Paulkellerite

\[ \text{Bi}_2\text{Fe}^{3+}\text{O}_2(\text{PO}_4)(\text{OH})_2 \]

\( \odot 2001-2005 \) Mineral Data Publishing, version 1

**Crystal Data:** Monoclinic. **Point Group:** \( 2/m \). Crystals, wedge-shaped with curved faces, to 0.8 mm, showing prominent \{110\} and \{011\}, with minor \{101\}.

**Physical Properties:** Hardness = \( \sim 4 \) D(meas.) = > 4.2 D(calc.) = [6.23]

**Optical Properties:** Transparent. **Color:** Pale greenish yellow. **Streak:** Very pale yellow. **Luster:** Vitreous to adamantine. **Optical Class:** Biaxial (+). **Orientation:** \( Y = b; Z = c; X \wedge a = 25^\circ \). \( \alpha = 1.762(2) \)
\( \beta = 1.767(2) \)
\( \gamma = 1.825(5) \)
2V(meas.) = 37(2)\(^\circ\) 2V(calc.) = 34\(^\circ\)

**Cell Data:** **Space Group:** \( C2/c \). \( a = 11.380(3) \)
\( b = 6.660(3) \)
\( c = 9.653(3) \)
\( \beta = 115.34(2)^\circ \)
\( Z = 4 \)

**X-ray Powder Pattern:** Neuhilfe mine, Schneeberg, Germany.

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
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</thead>
<tbody>
<tr>
<td>( \text{P}_2\text{O}_5 )</td>
<td>11.3</td>
<td>11.18</td>
</tr>
<tr>
<td>( \text{Bi}_2\text{O}_3 )</td>
<td>71.6</td>
<td>73.40</td>
</tr>
<tr>
<td>( \text{Fe}_2\text{O}_3 )</td>
<td>14.5</td>
<td>12.58</td>
</tr>
<tr>
<td>( \text{H}_2\text{O} )</td>
<td>2.9</td>
<td>2.84</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.3</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

(1) Neuhilfe mine, Schneeberg, Germany; by electron microprobe, total Fe as \( \text{Fe}_2\text{O}_3 \), confirmed by microchemical tests, \( \text{H}_2\text{O} \) by TGA-EGA; corresponds to \( \text{Bi}_{1.96}\text{Fe}_{1.12}(\text{P}_{0.98}\text{O}_4)(\text{OH})_{1.99} \).

(2) \( \text{Bi}_{2}\text{FeO}_2(\text{PO}_4)(\text{OH})_2 \).

**Occurrence:** A rare secondary mineral in Bi–Ni–Co ores in a hydrothermal ore deposit.

**Association:** Bismuth, skutterudite, pyrite, erythrite, bismutoferrite.

**Distribution:** From the Neuhilfe mine, Schneeberg, Saxony, Germany.

**Name:** To honor Dr. Paul Keller (1940– ), Professor of Mineralogy, University of Stuttgart, Stuttgart, Germany, for his contributions to the mineralogy of secondary minerals from ore deposits.

**Type Material:** Mining Academy, Freiberg, Germany; Canadian Museum of Nature, Ottawa, Canada, 53450; National Museum of Natural History, Washington, D.C., USA, 163777.

**References:**
