SCANNING ELECTRON MICROSCOPY AND ENERGY DISPERSIVE X-RAY CHARACTERIZATION OF BA-PYROCLHORE FROM CATALÃO I, GO - BRAZIL

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The niobium ore mineral in the alkaline-carbonatitic complex of Catalão I, central part of Brazil, is typically a Ba-pyrochlore formed by primary mineralization associated with a low temperature hydrotermal / supergenic alteration, that impressed mineral characteristics peculiar of this type of Brazilian and African mineralizations [1-7].

The barium pyrochlore, also called pandaite [8], is the essential niobium mineral in the ore. It occurs as micro crystalline yellow shadowed aggregates, with dimension between 5 to 100 microns, and tendency to preserve an relict external octahedral form (Fig. 1). Often these aggregates contain minor inclusions of iron oxides and phosphates (Fig. 2), as well as holes (Fig.3).

Chemically it carries some Sr, Pb, Fe, Ca and Na, with typical EDS spectrum at Fig.4. A second group of Ba-pyrochlore, less common, could be detected by Ti, Zr and Th content - Table 1.

Table 1 - EDS microanalysis of Ba-pyrochlore (grades in % of weight)

Oxides	Sample 1	Sample 2	Sample 4	Sample 5	Media	Sample 6	Sample 7	Media
BaO	18,77	18,33	18,25	20,51	18,96	13,35	16,37	14,86
CaO	0,44	0,26	0,18	nd	0,22	0,76	0,38	0,57
SrO	1,68	1,53	1,54	2,13	1,72	2,29	1,15	1,72
Na_2O	0,18	0,14	0,17	0,21	0,17	1,43	0,22	0,83
Nb_2O_5	57,54	59,72	62,92	70,81	62,75	54,46	66,04	60,25
TiO_2	nd	nd	nd	nd	nd	4,32	3,19	3,75
ZrO_2	nd	nd	nd	nd	nd	4,16	3,81	3,98
PbO	1,85	1,09	0,97	0,72	1,16	0,68	0,55	0,62
Fe_2O_3	1,38	1,03	0,82	nd	0,81	5,18	0,82	3,00
Al_2O_3	0,81	0,49	0,57	nd	0,47	0,59	0,59	0,59
SO_2	nd	nd	nd	nd	nd	nd	0,36	0,18
ThO_2	nd	nd	nd	nd	nd	0,60	0,75	0,68
H_2O*	17,35	17,40	14,58	5,62	13,74	13,73	6,44	7,64

* calculated by difference of oxygen nd - below the detection limit

Nucleation is frequently in the aggregates (Fig. 4), with important chemical composition differences.

The feature variation of the ore mineral has direct implication in its technological behavior and in the quality of the niobium concentrate obtained, aspects to be considered in the evaluation of ore.

References

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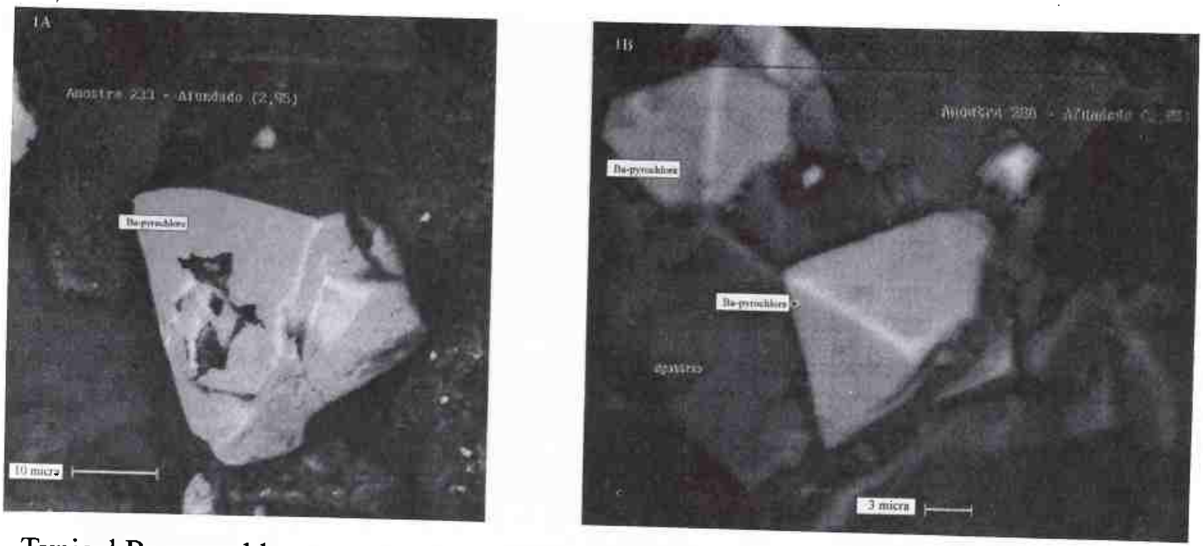

