Smamite

**Ca$_2$Sb(OH)$_4$[H(AsO$_4$)$_2$]·6H$_2$O**

**Crystal Data:** Triclinic. *Point Group:* 1. As lenticular crystals, in aggregates to ~0.5 mm.

**Physical Properties:** *Cleavage:* None. *Fracture:* Curved. *Tenacity:* Brittle. *Hardness =* ~3.5

D(meas.) = 2.72(3) D(calc.) = 2.709 Quickly soluble in dilute (10%) HCl.


**Optical Class:** Biaxial (~). $\alpha = 1.556(1)$ $\beta = 1.581(1)$ $\gamma = 1.588(1)$ 2V(meas.) = 54(1)$°

2V(calc.) = 55.1° *Dispersion:* Weak, $r > v$. *Pleochroism:* None.

**Cell Data:** Space Group: $P\overline{1}$. $a = 5.8207(4)$ $b = 8.0959(6)$ $c = 8.21296(6)$ $\alpha = 95.8343(7)^\circ$

$\beta = 110.762(8)^\circ$ $\gamma = 104.012(7)^\circ$ Z = 1

**X-ray Powder Pattern:** Giftgrube mine, Rauenthal, Sainte-Marie-Aux-Mines district, France. 5.07 (100), 6.03 (60), 2.858 (51), 5.66 (47), 3.992 (43), 7.56 (41), 3.783 (36)

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CaO</td>
<td>17.34</td>
<td>17.07</td>
</tr>
<tr>
<td>Sb$_2$O$_5$</td>
<td>23.92</td>
<td>24.63</td>
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<tr>
<td>SiO$_2$</td>
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<tr>
<td>As$_2$O$_5$</td>
<td>34.93</td>
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<tr>
<td>H$_2$O</td>
<td>[23.50]</td>
<td>23.31</td>
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<tr>
<td>Total</td>
<td>99.81</td>
<td>100.00</td>
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</tbody>
</table>

(1) Giftgrube mine, Rauenthal, Sainte-Marie-Aux-Mines district, France; average electron microprobe analysis supplemented by Raman spectroscopy, H$_2$O calculated from structure; corresponds to Ca$_{2.03}$Sb$_{0.97}$(OH)$_4$[H$_{1.10}$As$_{1.99}$Si$_{0.01}$O$_{10}$]·6H$_2$O. (2) Ca$_2$Sb(OH)$_4$[H(AsO$_4$)$_2$]·6H$_2$O.

**Occurrence:** A supergene mineral from the oxidative weathering of primary As-mineralization [native arsenic, tennantite-tetrahedrite (fahlore), arsenides of Co and Ni, löllingite and chalcopyrite].

**Association:** Picropharmacolite, fluckite, pharmacolite, quartz, calcite, dolomite.

**Distribution:** From the Giftgrube mine, Rauenthal, Sainte-Marie-Aux-Mines district, Haut-Rhin department, Grand Est, France.

**Name:** From the acronym (SMAM) for the Sainte-Marie-aux-Mines district, were the mineral was found.

**Type Material:** Mineralogical Collection, Musée cantonal de géologie, University of Lausanne, Switzerland (MGL 093481, 093482, and 093483) and the Natural History Museum of Los Angeles County, Los Angeles, California, USA (67169).