

OVERVIEW

Full Name	Hafnium (None)
Symbol	Hf
Atomic Number	72
Series	Transition Metal
Block / Group / Period	d-block Group 4 Period 6
Electron Config.	[Xe]6s24f145d2
Phase at STP	Solid
Colour	Gray
Discovery	1923 in Denmark

THERMAL PROPERTIES

Melting Point	2233 °C	°C
Melting Point (abs.)	2506 K	K
Boiling Point	4603 °C	°C
Boiling Point (abs.)	4876 K	K
Heat of Fusion	25.5 kJ/mol	kJ/mol
Heat of Vaporization	630 kJ/mol	kJ/mol
Specific Heat (solid)	144 J/(kg K)	J/(kg·K)
Thermal Conductivity	23 W/(m K)	W/(m·K)
Thermal Expansion	5.9×10 ⁻⁶ K ⁻¹	K ⁻¹

MECHANICAL PROPERTIES

Density (solid, STP)	13.31 g/cm ³	g/cm ³
Density (liquid, MP)	12 g/cm ³	g/cm ³
Young's Modulus	78 GPa	GPa
Shear Modulus	30 GPa	GPa
Bulk Modulus	110 GPa	GPa
Poisson's Ratio	0.37	
Speed of Sound	3010 m/s	m/s
Mohs Hardness	5.5	
Vickers Hardness	1760 MPa	MPa
Brinell Hardness	1700 MPa	MPa

ELECTRICAL PROPERTIES

Type	Conductor	
Conductivity	3.3×10 ⁶ S/m	S/m
Resistivity	3×10 ⁻⁷ m ?	Ohm·m
Superconducting Pt.	0.128	K

MAGNETIC PROPERTIES

Type	Paramagnetic	
Vol. Susceptibility	0.0000705	
Mass Susceptibility	5.3×10 ⁻⁹ m ³ /Kg	m ³ /kg

REACTIVITY

Valence	4	
Electronegativity	1.3	(Pauling)
Electron Affinity	0 kJ/mol	kJ/mol
Ionization Energies	658.5, 1440	kJ/mol

ATOMIC DIMENSIONS

Atomic Radius	208 pm	pm
Covalent Radius	175 pm	pm

CRYSTAL STRUCTURE

Structure	Simple Hexagonal	
Lattice Constant	319.64, 319.64, 505.11 pm	
Space Group	P63/mmc	#194

ISOTOPES & NUCLEAR

Stability	Stable	
Stable Isotopes	176Hf, 177Hf, 178Hf, 179Hf, 180Hf...	
Isotopic Abundance	174Hf0.16%176Hf5.26%177Hf18.6%17...	
Known Isotopes	153Hf ■ 188Hf (36 total)	
Neutron Cross Sect.	104	barns

ELEMENTAL ABUNDANCES

Universe	7×10 ⁻⁸ %	%
Earth's Crust	0.00033%	%
Oceans	8×10 ⁻¹⁰ %	%

HEALTH & SAFETY

DOT Hazard Class	4.2	
RTECS Number	MG4600000	
NFPA Health/Fire/Rx	0 / 0 / 0	