Tooeleite  

\[ \text{Fe}^{3+}_6(\text{AsO}_3)_4(\text{SO}_4)(\text{OH})_4\cdot 4\text{H}_2\text{O} \]

**Crystal Data:** Monoclinic.  
**Point Group:** 2/m.  
Bladed crystals, to 1 cm, are elongate along [001], showing {010}, {304}, and {100}; usually, in compact crystalline crusts.

**Physical Properties:**  
Cleavage: On {010}, good.  
Hardness = 3 D(meas.) = 4.23(8) D(calc.) = 3.16

**Optical Properties:**  
Transparent.  
Color: Cadmium-orange, may be brownish orange or yellowish orange.  
Streak: Cadmium-orange.  
Luster: Greasy.

**Optical Class:** Biaxial (−).  
\( \alpha = 1.94 \quad \beta = 2.04 \quad \gamma = 2.05 \)  
2V(meas.) = Small  
2V(calc.) = 32°

**Pleochroism:** Moderate;  
\( Y = \text{orange} \quad X = \text{Z} = \text{lemon-yellow} \).  
Orientation:  
\( X = a, Y = c, Z = b \).

**Cell Data:**  
**Space Group:** C2/m.  
\( a = 8.9575(1) \quad b = 6.4238(1) \quad c = 9.7912(1) \quad \beta = 96.032(1)^\circ \quad Z = 1 \)

**X-ray Powder Pattern:** U.S. mine, Utah, USA.  

**Chemistry:**

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>SO(_4)</td>
<td>9.7</td>
</tr>
<tr>
<td>As(_2)O(_3)</td>
<td>36.2</td>
</tr>
<tr>
<td>Fe(_2)O(_3)</td>
<td>44.3</td>
</tr>
<tr>
<td>H(_2)O</td>
<td>9.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

(1) U.S. mine, Utah, USA; average electron microprobe analysis supplemented by ZANES, total Fe as Fe\(_2\)O\(_3\), H\(_2\)O by the Penfield method; corresponds to Fe\(_6\)[(AsO\(_3\)]\(_4\)(SO\(_4\))\(_3\)5(OH)\(_4\)\cdot 4H\(_2\)O.

**Occurrence:** An uncommon secondary mineral in the oxidized zone of a replacement orebody in metamorphosed limestone. Formed by bacterial action in acid mine drainage.

**Association:** Jarosite, scorodite, sulfur, kaatialaite, pyrite, arsenopyrite, galena, sphalerite, goethite, gypsum.

**Distribution:** From the U.S. mine, Gold Hill, Tooele Co., Utah, USA. Likely more widespread in contact with acid mine drainage.

**Name:** For its initially noted occurrence in Tooele Co., Utah, USA.

**Type Material:** National School of Mines, Paris, France.

**References:**  