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## Common Properties - Tungsten Metal

Atomic number	74
Relative atomic mass	183.85
Lattice type	A2, bcc
Lattice parameter	0.31648 nm
Atomic radius	0.139 nm
Ionic radius	
(4-valent)	0.064 nm
(6-valent)	0.068 nm
Absorption cross section for thermal neutrons	19.2 barns
1 <sup>st</sup> ionization potential	8.0 eV
Melting point	3422 °C
Boiling Point	5900 °C
Heat of fusion	35.17 kJ/mol
Heat of sublimation	850.8 kJ/mol
Molar heat capacity @ 20°C	24.28 J/(mol.K)
Specific heat capacity	
@ 25 °C	0.135 kJ/(kg.K)
@ 1000 °C	0.17 kJ/(kg.K)
@ 2000 °C	0.20 kJ/(kg.K)
Coefficient of thermal expansion	
@ 500 °C	2.3 mm/m
@ 1500 °C	7.6 mm/m
@ 2000 °C	19.2 mm/m
Thermal conductivity	

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@ 0 °C	129.5 W/(m.K)
@ 1000°C	112.5 W/(m.K)
@ 2000 °C	96.0 W/(m.K)
Vapour pressure	
@ 1700 °C	$1 \times 10^{-10}$ Pa
@ 2300°C	$4 \times 10^{-1}$ Pa
@ 3000 °C	$2 \times 10^{-3}$ Pa
Standard entropy $S^{\circ}_{25^{\circ}\text{C}}$ at 101 kPa	32.76 J/(mol.K)
Standard enthalpy $H^{\circ}_{25^{\circ}\text{C}} - H^{\circ}_{-273^{\circ}\text{C}}$	$5.09 \times 10^3$ J/mol
Specific electrical resistivity	
@ 20 °C	0.055 $\mu\text{W.m}$
@ 1000 °C	0.330 $\mu\text{W.m}$
@ 2000 °C	0.655 $\mu\text{W.m}$
@ 3000 °C	1.40 $\mu\text{W.m}$
Magnetic susceptibility @ 25 °C	$0.32 \times 10^{-6} \text{cm}^3/\text{g}$
Black body temperature @ 727 °C ( $\lambda = 665 \text{ nm}$ )	693 °C
Spectral emission @ 25 °C ( $\lambda = 665 \text{ nm}$ )	0.47
Electron emission	
@ 727 °C	$1.07 \times 10^{-15} \text{ A/cm}^2$
@ 1627 °C	$2.28 \times 10^{-4} \text{ A/cm}^2$
@ 2227 °C	$2.98 \times 10^{-1} \text{ A/cm}^2$
Electron yield	
@ 727 °C	$1.77 \times 10^{-5} \text{ A/W}$
@ 1627 °C	$1.22 \times 10^{-5} \text{ A/W}$
@ 2227 °C	$4.26 \times 10^{-5} \text{ A/W}$
Density @ 20 °C	$19.3 \text{ g/cm}^3$

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Hardness (Vickers) HV 30	
@ 0 °C	450
recrystallized	300
deformed	< 650
@ 400 °C	240
@ 800 °C	190
Modulus of elasticity	
@ 0 °C	407 kN/mm <sup>2</sup>
@ 1000 °C	365 kN/mm <sup>2</sup>
@ 2000 °C	285 kN/mm <sup>2</sup>
Velocity of sound	
longitudinal	5320 m/s
transverse	2840 m/s
Minimum compression strength (sintered)	1150 N/mm <sup>2</sup>
Shear modulus @ 20 °C	177 kN/mm <sup>2</sup>

**Source:** E.Lassner and W.D.Schubert, TUNGSTEN: properties, chemistry, technology of the element, alloys and chemical compounds, ISBN 0-306-45053-4, Kluwer Academic / Plenum Publishers, New York (1990).