**Giessenite**

\[ \text{Pb}_{28}\text{Cu}^{1+}_{2}(\text{Bi}, \text{Sb})_{19}\text{S}_{57} \]

**Crystal Data:** Monoclinic, pseudo-orthorhombic. **Point Group:** 2/m. As fine needles, to 1.5 mm. **Twinning:** Intimately on {100}.

**Physical Properties:** Hardness = \( \sim 2.5 \)  
VHN = 65  
D(meas.) = n.d.  
D(calc.) = 7.45

**Optical Properties:** Opaque. **Color:** Grayish black. **Streak:** Grayish black. **Luster:** Metallic.  
\( R_1 \text{–} R_2: \text{n.d.} \)

**Cell Data:** **Space Group:** \( P_2_1/n \).  
\( a = 34.51(3) \)  
\( b = 38.18(5) \)  
\( c = 4.080(8) \)  
\( \beta = 90.33(5)^\circ \)  
\( Z = 2 \)

**X-ray Powder Pattern:** Bjørkåsen, Norway.  
2.0271 (100), 3.436 (90), 3.404 (90), 2.1514 (90), 2.9061 (70), 2.8867 (70), 2.8413 (70)

**Chemistry:**

<table>
<thead>
<tr>
<th>Element</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pb</td>
<td>47.5</td>
<td>48.3</td>
<td>48.9</td>
</tr>
<tr>
<td>Cu</td>
<td>1.2</td>
<td>0.7</td>
<td>0.88</td>
</tr>
<tr>
<td>Ag</td>
<td>0.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fe</td>
<td>0.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bi</td>
<td>29.8</td>
<td>31.7</td>
<td>31.2</td>
</tr>
<tr>
<td>Sb</td>
<td>4.2</td>
<td>3.5</td>
<td>3.1</td>
</tr>
<tr>
<td>S</td>
<td>16.5</td>
<td>[16.0]</td>
<td>16.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>99.2</td>
<td>[100.2]</td>
<td>[100.71]</td>
</tr>
</tbody>
</table>

(1) Binntal, Switzerland; by electron microprobe, average of three analyses; corresponds to \( \text{Pb}_{25.88}\text{Cu}_{2.13}(\text{Bi}_{16.16}\text{Sb}_{3.89})\Sigma=19.99\text{S}_{58.08} \). (2) Bjørkåsen, Norway; by electron microprobe, average of three analyses, S assumed; corresponds to \( \text{Pb}_{26.36}\text{Cu}_{1.24}(\text{Bi}_{17.15}\text{Sb}_{3.25})\Sigma=20.49\text{S}_{56.41} \). (3) Do.; by electron microprobe, average of eight analyses, original total given as 100.8%; corresponds to \( \text{Pb}_{26.50}(\text{Cu}_{1.55}\text{Fe}_{0.18}\text{Ag}_{0.15})\Sigma=1.88(\text{Bi}_{16.76}\text{Sb}_{2.86})\Sigma=19.62\text{S}_{57.42} \).

**Polymorphism & Series:** Forms a series with izoklakeite.

**Occurrence:** Of hydrothermal origin, with other sulfides.

**Association:** Galena, pyrite, pyrrhotite, sphalerite, tennantite, seligmannite, geocronite, quartz, dolomite.

**Distribution:** In Switzerland, from Turtschi, between Giessen and Binn, about 2 km from the Lengenbach quarry, Binntal, Valais [TL]; and at Lake Zervreila, Vals, Graubünden. From the Bjørkåsen sulfide deposit, Otoften, Norway. At the Vena mines, near Askersund, Örebro, Sweden. In the Otome mine, Yamanashi Prefecture, Japan.

**Name:** For Giessen, a village nearby the Binntal, Switzerland.

**Type Material:** Natural History Museum, Basel, Switzerland, SG393.

**References:**  

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