

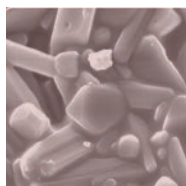
VIRGINIA MULLITE™ | $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$

SPECIFICATION SHEET



KYANITE MINING CORPORATION

Consistent Purity • Abundant Supply • Personalized Service



What is Mullite?

Mullite is an important ceramic material and is a key ingredient in many high-temperature products. Mullite has a high melting temperature, high hot strength, and excellent thermal shock and creep resistance. Mullite has no polymorphic inversions, making it volume stable at very high temperatures and has a low coefficient of thermal expansion. It has excellent electrical insulation and hot load-bearing properties and is resistant to many corrosive environments. When mullite re-crystallizes in a ceramic or a refractory it forms as small lenticular crystals which promote high strength, even at very high temperatures.

Making Virginia Mullite™ by Calcining Virginia Kyanite™

Mullite is rarely found in nature and thus must be formed for commercial use. Virginia Mullite™ is unique as it is created by calcining Virginia Kyanite™, not by calcining clay minerals. Virginia Kyanite™ is converted to Virginia Mullite™ via a phase transition in a rotary kiln, calcined in excess of 1450°C. The resulting product contains 55-60% alumina, about 80% mullite, 11% finely dispersed amorphous silica, 7% quartz, and less than 1% cristobalite. The amorphous silica is highly reactive and combines easily with sources of alumina to form secondary mullite. Virginia Mullite™ has a different particle shape to that of mullite formed by calcining clay minerals. Virginia Mullite™ is very low in magnetic iron and other impurities, which brings added benefits.

Uses

Virginia Mullite™ is a key ingredient in refractory and ceramics applications due to its exceptional hot properties. Virginia Mullite™ has excellent electrical properties and is used in a wide range of electrical

insulators and in heating elements where electrical receptivity is important. Virginia Mullite™ is used in brake shoe linings as a friction modifier; it is heat resistant and helps provide a clean friction surface as the brake wears down due to its friability and shape. Virginia Mullite™ is used in various foundry washes and coatings for specialty alloy steel castings; it provides excellent surface finish to the casting and can be used with higher temperature alloys. Virginia Mullite™ is extensively used in mullite/cordierite kiln furniture where creep resistance is critical. Virginia Mullite™ is used in investment casting shells as both slurry and stucco materials and is successfully being used in equiax, directional, and single crystal castings.

Typical Chemical Analysis (%)	
Al_2O_3	57.0 *(55.0 min)
SiO_2	40.2
TiO_2	1.1
Fe_2O_3	0.5 (0.75 max)
CaO	<0.04
MgO	<0.03
Na_2O	<0.04
K_2O	<0.07
P_2O_5	<0.15
Mineralogy (%)	Typical
Mullite	79–85
Amorphous	8–12
Quartz	4–8
Cristobalite	<1
Specific Gravity	3.00 g/cm ³

Typical Screen Specification of Virginia Mullite Grains

	40m (420 µm)	50m (300 µm)	100m (150 µm)	140m (106 µm)	200m (75 µm)	325 m (45 µm)	Pan
35 Mesh	15-30	15-30	30-45				10-30
48 Mesh		4-10	10-25	10-20	10-20		33-55
100 Mesh			5-10	8-20	12-25		50-73
200 Mesh					10 max		90 min
325 Mesh						10 max	90 min

Screen analysis is reported on US Standard sieves. Pan designates material passing the last reported screen. All analysis are expressed in weight percent.