Stable isotopes of gadolinium available from ISOFLEX

Isotope	Z(p)	N(n)	Atomic Mass	Natural Abundance	Enrichment Level	Chemical Form
Gd-152	64	88	151.919789	0.20%	30.60-34.80%	Oxide
Gd-154	64	90	153.920862	2.18%	52.10-64.20%	Oxide
Gd-155	64	91	154.922619	14.80%	>90.00%	Oxide
Gd-156	64	92	155.922120	20.47%	≥93.30%	Oxide
Gd-157	64	93	156.923957	15.65%	88.40%	Oxide
Gd-158	64	94	157.924101	24.84%	>97.30%	Oxide
Gd-160	64	96	159.927051	21.86%	98.20%	Oxide

Gadolinium was discovered by Jean de Marignac in 1880. It is named for *gadolinite,* one of the minerals in which it was found, which was in turn named for chemist Johan Gadolin.

A colorless or light yellow lustrous metal, gadolinium occurs in a hexagonal close-packed crystalline form, known as *alpha-gadolinium,* which transforms to a body-centered cubic allotropic form, *beta-gadolinium,* when it reaches 1262 ºC. It exhibits a high degree of magnetism, especially at lower temperatures. Its salts are colorless. It has a vapor pressure of 9.0 torr at 1800 ºC. It also has superconductive properties. It is combustible and burns in air to form the oxide. It reacts slowly in water, is soluble in dilute acid, and is insoluble in water. All of its compounds are trivalent. Although the metal is stable in air at ordinary temperatures, it burns in air when heated to 150-180 ºC. Gadolinium is a strong reducing agent. It reduces oxides of several metals such as iron, chromium, lead, manganese, tin and zirconium into their elements. It burns in halogen vapors above 200 ºC, forming gadolinium(III) halides.

The most important application of this metal is as control rod material for shielding in nuclear power reactors. Other uses are in thermoelectric generating devices, as a thermoionic emitter, in yttrium-iron garnets in microwave filters to detect low-intensity signals, as an activator in many phosphors, for deoxidation of molten titanium, and as a catalyst.

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Properties of Gadolinium

Name	Gadolinium
Symbol	Gd
Atomic number	64
Atomic weight	157.25
Standard state	Solid at 298 ºK
CAS Registry ID	7440-54-2
Group in periodic table	N/A
Group name	Lanthanoid
Period in periodic table	6 (Lanthanoid)
Block in periodic table	f-block
Color	Silvery white
Classification	Metallic
Melting point	1313 °C
Boiling point	3266 °C
Vaporization point	3266 ºC
Thermal conductivity	10.5 W/(m·K) at 298.2 ºK
Electrical resistivity	134.0 μΩ·cm at 25 ºC
Electronegativity	1.1
Specific heat	0.230 J/g mol at 20 ºC
Heat of vaporization	305 $kJ \cdot mol^{-1}$ at 3266 ºC
Heat of fusion	10 $kJ \cdot mol^{-1}$
Density of liquid	7.4 g/cm^3 at 1313 °C
Density of solid	7.90 g/cm^3
Electron configuration	$[Xe]4f^7 5d^1 6s^2$ (partially filled f orbital)
Common oxidation state	+3

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