

Extraction and Applications of **Rare Earth Metals and Alloys**

*(Uranium, Lithium, Beryllium, Selenium, Platinum
Metals, Tantalum, Silicon, Molybdenum,
Manganese, Chromium, Cadmium, Boron,
Titanium, Tungsten, Zirconium)*

Introduction

Metals & Alloys is a primary source of the lanthanide rare earth metals (including yttrium and scandium) and of rare earth metal alloys. The oxides produced from processing rare earths are collectively referred to as rare earth oxides. Although rare earths are relatively common in the earth's crust, they often do not occur in high enough concentrations, or occur along with high levels of radioactive elements to make their extraction economic. The oxides that are produced from processing the rare earth elements constitute the basic material that can be sold to the market or further processed into metals or alloys.

Rare earths are essential constituents of more than 100 mineral species and present in many more through substitution. They have a marked geochemical affinity for calcium, titanium, niobium, zirconium, fluoride, phosphate and carbonate ions. Industrially important minerals, which are utilized at present for rare earths production, are essentially three, namely monazite, bastnasite and xenotime. In modern time techniques for exploration of rare earths and yttrium minerals include geologic identification of environments of deposition and surface as well as airborne reconnaissance with magneto metric and radiometric equipment. x

There are numerous applications of rare earths such as in glass making industry, cracking catalysts, electronic and optoelectronic devices, medical technology, nuclear technology, agriculture, plastic industry etc. Lot of metals and alloys called rare earth are lying in the earth which required to be processed. Some of the important elements extracted from rare earths are uranium, lithium, beryllium, selenium, platinum metals, tantalum, silicon, molybdenum, manganese, chromium, cadmium, titanium, tungsten, zirconium etc. There are different methods involved in production of metals and non metals from rare earths for example; separation, primary crushing, secondary crushing, wet grinding, dry grinding etc.

The rare earths are silver, silvery white, or gray metals; they have a high luster, but tarnish readily in air, have high electrical conductivity. The rare earths share many common properties this makes them difficult to separate or even distinguish from each other. There are very small differences in solubility and complex formation between the rare earths. The rare earth metals naturally occur together in minerals. Rare earths are found with non metals, usually in the 3+ oxidation state. At present all the rare earth resources in India are in the form of placer monazite deposits, which also carry other industrially important minerals like limonite, rutile, zircon, sillimanite and garnet.

Rare earth metals and alloys that contain them are used in many devices that people use every day such as computer memory, DVDs, rechargeable batteries, cell phones, catalytic converters, magnets, fluorescent lighting and much more.

Some of the fundamentals of the book are commercially important rare earth minerals, exploration for rare earth resources, rare earth resources of the world, some rare earth minerals and their approximate compositions, rare earths in cracking catalysts, rare earth based phosphors, interdependence of applications and production of rare earths, uranium alloys, conversion of ores to lithium chemicals, characterization and analysis of very pure silicon,

derivation of molybdenum metal, electroplating and chromizing, electrolytic production of titanium, heat treatment of titanium alloys, tensile properties of alloys etc.

The book covers occurrence of rare earth, resources of the world, production of lithium metals, compounds derived from the metals, chemical properties of beryllium, uses of selenium, derivation of molybdenum metals, ore concentration and treatment and many more. This is a unique book of its kind, which will be a great asset for scientists, researchers, technocrats and entrepreneurs.

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- 2. Bastnasite**
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Niir Project Consultancy Services (NPCS)
can provide Process Technology Book on
Rare Earth Metals and Alloys
(Properties, Extraction, Preparation and
Applications)

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Our Approach

Requirement collection



Thorough analysis of the project



Economic feasibility study of the Project



Market potential survey/research



Report Compilation

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- *Biodegradable & Bioplastic Based Projects*
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- *Coconut And Coconut Based Products*
- *Cold Storage For Fruits & Vegetables*
- *Coal & Coal Byproduct*

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- *Dairy/Milk Processing*
- *Disinfectants, Pesticides, Insecticides, Mosquito Repellents,*
- *Electrical, Electronic And Computer based Projects*
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- *Engineering Goods*
- *Fibre Glass & Float Glass*
- *Fast Moving Consumer Goods*
- *Food, Bakery, Agro Processing*

- *Fruits & Vegetables Processing*
- *Ferro Alloys Based Projects*
- *Fertilizers & Biofertilizers*
- *Ginger & Ginger Based Projects*
- *Herbs And Medicinal Cultivation And Jatropha (Biofuel)*
- *Hotel & Hospitality Projects*
- *Hospital Based Projects*
- *Herbal Based Projects*
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- *Jute & Jute Based Products*
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- *Leisure & Entertainment Based Projects*
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- *Minerals And Minerals*
- *Maize Processing(Wet Milling) & Maize Based Projects*
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- *Pharmaceuticals And Drugs*
- *Plantations, Farming And Cultivations*
- *Plastic Film, Plastic Waste And Plastic Compounds*
- *Plastic, PVC, PET, HDPE, LDPE Etc.*

- *Potato And Potato Based Projects*
- *Printing And Packaging*
- *Real Estate, Leisure And Hospitality*
- *Rubber And Rubber Products*
- *Soaps And Detergents*
- *Stationary Products*
- *Spices And Snacks Food*
- *Steel & Steel Products*
- *Textile Auxiliary And Chemicals*

- *Township & Residential Complex*
- *Textiles And Readymade Garments*
- *Waste Management & Recycling*
- *Wood & Wood Products*
- *Water Industry(Packaged Drinking Water & Mineral Water)*
- *Wire & Cable*

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