Nicksobolevite

\[ \text{Cu}_7(\text{SeO}_3)_2\text{O}_2\text{Cl}_6 \]

**Crystal Data:** Monoclinic.  
*Point Group:* 2/m.  
As aggregates of needle-like crystals to 0.4 mm, elongated along [001] and displaying \{100\}, \{120\}, \{101\}, and \{1\ 01\}.

**Physical Properties:**  
*Cleavage:* Perfect on \{010\} and \{1\ 01\}, good on \{120\}.  
*Fracture:* n.d.  
*Tenacity:* Very brittle.  
*Hardness:* = 2-2.5  
*VHN:* = 33 (5 g load).  
*D*(meas.)* = n.d.  
*D*(calc.)* = 4.18

**Optical Properties:**  
*Color:* Dark red.  
*Streak:* Orange-red.  
*Luster:* Vitreous.

**Optical Class:** Biaxial (+).  
*α* = 2.00(1)  
*β* = 2.01(1)  
*γ* = 2.08(1)  
*2V*(calc.)* = 43°

**Orientation:**  
*X* = *b*,  
*Z* ∨\(c\) = 36° (in obtuse \(β\)).

**Pleochroism:**  
*X* = *Y* = red,  
*Z* = brownish red.

**Cell Data:**  
*Space Group:* \(P2_1/c\).  
*a* = 10.906(4)  
*b* = 14.442(5)  
*c* = 10.395(4)  
*β* = 113.559(8)°  
*Z* = 4

**X-ray Powder Pattern:** Tolbachik volcano, Kamchatka Peninsula, Russia.  
5.877 (100), 3.257 (95), 8.25 (77), 2.715 (50), 2.278 (40), 3.619 (37), 4.239 (26)

**Chemistry:**  
<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CuO</td>
<td>56.17</td>
<td>59.02</td>
</tr>
<tr>
<td>ZnO</td>
<td>2.34</td>
<td></td>
</tr>
<tr>
<td>SeO₂</td>
<td>23.29</td>
<td>23.52</td>
</tr>
<tr>
<td>Cl</td>
<td>22.69</td>
<td>22.54</td>
</tr>
<tr>
<td>-O = Cl₂</td>
<td>5.12</td>
<td>5.09</td>
</tr>
<tr>
<td>Total</td>
<td>99.37</td>
<td>99.99</td>
</tr>
</tbody>
</table>

(1) Tolbachik volcano, Kamchatka Peninsula, Russia; electron microprobe analysis; corresponding to \(\text{Cu}_{6.71}\text{Zn}_{0.27}\text{Se}_{1.99}\text{O}_{7.92}\text{Cl}_{6.08}\).  
(2) \(\text{Cu}_7(\text{SeO}_3)_2\text{O}_2\text{Cl}_6\).

**Occurrence:** In crusts deposited from gases escaping an active fumarole on a basaltic volcano.

**Association:** Chloromenite, prewittite, melanothallite, sophiite, ralstonite, ponomarevite, gold.

**Distribution:** At the second cinder cone of the North Breach, Great Fissure eruption, Tolbachik volcano, Kamchatka Peninsula, Russia.

**Name:** Honors Academician Nikolay (Nick) Vladimirovich Sobolev (b. 1935), for his contributions to mineralogy and petrology.

**Type Material:** Mineralogical Museum, St. Petersbug State University, St. Petersbug, Russia (1/19599).

**References:**  