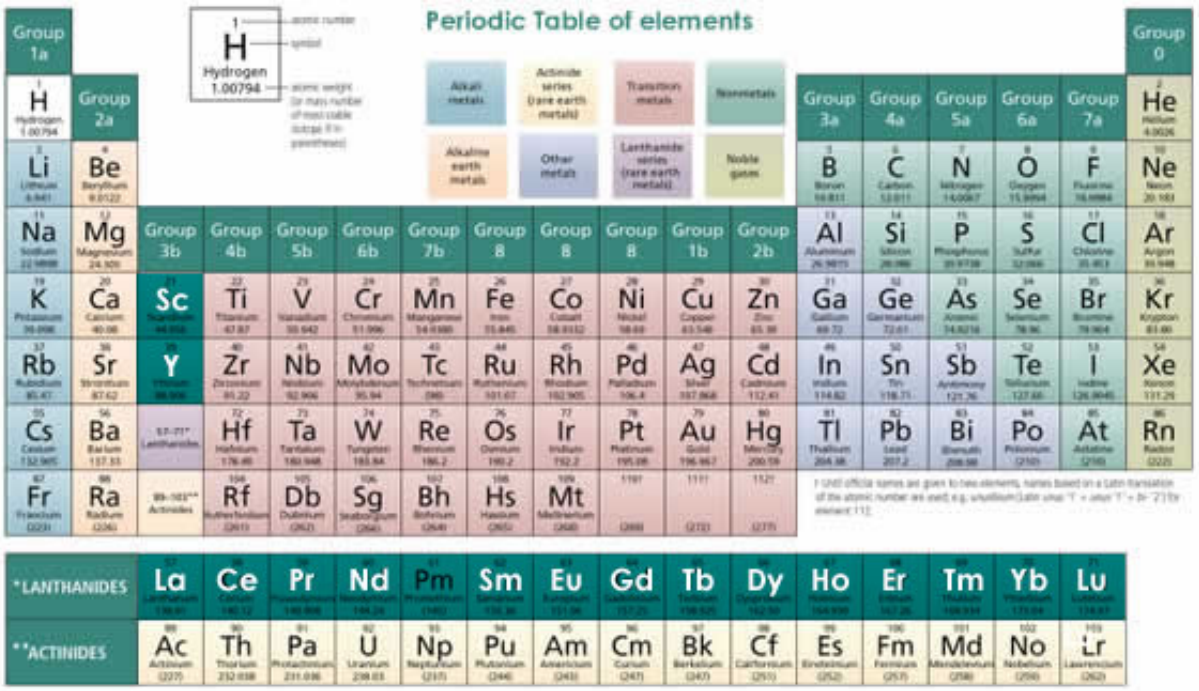
Rare Earth is a group of 17 elements including 15 lanthanides (La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu) located in the bottom of the Periodic Table from atomic number 57 to 71, and Sc numbered 21 and Y numbered 39. According to the differences in chemical and physical properties, Rare Earth elements are usually grouped into two subgroups: light Rare Earth or ceric group including the first 7 lanthanides from La to Gd, and heavy Rare Earth or yttric group including the rest of the lanthanides, Sc and Y.

- **Yttrium**
- **Lanthanum**
- **Cerium**
- **Praseodymium**
- **Neodymium**
- **Samarium**
- **Europium**
- **Gadolinium**
- **Terbium**
- **Dysprosium**
- **Holmium**
- **Erbium**
- **Thulium**
- **Ytterbium**
- **Lutetium**
- **Scandium**



Abbreviated words in Rare Earth industry

TREO = Total Rare Earth Oxide

TREM = Total Rare Earth Metal

L.O.I. = Loss on ignition

Rare Earth primary products are mainly used as raw materials for high-purity individual Rare Earth chemicals, and in the making of petroleum and environment protection catalysts, mischmetal, polishing powders and Rare Earth fertilizers.

Most Rare Earth metals can be processed to different shape and size for evaporation materials, sputtering targets and other specialty applications.

Super pure Rare Earth oxides are obtained by Ion-exchange technology, it can reduce both Rare Earth impurities and non-Rare Earth impurities significantly, to purify individual Rare Earth oxides again to above 99.999% purity, some oxides can achieve 99.9999% purity. These super pure Rare Earth Oxides are widely used in making laser crystal, fibre coating, and high-tech ceramics.

Products available :

Product Name	Grade	Description	Applications
Mischmetal	48% 48% 48% 60%	Silver grey ingot, rods or wires	Metallurgy; NiMH battery alloy; Inoculant & nodulariser; Flint
Rare Earth Alloy	Sc-Al Y-Al La-Ni Nd-Fe Nd-Fe-B Sm-Co Gd-Mg Tb-Dy-Fe Dy-Fe	Lump pieces or ingots	Metallurgy; Specialty alloy; Magnets;
Rare Earth Boride	LaB6	Powders or Custom-made shapes	Electronics
Rare Earth Bromide	DyBr3	Powder or lump pieces	Electronics
Rare Earth Carbonate	Neodymium Deleted	Powder	FCC catalyst; Polishing Powder; Glass; Ceramics
Rare Earth Chloride		Lump pieces or crystalline	Catalyst; Water treatment; Paint drier
Rare Earth Fluoride		Powder	Glass; Metallurgy; Electronic
Rare Earth Hydride		Powder or lump pieces	Electronics
Rare Earth Iodide		Powder or lump pieces	Electronics
Rare Earth Metals		Silver grey rods, discs, wires or Custom-made shapes	
Rare Earth Oxide, Mixed		Powder	Glass; Metallurgy; Paint drier
Sparking Flint		Silver grey rods, discs, wires or Custom-made shapes	Fire Starter; Sparking effects; Toys
Sputtering Targets			Electronics

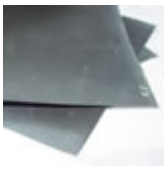
Rare Earth Metals with various shape and forms

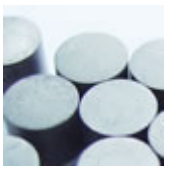
Most Rare Earth metals are usually in the forms of lump pieces or irregular ingots, and can be further processed to different shape and size for evaporation materials, sputtering targets and other specialty applications, the following shape and size are available for most of these Rare Earth metals, our capacity for various shapes of Rare Earth metals are:


Powder


Wire


Rod


Foil


Slab


Disc

Ingot	different shape of ingots
Lump	lump pieces below 0.5cm, 1cm, 2cm, 3cm or more
Powder	fineness to 325mesh, 250mesh, 100mesh, 60 mesh, 40mesh, 20mesh, 10mesh
Wire	diameter to 0.1mm, 0.5mm, 1.0mm, 5mm and length to 100cm or more
Rod	diameter 5mm, 1cm, 5cm, 10cm, and length to 30cm
Foil	thickness to 0.25mm. 0.5mm. 1.0mm, and width to 40cm
Slab	thickness to 1cm, 2cm, 3cm, width to 40cm
Disc	thickness to 0.1mm, 0.25mm. 0.5mm. 1.0mm, and diameter to 35cm

