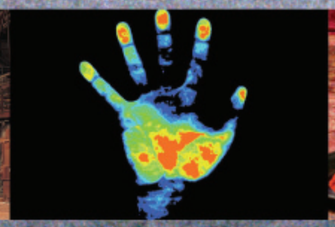

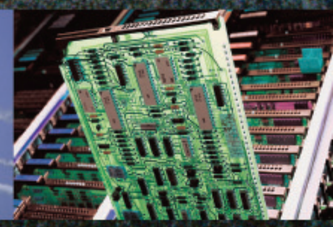

RARE EARTH METALS

The name rare earth metals can be misleading. Most are actually quite plentiful in the crust of the Earth. What makes most of them "rare" is the fact that due to their geochemical properties, they are usually quite dispersed and thus not economical to exploit because of their low concentrations.

The International Union of Pure and Applied Chemistry (IUPAC) defines rare earth metals, or rare earth elements, as a set of seventeen chemical elements found on the periodic table. Specifically, the fifteen lanthanides plus scandium and yttrium make up this classification.

Lanthanides comprise the fifteen metallic chemical elements with atomic numbers 57 through 71. Scandium and yttrium are considered rare earth elements since they tend to occur in the same ore deposits as the lanthanides and exhibit similar chemical properties.

There has been an explosion in demand for these metals during the last several decades. Many rare earth metals are critical for the manufacturing of modern products, cutting edge technologies and critical defense department uses. Rare earth metals are traded on the NYSE in the form of ETFs.

Rare Earth Elements

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mr	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La-Lu	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac-Lr	Rf	Db	Sg	Bh	Hs	Mt									

Lanthanides: La Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb Lu

Actinides: Ac Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No Lr

Geographical Areas Mined for Rare Earth Metals

Major Producers | Minor Producers | Known Resources

Until the 1980s, the United States was a leader in the global production of rare earth metals. Today, only a few countries produce significant amounts of these elements and China is the current dominant worldwide producer. Numerous reports claim that China is currently responsible for over 95+% of the world's production on a rare earth oxide basis. Other countries that have notable amounts of production include India, Brazil and Malaysia.

Due to the technology required to separate rare earth metals, and the environmental damage that can result from the process, a number of countries that have significant deposits of the materials have not yet begun to significantly produce the materials. Countries with large known deposits include Russia, Australia and Canada.

The Rare Earth Metals and Some of Their Common Applications

SCANDIUM Symbol SC Atomic Weight 21	Used to strengthen aluminum alloys. Used in aerospace components and as an additive in Mercury-vapor lamps.
YTTRIUM Symbol Y Atomic Weight 39	Used in superconductors, exotic light sources and microwave filters.
LANTHANUM Symbol La Atomic Weight 57	Used in specialty glasses including lens and optics, in electrodes, as a fluid cracking catalyst for oil refineries and for hydrogen storage.
CERIUM Symbol Ce Atomic Weight 58	Excellent oxidizer, used in oil cracking during petroleum refining, for yellow color in ceramics and glass, and as a catalyst for self-cleaning ovens.
PRASEODYMIUM Symbol Pr Atomic Weight 59	Used in rare-earth magnets, lasers, as a core material for carbon arc lighting and as green color in ceramics and glass.
NEODYMIUM Symbol Nd Atomic Weight 60	Used in rare-earth magnets, lasers, ceramic capacitors and as purple color in ceramics and glass.
PROMETHIUM Symbol Pm Atomic Weight 61	Used in nuclear batteries.
SAMARIUM Symbol Sm Atomic Weight 62	Used in rare-earth magnets, lasers, masers and for neutron capture.
EUROPIUM Symbol Eu Atomic Weight 63	Makes red and blue colored phosphors and used in lasers, NMR relaxation agent and mercury-vapor lamps.
GADOLINIUM Symbol Gd Atomic Weight 64	Used in rare-earth magnets, lasers, x-ray tubes, specialty optics and computer memory.
TERBIUM Symbol Tb Atomic Weight 65	Used as green in ceramics and paints, lasers and fluorescent lamps.
DYSPROSIUM Symbol Dy Atomic Weight 66	Used in rare-earth magnets and lasers.
HOLMIUM Symbol Ho Atomic Weight 67	Used in lasers.
ERBIUM Symbol Er Atomic Weight 68	Used in vanadium steel and lasers.
THULIUM Symbol Tm Atomic Weight 69	Used in portable x-ray equipment.
YTTERBIUM Symbol Yb Atomic Weight 70	Used in infrared lasers and as a great chemical reducing agent.
LUTETIUM Symbol Lu Atomic Weight 71	Used in high refractive glass and radiology equipment.

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