

Stable isotopes of palladium available from ISOFLEX

Isotope	Z(p)	N(n)	Atomic Mass	Natural Abundance	Enrichment Level	Chemical Form
Pd-102	46	56	101.905607	1.02%	>96.00%	Metal
Pd-104	46	58	103.904034	11.14%	86.00-98.00%	Metal
Pd-105	46	59	104.905083	22.33%	94.00-98.00%	Metal
Pd-106	46	60	105.903484	27.33%	95.00-98.00%	Metal
Pd-108	46	62	107.903895	26.46%	>99.00%	Metal
Pd-110	46	64	109.90515	11.72%	>99.00%	Metal

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Pd

Palladium was discovered in 1803 by William Hyde Wollaston. It is named for the asteroid Pallas, which was discovered at about the same time, as well as for the Greek name *Pallas*, goddess of wisdom.

A silver-white, ductile metal, palladium has a face-centered cubic crystalline structure and does not tarnish in air. It is the least noble (most reactive) of the platinum group and can absorb up to 800 times its own volume of hydrogen. Upon doing so, the metal swells, becoming brittle and cracked. Such absorption of hydrogen decreases the electrical conductivity of the metal. Also, such absorption activates molecular hydrogen, dissociating it to atomic hydrogen. It is attacked by hot, concentrated nitric acid and boiling sulfuric acid. It is soluble in *aqua regia*, fused alkalis, hot nitric acid and boiling sulfuric acid, and insoluble in organic acids and water. It is a good electrical conductor. It is nontoxic and noncombustible, except as dust. The metal forms mostly bivalent compounds, although a small number of tetravalent and fewer trivalent compounds are known. Palladium exhibits a strong tendency to form complexes, and it dissolves more oxygen in its molten state than in solid form. Palladium reacts with fluorine and chlorine at 500 °C, forming its halides. Hydrochloric acid has no effect on the metal.

One of the most important applications of palladium is to catalyze hydrogenation, dehydrogenation and petroleum cracking. Such reactions are widely employed in organic syntheses and petroleum refining. Palladium and platinum are installed in catalytic converters in automobiles to cut down the emission of unsaturated hydrocarbon gases.

Properties of Palladium

Name	Palladium
Symbol	Pd
Atomic number	46
Atomic weight	106.42
Standard state	Solid at 298 °K
CAS Registry ID	7440-05-3
Group in periodic table	10
Group name	Precious metal or platinum group metal
Period in periodic table	5
Block in periodic table	d-block
Color	Silvery white metallic
Classification	Metallic
Melting point	1554 °C
Boiling point	2970 °C
Thermal conductivity	71.8 W/(m·K) at 298.2 °K
Electrical resistivity	10.54 $\mu\Omega\cdot\text{cm}$ at 20 °C
Electronegativity	2.2
Specific heat	0.24 kJ/kg K
Heat of vaporization	380 kJ·mol ⁻¹ at 2970 °C
Heat of fusion	16.7 kJ·mol ⁻¹
Density of liquid	10.38 g/cm ³ at 1554 °C
Density of solid	12.02 g/cm ³
Electron configuration	[Kr]4d ¹⁰
Atomic radius	1.375 Å
Ionic radius	Pd ²⁺ (coordination number 4, square planar): 0.64 Å
Oxidation states	+2, +3, +4
Most common oxidation state	+2