Products available :

Shapes of Rare Earth Metals	**Ingot**	**Lump**	**Powder**	**Wire**	**Rod**	**Foil**	**Slab**	**Disc**
Yttrium Metal	V	V	V	V	V	V	V	V
Lanthanum Metal	V	V	V	V	V	V	V	V
Cerium Metal	V	V	-	V	V	V	V	V
Praseodymium Metal	V	V	V	V	V	V	V	V
Neodymium Metal	V	V	V	V	V	V	V	V
Samarium Metal	V	V	V	V	V	V	V	V
Europium Metal	V	V	-	-	-	-	-	-
Gadolinium Metal	V	V	V	V	V	V	V	V
Terbium Metal	V	V	V	V	V	V	V	V
Dysprosium Metal	V	V	V	V	V	V	V	V
Holmium Metal	V	V	V	V	V	V	V	V
Erbium Metal	V	V	V	V	V	V	V	V
Thulium Metal	V	V	V	V	V	V	V	V
Ytterbium Metal	V	V	V	V	V	V	V	V
Lutetium Metal	V	V	V	V	V	V	V	V
Scandium Metal	V	V	V	V	V	V	V	V
Mischmetal	V	V	-	V	V	V	V	V

Yttrium

Yttrium, atomic no.: **39**, symbol as **Y**, weight at **88.91**, has the highest thermo-dynamic affinity for oxygen of any element, this characteristic is the basis for many of its applications. While not part of the rare earth series, it resembles the heavy rare earths which are sometimes referred to as the yttrics for this reason.
Another unique characteristic derives from its ability to form crystals with useful properties.
Some of the many applications of yttrium include in ceramics for crucibles for molten reactive metals, in florescent lighting phosphors, computer displays and automotive fuel consumption sensors.
Yttria stabilized zirconium oxide are used in high temperature applications, such as in thermal plasma sprays to protect aerospace high temperature surfaces.
Crystals of the yttrium-iron-garnet (YIG) variety are essential to microwave communication equipment.
The phosphor Eu:Y2O2S creates the red color in televisions.
Crystals of the yttrium-aluminum-garnet (YAG) variety are utilized with neodymium in a number of laser applications.
Yttria can also increase the strength of metallic alloys.

Products available :

Product Name	Formula	Grade	Description	Applications
Yttrium Acetate	Y(O2C2H3)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Phosphor; Laser crystal; YSZ Ceramics
Yttrium Carbonate	Y2(CO3)3.xH2O	99.999% 99.99% 99.9% 99%	White materials	Optical glass; Laser crystal; YSZ Ceramics
Yttrium Chloride	YCl3.xH2O	99.9999% 99.999% 99.99% 99.9% 99%	White crystalline	Phosphor; Laser crystal; Optical glass; YSZ Ceramics
Yttrium Fluoride	YF3	99.999% 99.99% 99.9% 99%	White materials	Glass; Metallurgy; Laser crystal
Yttrium Hydroxide	Y(OH)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Glass; Catalyst; Laser crystal
Yttrium Metal	Y	99.999% 99.99% 99.9% 99%	Silver grey ingot, rods, foils, slabs, tubes, or wires	Y-Al, Y-Mg Alloys; Sputtering target; Master alloy; Specialty alloy
Yttrium Nitrate	Y(NO3)3.6H2O	99.999% 99.99% 99.9% 99%	White crystalline	Phosphor; Laser crystal; Optical glass; YSZ Ceramics
Yttrium Octoate	Y(C8H15O2)2	99.99% 99.9% 99%	White crystalline	Glass; Catalyst; Laser crystal; Phosphors

Yttrium Oxalate	Y2(C2O4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Phosphor; Laser crystal; Optical glass; YSZ Ceramics
Yttrium Oxide	Y2O3	99.9999% 99.999% 99.99% 99.9% 99%	White powder	Phosphors for lamp, color TV, X-ray and other luminescent materials ; Laser crystal; Optical glass; YSZ Ceramics; Catalyst
Yttrium Sulfate	Y2(SO4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Electronic; Crystals; Ceramics

Lanthanum

Lanthanum, atomic no.: **57**, symbol as **La**, weight at **138.91**, is the first element in the rare earth or lanthanide series. It is the model for all the other trivalent rare earths. After cerium, it is the second most abundant of the rare earths.
Lanthanum-rich lanthanide compounds have been used extensively for cracking reactions in FCC catalysts, especially to manufacture high-octane gasoline from heavy crude oil.
Lanthanum-Rich Rare Earth metals play the important roles in hydrogen storage batteries.
It is utilized in green phosphors based on the aluminate (La0.4Ce0.45Tb0.15)PO4.
Lanthanide zirconates are used for their catalytic and conductivity properties and lanthanum stabilized zirconia has useful electronic and mechanical properties.
It is utilized in laser crystals based on the yttrium-lanthanum-fluoride (YLF) composition.

Products available :

Product Name	Formula	Grade	Description	Applications
Lanthanum Acetate	La(O2C2H3)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Catalysts; Electronic; Crystals; Phosphors
Lanthanum Boride	LaB6	99.9% 99% 98%	Purple color powder, cathodes and filaments	LaB6 Cathode; Filament; Glass coating; Physical Vapour Deposition(PVD) materials; Superconductive materials
Lanthanum Carbonate	La2(CO3)3.xH2O	99.999% 99.99% 99.9% 99%	White materials	Optical glass; Medicine; Electronic; Phosphors; Water treatment
Lanthanum Chloride	LaCl3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline or lump aggregates	Catalyst; Electronics; Glass; Water treatment
Lanthanum Fluoride	LaF3	99.999% 99.99% 99.9% 99%	White materials	Catalysts; Electronic; Crystals

Lanthanum Hydroxide	La(OH)3.xH2O	99.999% 99.99% 99.9% 99%	White materials	Catalysts; Crystals; Phosphors
Lanthanum Metal	La	99.99% 99.9% 99% 99%	Silver grey ingot, rods or wires	Hydrogen storage material; NiMH Battery; Metallurgy; Specialty alloy
Lanthanum Nitrate	La(NO3)3.6H2O	99.999% 99.99% 99.9% 99%	White crystalline	Catalysts; Electronic; Crystals; Phosphors
Lanthanum Oxalate	La2(C2O4)3.xH2O	99.999% 99.99% 99.9% 99%	White materials	Catalysts; Electronic; Crystals; Phosphors
Lanthanum Oxide	La2O3	99.999% 99.995% 99.99% 99.9% 99%	White materials	Optical glass; Catalysts; Ceramics; Electronic; Crystals; Phosphors
Lanthanum Sulfate	La2(SO4)3.xH2O	99.99% 99.9% 99%	White crystalline	Catalysts; Electronic; Crystals; Phosphors

