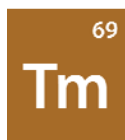


Stable Isotopes of Thulium

Isotope	Z(p)	N(n)	Atomic Mass	Natural Abundance	Nuclear Spin
Tm-169	69	100	168.934211	100.00%	1/2+



Thulium was discovered in 1879 by Per Theodore Cleve. Its name derives from *Thule*, an ancient name for Scandinavia.

Thulium is a silvery-white metal with a metallic luster and a hexagonal, close-packed structure. Its salts are colored green. It has an effective magnetic moment of 7.62 Bohr magneton. It is insoluble in water and dissolves in concentrated acids. It is relatively stable in air at ambient temperatures.

Reactions with halogens are slow at ordinary temperatures, but vigorous above 200 °C, forming halides. Thulium reacts with concentrated mineral acids, forming corresponding salts and liberating hydrogen.

The metal has very few commercial applications because of its high cost and low relative abundance. Thulium metal pellets containing natural isotope Thulium-169 and radioactive isotope Thulium-170 are used in portable x-ray equipment as medical and dental diagnostic tools. These pellets are also used to detect flaws in small, inaccessible parts of mechanical and electrical devices. Radioactive Thulium-171 is a beta emitter with a half-life of two years and is potentially useful as an energy source. Natural thulium is used in ceramic magnetic materials (ferrites) for microwave devices.

Properties of Thulium

Name	Thulium
Symbol	Tm
Atomic number	69
Atomic weight	168.9342
Standard state	Solid at 298 °K
CAS Registry ID	7440-30-4
Group in periodic table	N/A
Group name	Lanthanoid
Period in periodic table	6 (Lanthanoid)
Block in periodic table	f-block
Color	Silvery white

Properties of Thulium (continued)

Classification	Metallic
Melting point	1545 °C
Boiling point	1947 °C
Vaporization point	1947 °C
Thermal conductivity	16.90 W/(m·K) at 298.2 °K
Electrical resistivity	79.00 $\mu\Omega\cdot\text{cm}$ at 25 °C
Electronegativity	1.2
Specific heat	0.13 kJ/kg K at 20 °C
Heat of vaporization	250.00 kJ·mol ⁻¹
Heat of fusion	16.80 kJ·mol ⁻¹
Density of liquid	8.56 g/cm ³ at 1545 °C
Density of solid	9.32 g/cm ³
Electron configuration	[Xe]4f ¹³ 6s ²
Atomic radius	1.73 Å
Ionic radius	Tm ³⁺ : 1.09 Å (coordination number 7)
Oxidation states	+2, +3
Most stable oxidation state	+3