

ALUMINUM OXIDE (AL₂O₃) (ALUMINA)

Aluminum Oxide is a tough, hard material often referred to by a number of other names including, Alumina, and Corundum. With a Mohs hardness of 9, Aluminum Oxide is a high strength, wear-resistant material possessing a strong ability to resist vigorous chemical attacks (such as acid and alkali) at extreme temperatures. Its high degree of refractoriness, along with its superior electrical insulating properties, dielectric properties, and high melting point make Aluminum Oxide a desirable material choice for a diverse range of applications.

Aluminum Oxide is typically produced by extracting crushed Bauxite via the Bayer Process.

Through various processes Aluminum Oxide has the related forms of Fused Aluminum Oxide, Calcined Alumina, Reactive alumina, activated alumina, and bubble alumina. Each of these forms of alumina vary in their distinct properties and have a wide range of applicable uses.

Panadyne offers a full range of aluminas to meet your application. Our Aluminum Oxide is offered in standard or custom sizing as well as spheres.



TYPICAL APPLICATIONS

| | | |
|------------------------|-------------------|----------------------|
| Refractories | Lapping | Filtration |
| Body and Vehicle Armor | Metal Preparation | Abrasives |
| Blasting Media | Ceramic Shapes | Refractory |
| Microdermabrasion | Anti-Slip | Polishing |
| Grinding | Laminates | Milling |
| Polishing | Coatings | Filler |
| | | Electrical Insulator |

TYPICAL PROPERTIES

| |
|---|
| High Hardness |
| High Compression Strength |
| Abrasive Wear-Resistance |
| Ability to Resist Vigorous Chemical Attacks at Extreme Temperatures |
| High Degree of Refractoriness |
| Superior Electrical Insulating Properties |
| Dielectric Properties |
| High Melting Point |

TYPICAL ANALYSIS

| PROPERTIES | UNITS | TEST | VALUE |
|---|----------------------------------|-------------------|--------------------------------|
| Physical | | | |
| Chemical Formula | - | - | Al ₂ O ₃ |
| Density, ρ | g/cm ³ | ASTM C20 | 3.21 |
| Color | - | - | ivory/white |
| Crystal Structure | - | - | hexagonal |
| Water Absorption | % @R.T. | ASTM C373 | 0.0 |
| Hardness | Mohs | - | 9 |
| Hardness | knoop (kg/mm ²) | Knoop 100g | 2000 |
| Mechanical | | | |
| Compressive Strength | MPa @ R.T. | ASTM C773 | 2070-2620 |
| Tensile Strength | MPa @ R.T. | ACMA Test #4 | 206-300 |
| Modulus of Elasticity (Young's Modulus) | GPa | ASTM C848 | 393 |
| Flexural Strength (MOR) | MPa @ R.T. | ASTM F417 | 310-379 |
| Poisson's Ratio, ν | | ASTM C818 | 0.27 |
| Fracture Toughness, K _{IC} | MPa x m ^{1/2} | Notched Beam Test | 4.5 |
| Thermal | | | |
| Max. Use Temperature (* denotes inert atm.) | °C | No load cond. | 1750 |
| Thermal Shock Resistance | ΔT (°C) | Quenching | 200 |
| Thermal Conductivity | W/m-K @ R.T. | ASTM C408 | 35 |
| Coefficient of Linear Thermal Expansion, α _l | μm/m-°C (~-25°C through ±1000°C) | ASTM C372 | 8.4 |
| Specific Heat, c _p | cal/g-°C @ R.T. | ASTM C351 | 0.21 |
| Electrical | | | |
| Dielectric Constant | 1MHz @ R.T. | ASTM D150 | 9.6 |
| Dielectric Strength | kV/mm | ASTM D116 | 15 |
| Electrical Resistivity | Ωcm @ R.T. | ASTM D1829 | >10 ¹⁴ |