Cerium

Cerium**,** atomic no.: **57**, symbol as **Ce**, weight at **140.12**, is the most abundant of the rare earths. It is characterized chemically by having two valence states, the +3 cerous and +4 ceric states. The ceric state is the only non-trivalent rare earth ion stable in aqueous solutions. It is, therefore, strongly acidic and a strong oxidizer. The cerous state closely resembles the other trivalent rare earths.
The numerous commercial applications for cerium include glass and glass polishing, phosphors, ceramics, catalysts and metallurgy:
In glass industry, it is considered to be the most efficient glass polishing agent for precision optical polishing. It is also used to decolorize glass by keeping iron in its ferrous state. The ability of cerium-doped glass to block out ultra violet light is utilized in the manufacturing of medical glassware and aerospace windows. It is also used to prevent polymers from darkening in sunlight and to suppress discoloration of television glass. It is applied to optical components to improve performance.
In phosphors, the role of cerium is not as the emitting atom, but as a "sensitizer."
Cerium is also used in a variety of ceramics, including dental compositions and as a phase stabilizer in zirconia-based products.
Ceria plays several catalytic roles. In catalytic converters it acts as a stabilizer for the high surface area alumina, as a promoter of the water-gas shift reaction, as an oxygen storage component and as an enhancer of the NOX reduction capability of Rhodium. Cerium is added to the dominant catalyst for the production of styrene from methylbenzene to improve styrene formation. It is used in FCC catalysts containing zeolites to provide both catalytic reactivity in the reactor and thermal stability in the regenerator.
In steel manufacturing, it is used to remove free oxygen and sulfur by forming stable oxysulfides and by tying up undesirable trace elements, such as lead and antimony.

Products available :

Product Name	Formula	Grade	Description	Applications
Cerium Acetate	Ce(O2C2H3)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Catalyst; Electronics; Glass
Cerium Ammonium Nitrate	(NH4)2Ce(NO3)6	99.99% 99.95% 99.9%	Orange crystalline	Catalyst; Electronics; Glass
Cerium Ammonium Sulfate	Ce(NH4)4(SO4)4.xH2O	99.99% 99.9% 99%	Yellow crystalline	Catalyst; Electronics; Glass
Cerium Carbonate	Ce2(CO3)3.xH2O	99.99% 99.95% 99.9% 99%	White materials	Catalyst; Electronics; Glass
Cerium Chloride	CeCl3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline or lump aggregates	Catalyst; Electronics; Glass
Cerium Fluoride	CeF3	99.99% 99.9% 99%	White materials	Catalyst; Metallurgy; Glass
Cerium Hydroxide	Ce(OH)4.xH2O	99.99% 99.9% 99%	Yellow materials	Catalyst; Electronics; Glass; Water treatment
Cerium Iodide	CeI3	99.95%	Yellow	Electronics
Cerium Metal	Ce	99.99% 99.9% 99%	Silver grey ingot, rods or wires	Metallurgy; Inoculant & nodulariser; Nuclear
Cerium Mischmetal	Ce	48% 48% 48% 60%	Silver grey ingot, rods or wires	Metallurgy; NiMH battery alloy; Inoculant & nodulariser; Flint
Cerium Nitrate	Ce(NO3)3.6H2O	99.999% 99.99% 99.9% 99%	White crystalline	FCC Catalyst; Glass production; Polishing powder; Ceramics; Crystals; Phosphors
Cerium Octoate	Ce(C7H15COO)2	99.9% 99%	White	Paint
Cerium Oxalate	Ce2(C2O4)3.xH2O	99.999% 99.99% 99.9% 99%	White to yellow materials	FCC Catalyst; Glass production; Polishing powder; Ceramics; Crystals; Phosphors

Cerium Oxide	CeO2	99.999% 99.99% 99.9% 99%	Powders with various colors against the different grade: Yellow, Tan, Light yellow, White	FCC Catalyst; Glass production; Polishing powder; Ceramics; Crystals; Phosphors
Cerium Oxide Polishing Powder	CeO2		Yellow to tan color powder	Flat glass; CRT glass; Mirrors & glasses; Lens & crystal; LED glass
Cerium Phosphate	CePO4.xH2O	99.99% 99.9% 99%	White crystalline	Phosphors; Electronics; Glass
Cerium Sulfate	Ce(SO4)2.xH2O	99.99% 99.9% 99%	Yellow crystalline	Catalyst; Electronics; Glass
Cerium Sparking Flint	Ce		Silver grey rods, discs, wires or Custom-made shapes	Fire Starter; Sparking effects; Toys

Praseodymium

Praseodymium, atomic no.:59, symbol as **Pr**, weight at **140.91**, resembles the typical trivalent rare earths, however, it will exhibit a +4 state when stabilized in a zirconia host. The element is found in most all light rare earth derivatives.
It is highly valued for ceramics as a bright yellow pigment in praseodymium doped zirconia because of its optimum reflectance at 560 nm.
Much research is being done on its optical properties for use in amplification of telecommunication systems, including as a doping agent in fluoride fibers.
It is also used in the scintillator for medical CAT scans.

Products available :

Product Name	Formula	Grade	Description	Applications
Praseodymium Acetate	Pr(O2C2H3)3.xH2O	99.999% 99.99% 99.9% 99%	Green crystalline	Pigment & Ink color; Glass; Ceramics
Praseodymium Carbonate	Pr2(CO3)3.xH2O	99.999% 99.99% 99.9% 99%	Green crystalline	Pigment & Ink color; Glass; Ceramics glaze
Praseodymium Chloride	PrCl3.xH2O	99.999% 99.99% 99.9% 99%	Green crystalline	Catalyst; Pigment & Ink color; Glass; Ceramics
Praseodymium Fluoride	PrF3	99.999% 99.99% 99.9% 99%	Light green materials	Pigment & Ink

Praseodymium Hydroxide	Pr(OH)3.xH2O	99.999% 99.99% 99.9% 99%	Green crystalline	Pigment; Crystals; Ceramic glaze
Praseodymium Metal	Pr	99.99% 99.9% 99%	Silver grey ingot, rods or wires	Metallurgy; Specialty a lloy; Nd-Fe-B magnets
Praseodymium Nitrate	La(NO3)3.6H2O	99.999% 99.99% 99.9% 99%	Green crystalline	Pigment; Ceramic glaze
Praseodymium Oxalate	Pr2(C2O4)3.xH2O	99.999% 99.99% 99.9% 99%	Green materials	Pigment; Ceramic glaze
Praseodymium Oxide	Pr6O11	99.999% 99.99% 99.9% 99%	Brown materials	Pigment; Ceramic glaze
Prsaeodymium Sulfate	Pr2(SO4)3.xH2O	99.999% 99.99% 99.9% 99%	Green crystalline	Pigment; Ceramic glaze

