**Penikisite**

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

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**Crystal Data:** Triclinic, pseudomonoclinic, or monoclinic. Point Group: \( \overline{1} \) or 1. In crystals, in zoned intergrowth with kulanite.

**Physical Properties:** Cleavage: On \( \{010\} \) and \( \{100\} \), fair to good. Hardness = \( \sim 4 \)

\[ D(\text{meas.}) = 3.79(2) \quad D(\text{calc.}) = 3.82 \]


**Cell Data:** Space Group: \( \overline{P} \overline{T} \) or \( P1 \).

\[
\begin{align*}
a & = 8.999 \\
b & = 12.069 \\
c & = 4.921 \\
\alpha & = \sim 90^\circ \\
\beta & = 100^\circ 31' \\
\gamma & = \sim 90^\circ \\
Z & = 2
\end{align*}
\]

**X-ray Powder Pattern:** Cross-cut Creek, Canada; almost identical to kulanite.

3.094 (100), 2.915 (80), 2.649 (70), 2.684 (60), 3.028 (60), 2.684 (60), 4.49 (55)

**Chemistry:**

<table>
<thead>
<tr>
<th>Element</th>
<th>Formula</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>P(_2)O(_5)</td>
<td>37.1</td>
<td></td>
</tr>
<tr>
<td>Al(_2)O(_3)</td>
<td>18.0</td>
<td></td>
</tr>
<tr>
<td>FeO</td>
<td>9.5</td>
<td></td>
</tr>
<tr>
<td>MnO</td>
<td>0.0</td>
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</tr>
<tr>
<td>MgO</td>
<td>6.5</td>
<td></td>
</tr>
<tr>
<td>CaO</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>BaO</td>
<td>24.9</td>
<td></td>
</tr>
<tr>
<td>H(_2)O</td>
<td>3.9</td>
<td></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.

**References:**