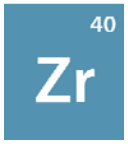
Stable isotopes of zirconium available from ISOFLEX

Isotope	Z(p)	N(n)	Atomic Mass	Natural Abundance	Enrichment Level	Chemical Form
Zr-90	40	50	89.904702	51.45%	96.80%	Metal
Zr-90	40	50	89.904702	51.45%	>98.00%	Oxide
Zr-91	40	51	90.905643	11.22%	>88.00%	Metal
Zr-91	40	51	90.905643	11.22%	>88.00%	Oxide
Zr-92	40	52	91.905038	17.15%	>91.00%	Oxide
Zr-94	40	54	93.906314	17.38%	>98.00%	Metal
Zr-94	40	54	93.906314	17.38%	>98.00%	Oxide
Zr-96	40	56	95.908275	2.80%	>86.00%	Oxide
Zr-96	40	56	95.908275	2.80%	>86.00%	Metal



Zirconium was discovered in 1789 by Martin Heinrich Klaproth. Its name originates with the Arabic word *zargun,* meaning “gold color.”

Zirconium may exist as a hard, lustrous, silvery-gray, crystalline scale or as a bluish-black amorphous powder. It is corrosion-resistant. It starts as a close-packed hexagonal lattice and transforms to a body -centered cubic structure at 865 ºC. It is soluble in hot, very concentrated acids and *aqua regia* and is insoluble in water and cold acids. It exhibits quadrivalency in most of its compounds, although divalent and trivalent compounds also exist.

Solid metal zirconium is stable in air at ordinary temperatures, but it reacts slowly at 200 ºC. The reaction is more rapid at high temperatures. Reactions with hydrogen occur at temperatures of 300-1000 ºC, forming ZrH_2, a brittle dihydride. Zirconium combines with halogens at high temperatures, forming tetrahalides. Reactions occur in the range of 200-400 ºC. Solid tetrahalides sublime above 300 ºC. Although stable to most acids, the metal is attacked by concentrated hydrochloric and sulfuric acids under boiling conditions or in the presence of *aqua regia* or hydrofluoric acid. The metal is stable in organic acids under all conditions.

The most important applications of zirconium involve its alloy, Zircaloy, which offers excellent mechanical and heat-transfer properties and great resistance to corrosion and chemical attack. Other uses are as an ingredient of explosive mixtures; as a “getter” in vacuum tubes; in making flash bulb, flash powder and lamp filaments; in rayon spinnerets; and in surgical appliances.

A suspected carcinogen, zirconium is not permitted in cosmetics (per the United States Food and Drug Administration). It is flammable and explosive in the form of dust, powder, borings or shavings.

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Properties of Zirconium

Name	Zirconium
Symbol	Zr
Atomic number	40
Atomic weight	91.224
Standard state	Solid at 298 °K
CAS Registry ID	7440-67-7
Group in periodic table	4
Group name	None
Period in periodic table	5
Block in periodic table	d-block
Color	Silvery white
Classification	Metallic
Melting point	1852 °C
Boiling point	4377 °C
Vaporization point	4377 ºC
Thermal conductivity	22.70 W/(m·K) at 298.2 °K
Electrical resistivity	40.00 μΩ·cm at 20 °C
Electronegativity	1.4
Specific heat	0.27 kJ/kg K
Heat of vaporization	580.00 $kJ \cdot mol^{-1}$
Heat of fusion	21.00 $kJ \cdot mol^{-1}$
Density of liquid	5.80 g/cm^3 at 1852 °C
Density of solid	6.51 g/cm^3
Electron configuration	$[Kr]4d^2 5s^2$
Atomic radius	1.60 Å
Ionic radius	Zr^{4+} in crystal: 0.84 Å (coordination number 8)
Oxidation states	+2, +3, +4

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