Neodymium

Neodymium, atomic no.: **60**, symbol as **Nd**, weight at **144.24**, is the most abundant of the rare earths after cerium and lanthanum. It shows similar characteristics to the other trivalent lanthanides.
Primary applications include lasers, glass coloring and tinting, dielectrics and, most importantly, as the fundamental basis for neodymium-iron-boron (Nd2Fe14B) permanent magnets.
The neodymium-based magnet was first introduced in 1982 simultaneously by Sumitomo Specialty Metals (Japan) and General Motors (USA) and commercialized in 1986. It is used extensively in the automotive industry with many applications including starter motors, brake systems, seat adjusters and car stereo speakers. Its largest application is in the voice coil motors used in computer disk drives.
Neodymium has a strong absorption band centered at 580 nm, which is very close to the human eye's maximum level of sensitivity making it useful in protective lenses for welding goggles. It is also used in CRT displays to enhance contrast between reds and greens. It is highly valued in glass manufacturing for its attractive purple coloring to glass.
Neodymium is included in many formulations of barium titanate, used as dielectric coatings and in multi-layer capacitors essential to electronic equipment.
Yttrium-aluminum-garnet (YAG) solid state lasers utilize neodymium because it has optimal absorption and emitting wavelengths. Nd-based YAG lasers are used in various medical applications, drilling, welding and material processing.

Products available :

Product Name	Formula	Grade	Description	Applications
Neodymium Acetate	Nd(O2C2H3)3.xH2O	99.999% 99.99% 99.9% 99%	Light purple crystalline	Glass; Laser crystal
Neodymium Carbonate	Nd2(CO3)3.xH2O	99.999% 99.99% 99.9% 99%	Light purple crystalline	Glass; MLCC capacitor Catalyst; Laser crystal

Neodymium Chloride	NdCl3.xH2O	99.999% 99.99% 99.9% 99%	Light purple crystalline	Glass; Catalyst; Laser crystal
Neodymium Fluoride	NdF3	99.999% 99.99% 99.9% 99%	Light purple	Glass; Metallurgy; Laser crystal
Neodymium Hydroxide	Nd(OH)3.xH2O	99.999% 99.99% 99.9% 99%	Purple crystalline	Glass; Catalyst; Laser crystal
Neodymium Iodide	NdI3	99.95%	Green	Electronics
Neodymium Metal	Nd	99.99% 99.9% 99% 80%	Silver grey ingot, rods or wires	Magnets; Alloys; Sputtering target
Neodymium Nitrate	Nd(NO3)3.6H2O	99.999% 99.99% 99.9% 99%	Rose crystalline	Glass; Catalyst; Laser crystal; Electric capacitor
Neodymium Oxalate	Nd2(C2O4)3.xH2O	99.999% 99.99% 99.9% 99%	Purple powder	Glass; Ceramics; Electric capacitor; Rubber additives
Neodymium Oxide	Nd2O3	99.999% 99.99% 99.9% 99%	Purple powder	Glass; Ceramics; Alloy; Laser crystal; Electric capacitor; Rubber additives
Neodymium Sulfate	Nd2(SO4)3.xH2O	99.999% 99.99% 99.9% 99%	Rose crystalline	Glass; Catalyst

Samarium

Samarium, atomic no.: **62**, symbol as **Sm**, weight at **150.36**, is primarily utilized in the production of Samarium-Cobalt (Sm2Co17) permanent magnets. It is also used in laser applications and for its dielectric properties.
They are utilized in lightweight electronic equipment where size or space is a limiting factor and where functionality at high temperature is a concern. Applications include electronic watches, aerospace equipment, microwave technology and servomotors.
Because of its weak spectral absorption band samarium is used in the filter glass on Nd:YAG solid state lasers to surround the laser rod to improve efficiency by absorbing stray emissions.
Samarium forms stable titanate compounds with useful dielectric properties suitable for coatings and in capacitors at microwave frequencies.

Products available :

Product Name	Formula	Grade	Description	Applications
Samarium Acetate	Sm(O2C2H3)3.xH2O	99.99% 99.9% 99%	Light yellow crystalline	Catalysts; Glass; Neutron absorption
Samarium Carbonate	Sm2(CO3)3.xH2O	99.99% 99.9% 99%	White materials	Glass; Neutron absorption
Samarium Chloride	SmCl3.xH2O	99.99% 99.9% 99%	Light yellow crystalline	Catalysts; Glass; Neutron absorption
Samarium Fluoride	SmF3	99.99% 99.9% 99%	White materials	Catalyst; Metallurgy; Glass
Samarium Hydroxide	Sm(OH)3.xH2O	99.99% 99.9% 99%	Light y ellow materials	Glass; Neutron absorption
Samarium Metal	Sm	99.99% 99.99% 99.9% 99%	Silvery grey lump pieces, ingot, rods or wires	Metallurgy; Sm-Co Magnets; Sputtering targets
Samarium Nitrate	Sm(NO3)3.6H2O	99.99% 99.9% 99%	Light yellow crystalline	Catalysts; Glass; Neutron absorption
Samarium Oxalate	Sm2(C2O4)3.xH2O	99.99% 99.9% 99%	Light yellow	Ceramics; Glass; Neutron absorption
Samarium Oxide	Sm2O3	99.999% 99.99% 99.9% 99%	Light yellow	Catalysts; Ceramics; Glass; Neutron absorption
Samarium Sulfate	Sm2(SO4)3.xH2O	99.99% 99.9% 99%	Yellow crystalline	Catalysts; Glass

Europium

Europium, atomic no.: **63**, symbol as **Eu**, weight at **151.96**, is utilized primarily for its unique luminescent behavior. Excitation of the Europium atom by absorption of ultra violet radiation can result in specific energy level transitions within the atom creating an emission of visible radiation.
In energy efficient fluorescent lighting, Europium provides not only the necessary red, but also the blue. Several commercial blue phosphors are based on Europium for color TV, computer screens and fluorescent lamps.
Its luminescence is also valuable in medical, surgical and biochemical applications.

