Vergasovaite

\[
\text{Cu}_3\text{O}(\text{MoO}_4, \text{SO}_4)(\text{SO}_4)
\]

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**Crystal Data:** Orthorhombic. \textit{Point Group:} \(2/m 2/m 2/m\). Crystals are stout prismatic, slightly elongated along \([001]\), to 0.3 mm, with \(\{100\}, \{110\}, \{120\}, \{130\}, \{111\}, \{263\}, \{315\}\), isolated and in radiating aggregates.

**Physical Properties:** Fracture: Uneven. Tenacity: Brittle. Hardness = 4–5.5 VHN = 302–413, 357 average (25 g load). \(D(\text{meas.}) = \text{n.d.}\) \(D(\text{calc.}) = 4.32\)


**Optical Class:** Biaxial. \textit{Pleochroism:} Distinct; olive-green \(\parallel c\); yellowish to brownish green \(\perp c\).

\(\alpha = [1.87] \quad \beta = \text{n.d.} \quad \gamma = [1.98] \quad 2V(\text{meas.}) = \text{n.d.}\)

**Cell Data:** \textit{Space Group:} \(P\overline{n}ma\). \(a = 7.421(2) \quad b = 6.754(3) \quad c = 13.624(5) \quad Z = 4\)

**X-ray Powder Pattern:** Tolbachik volcano, Russia.

\(3.077\ (100), 3.391\ (60), 3.342\ (60), 2.542\ (60), 2.500\ (60), 2.275\ (60), 3.71\ (30)\)

**Chemistry:**

<table>
<thead>
<tr>
<th>(\text{Component})</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\text{SO}_3)</td>
<td>21.44</td>
</tr>
<tr>
<td>(\text{MoO}_3)</td>
<td>25.29</td>
</tr>
<tr>
<td>(\text{V}_2\text{O}_5)</td>
<td>0.88</td>
</tr>
<tr>
<td>(\text{CuO})</td>
<td>49.81</td>
</tr>
<tr>
<td>(\text{ZnO})</td>
<td>1.76</td>
</tr>
<tr>
<td>(\text{PbO})</td>
<td>0.63</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>99.81</td>
</tr>
</tbody>
</table>

(1) Tolbachik volcano, Russia; by electron microprobe, average of 18 analyses, \((\text{OH})^1\) and \(\text{H}_2\text{O}\) shown absent by IR; corresponds to \((\text{Cu}_{2.82}\text{Zn}_{0.10}\text{Pb}_{0.01})\Sigma=2.93\text{O}(\text{Mo}_{0.79}\text{S}_{0.20}\text{V}_{0.04})\Sigma=1.03\text{O}_4\text{SO}_4\).

**Occurrence:** A rare sublimation product in fumaroles.

**Association:** Chalcocyanite, dolerophanite, euchlorine, fedotovite, tenorite, cuprian anglesite, gold.

**Distribution:** From the Tolbachik fissure volcano, Kamchatka, Russia.

**Name:** Honors Dr. Lidia Pavlovna Vergasova (1941– ), Institute of Vulcanology, Petropavlovsk-Kamchatskii, Russia, for her contributions to the mineralogy of that volcanic region.

**Type Material:** A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia; Natural History Museum, Basel, Switzerland.

**References:**

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