

Stable isotopes of thallium available from ISOFLEX

Isotope	Z(p)	N(n)	Atomic Mass	Natural Abundance	Enrichment Level	Chemical Form
TI-203	81	122	202.972329	29.52%	>99.00%	Metal
TI-203	81	122	202.972329	29.52%	>99.00%	Oxide
TI-205	81	124	204.974412	70.48%	99.90%	Metal
TI-205	81	124	204.974412	70.48%	99.90%	Oxide

81

TI

Thallium was discovered in 1861 by Sir William Crookes. Its name derives from the Greek word *thallos*, meaning “green twig” or “green shoot.”

A bluish-white, lead-like solid, thallium has tetragonal crystals. It oxidizes in air at room temperature. It is soluble in nitric and sulfuric acid, insoluble in water (but readily forms soluble compounds when exposed to air or water), and slightly soluble in hydrochloric acid. It reacts with water containing oxygen to form thallos hydroxide, a relatively strong base, absorbing carbon dioxide and attacking glass. It burns in fluorine with incandescence. It reacts with other halogens to form halides. It also combines with several elements, forming binary compounds.

Thallium and its compounds have limited applications, including insecticides and rodenticides. Thallium-mercury alloys are used for switches and closures for use at sub-zero temperatures; another use is in low-melting glasses for electronic encapsulation. Thallium sulfide is used in photocells.

Thallium and its compounds (particularly its soluble salts) can cause serious or fatal poisoning from accidental ingestion or external application. Acute symptoms include nausea, vomiting, diarrhea, weakness, pain in extremities, convulsions and coma. Chronic effects include weakness, pain in extremities, and rapid loss of hair. Thallium and its compounds are listed under federal toxics regulations. It is listed by the United States Environmental Protection Agency as a priority pollutant metal in the environment.

Properties of Thallium

Name	Thallium
Symbol	TI
Atomic number	81
Atomic weight	204.38
Standard state	Solid at 298 °K
CAS Registry ID	7440-28-0

Properties of Thallium (continued)

Group in periodic table	13
Group name	None
Period in periodic table	6
Block in periodic table	p-block
Color	Silvery white
Classification	Metallic
Melting point	303.5 °C
Boiling point	1457 °C
Vaporization point	1473 °C
Thermal conductivity	46.10 W/(m·K) at 298.2 °K
Electrical resistivity	18.00 μΩ·cm at 0 °C
Electronegativity	1.8
Specific heat	0.13 kJ/kg K
Heat of vaporization	165.00 kJ·mol ⁻¹
Heat of fusion	4.20 kJ·mol ⁻¹
Density of liquid	11.22 g/cm ³
Density of solid	11.85 g/cm ³
Electron configuration	[Xe]4f ¹⁴ 5d ¹⁰ 6s ² 6p ¹
Atomic radius	1.70 Å
Oxidation states	+1 (thallos), +3 (thallic)