Products available :

Product Name	Formula	Grade	Description	Applications
Europium Acetate	Eu(O2C2H3)3.xH2O	99.999% 99.99% 99.9%	White crystalline	Phosphor; Glass; Ceramics
Europium Carbonate	Eu2(CO3)3.xH2O	99.999% 99.99% 99.9%	White materials	Phosphor; Glass; Ceramics
Europium Chloride	EuCl3.xH2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Phosphor; Glass; Ceramics
Europium Fluoride	SmF3	99.999% 99.99% 99.9%	White materials	Phosphor; Glass; Ceramics
Europium Hydroxide	Eu(OH)3.xH2O	99.999% 99.99% 99.9%	White crystalline	Glass; Neutron absorption
Europium Metal	Eu	99.99% 99.99% 99.9%	Silvery grey lump pieces	Metallurgy; Nuclear industry; Specialty alloy
Europium Nitrate	Eu(NO3)3.6H2O	99.999% 99.99% 99.9%	White crystalline	Catalysts; Phosphor; Glass; Ceramics
Europium Oxalate	Eu2(C2O4)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Phosphor; Glass; Ceramics
Europium Oxide	Eu2O3	99.9999% 99.999% 99.99% 99.9%	White powder	Phosphors for lamp, color TV, X-ray and other luminescent materials; Glass; Crystal
Europium Sulfate	Eu2(SO4)3.xH2O	99.999% 99.99% 99.9%	White crystalline	Phosphor; Glass; Ceramics

Gadolinium

Gadolinium, atomic no.: **64**, symbol as **Gd**, weight at **157.25**, is utilized for both its high magnetic moment (7.94uB) and in phosphors and scintillated material. When mixed with EDTA dopants, it is used as an injectable contrast agent for patients undergoing magnetic resonance imaging. With its high magnetic moment, gadolinium can reduce relaxation times and thereby enhance signal intensity. The extra stable half-full 4f electron shell with no low lying energy levels creates applications as an inert phosphor host. Gadolinium can therefore act as hosts for x-ray cassettes and in scintillated materials for computer tomography.

Products available :

Product Name	Formula	Grade	Description	Applications
Gadolinium Acetate	Gd(O2C2H3)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Catalyst; Phosphors; Laser glass
Gadolinium Carbonate	Gd2(CO3)3.xH2O	99.999% 99.99% 99.9% 99%	White materials	Catalyst; Laser crystal; Ceramics
Gadolinium Chloride	GdCl3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Phosphor; Optical glass; Electronic; Ceramics
Gadolinium Fluoride	GdF3	99.999% 99.99% 99.9% 99%	White materials	Glass; Metallurgy; Laser crystal
Gadolinium Hydroxide	Gd(OH)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Glass; Catalyst; Laser crystal
Gadolinium Iodide	GdI3	99.95%	White	Electronics
Gadolinium Metal	Gd	99.99% 99.99% 99.9% 99%	Silver grey ingot, rods, foils, slabs, tubes, or wires	Magnets; Alloys; Sputtering target; Magnetic refrigerator
Gadolinium Nitrate	Gd(NO3)3.6H2O	99.999% 99.99% 99.9% 99%	White crystalline	Glass; Catalyst; Laser crystal; Phosphors
Gadolinium Oxalate	Gd2(C2O4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Phosphor; Neutron absorption; Optical glass; Electronic; Ceramics
Gadolinium Oxide	Gd2O3	99.9999% 99.999% 99.99% 99.9% 99%	White powder	Phosphor; Neutron absorption; Optical glass; Electronic; GGG materials; Crystals; Ceramics
Gadolinium Sulfate	Gd2(SO4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Electronic; Crystals; Ceramics

Terbium

Terbium, atomic no.: **65**, symbol as **Tb**, weight at **158.93**, is primarily used in phosphors, particularly in fluorescent lamps and as the high intensity green emitter used in projection televisions, such as the yttrium-aluminum-garnet (Tb:YAG) variety.
Terbium responds efficiently to x-ray excitation and is, therefore, used as an x-ray phosphor.
Terbium alloys are also used in magneto-optic recording films, such as TbFeCo.

Products available :

Product Name	Formula	Grade	Description	Applications
Terbium Acetate	Tb(O2C2H3)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Phosphor; Optical glass; Electronic; Ceramics
Terbium Carbonate	Tb2(CO3)3.xH2O	99.999% 99.99% 99.9% 99%	White materials	Phosphor; Optical glass; Electronic; Ceramics
Terbium Chloride	TbCl3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Phosphor; Optical glass; Electronic; Ceramics
Terbium Fluoride	TbF3	99.999% 99.99% 99.9% 99%	White materials	Glass; Metallurgy; Laser crystal
Terbium Hydroxide	Tb(OH)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Phosphor; Optical glass
Terbium Metal	Tb	99.99% 99.99% 99.9% 99%	Silver grey ingot, rods, foils, slabs, tubes, or wires	Magnets; Alloys; Sputtering target
Terbium Nitrate	Tb(NO3)3.6H2O	99.999% 99.99% 99.9% 99%	White crystalline	Glass; Laser crystal; Phosphors
Terbium Oxalate	Tb2(C2O4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Phosphor; Optical glass; Electronic; Ceramics
Terbium Oxide	Tb4O7	99.999% 99.99% 99.9% 99%	Brown powder	Phosphor; Optical dopant; Electronic; Ceramics
Terbium Sulfate	Tb2(SO4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Crystals; Ceramics

Dysprosium

Dysprosium, atomic no.: **66**, symbol as **Dy**, weight at **162.50**, is most commonly used as in neodymium-iron-boron high strength permanent magnets. While it has one of the highest magnetic moments of any of the rare earths (10.6uB), this has not resulted in an ability to perform on its own as a practical alternative to neodymium compositions.
It is however now an essential additive in NdFeB production.
It is also used in special ceramic compositions based on BaTiO formulations.
Recent research has examined the use of dysprosium in dysprosium-iron-garnet (DyFeG) and silicon implanted with dysprosium and holmium to form donor centers.

Products available :

Product Name	Formula	Grade	Description	Applications
Dysprosium Acetate	Dy(O2C2H3)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Halide lamps; Optical fiber; Phosphors
Dysprosium Bromide	DyBr3	99.95%	White powder	Electronics
Dysprosium Carbonate	Dy2(CO3)3.xH2O	99.999% 99.99% 99.9% 99%	White materials	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Dysprosium Chloride	DyCl3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Dysprosium Fluoride	DyF3	99.999% 99.99% 99.9% 99%	White materials	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Dysprosium Hydroxide	Dy(OH)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Halide lamps; Optical fiber; Phosphors
Dysprosium Iodide	DyI3	99.95%	Deep Yellow	Electronics
Dysprosium Metal	Dy	99.99% 99.99% 99.9% 99%	Silver grey lump pieces, ingot, rods or wires	NdFeB magnets; Super alloy; Sputtering target; Nuclear
Dysprosium Nitrate	Dy(NO3)3.6H2O	99.999% 99.99% 99.9% 99%	White crystalline	Catalyst; Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Dysprosium Oxalate	Dy2(C2O4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors

