

Properties of Refractory and Ceramic Materials

Material	Melting Point	Limit of Application	Hardness Moh's Scale	Density	Specific Heat (mean) 25 - 1,000 °C	Linear Coefficient of Expansion	Thermal Conductivity	Electrical Resistivity
Units	°C	°C		g/cm ³	J/kg °C	25 - 800 °C x 10 ⁶ / °C	@ °C W/m	@ °C ohm/cm
Alumina (Al ₂ O ₃)	2,050	1,950	9	3.96	1,050	8.0	4 @ 1,315	10 ⁶ @ 1,100
Beryllia (BeO)	2,550	2,400	9	3.0	2,180	7.5	29 @ 1,000	4 x 10 ⁸ @ 600 8 x 10 ¹² @ 850
Magnesia (MgO)	2,850	2,400	6	3.60	1,170	13.5	59 @ 1,100	2 x 10 ⁸ @ 850
Thoria (ThO ₂)	3,220 (approximately)	2,700	7	9.5 - 9.9	290	9.5	3 @ 1,000	2.6 x 10 ⁷ @ 550 1.5 x 10 ⁴ @ 1,200
Zirconia (ZrO ₂)	2,700	2,400	6.5	5.5 - 5.8	590	7.5	3 @ 1,315	10 ⁶ @ 385 3.6 x 10 ² @ 1,200
Zircon (ZrO ₂ SiO ₂)	2,500 (approximately)	1,870	7.5	4.5 - 4.7	630	4.5	4 @ 1,200	High
Spinel (MgO Al ₂ O ₃)	2,130	1,900	8	3.6	1,050	8.5	2 @ 1,315	2.8 x 10 ⁷ @ 500 2.0 x 10 ⁵ @ 110
Mullite (3Al ₂ O ₃ 2SiO ₂)	1,850	1,800	-	2.8	840	5.0	4 @ 1,200	10 ⁵ - 10 ³ @ 815 - 1370
Sillimanite (Al ₂ O ₃ SiO ₂)	1,800 (approximately)	1,800	6.5	3.2	840	5.0	2 @ 1,300	10 ⁴ - 10 ⁵ @ 815 - 1,370
Silicon Carbide (SiC)	2,200 - 2,700 (decomposes)	1,400 - 1,700 (oxidizes)	9	3.2	840	4.5	13 @ 1,100	7420 - 745 @ 1,000 - 1,500
Silicon Nitride (Si ₃ N ₄)	1,900 (sublimes)	1400 in air 1,850 in inert	9	3.18	1,050	α = 2.9 β = 2.3	9.5 @ 1,200	10 ¹³ @ 25 10 ¹⁰ @ 480
Carbon Graphite (C) varies	3,600 (sublimes)	-	0.5 - 1.0	2.2	1,600	2.2	147 @ 50 63 @ 900	10 ³
Quartzite (SiO ₂)	1,400	1,090	7	2.65	1,170	8.6	2.6 @ 1,200	10 ¹⁴ @ 20 5 x 10 ³ @ 1,300
Boron Carbide (B ₄ C)	2,350	540 in air 2,260 in inert	9.3	2.5	2,090	5.7	17.3 @ 800	-
Boron Nitride (BN)	2,721	650 (oxidizes)	2	2.1	1,570	7.5 // 0.77 ↓	26 @ 900	1.7 x 10 ¹³ @ 25 // 2.3 x 10 ¹⁰ @ 480 //
Titanium Carbide (TiC)	3,140	1,500 (oxidizes)	9 - 10	6.5	1,050	6.9	40 @ 1,100	-
Tungsten Carbide	2,780	-	9 - 10	14.3	300	6.3	43.3 @ 1,100	-