

Rare Earths or Lanthanides 2000-2015

Important Properties



Magnetics



Luminescent



Catalytic

Rare earths reserves - 2016*

- 1º China
- 2º Brazil
- 3º Australia

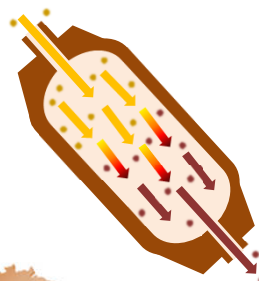
Extraction of rare earths

- 1º China
- 2º Australia
- 3º United States of America



Billions \$

Generated products



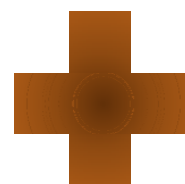
Catalysts



Paints,
Solvents



Oil industry



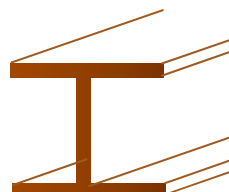
Health imaging



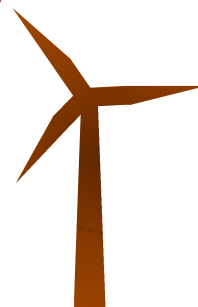
Electronic
equipment



Hybrid vehicles



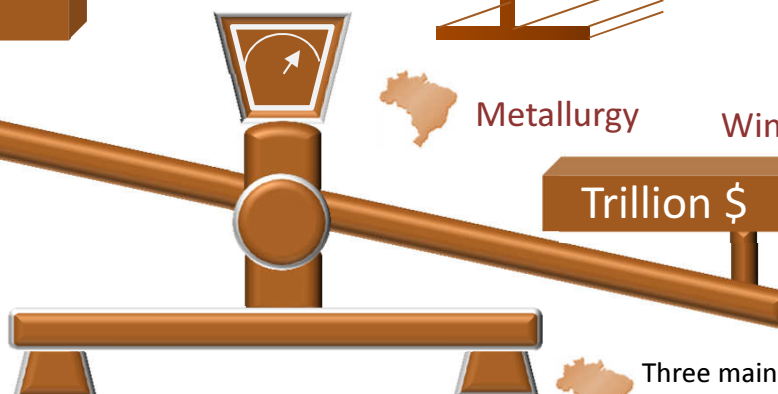
Metallurgy



Wind generators

Rare earths
17 Chemical Elements

Trillion \$



* USGS Geological Survey (2016)

Three main technologies to
which patent protection is
sought in Brazil



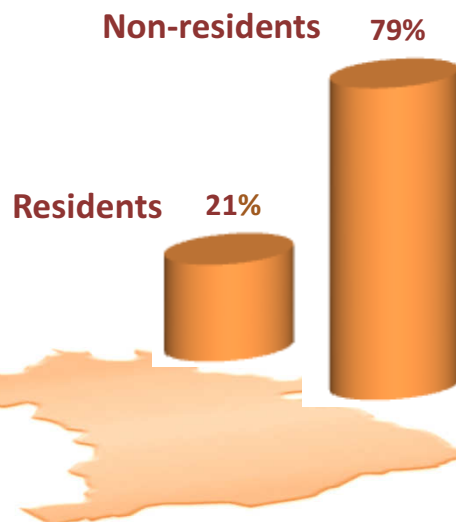
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Patent applications – Worldwide and in Brazil

China ≈ 35.000
Japan ≈ 17.000
USA ≈ 10.000
Korea ≈ 5.000



Patent applicants in Brazil



Most of rare earths related inventions is not patent protected in Brazil.

Three rare earth elements most cited in the brazilian patent documentation and some of its applications*



1º cerium

- Alloys and metallic coatings
- Catalyst



2º lanthanum

- Medical applications
- Metal alloys
- Catalysis



3º yttrium

- Metal alloys
- Catalysis

Cerium, yttrium and lanthanum, in this order, were the most cited elements in the sample (world).

* The abstracts of patent applications were read.

**Others = Luminescence, radiation, pigment, extraction.