Dysprosium Oxide	Dy2O3	99.999% 99.99% 99.9% 99%	White powder	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Dysprosium Sulfate	Dy2(SO4)3.xH2O	99.99% 99.9% 99%	White crystalline	Crystal dopant; Ceramics; Phosphors

Holmium

Holmium, atomic no.: **67**, symbol as **Ho**, weight at **164.93**, has the highest magnetic moment (10.6uB) of any naturally occurring element. Because of this it has been used to create the highest known magnetic fields by placing it within high strength magnets as a pole piece or magnetic flux concentrator.
This magnetic property also has value in yttrium-iron-garnet (YIG) lasers for microwave equipment. Holmium lasers at a human eye safe 2.08 microns allowing its use in a variety of medical and dental applications in both yttrium-aluminum-garnet (YAG) and yttrium-lanthanum-fluoride (YLF) solid state lasers. The wavelength allows for use in silica fibers designed for shorter wavelengths while still providing the cutting strength of longer wave length equipment.

Products available :

Product Name	Formula	Grade	Description	Applications
Holmium Acetate	Ho(O2C2H3)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Halide lamps; Optical fiber
Holmium Carbonate	Ho2(CO3)3.xH2O	99.999% 99.99% 99.9% 99%	White materials	Halide lamps; Optical fiber; Crystal dopant; Phosphors
Holmium Chloride	HoCl3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Holmium Fluoride	HoF3	99.999% 99.99% 99.9% 99%	Light yellow powder	Halide lamps; Optical fiber; Crystal dopant;
Holmium Hydroxide	Ho(OH)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Halide lamps; Optical fiber; Phosphors
Holmium Iodide	HoI3	99.95%	Light yellow	Electronics
Holmium Metal	Ho	99.99% 99.99% 99.9% 99%	Silver grey lump piwces, ingot, rods or wires	Super alloy; Sputtering target; Nuclear

Holmium Nitrate	Ho(NO3)3.6H2O	99.999% 99.99% 99.9% 99%	White crystalline	Catalyst; Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Holmium Oxalate	Ho2(C2O4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Holmium Oxide	Ho2O3	99.999% 99.99% 99.9% 99%	Light yellow powder	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Holmium Sulfate	Ho2(SO4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Crystal dopant; Phosphors

Erbium

Erbium, atomic no.: **68**, symbol as **Er**, weight at **167.26**, has application in glass coloring, as an amplifier in fiber optics, and in lasers for medical and dental use.
The Erbium ion has a very narrow absorption band coloring erbium salts pink. It is therefore used in eyeware and decorative glassware. It can neutralize discoloring impurities such as ferric ions and produce a neutral gray shade. It is used in a variety of glass products for this purpose.
It is particularly useful as an amplifier for fiber optic data transfer. Erbium lasers at the wavelength required to provide an efficient optical method of amplification, 1.55 microns. As shown below under recent research, many interesting developments are occurring in this area.
Lasers based on Er:YAG are ideally suited for surgical applications because of its ability to deliver energy without thermal build-up in tissue.

Products available :

Product Name	Formula	Grade	Description	Applications
Erbium Acetate	Er(O2C2H3)3.xH2O	99.999% 99.99% 99.9% 99%	Pink crystalline	Halide lamps; Optical fiber
Erbium Carbonate	Er2(CO3)3.xH2O	99.999% 99.99% 99.9% 99%	Pink materials	Halide lamps; Optical fiber; Crystal dopant; Phosphors
Erbium Chloride	ErCl3.xH2O	99.999% 99.99% 99.9% 99%	Pink crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Erbium Fluoride	ErF3	99.999% 99.99% 99.9% 99%	Pink powder	Halide lamps; Optical fiber; Crystal dopant;

Erbium Hydroxide	Er(OH)3.xH2O	99.999% 99.99% 99.9% 99%	Purple crystalline	Halide lamps; Optical fiber; Phosphors
Erbium Iodide	ErI3	99.95%	Pink	Electronics
Erbium Metal	Er	99.99% 99.99% 99.9% 99%	Silver grey lump piwces, ingot, rods or wires	Super alloy; Sputtering target; Nuclear
Erbium Nitrate	Er(NO3)3.6H2O	99.999% 99.99% 99.9% 99%	Pink crystalline	Catalyst; Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Erbium Oxalate	Er2(C2O4)3.xH2O	99.999% 99.99% 99.9% 99%	Pink crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Erbium Oxide	Er2O3	99.999% 99.99% 99.9% 99%	Pink powder	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Erbium Sulfate	Er2(SO4)3.xH2O	99.999% 99.99% 99.9% 99%	Pink crystalline	Crystal dopant; Phosphors

Thulium

Thulium, atomic no.: **69**, symbol as **Tm**, weight at **168.94**, products are mainly used in making crystal and lasers.
An important application of the thulium in the Medicine area, and relatively independent of its high cost, is the production of portable X-ray sources. These sources are available for about one year, as tools in medical and dental diagnosis, as well as to detect defects in mechanical and electronic inaccessible components. This type of sources does not need excessive protection. Usually a small cap of lead is enough. Thulium can also be used in magnetic and ceramic materials (ferrite), similar to the yttrium-iron alloys, nowadays used in the microwave technologies.

Products available :

Product Name	Formula	Grade	Description	Applications
Thulium Acetate	Tm(O2C2H3)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Crystal dopant
Thulium Carbonate	Tm2(CO3)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White materials	Halide lamps; Optical fiber; Crystal dopant; Ceramics

Thulium Chloride	TmCl3.xH2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Thulium Fluoride	TmF3	99.9999% 99.999% 99.99% 99.9%	White Powder	Halide lamps; Optical fiber; Crystal dopant
Thulium Iodide	TmI3	99.95%	Light yellow	Electronics
Thulium Metal	Tm	99.99% 99.99% 99.9% 99%	Silver grey lump pieces, ingot, rods or wires	Super alloy; Sputtering target; Nuclear
Thulium Nitrate	Tm(NO3)3.6H2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Thulium Oxalate	Tm2(C2O4)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White materials	Halide lamps; Optical fiber; Ceramics; Phosphors
Thulium Oxide	Tm2O3	99.9999% 99.999% 99.99% 99.9%	White powder	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Thulium Sulfate	Tm2(SO4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Crystal dopant; Phosphors

Ytterbium

Ytterbium, atomic no.: **70**, symbol as **Yb**, weight at **173.04**, is being applied to numerous fiber amplifier and fiber optic technologies and in various lasing applications. It has a single dominant absorption band at 985 in the infra-red making it useful in silicon photocells to directly convert radiant energy to electricity.
Ytterbium metal increases its electrical resistance when subjected to very high stresses. This property is used in stress gauges for monitoring ground deformations from earthquakes and nuclear explosions.
It is also used as in thermal barrier system bond coatings on nickel, iron and other transitional metal alloy substrates.

