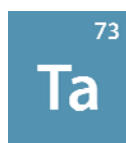


Stable isotopes of tantalum available from ISOFLEX

Isotope	Z(p)	N(n)	Atomic Mass	Natural Abundance	Enrichment Level	Chemical Form
Ta-180	73	107	179.947466	0.012%	0.26-5.70%	Oxide
Ta-181	73	108	180.947996	99.988%	99.99%	Oxide



Tantalum was discovered in 1802 by Anders Ekeberg. Its name derives from the Greek name *Tantalos*, meaning “father of Niobe” (tantalum is closely related to niobium in the periodic table).

A gray, heavy, very hard metal, tantalum is also malleable and ductile and has a body-centered cubic lattice structure. It is soluble in fused alkalis and hydrofluoric acid, and insoluble in water, alcohol and all acids, except hydrofluoric and fuming sulfuric acids. Its aqueous solution chemistry is that of its pentavalent ion, Ta⁵⁺. The metal is attacked by hydrofluoric acid below 150 °C. It also is dissolved by hot fuming sulfuric acid. It reacts with fluorine and chlorine on heating. The metal is immune to dilute aqueous alkalis but is attacked slowly by concentrated fused alkalis. Tantalum forms alloys with several metals: tantalum and its alloys have high melting points, high strength and ductility, and show excellent resistance to chemical attack. Tantalum carbide graphite composite is one of the hardest substances ever made; it has a melting point of 6700 °C.

The pure metal is ductile and can be drawn into fine wire, which is used as a filament for evaporating aluminum and other metals. Tantalum and its alloys are used to build reactors, vessels, and crucibles for preparing and carrying out reactions involving many reactive intermediates. The metal and its alloys also are used to construct furnace parts, electrolytic capacitors, aircraft and missile parts, chemical process equipment, and nuclear reactors. Since it is nonreactive to body fluids and a nonirritant to body tissues, tantalum is used in making surgical appliances. Plate and sheet tantalum are applied in bone repair; foil and wire in nerve repair; and plate, gauge and sheet in the repair of abdominal muscle. Tantalum oxide is used to produce optical glasses of high refractive index. The oxide film on the metal makes it a rectifier for converting alternating current to direct current.

Properties of Tantalum

Name	Tantalum
Symbol	Ta
Atomic number	73
Atomic weight	180.95
Standard state	Solid at 298 °K
CAS Registry ID	7440-25-7
Group in periodic table	5
Group name	None

Properties of Tantalum (continued)

Period in periodic table	6
Block in periodic table	d-block
Color	Gray blue
Classification	Metallic
Melting point	2996 °C
Boiling point	5425 °C
Vaporization point	5458 °C
Thermal conductivity	57.5 W/(m·K) at 298.2 °K
Electrical resistivity	12.45 $\mu\Omega\cdot\text{cm}$ at 0 °C
Electronegativity	1.5
Specific heat	0.14 kJ/kg K
Heat of vaporization	735 kJ·mol ⁻¹
Heat of fusion	36 kJ·mol ⁻¹
Density of liquid	15 g/cm ³
Density of solid	16.65 g/cm ³
Electron configuration	[Xe]4f ¹⁴ 5d ³ 6s ²
Atomic radius	1.46 Å
Ionic radius	Ta ⁵⁺ : 0.64 Å (coordination number 6)
Oxidation state	+5