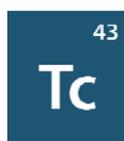


Isotopes of Technetium

Isotope	Atomic Mass	Half-life	Mode of Decay	Nuclear Spin	Nuclear Magnetic Moment
Tc-93	92.910248	2.73 hours	EC to Mo-93	9/2	6.26
Tc-94	93.909655	4.88 hours	EC to Mo-94	7	5.08
Tc-95	94.90766	20.00 hours	EC to Mo-95	9/2	5.89
Tc-96	95.90787	4.30 days	EC to Mo-96	7	5.04
Tc-97	96.906364	2.6 x 10 ⁶ years	EC to Mo-97	9/2	No data available
Tc-98	97.907215	4.2 x 10 ⁶ years	β- to Ru-98	6	No data available
Tc-99	98.907	213,000 years	β- to Ru-99	9/2	5.6847



Technetium was discovered in 1936 by Carlo Perrier and Emilio Segrè. Its name comes from the Greek word *technetos*, meaning “artificial.” It is the lowest atomic number element without any stable isotopes; every form of technetium is radioactive.

Technetium is a silver-gray metal with a hexagonal close-packed crystal structure. Its chemical properties are intermediate between those of rhenium and manganese. Technetium dissolves in *aqua regia*, nitric acid and concentrated sulfuric acid, but it is not soluble in hydrochloric acid. The metal form is slightly paramagnetic, tarnishes slowly in moist air and, in powder form, will burn in oxygen.

Only minute traces of technetium occur naturally in the Earth's crust. Small amounts exist as spontaneous fission products in uranium ores. Some red giant stars are indicated to contain technetium — these are known informally as “technetium stars.” In contrast with its rare natural occurrence, bulk quantities of the isotope Technetium-99 are produced each year from spent nuclear fuel rods.

The metastable isotope Technetium-99m is used in nuclear medicine for a wide variety of diagnostic tests, including imaging and functional studies of the brain, myocardium, thyroid, lungs, liver, gallbladder, kidneys, skeleton, blood and tumors. Technetium-99 is a United States National Institute of Standards and Technology (NIST) standard beta emitter and is therefore used for equipment calibration. Technetium can be used as a catalyst, although its radioactivity limits the safety of these applications.

Properties of Technetium

Name	Technetium
Symbol	Tc
Atomic number	43
Atomic weight	98
Standard state	Solid at 298 °K
CAS Registry ID	7440-26-8
Group in periodic table	7
Group name	None
Period in periodic table	5
Block in periodic table	d-block
Color	Silvery gray metallic
Classification	Metallic
Melting point	2157 °C
Boiling point	4265 °C
Thermal conductivity	50.60 W/(m·K)
Electronegativity	1.9
Heat of vaporization	585.20 kJ·mol ⁻¹
Heat of fusion	33.29 kJ·mol ⁻¹
Density of solid	11.00 g/cm ³
Electron configuration	[Kr]4d ⁵ 5s ²
Oxidation states	-3, -1, +1, +2, +3, +4, +5, +6, +7