Products available :

Product Name	Formula	Grade	Description	Applications
Ytterbium Acetate	Yb(O2C2H3)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Crystal dopant

Ytterbium Carbonate	Yb2(CO3)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White materials	Halide lamps; Optical fiber; Crystal dopant; Ceramics
Ytterbium Chloride	YbCl3.xH2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Ytterbium Fluoride	YbF3	99.9999% 99.999% 99.99% 99.9%	White Powder	Halide lamps; Optical fiber; Crystal dopant
Ytterbium Hydroxide	Yb(OH)3.xH2O	99.999% 99.99% 99.9%	White Powder	Halide lamps; Optical fiber; Crystal dopant
Ytterbium Iodide	YbI3	99.95%	Light yellow	Electronics
Ytterbium Metal	Yb	99.99% 99.99% 99.9% 99%	Silver grey lump piwces, ingot, rods or wires	Super alloy; Sputtering target; Nuclear
Ytterbium Nitrate	Yb(NO3)3.6H2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Ytterbium Oxalate	Yb2(C2O4)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White materials	Halide lamps; Optical fiber; Ceramics; Phosphors
Ytterbium Oxide	Yb2O3	99.9999% 99.999% 99.99% 99.9%	White powder	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Ytterbium Sulfate	Yb2(SO4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Crystal dopant; Phosphors; Ceramics

Lutetium

Lutetium, atomic no.: **71**, symbol as **Lu**, weight at **174.97**, is the last member of the rare earth series. Unlike most rare earths it lacks a magnetic moment. It also has the smallest metallic radius of any rare earth. It is perhaps the least naturally abundant of the lanthanides.
It is the ideal host for x-ray phosphors because it produces the densest known white material, lutetium tantalate (LuTaO4).
It is utilized as a dopant in matching lattice parameters of certain substrate garnet crystals, such as indium-gallium-garnet (IGG) crystals due its lack of a magnetic moment.

Products available :

Product Name	Formula	Grade	Description	Applications
Lutetium Acetate	Lu(O2C2H3)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Laser crystal; Optical fiber; Optical dopant
Lutetium Carbonate	Lu2(CO3)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White materials	Laser crystal; Optical fiber; Optical dopant; Ceramics
Lutetium Chloride	LuCl3.xH2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Laser crystal; Optical fiber; Optical dopant
Lutetium Fluoride	LuF3	99.9999% 99.999% 99.99% 99.9%	White Powder	Laser crystal; Optical fiber; Optical dopant; Ceramics
Lutetium Hydroxide	Lu(OH)3.xH2O	99.999% 99.99% 99.9%	White Powder	Optical fiber; Optical dopant; Ceramics
Lutetium Metal	Lu	99.99% 99.99% 99.9% 99%	Silver grey lump pieces, ingot, rods or wires	Super alloy; Sputtering target; Nuclear
Lutetium Nitrate	Lu(NO3)3.6H2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Optical fiber; Optical dopant; Ceramics; Phosphors
Lutetium Oxalate	Lu2(C2O4)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White materials	Laser crystal; Optical fiber; Optical dopant
Lutetium Oxide	Lu2O3	99.9999% 99.999% 99.99% 99.9%	White powder	Laser crystal; Optical fiber; Optical dopant; Ceramics; Phosphors
Lutetium Sulfate	Lu2(SO4)3.xH2O	99.999% 99.99% 99.9% 99%	White crystalline	Optical fiber; Ceramics; Phosphors

Scandium

Scandium, atomic no.: **21**, symbol as **Sc**, weight at **44.96**, products are mainly used in ceramics, lasers, phosphors and crystal. Scandium oxide is suitable for the high index component of UV, AR and bandpass coatings due to its high index value, transparency, and layer hardness make High damage thresholds have been reported for combinations with silicon dioxide or magnesium fluoride for use in AR.Scandium are widely used in making Scandium-Aluminium alloy.

Products available :

Product Name	Formula	Grade	Description	Applications
Scandium Acetate	Sc(O2C2H3)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Scandium Aluminium Alloy	ScAl	2% 1%	Silver grey lump pieces	Super alloy; Sputtering target; Aero alloy
Scandium Carbonate	Sc2(CO3)3.xH2O	99.999% 99.99% 99.9%	White materials	Halide lamps; Optical fiber
Scandium Chloride	ScCl3.xH2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Laser
Scandium Fluoride	ScF3	99.999% 99.99% 99.9%	White powder	Halide lamps; Optical fiber; Crystal dopant
Scandium Hydroxide	Sc(OH)3.xH2O	99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Phosphors
Scandium Iodide	ScI3	99.95%	Yellow	Electronics
Scandium Metal	Sc	99.999% 99.99% 99.9% 99%	Silver grey lump pieces, ingot, foils, rods or wires	Super alloy; Sputtering target; Nuclear; Aero alloy
Scandium Nitrate	Sc(NO3)3.6H2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Phosphors
Scandium Oxalate	Sc2(C2O4)3.xH2O	99.9999% 99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Phosphors
Scandium Oxide	Sc2O3	99.9999% 99.999% 99.99% 99.9%	White crystalline	Halide lamps; Optical fiber; Crystal dopant; Ceramics; Phosphors
Scandium Sulfate	Sc2(SO4)3.xH2O	99.999% 99.99% 99.9%	White crystalline	Crystal dopant; Phosphors

The standard specifications are only for reference, customized productions are welcome. More detailed information including MSDS sheet, lot weight, packing condition, lead time and price are on request.

Here you can find an example of a standard specification as below. The specs. regarding all of our products, are available at once upon request.

