VIRGINIA MULLITE™ | $3Al_2O_3 \cdot 2SiO_2$

MULLITE FOUNDRY COATINGS AND SPRAYS SPECIFICATION

VIRGINIA MULLITE

KYANITE MINING CORPORATION

Consistent Purity • Abundant Supply • Personalized Service

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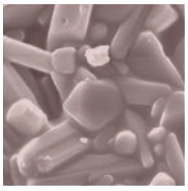


What is Mullite?

Mullite is an important ceramic material and 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 high temperatures and has a low coefficient of thermal expansion.

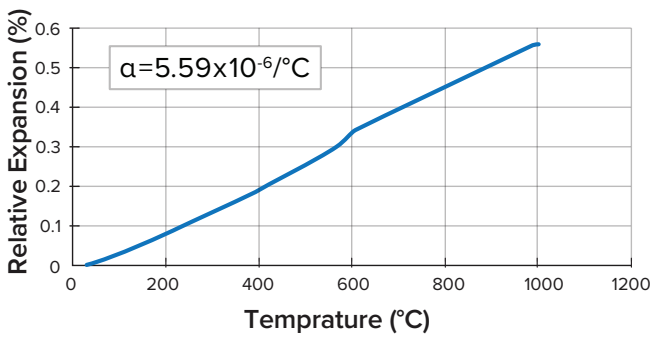
Making Mullite by Calcining Kyanite

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 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.

Foundry Coating and Spray Materials

Virginia Mullite™ i s an excellent, cost-effective material for foundry coatings or sprays. Virginia Mullite™ i is lower in impurities than other mullite products; this reduces glass formation during sintering and provides cleaner mold release. Virginia Mullite™ i works well in direct contact with molten metal at temperatures up to about 1600°C. It can be an excellent partial or full substitute for zircon flour in applications where the temperature is equal to or less than 1600°C; it is lower in density with a low thermal expansion. The unique, needle-like particle shape also helps mitigate cracks in the coatings.

Thermal Expansion of Virginia Mullite



Typical Chemical Analysis (%)

Al_2O_3	57.0 *(55.0 min)
SiO_2	40.2
TiO_2	1.1
Fe_20_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/c^{m3}

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.

06/2021