

RARE-EARTH BRAZILIAN TYPE-MINERALS

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There are six rare-earth Brazilian type-minerals, that is, they were described for the first time from Brazilian specimens. One is a fluoride [waimirite-(Y)], one is a phosphate [florencite-(Ce)], three are carbonates [lanthanite-(Nd), lanthanite-(La), and parisite-(La)] and one is a silicate [minasgeraisite-(Y)].

Waimirite-(Y), ideally YF_3 , orthorhombic, occurs in thin hydrothermal veins crosscutting the albite-enriched granite facies of an A-type Madeira granite, at the Pitinga mine, Presidente Figueiredo, Amazonas. Directly associated minerals are dickite and quartz. Other minerals in the albite-enriched granite are “alkali feldspar”, albite, riebeckite, biotite, muscovite, cryolite, zircon, polyolithionite, cassiterite, pyrochlore-group minerals, hydrokenoralstonite, “columbite”, thorite, lead, galena, fluorite, xenotime-(Y), gagarinite-(Y), fluocerite-(Ce), genthelvite-helvite, topaz, “illite”, kaolinite and “chlorite” (¹). The empirical formula of waimirite-(Y) is $(Y_{0.74}Dy_{0.09}Er_{0.07}Yb_{0.06}Ca_{0.04}Gd_{0.02}Ho_{0.02}Nd_{0.01}Sm_{0.01}Tb_{0.01}Tm_{0.01})_{\Sigma 1.08}F_{2.93}$ (²).

Florencite-(Ce), ideally $CeAl_3(PO_4)_2(OH)_6$, trigonal, was originally described (^{3,4}) from three Brazilian occurrences: (i) Tripuí, Ouro Preto; (ii) Mata dos Crioulos, Rio Jequitinhonha, near Diamantina; and (iii) Morro do Caxambu, a locality known for its yellow topaz, near Tripuí, Ouro Preto; all in Minas Gerais. Chemical data for the first time distinguishing the different rare-earth elements and new X-ray powder diffraction data were published for florencite-(Ce) from Diamantina (⁵). Empirical formula: $(Ce_{0.40}Mg_{0.28}La_{0.27}Nd_{0.11}Sm_{0.04}Gd_{0.03}Ca_{0.03})_{\Sigma 1.16}Al_{3.06}(P_{1.96}Si_{0.04})_{\Sigma 2.00}O_8(OH)_{6.31}$.

Lanthanite-(Nd), $(Nd,La)_2(CO_3)_3 \cdot 8H_2O$, orthorhombic (⁶), and **lanthanite-(La)** $(La,Nd)_2(CO_3)_3 \cdot 8H_2O$, orthorhombic (⁷), occur in the city of Curitiba (Paraná State) and the neighboring region where several outcrops have been found in the sediments of the Guabirotuba Formation of the Curitiba Basin. All the chemical analysis for the Curitiba mineral have a Nd:La ratio of approximately 1:1. In reality, in each crystal there are points that correspond to lanthanite-(La) and to lanthanite-(Nd). Empirical formula: $(Nd_{0.77}La_{0.71}Pr_{0.19}Sm_{0.14}Gd_{0.06}Eu_{0.02}Dy_{0.01}Y_{0.01})_{\Sigma 1.91}C_{3.00}O_{8.86} \cdot 7.53H_2O$.

Parisite-(La), ideally $CaLa_2(CO_3)_3F_2$, monoclinic, occurs in a hydrothermal vein crosscutting a metarhyolite of the Rio dos Remédios Group, at the Mula mine, Tapera

village, Novo Horizonte county, Bahia, associated with hematite, rutile, almeidaite, fluocerite-(Ce), brockite, monazite-(La), rhabdophane-(La), and bastnäsite-(La). Parisite-(La) occurs as residual nuclei (up to 5 mm) in steep doubly-terminated pseudo-hexagonal pyramidal crystals. The empirical formula is $\text{Ca}_{0.91}(\text{La}_{0.82}\text{Nd}_{0.47}\text{Ce}_{0.43}\text{Pr}_{0.26}\text{Sm}_{0.04}\text{Y}_{0.02})_{\Sigma 2.04}(\text{CO}_3)_{3.03}\text{F}_{1.91}$.⁽⁸⁾

Minasgeraisite -(Y) was originally described as $\text{CaBe}_2\text{Y}_2\text{Si}_2\text{O}_{10}$, monoclinic, isostructural with gadolinite-group minerals⁽⁹⁾. A crystal structure study revealed that minasgeraisite-(Y) is $\text{BiCa}(\text{Y},\text{Ln})_2(\square,\text{Mn})_2(\text{Be},\text{B},\text{Si})_4\text{Si}_4\text{O}_{16}[(\text{OH}),\text{O}]_4$, triclinic⁽¹⁰⁾. It occurs as a sparse, accessory, late-stage mineral, in small druses in the zoned complex of the Jaguaraçu granitic pegmatite, in the Mr. José Pinto quarry, adjacent to a soccer field, Jaguaraçu, Minas Gerais. Associated minerals are milarite, agakhanovite-(Y), albite, quartz, muscovite, hematite, microcline var. amazonite, adularia, almandine-spessartine, magnetite, churchite-(Y), elbaite, pyrite, cerussite, pyromorphite, and anatase. Empirical formula⁽¹⁰⁾: $(\text{Y}_{1.42}\text{Ca}_{1.19}\text{Bi}_{0.81}\text{Er}_{0.58})_{\Sigma 4.00}(\square_{1.37}\text{Mn}_{0.63})_{\Sigma 2.00}(\text{Be}_{3.32}\text{B}_{0.40}\text{Si}_{0.28})_{\Sigma 4.00}\text{Si}_4\text{O}_{16}[(\text{OH})_{2.74}\text{O}_{1.26}]_{\Sigma 4.00}$.

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