Meta-alunogen  \( \text{Al}_4(\text{SO}_4)_6 \cdot 27\text{H}_2\text{O} \)

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**Crystal Data:** Orthorhombic (synthetic).  *Point Group:* n.d.  Typically in fibrous tangled masses and efflorescences, or crackled massive, altered from alunogen.

**Physical Properties:**  *Cleavage:* Perfect on \{010\}.  *Hardness =* n.d.  *D(meas.) =* n.d.  
\( D(\text{calc.}) = 2.85 \)

**Optical Properties:** Semitransparent.  *Color:* White, pale yellow; colorless in transmitted light.  
*Luster:* Waxy to pearly.  
*Optical Class:* Biaxial (+).  *Orientation:* \( X \perp b \).  \( \alpha = 1.469 \quad \beta = 1.473 \quad \gamma = 1.491 \)

**Cell Data:**  *Space Group:* n.d.  \( a = 12.25 \quad b = 13.95 \quad c = 15.95 \quad Z = 4 \)

**X-ray Powder Pattern:** Synthetic.  
4.071 (100), 12.20 (26), 6.114 (11), 3.860 (9), 4.208 (7), 3.990 (5), 3.024 (4)

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
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</thead>
<tbody>
<tr>
<td>\text{SO}_3</td>
<td>41.04</td>
<td>41.03</td>
</tr>
<tr>
<td>\text{Al}_2\text{O}_3</td>
<td>17.33</td>
<td>17.42</td>
</tr>
<tr>
<td>\text{H}_2\text{O}</td>
<td>41.44</td>
<td>41.55</td>
</tr>
<tr>
<td>Total</td>
<td>99.81</td>
<td>100.00</td>
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</tbody>
</table>

(1) Francisco de Vergara, Chile.  (2) \( \text{Al}_4(\text{SO}_4)_6 \cdot 27\text{H}_2\text{O} \).

**Occurrence:** An uncommon mineral formed by dehydration of alunogen; found in sulfate-rich hydrothermal deposits and geothermal fields.

**Association:** Alunogen, pickeringite, halotrichite, mirabilite, kalinite, gypsum.

**Distribution:** From alum mines 3.5 km south of Francisco de Vergara, Antofagasta, Chile.  In Ruatapu Cave and within the Te Kopia geothermal field, Taupo Volcanic Zone, New Zealand.

**Name:**  For *meta*, indicating a lower hydrate, and *alunogen*.

**Type Material:** n.d.


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