TITANIUM

Typical Properties:

Present in meteorites and in the sun, titanium is the ninth most abundant element in the earth's crust. It's presence is found in almost all igneous rocks, in the ash of coal, in plants and in the human body. Pure titanium is a silvery white, lustrous metal with low density and good strength. In powder form, it is dark gray. Titanium is malleable when warmed and easily fabricated. Titanium is as strong as steel with only 45% of its weight, so when combined with other metals, it greatly improves strength and ability to withstand extremes of temperature.

Crystal Structure:

phase: Close-packed hexagonal; a = 0.295030 nm, c = 0.468312, c/a = 1.5873.
ß phase: Body-centered cubic, a = 0.332 nm at 900 °C.

Mass Characteristics:

Atomic Weight: 47.9
Density:
phase: 4.507 g/cm^3 at 20 °C.
ß phase: 4.35 g/cm^3 at 885 °C.

Thermal Properties:

Melting Point: 1668 ± 10 °C
Boiling Point: 3260 °C (estimated)
Vapor Pressure (From 1587 to 1698 K): $\log P = 7.7960 - \frac{24{,}644}{T} - 0.000227\ T$ (where P is in Pa and T is in K).
Phase Transformation Temperature: to ß, 882.5 °C
Coefficient of Thermal Expansion: **At 20 °C**: 8.41 x 10^{-6}/ °C. **At 1000 °C**: 10.1 x 10^{-8}/ °C (estimated).
Specific Heat:
Below 13 K: $C_p = 0.0706 + 5.43 \times 10^{-4}\ T^3$
Above Room Temperature: $C_p = 669.0 - 0.037188\ T - 1.080 \times 10^{7}\ T^{-2}$ (where C_p is in J/kg · K and T is in K)

Temperature, K	C_p, kJ/kg · K
50	0.0993
100	0.3002
200	0.4651
500	0.6072

Latent Heat of Fusion: 440 kJ/kg (estimated)
Latent Heat of Transformation: 91.8 kJ/kg (estimated)
Latent Heat of Vaporization: 9.83 MJ/kg (estimated)
Thermal Conductivity: 11.4 W/k · K at -240 °C

Electrical Properties:

Electrical Resistivity: 420 n · m at 20 °C
Superconductivity (Critical Temperature): 0.37 to 0.56 K

Magnetic Properties:

Magnetic Susceptibility (Volume, at Room Temperature): 180 (± 1.7) x 10^{-6} mks

Optical Properties:

Total Hemispherical Emittance: 0.30 at 710 °C

Nuclear Properties:

Stable Isotopes:	**Isotope**	**Natural Abundance, %**	**Cross Section, Barns**
	^{46}Ti	7.95	0.6
	^{47}Ti	7.75	1.6
	^{48}Ti	73.43	8.0
	^{49}Ti	5.51	1.8
	^{50}Ti	5.34	0.2

Mechanical Properties:

Tensile Properties (Typical, at Room Temperature):

Tensile Strength: 235 MPa
0.2% Yield Strength: 140 MPa
Elongation in 50 mm: 54%

Minimum Bend Radius: <1t

Hardness:

Ingot Melted From Electrolytic Titanium: 70 to 74 HB
Ingot Melted From Iodide Titanium: 65 to 72 HB

Velocity of Sound: 4970 m/s