

TUNGSTEN AT A GLANCE

July 29, 1957

PHYSICAL PROPERTIES OF TUNGSTEN (W)

Atomic number	74
Atomic weight	183.92
Isotopes (natural)	180, 182, 183, 184, 186
Melting point	3410°C ± 10
	3380°C (3653°K)
Boiling point	5900°C
Vapor pressure (mm Hg)	
1527°C (2780°F)	1.93 x 10 ⁻¹⁵
2127°C (3860°F)	7.9 x 10 ⁻⁹
2727°C (4940°F)	6.5 x 10 ⁻⁵
3227°C (5840°F)	4.68 x 10 ⁻³
Specific heat at 20°C (68°F) (Cal/gram-atom)	6.25
Thermal conductivity (cal/sq cm/cm/sec/°C)	
20°C (68°F)	0.31
927°C (1701°F)	.275
1127°C (2061°F)	.268
1327°C (2421°F)	.260
1527°C (2781°F)	.253
1727°C (3141°F)	.245
Lattice type	Body centered cube
Lattice constant (A)	3.1585
Density (g/cc)	19.3
	19.26 (calcd. from lattice constants)
Coefficient of linear expansion (mean value 0°-500°C) (32°-932°F)	
Worked	4.98 x 10 ⁻⁶
Annealed	4.45 x 10 ⁻⁶
Atomic volume (cc/gram-atom based on density 19.3)	9.53
Heat of fusion (cal/g)	44
Electrical resistivity at 0°C (microhm-cm)	5.48
Temp.-coefficient of electrical resistivity per °C (20°-100°C)	0.00482
Thermionic data	
Apparent electron work function (eV)	4.55
Apparent positive ion emission (eV)	11.93
Radiation emission coefficient	0.43
First ionization potential	7.60
Magnetic susceptibility (gram-atom)	±40.0 x 10 ⁻⁶

CHEMICAL REACTIONS OF TUNGSTEN (W)

<u>Substance</u>	<u>Temperature</u>	<u>Reaction</u>
Air or oxygen	20°C (68°F) 400°C (752°F)	No action Oxidation begins
Hydrogen	All temperatures	No action
Ammonia		No action
Nitrogen	1500°C (2732°F)	Nitriding
Water	20°C (68°F)	No action
Steam	Above 700°C (1292°F)	Oxidation
CO	Above 1700°C (3092°F)	Carburization
CO ₂	Above 1200°C (2192°F)	Oxidation
Fluorine	20°C (68°F)	Fluoride formed
Chlorine	Above 250°C (482°F)	Chloride formed
Bromine	Red Heat	Bromide formed
Iodine	Red heat	Iodide formed
H ₂ S	Red heat	Superficial action
Sulfur	Red heat	Attacked slowly
Phosphorus	Red heat	No action
Carbon	Above 1200°C (2192°F)	Carburization
Hydrocarbons	Above 1200°C (2192°F)	Carburization
Silicon	Above 1000°C (1832°F)	Silicide formed
Mercury		Slight amalgamation
Sodium	600°C (1112°F)	No action
Sodium-potassium	600°C (1112°F)	No action
Gallium	600°C (1112°F)	No action
Magnesium	20°C (68°F)	No action
NaOH, 10% sol.	20°C (68°F)	No action
NaOH	Fused	Attacked rapidly
H ₂ SO ₄ , dilute	20°C (68°F)	No action
H ₂ SO ₄ , dilute	100°C (212°F)	Attacked slightly
H ₂ SO ₄ , conc.	20°C (68°F)	Attacked slightly
H ₂ SO ₄ , conc.	110°C (230°F)	Attacked slowly
HCl, conc.	20°C (68°F)	No action
HCl, conc.	100°C (212°F)	Attacked slightly
HNO ₃ , conc.	100°C (212°F)	Attacked slightly
Aqua regia	100°C (212°F)	Attacked rapidly
HF	100°C (212°F)	Attacked slightly
HF + HNO ₃	20°C (68°F)	Attacked rapidly