**Starovaite**

**KCu₅O(VO₄)₃**

**Crystal Data:** Triclinic.  
*Point Group:* 1.  
As prismatic, lath or bar-like crystals to 70 μm, or in sprays, sheaf-like aggregates or crusts to 0.5 mm.

**Physical Properties:**  
*Cleavage:* None.  
*Fracture:* Uneven.  
*Tenacity:* Brittle.  
*Hardness:* 3.5-4  
*VHN* = 182 (20 g load).  
*D(meas.)* = n.d.  
*D(calc.)* = 4.54

**Optical Properties:**  
*Opaque.*  
*Color:* Golden brown to reddish brown, gray with a brownish hue and distinct red-brown internal reflections in reflected light.  
*Streak:* Yellowish brown.  
*Luster:* Semi-metallic.  
*Anisotropy:* Weak.  
*Bireflectance:* Weak.

**Optical Class:** n.d.

**Cell Data:**  
*Space Group:* P1.  
*a* = 6.08(4)  
*b* = 8.26(5)  
*c* = 10.71(6)  
*a* = 97.8(1)°  
*β* = 92.4(1)°  
*γ* = 90.4(1)°  
*Z* = 2

**X-ray Powder Pattern:** Yadovitaya fumarole, Tolbachik volcano, Kamchatka, Russia.  
2.526 (100), 2.322 (98), 2.745 (47), 8.18 (46), 3.047 (41), 10.65 (32), 1.867 (23)

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
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<tbody>
<tr>
<td>K₂O</td>
<td>4.90</td>
<td>6.56</td>
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<tr>
<td>CaO</td>
<td>0.04</td>
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<tr>
<td>PbO</td>
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<tr>
<td>CuO</td>
<td>48.20</td>
<td>55.43</td>
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<td>ZnO</td>
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<td>Al₂O₃</td>
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<td>Fe₂O₃</td>
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<td>P₂O₅</td>
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<td>As₂O₅</td>
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<td>SO₃</td>
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<td>MoO₃</td>
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<td>Total</td>
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<td>100.00</td>
</tr>
</tbody>
</table>

(1) Yadovitaya fumarole, Tolbachik volcano, Kamchatka, Russia; average of 8 electron microprobe analyses; corresponding to (K₀.76Pb₀.04Ca₀.01)Σ=0.81(Cu₄.45Zn₀.51Al₀.01Fe₀.01)Σ=4.98(V₂.58As₀.29Mo₀.12S₀.02P₀.01)Σ=3.02O₁₃⁻.  
(2) KCu₅O(VO₄)₃.

**Occurrence:** In sublimates around a volcanic fumarole.

**Association:** Lammerite, hematite, palmierite, tenorite, piypite, rutile, orthoclase, lyonsite, pseudolonymsite, lammerite-β, langbeinite, calciolangbeinite, cupromolybdate.

**Distribution:** From the Yadovitaya (poisonous) fumarole, Second scoria cone of the Northern Breach, Great Tolbachik Fissure Eruption, Tolbachik volcano, Kamchatka, Russia.

**Name:** Honors Russian crystallographer and crystal chemist Galina L. Starova (b. 1946) for her contributions to the crystal chemistry of minerals from the Tolbachik fumaroles.

**Type Material:** A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia (4196/1).

**References:**  