Sabugalite

\[ \text{HAI(UO}_2\text{)}_4(\text{PO}_4\text{)}_4 \cdot 16\text{H}_2\text{O} \]

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Crystal Data: Monoclinic, pseudotetragonal. Point Group: 2/m. Crystals, to 1 mm, very thin on \{001\}, square to lathlike outlines, typically warped, in composite subparallel growths; typically in thick crusts.

Physical Properties: Cleavage: On \{001\}, perfect. Tenacity: Somewhat flexible. Hardness = 2.5 D(meas.) = 2.30 D(calc.) = 3.15 Radioactive; fluoresces bright lemon-yellow under SW and LW UV.

Optical Properties: Transparent to translucent. Color: Bright yellow to lemon-yellow. Luster: Weakly vitreous. Optical Class: Biaxial (-). Pleochroism: X = colorless; Y = Z = pale yellow. Orientation: Z = elongation. \( \alpha = 1.564–1.565 \quad \beta = 1.581–1.583 \quad \gamma = 1.582–1.584 \) 2V(meas.) = Moderately large, may be 0°.

Cell Data: Space Group: C2/m (synthetic). \( a = 19.426 \quad b = 9.483 \quad c = 9.850 \)

X-ray Powder Pattern: Sabugal, Portugal. 9.69 (10), 4.86 (9), 3.47 (8), 2.188 (6), 4.39 (4), 2.452 (2), 2.389 (2)

Chemistry:

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{UO}_3 )</td>
<td>65.22</td>
<td>65.01</td>
<td>64.41</td>
<td>( \text{Al}_2\text{O}_3 )</td>
<td>2.65</td>
<td>3.20</td>
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<tr>
<td>( \text{P}_2\text{O}_5 )</td>
<td>16.08</td>
<td>14.02</td>
<td>15.98</td>
<td>CaO</td>
<td>0.36</td>
<td></td>
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<tr>
<td>( \text{As}_2\text{O}_5 )</td>
<td>2.70</td>
<td></td>
<td></td>
<td>( \text{H}_2\text{O} )</td>
<td>15.93</td>
<td>[14.71]</td>
</tr>
<tr>
<td>Total</td>
<td>99.88</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[100.00]</td>
</tr>
</tbody>
</table>

(1) Quarta Feira mine, Portugal; corresponds to \( \text{H}_1.00\text{Al}_{0.94}(\text{UO}_2\text{)}_{4.12}(\text{PO}_4\text{)}_{4.08} \cdot 15.96\text{H}_2\text{O} \).
(2) Kariz, Portugal; \( \text{H}_2\text{O} \) by difference; corresponds to \( \text{H}_1.00\text{Al}_{1.10}(\text{UO}_2\text{)}_{4.08} [(\text{PO}_4\text{)}_{3.56}(\text{AsO}_4\text{)}_{0.42}]_\Sigma=3.98 \cdot 15.96\text{H}_2\text{O} \). (3) \( \text{HAI(UO}_2\text{)}_4(\text{PO}_4\text{)}_4 \cdot 16\text{H}_2\text{O} \).

Mineral Group: Autunite group.

Occurrence: A secondary mineral formed in the oxidized zone of uranium veins.

Association: Meta-autunite, saléite, phosphuranylite.

Distribution: In Portugal, in Beira Alta, from the Quarta Feira and Coitos mines, Sabugal Co.; at Kariz, Minho Province; and elsewhere. From the Pedro Alvaro and Cuidad Rodrigo vanadium mines, Salamanca Province, Spain. In the Margnac mine, Compreignac, and the La Crouzille mine, Haute-Vienne, France. At Arcu su Linnarbu, near Capoterra, Sardinia, Italy. In the USA, from the Black Water mine, Black Mesa Basin, Apache Co., and at the Huskon and Arrowhead claims, Huskon district, near Cameron, Coconino Co., Arizona; in the Union Carbide mine, Maybell district, Moffat Co., at the Pitch mine, Marshall Pass district, Saguache Co., and the High Park claims, Teller Co., Colorado; from the Happy Jack mine, White Canyon, San Juan Co., Utah; at the Lucky Mc No. 20 mine, the Blue Buck claim and Blarco group, Fremont Co., the Poison Creek claim, Crook Co., and the Del Linch claim, Johnson Co., Wyoming. In the Sapucaia pegmatite mine, about 50 km east-southeast of Governador Valadares, Minas Gerais, Brazil. From the El Sharana mine, South Alligator Valley, Northern Territory, Australia.

Name: For Sabugal Co., Portugal, in which the mineral was first found.


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