EXAMPLE: Yttrium Acetate

Yttrium Acetate	Yttrium Acetate is widely applied in electronic ceramics, glass, and electronics. High purity grades are the most important materials for tri-bands Rare Earth phosphors and yttrium-iron-garnets, which are very effective microwave filters.	**Formula** Y(O2C2H3)3.4H2O **CAS No**. 23363-14-6 **Molecular Weight** 266.03 **Appearance** White **Solubility** Insoluble in water, moderately soluble in strong mineral acids **Stability** Slightly hygroscopic

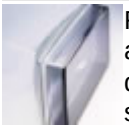
Standard Specifications :

Grade	99.999%	99.99%	99.9%	99%
CHEMICAL COMPOSITION				
Y2O3/TREO (% min.)	99.999	99.99	99.9	99
TREO (% min.)	29	29	29	29
Rare Earth Impurities	**% max.**	**% max.**	**% max.**	**% max.**
La2O3/TREO	0.0001	0.0003	0.03	0.03
CeO2/TREO	0.0001	0.0003	0.01	0.03
Pr6O11/TREO	0.0001	0.0003	0.005	0.03
Nd2O3/TREO	0.0001	0.0003	0.005	0.03
Sm2O3/TREO	0.0001	0.0003	0.005	0.03
Eu2O3/TREO	0.0002	0.0003	0.005	0.03
Gd2O3/TREO	0.0001	0.0003	0.01	0.1
Tb4O7 /TREO	0.0001	0.0003	0.001	0.05
Dy2O3 /TREO	0.0001	0.003	0.005	0.05
Ho2O3/TREO	0.0001	0.005	0.03	0.3
Er2O3/TREO	0.0001	0.0003	0.03	0.3
Tm2O3/TREO	0.0001	0.0003	0.001	0.03
Yb2O3/TREO	0.0001	0.0003	0.005	0.03
Lu2O3 /TREO	0.0001	0.0003	0.001	0.03
Non-Rare Earth Impurities	**% max.**	**% max.**	**% max.**	**% max.**
Fe2O3	0.0003	0.0003	0.001	0.01
SiO2	0.001	0.005	0.03	0.05
CaO	0.001	0.001	0.01	0.05
Cl-	0.01	0.01	0.05	0.1
CuO	0.0002	0.0003		
NiO	0.0003	0.0003		
PbO	0.0002	0.0003		
Na2O	0.0015	0.0015		
K2O	0.0015	0.0015		
MgO	0.0015	0.0015		
Al2O3	0.005	0.005		
TiO2	0.005	0.005		
ThO2	0.002	0.002		

Application Info

As all other innovative OSNABRUEGGE High-Tech materials, our quality Rare Earth products are used in many different market segments. The unsaturated 4f electronic structure of rare earth elements makes them have special properties in luminescence, magnetism and electronics, which could be used to develop many new materials such as phosphors, magnetic and magnetostrictive materials, hydrogen storage materials and catalysts.

Glass



Rare Earth products are used in glass applications as colorants, stabilizers and UV absorbers. They are also used as modifiers to increase the refractive index and decrease dispersion of high purity glass. Concentrates are used in mirrors, cut crystal glass, TV screens and cathode ray tubes and polishing compounds. Purified compounds are also used as additives to optical, safety, radiation shielding and crystal glass and for lasers, fluorescent lights and opticals.
La-containing glass has high refraction and low scattering, thus being used in lenses for all kinds cameras. Er-containing fiber optics is used to replace the relay stations in the traditional optical transmission, Cerium is used in television glass to absorb UV rays and is added to glass to add or suppress color. Cerium is also used as a polishing agent for production of high performance optical glass such as lenses for digital cameras and telescopes. Nd-containing glass is a wonderful material for lasers. Gd and Y are used to produce special glass.

Related mostly Rare Earth elements:

Lanthanum, Cerium, Neodymium, Samarium, Europium, Gadolinium, Terbium, Erbium, Ytterbium, Lutetium, Scandium

Catalyst

Growth in auto catalysts is very strong in response to legislation on lower emission levels, auto-emission converters will be a must for new vehicles in which rare earth is used as a catalyst, thus lowering the consumption of precious metals in the fields.
Rare Earth catalyst can raise gasoline production by 5% and increase the capacity of the cracking equipment by 20-30%. Rare earth can also be employed in paints drier and thermal stabilizer for plastics and so on..

Related mostly Rare Earth elements:

Lanthanum, Cerium, Yttrium, Scandium

Metallurgy

Rare earth elements are chemically active, so they can remove impurities in iron and steel such as nitrogen, oxygen, sulfur and other elements. In addition, they can also modify the morphology of sulfide and graphite so as to refine grains and strengthen matrix of cast iron. Mischmetal widely used in the iron and steel industry and the production of nickel metal hydride batteries, which is widely used in portable electronic equipment with smaller size and longer life span.
Rare Earth alloys such as Sc-Al, Sc-Mg, Y-Al, Y-Mg and Nd-Mn are widely used in metallurgy, acting as strong de-oxidizers and to increase resistance to corrosion at high temperatures.

Related mostly Rare Earth elements:

Lanthanum, Cerium, Neodymium, Samarium, Gadolinium, Terbium, Dysprosium, Thulium, Scandium, Yttrium

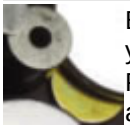
Ceramics

Ceramic powders are necessary ingredients in most engineering ceramics, electronic ceramics and ceramic coatings. With telecommunications being one of the largest ceramic industries, dielectric resonators, ceramic filters and multi-layer capacitors are continually being developed to increase performance. Y_2O_3 stabilized ZrO_2, Nd_2O_3, La_2O_3 and Y_2O_3 are used to make different kinds of advanced ceramics.

Related mostly Rare Earth elements:

Lanthanum, Cerium, Praseodymium, Neodymium, Samarium, Gadolinium, Ytterbium, Scandium, Yttrium

Rare Earth Magnets



Between 1997 and 2001 the demand for rare earth permanent magnets grew at 21% per year. Rare earth metals of Neodymium, Dysprosium, Samarium, Terbium and Praseodymium are widely used in the production of permanent magnets of NdFeB, SmCo and SmFeN, which are mainly used in automobile, computer, and telecommunications industries to improve performance and efficiency. One of the largest magnetic applications in the automobile industry is to improve fuel efficiency by saving weight in the motor using these small size magnets.

Related mostly Rare Earth elements:

Praseodymium, Neodymium, Samarium, Gadolinium, Terbium, Dysprosium

Rare Earth Phosphors

Rare earth compounds are known to emit distinct and different wavelengths in the electromagnetic spectrum, the three main phosphor applications using rare earths are color cathode ray tubes, tri-phosphor fluorescent lamps, and x-ray intensifying screens, in which Y_2O_3 and Eu_2O_3 of 99.99% pure play a key role, in addition, high purity La_2O_3, CeO_2 and Gd_2O_3 are used.

Related mostly Rare Earth elements:

Cerium, Europium, Gadolinium, Terbium, Ytterbium, Yttrium

Other applications

Some other promising applications of Rare Earth products include: Lasers, Superconductors, Data storage, Optical fibers, Nuclear uses, Magnetostrictive alloys, Magnetic refrigeration; Cement additive, Paints and coatings, etc.
Magnetic refrigeration now under industrial experiment is a typical example, which is characterized by low cost and pollution free and will cause a revolution in refrigeration industry if commercialized. Giant magnetic resistance material has a capacity potential hundreds of times larger than that of commonly-used information storage elements today. PDP phosphor will help realize thin and large screen for color TV and computer monitor. And fuel cell will provide the final solution for pollution free power sources for electronic products and electric vehicles.