

Detailed mineralogical characterization of the Catalão I (Central Brazil) complex RE ores

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The Catalão I REE ore deposit, Central Brazil, averages 30 Mton of ore, with a mean grade of 7.6% RE₂O₃. Two different main ore types have been identified: a siliceous, with a RE₂O₃ content of 10,8%, and a lateritic one, containing 6,8%. Both types ore are strongly mingled in the ore body, but complex mineralogy in the lateritic ore and very low grain size in both make a separate study necessary.

The siliceous ore's mineralogy is quartz (about 70%), monazite, fluorapatite, goethite, hematite and barite. Cerianite, magnetite, heulandite and iron sulfides have been detected. A Th-free monazite is the main REE carrier. It is usually found as concentric spheroids dispersed in the quartz-rich matrix, and can contain up to 6% (wt) Sr. The other REE carrier is cerianite, always as very fine-grained spheres (less than 1 µm) associated to the monazite and to iron oxides. It may be important from a hydrometallurgical point of view, as it can be refractory to some acids.

The lateritic ore has a high Fe₂O₃ content, about 23%, mainly as goethite, besides monazite, quartz, ilmenite, gorceixite, magnetite and fluorapatite. About 30 other mineral species have been described. The most important carrier is monazite. It has the same overall characteristics than in the siliceous ore, and is strongly associated to quartz and the iron oxides/hydroxides, but not to gorceixite. No REE have been detected in gorceixite. A Sr-containing fluorapatite is also an important REE carrier, both as small monazite inclusions and in the crystall lattice, and could be recovered as a by-product of phosphoric acid production.