

REE in Brazil –condition of formation and types of deposits

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The REE pertains to two series (Lantanides, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb and Lu) according to increasing number and atomic masses and Actinides corresponding to U, Th, Pa and decay products, which are still not economically important for private activities. Brazil possesses large reserves of REE concentrated in several geological environments and conditions. Some of these deposits correspond to the Nb-rich and Phosphate-rich Araxá Carbonatite Complex, exploited for four decades. The other deposits are represented by the monazite-rich placers with zirconite as the main products, ilmenite, rutile and secondarily siliceous sands and garnet. Investments in Brazil are poorly developed because of lack of technology and wrong governmental policies. Coastal placer deposits are monazite-rich containing most of the above listed REE constituents, consequently forming one of the important Brazilian sources, explored since the beginning of last century. The circular structure of Monte Alegre at Pará State is structured in Paleozoic shales and contains values in U₃O₈ (300-1800ppm), ThO₂ (850-1800ppm) and La₂O₃ (0.1-0.7ppm) important contents of REE (CeO₂=0.3-1.0ppm and 0.1-0.0.7ppm) and is deeply weathered. The quartzites of Serra de Itiuba (Bahia) revealed important concentrations of cheralite, monazite and Fe-autunite with significant grades of REE. Cryolite deposits of Pitinga (Amazon), exploited for Sn and Nb since the beginning of 1970, contain 0.03%Y₂O₃ and 0.036%HREE, mostly in the mine tailings. Pirochlore itself consists of 0.25%Y₂O₃ and in the metallurgical product, remaining in the storage sites several tons of material reach 2-3%REE exist. Euxenite and samarskite from pegmatites of Serra do Pangarito (MG) are rich in REE (13%Y₂O₃ from the total of REE=37%). In pegmatites from Sabinópolis, Divino do Ubá and Generosa the grades of Y₂O₃ (12.1-28.6%), Ce₂O₃ (0.81-8.62%) attain in samarskite, but significant values are obtained in the pegmatites from Rio Pomba (MG) in the range 7-29% REE-oxides. In the pegmatites from the Serra da Mesa (Goiás) the grades in REE varies from 0.03-4.76% Y₂O₃ and 0.04-4.35%Yb₂O₃ in ixiolite and Ti-ixiolite. Another important area with pegmatites and alluvial deposits is the Rio Tajauí (Amapá) in uranothorianite (0.2-0.5%La₂O₃ and 0.4-0.6% Nd₂O₃) in an unexplored region. The albitites of Espinharas (Paraíba State) contains high grades of La (2.7-195ppm), Ce (3.2-220ppm), Pr (0.33-29.9ppm), Nd (1.1-88.5ppm), Sm (0.5-37.9ppm), Eu (0.05-7.11ppm), Gd (0.63-51.7ppm), Tb (0.09-12.9ppm), Dy (0.55-12.5ppm), Ho (0.09-34.1ppm) Er (0.25-12.9ppm), Tm (0.05-15.8ppm) and Yb (0.3-88.7 ppm) indicating high potential for REE...

see attachment for full abstract

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