FIG. 1. Typical Ba-pyrochlore aggregates: coarse liberated (A), and fine in a phosphate grain (B)

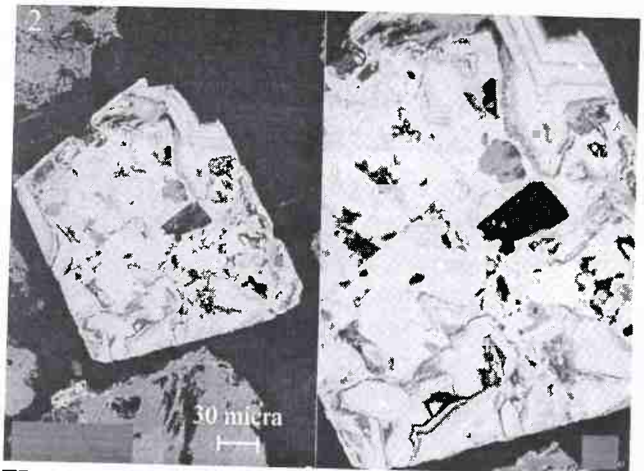

FIG.2. Ba-pyrochlore aggregate with crystal growing lines with other mineral species associated, essentially iron oxide and phosphate.

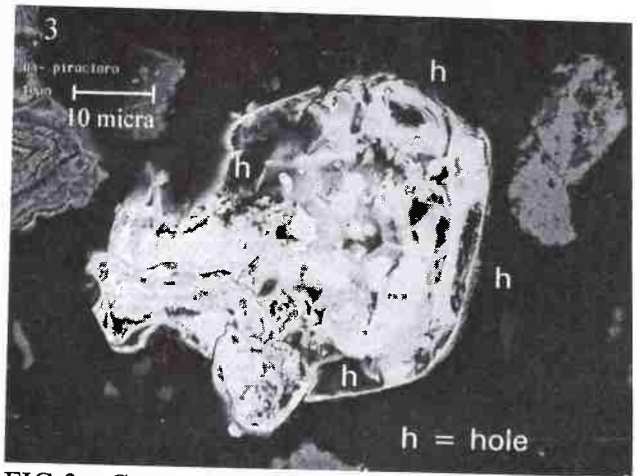

FIG.3. Compositional zoning in Ba-pyrochlore aggregate, distinctive by gray tones, and several holes.

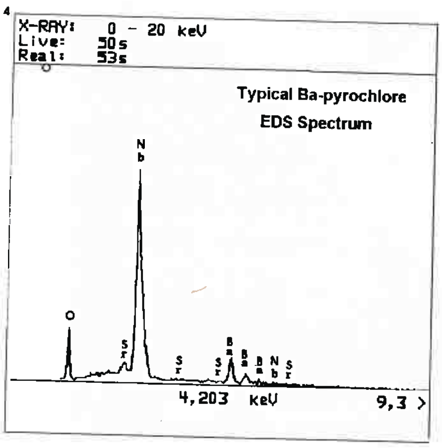

FIG.4. EDS Spectrum of Ba-pyrochlore.

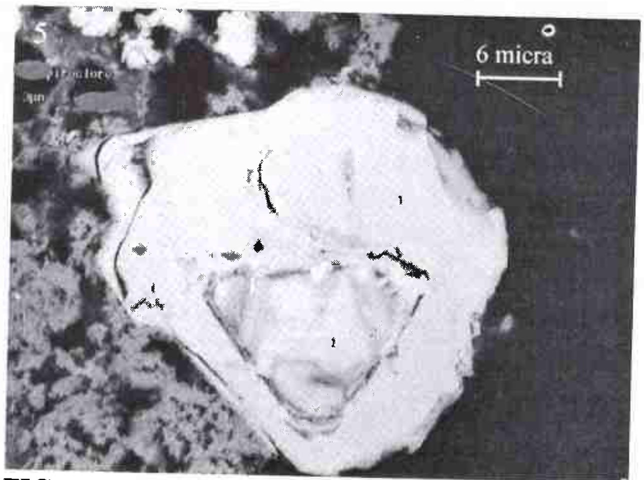

FIG. 5. Nucleation in an aggregate with chemical compositional soft variation.