

Stable isotopes of platinum available from ISOFLEX

Isotope	Z(p)	N(n)	Atomic Mass	Natural Abundance	Enrichment Level	Chemical Form
Pt-190	78	112	189.95993	0.014%	4.00%	Metal
Pt-192	78	114	191.961035	0.782%	56.00%	Metal
Pt-194	78	116	193.962663	32.967%	>96.00%	Metal
Pt-195	78	117	194.964774	33.832%	>96.00%	Metal
Pt-196	78	118	195.964934	25.242%	>97.00%	Metal
Pt-198	78	120	197.967875	7.163%	>91.00%	Metal

78

Pt

Platinum was discovered in 1735 by Antonio de Ulloa. Its name derives from the Spanish word *platina*, meaning “silver.”

Platinum is a silvery white, ductile, lustrous metal with face-centered cubic crystals. When heated, platinum absorbs large volumes of hydrogen. It is also a strong complexing agent. It has a vapor pressure of 0.00014 torr at its melting point. It has a magnetic susceptibility of $9.0 \times 10^{-6} \text{ cm}^3/\text{g}$. As a catalyst it is abnormally sensitive to poisons. It is insoluble in mineral and organic acids, and soluble in *aqua regia*. It is attacked by fused alkalis. It does not corrode or tarnish. At ordinary temperatures platinum is inert to practically all substances except *aqua regia* and, to a small extent, chlorine water. It reacts with oxygen only at elevated temperatures. Finely divided metal forms platinum oxide at about 500 °C. Fused alkalis, particularly potassium and barium hydroxides, are corrosive to platinum. Platinum can be alloyed with many elements at elevated temperatures.

Platinum metal and its alloys have numerous applications. It is used extensively as a precious metal in the manufacture of jewelry. Other important applications include construction of laboratory crucibles and high-temperature electric furnaces, in instruments as thermocouple elements, as wire for electrical contacts, as electrodes, in dentistry, in cigarette lighters, and for coating missile and jet engine parts. Platinum is also used extensively as a catalyst in hydrogenation, dehydrogenation, oxidation, isomerization, carbonylation and hydrocracking. It is also used in organic synthesis and petroleum refining. An important application is in the catalytic oxidation of ammonia in Ostwald’s process in the manufacture of nitric acid. Platinum is installed in the catalytic converters in automobile engines for pollution control.

Properties of Platinum

Name	Platinum
Symbol	Pt
Atomic number	78
Atomic weight	195.09
Standard state	Solid at 298 °K
CAS Registry ID	7440-06-4
Group in periodic table	10
Group name	Precious metal or platinum group metal
Period in periodic table	6
Block in periodic table	d-block
Color	Grayish white
Classification	Metallic
Melting point	1768.4 °C
Boiling point	3827 °C
Vaporization point	3825 °C
Thermal conductivity	71.60 W/(m·K) at 298.2 °K
Electrical resistivity	10.60 μΩ·cm at 20 °C
Electronegativity	2.2
Specific heat	0.13 kJ/kg K
Heat of vaporization	490.00 kJ·mol ⁻¹
Heat of fusion	20.00 kJ·mol ⁻¹
Density of liquid	19.77 g/cm ³
Density of solid	21.50 g/cm ³
Electron configuration	[Xe]4f ¹⁴ 5d ⁹ 6s ¹
Atomic radius	1.39 Å
Ionic radii	Pt ²⁺ : 0.60 Å and Pt ⁴⁺ : 0.63 Å (coordination numbers 4 and 6)
Oxidation states	+2, +3, +4
Most common oxidation state	+4