

Trace PGE and Ga in the granulite hosted early Proterozoic Arapiraca titanomagnetite-Ni-Cu deposit in Alagoas, eastern Brazil

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The Arapiraca Cu-Ni-sulfide-magnetite deposit is situated near the eastern coast of Brazil, 219 km west from the town Maceo and 205 km NE from the town of Aracaju. The Arapiraca area belongs to an early Proterozoic (ca. 2200 Ma) granulite belt, which consists of migmatitic granites, quartzites, quartz-feldspar gneisses, metacarbonates and amphibolites. Between granulite zones there are arenitic sediments, quartzites, metacarbonates and mica schists. The massive magnetite ore is hosted by garnet bearing norites and sillimanite gneisses. The Ni-Cu-sulfides occur interstitially in cracks and open spaces between magnetite-ilmenite and silicate grains. Green spinel - hercynite - is found as inclusions inside magnetite grains with ilmenite lamellae and as separate grains. The main sulfides are chalcopyrite, bornite, pyrrhotite, and pentlandite. In upper parts of the ore, secondary copper minerals chalcocite and covellite exist along with violarite. Besides pentlandite other Ni-bearing phases found are NiS, (Co,Ni,Fe)As and NiTe. Other tellurides found as inclusions in sulfides are PbTe, BiTe and AuTe occurring together with Ag-bearing native Au. The ore contains 1.5 % Cu, 0.3 % Ni, 0.3-0.5g/t Au, 15 g/t Ga, 2 g/t Pt and 1.5 g/t Pd. The hosting minerals for the PGE and Ga were defined as melonite and hercynite, respectively. Both minerals were analysed with Cameca SX50 electron microprobe using the Australian CSIRO-TRACE program and with measuring conditions of 35 kV, 500 nA and 600 seconds measuring time. The PGE-contents in melonite are: Pd average 2250 ppm, maximum 6910 ppm, minimum 596 ppm, Pt average 1426 ppm, maximum 2738 ppm, minimum 330 ppm (18 analyses). The Ga content in hercynite varies from 292 ppm to 594 ppm with average 469 ppm (60 analyses).