

## Zirconium ${}_{40}\text{Zr}^{91.22}$

Zirconium was discovered in 1789 by M.H. Klaproth at the University of Berlin, Germany. First isolated 1824 by J.J. Berzelius at Stockholm, Sweden.

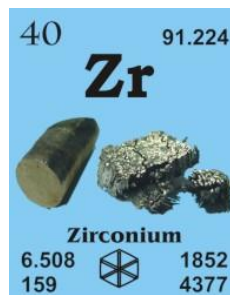
[Arabic, zargun = gold colour]

French: zirconium

German: zirconium

Italian: zirconio

Spanish: circonio



Atomic number	40
Density in g/cm <sup>3</sup>	6.508
Atomic radius in pm	206
Atomic weight	91.224
Melting point in °C	1852
Boiling point in °C	4377

**Description:** Zirconium is a hard, lustrous, silvery metal which is very resistant towards corrosion due to an oxid layer on the surface. However, it will burn in air if ignited. Zirconium is unaffected by acids (except HF) and alkalis. It is used in alloys, coloured glazes, and nuclear reactors. Its oxides are used in foundry crucibles, bricks, ceramics and abrasives.

### ZIRCONIUM SINGLE CRYSTAL PROPERTIES

<b>State:</b>	single crystal (max. grain size ~3-4mm)
<b>Crystal structure:</b>	hexagonal
<b>Production method:</b>	Floating zone
<b>Standard size:</b>	diameter 3-4mm thickness 1mm
<b>Orientation:</b>	(0001)
<b>Orientation accuracy:</b>	<2°, <1°, <0.4° or <0.1°
<b>Polishing:</b>	as cut, one or two sides polished
<b>Roughness of surface:</b>	<0.03µm
<b>Purity:</b>	99.99% ex Hf C 3 H < 1 O 9 N < 5 Cu 1.60 Fe 1.80 Ni < 1 Pb 0.30 Si 0.30 Ga, Hf and Ta are below the detection limit
<b>Density:</b>	6.49 g/cm <sup>3</sup>
<b>Melting point:</b>	1851.85 °C / 2125 °K
<b>Boiling point:</b>	4376.85 °C / 4650 °K
<b>Molar volume:</b>	14.02 cm <sup>3</sup>
<b>Typical analysis (ppm):</b>	

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<b>Thermal conductivity:</b>	22.7 [300 K] Wm <sup>-1</sup> K <sup>-1</sup>
<b>Coefficient of linear thermal expansion:</b>	5.78 x 10 <sup>-6</sup> K <sup>-1</sup>
<b>Electrical resistivity:</b>	42.1x 10 <sup>-8</sup> [293 K] Wm
<b>Mass magnetic susceptibility:</b>	+1.68 x 10 <sup>-8</sup> (s) kg <sup>-1</sup> m <sup>3</sup>
<b>Young's modulus:</b>	98 GPa
<b>Rigidity modulus:</b>	35 GPa
<b>Bulk modulus:</b>	89.8 GPa
<b>Poisson's ratio:</b>	0.38
<b>Radii:</b>	Zr <sup>4+</sup> 87; Zr <sup>2+</sup> 109; atomic 160; covalent 145
<b>Electronegativity:</b>	1.33 (Pauling); 1.22 (Allred); 3.64 eV (absolute)
<b>Effective nuclear charge:</b>	3.15 (Slater); 6.45 (Clementi); 9.20 (Froese-Fischer)
<b>Number of Isotopes (incl. nuclear isomers):</b>	25
<b>Isotope mass range:</b>	82 -> 101
<b>Crystal structure, (cell dimensions / pm), space group</b>	hexagonal
<b>X-ray diffraction: mass absorption coefficients:</b>	CuK $\alpha$ 143 ( $\mu/r$ ) / cm <sup>2</sup> g <sup>-1</sup> MoK $\alpha$ 15.9 ( $\mu/r$ ) / cm <sup>2</sup> g <sup>-1</sup>
<b>Neutron scattering length:</b>	0.716 b/10 <sup>-12</sup> cm
<b>Thermal neutron capture cross-section:</b>	0.184 sa / barns

