

# Technetium

**Tc**

## ***General Information***

### **Discovery**

Technetium was discovered by C. Perrier and E.G. Segre in 1937 in Palermo, Italy. It was the first element to be produced artificially.

### **Appearance**

Technetium is a silvery-grey metal that tarnishes slowly in moist air. It is usually obtained as a grey powder.

### **Source**

The metal is produced in tonne quantities from the fission products of uranium nuclear fuel.

### **Uses**

Technetium is a remarkable corrosion inhibitor for steel, and can protect steel by the addition of very small amounts. This use is limited to closed systems as technetium is radioactive.

### **Biological Role**

Technetium has no known biological role. It is a radioactive element.

### **General Information**

Technetium is an excellent superconductor at 11 K and below. It resists oxidation, burns in oxygen and dissolves in nitric and sulphuric acids.

## Physical Information

Atomic Number	43
Relative Atomic Mass ( $^{12}\text{C}=12.000$ )	98.91
Melting Point/K	2445
Boiling Point/K	5150
Density/kg m <sup>-3</sup>	11500 (293K)
Ground State Electron Configuration	[Kr]4d <sup>5</sup> 5s <sup>2</sup>
Electron Affinity (M-M <sup>-</sup> )/kJ mol <sup>-1</sup>	96

## Key Isotopes

Nuclide	<sup>97</sup> Tc	<sup>98</sup> Tc	<sup>99</sup> Tc
Atomic mass		97.911	98.90
Natural abundance	0%	0%	0%
Half-life	2.6x10 <sup>6</sup> yrs	1.5x10 <sup>6</sup> yrs	2.12x10 <sup>5</sup> yrs

## Ionisation Energies/kJ mol<sup>-1</sup>

M - M <sup>+</sup>	702
M <sup>+</sup> - M <sup>2+</sup>	1472
M <sup>2+</sup> - M <sup>3+</sup>	2850
M <sup>3+</sup> - M <sup>4+</sup>	4100
M <sup>4+</sup> - M <sup>5+</sup>	5700
M <sup>5+</sup> - M <sup>6+</sup>	7300
M <sup>6+</sup> - M <sup>7+</sup>	9100
M <sup>7+</sup> - M <sup>8+</sup>	15600
M <sup>8+</sup> - M <sup>9+</sup>	17800
M <sup>9+</sup> - M <sup>10+</sup>	19900

## Other Information

Enthalpy of Fusion/kJ mol <sup>-1</sup>	23.81
Enthalpy of Vaporisation/kJ mol <sup>-1</sup>	585.22

### Oxidation States

Main	Tc <sup>IV</sup> , Tc <sup>V</sup> , Tc <sup>VII</sup>
Others	Tc <sup>-I</sup> , Tc <sup>O</sup> , Tc <sup>VI</sup>

### Covalent Bonds/kJ mol<sup>-1</sup>

Not applicable