Penikisite

\[
\text{Ba(Mg, Fe}^{2+})_2\text{Al}_2(\text{PO}_4)_3(\text{OH})_3
\]

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Crystal Data: Triclinic, pseudomonoclinic, or monoclinic. Point Group: 1 or 1. In crystals, in zoned intergrowth with kulanite.

Physical Properties: Cleavage: On \{010\} and \{100\}, fair to good. Hardness = ~4
D(meas.) = 3.79(2) D(calc.) = 3.82

Optical Class: Biaxial (+). Pleochroism: X = grass-green; Y = blue-green; Z = pale pink. Orientation: \(Y \cap b = 0^\circ\sim 19^\circ; Z \cap c = -6^\circ\). Dispersion: \(r > v\), asymmetrical, suggesting a triclinic structure. Absorption: \(X \approx Y > Z\). \(\alpha = 1.684(2)\) \(\beta = 1.688(2)\) \(\gamma = 1.705(2)\)
2V(meas.) = 56° 2V(calc.) = 52.2°

Cell Data: Space Group: \(P\overline{1}\) or \(P1\). \(a = 8.999\) \(b = 12.069\) \(c = 4.921\) \(\alpha = \sim 90^\circ\)
\(\beta = 100^\circ31'\) \(\gamma = \sim 90^\circ\) Z = 2

X-ray Powder Pattern: Cross-cut Creek, Canada; almost identical to kulanite.
3.094 (100), 2.915 (80), 2.649 (70), 8.81 (60), 3.028 (60), 2.684 (60), 4.49 (55)

Chemistry:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>(\text{P}_2\text{O}_5)</td>
<td>37.1</td>
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<tr>
<td>(\text{Al}_2\text{O}_3)</td>
<td>18.0</td>
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<tr>
<td>(\text{FeO})</td>
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<tr>
<td>(\text{MnO})</td>
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<td>(\text{CaO})</td>
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<td>(\text{BaO})</td>
<td>24.9</td>
</tr>
<tr>
<td>(\text{H}_2\text{O})</td>
<td>3.9</td>
</tr>
</tbody>
</table>

Total 101.3

(1) Cross-cut Creek, Canada; by electron microprobe, total Fe as FeO; corresponds to \(\text{Ba}_{0.96}(\text{Mg}_{0.95}\text{Fe}_{0.76}\text{Ca}_{0.15})_2\text{Al}_{2.09}(\text{P}_{1.03}\text{O}_{4.15})_3(\text{OH})_{2.56}\).

Polymorphism & Series: Forms a series with kulanite.

Mineral Group: Bjarebyite group.

Occurrence: A very rare weathering product in fractures in sideritic iron formation.

Association: Kulanite, quartz, siderite, fluorapatite, rapidcreekite, brazilianite, arrojadite, anatase, goyazite.

Distribution: From Cross-cut Creek, Big Fish River–Blow River area, and in the Hess River area, Yukon Territory, Canada.

Name: Honoring Mr. Gunar Penikis (1936–1979), Ross River, Yukon Territory, Canada, a codiscoverer of the Rapid Creek phosphate occurrences.

Type Material: Royal Ontario Museum, Toronto, Canada, M34172.