_3 is determined with an ICP-OES.

The wt-% of Al_2O_3 is calculated from the difference between 100 wt-% and the sum of all impurities.

Analysis of Physical Properties

These include Water Absorption (WA), Apparent Porosity (AP) and Bulk Specific Gravity (BSG). These parameters are calculated from the dry weight [wt_d] and wet weight after infiltrating with water in a centrifuge with 880 RPM for 220 sec or boiling in water [wt_w] of crushed Converter Discharge balls (particle size about 5-8 mm) and from the volume of displaced water [V_{di}], measured by means of a hydrostatic scale, according to following formulas:

$$\text{Water Absorption [wt-\%]} = [\text{wt}_w - \text{wt}_d / \text{wt}_d] \times 100$$

$$\text{Apparent Porosity [vol-\%]} = [\text{wt}_w - \text{wt}_d / V_{di} \times \rho_{\text{H}_2\text{O}}] \times 100$$

$$\text{BSG [g/cm}^3\text{]} = \text{wt}_d / V_{di}$$

In all calculations it is assumed that the density $\rho_{\text{H}_2\text{O}}$ of water is exactly 1 g/cm³.

Particle Size Distribution (PSD) - Sieve Analysis

For all closed size and open size Tabular Alumina and Spinel products a sieve analysis is performed on an assembly of sieves according DIN/ISO 3310/1 and Tyler Screen Scale respectively. The assembly of required sieves is arranged in order of increasing mesh size with the coarsest sieve in the top position and a receiving pan in the bottom position. A weighed sample is placed on the top sieve and the assembly is placed in a sieve shaker. The sample is shaken for 10 minutes and the amount of material on each sieve is weighed. The percentage of material on each sieve is calculated and expressed as wt.% of the original sample weight. The coarse products are dry sieved whereas the -45 micron products are dry or wet sieved and the -20 micron products are wet sieved.

Particle Size Distribution (PSD) - Laser Granulometry

The PSD of Tabular Alumina -20 micron and of all Spinel sizes with upper limits < 90 micron (AR 78 -90 micron, -45 micron, -20 micron) is measured in a Battersizer S3 laser granulometer. In this method a powder sample is ultrasonically dispersed in an aqueous solution with sodium hydroxide. The laser method allows the determination of the PSD from the diffraction behavior of a laser beam.

Contact for sales, technical information and application assistance

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