## Menezesite $Ba_3MgZr_4Nb_{12}O_{42}\cdot 12H_2O$

**Crystal Data**: Cubic. *Point Group*: $2/m\,\bar{3}$. As rhombododecahedra to 1 mm, alone or in aggregates.

**Physical Properties**: *Cleavage*: n.d. *Tenacity*: n.d. *Fracture*: n.d. Hardness = ~4
D(meas.) = n.d. D(calc.) = 4.181

**Optical Properties**: Transparent. *Color*: Reddish brown. *Streak*: White. *Luster*: Vitreous.
*Optical Class*: Isotropic. *n*(meas.) > 1.93(1) *n*(calc.) = 2.034 Weak anomalous birefringence.

**Cell Data**: *Space Group*: $Im\bar{3}$. $a$ = 13.017(1) Z = 2

**X-ray Powder Pattern**: Jacupiranga mine, Cajati county, São Paulo state, Brazil.
9.183 (100), 1.741 (21), 3.256 (16), 3.070 (13), 2.655 (13), 4.592 (12), 4.136 (11)

**Chemistry**:

| | (1) | (2) |
|---|---|---|
| $Na_2O$ | 0.06 | |
| $K_2O$ | 0.86 | |
| CaO | 0.60 | |
| BaO | 11.50 | 16.40 |
| $La_2O_3$ | 0.09 | |
| $Ce_2O_3$ | 0.94 | |
| $Nd_2O_3$ | 0.57 | |
| MgO | 1.29 | 1.44 |
| FeO | 0.57 | |
| MnO | 0.55 | |
| $Al_2O_3$ | 0.05 | |
| $ZrO_2$ | 11.58 | 17.58 |
| $ThO_2$ | 4.94 | |
| $UO_2$ | 0.23 | |
| $TiO_2$ | 8.90 | |
| $Nb_2O_5$ | 41.97 | 56.87 |
| $Ta_2O_5$ | 2.71 | |
| $SiO_2$ | 0.25 | |
| $H_2O$ | [7.40] | 7.71 |
| Total | 95.06 | 100.00 |

(1) Jacupiranga mine, Cajati county, São Paulo state, Brazil; average of 10 electron microprobe analyses, $H_2O$ calculated from the crystal structure solution; corresponding to $(Ba_{1.47}K_{0.53}Ca_{0.31}Ce_{0.17}Nd_{0.10}Na_{0.06}La_{0.02})_{\Sigma=2.66}(Mg_{0.94}Mn_{0.23}Fe_{0.23}Al_{0.03})_{\Sigma=1.43}(Zr_{2.75}Ti_{0.96}Th_{0.29})_{\Sigma=4.00}[(Ba_{0.72}Th_{0.26}U_{0.02})_{\Sigma=1.00}(Nb_{9.23}Ti_{2.29}Ta_{0.36}Si_{0.12})_{\Sigma=12.00}O_{42}]\cdot 12H_2O$. (2) $Ba_2MgZr_4(BaNb_{12}O_{42})\cdot 12H_2O$.

**Occurrence**: In a vug in the contact zone between dolomite carbonatite and "jacupirangite" (a pyroxenite).

**Association**: Dolomite, calcite, magnetite, clinohumite, phlogopite, ancylite-(Ce), strontianite, pyrite, tochilinite.

**Distribution**: At the Jacupiranga mine, Cajati county, São Paulo state, Brazil.

**Name**: Honors Luiz Alberto Dias *Menezes* Filho (b. 1950), mining engineer, mineral collector and merchant.

**Type Material**: Geoscience Museum, Geosciences Institute, University of São Paulo, SP, Brazil (DR458).

**References**: (1) Atencio, D., J.M.V. Coutinho, A.C. Doriguetto, Y.P. Mascarenhas, J. Ellena, and V.C. Ferrari (2008) Menezesite, the first natural heteropolyniobate, from Cajati, São Paulo, Brazil: Description and crystal structure. Amer. Mineral., 93, 81-87.