Tooeleite $Fe^{3+}_6(AsO_3)_4(SO_4)(OH)_4 \cdot 4H_2O$

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 (–). $\alpha = 1.94$ $\beta = 2.04$ $\gamma = 2.05$ 2V(meas.) = Small. 2V(calc.) = 32°
Pleochroism: Moderate; *Y* = orange, *X* = *Z* = lemon-yellow. *Orientation*: *X* = *a*, *Y* = *c*, *Z* = *b*.
Dispersion: *r* > *v*, slight. *Absorption*: *Y* > *X* = *Z*.

Cell Data: *Space Group*: *C*2/*m*. $a = 8.9575(1)$ $b = 6.4238(1)$ $c = 9.7912(1)$ $\beta = 96.032(1)°$ Z = 1

X-ray Powder Pattern: U.S. mine, Utah, USA.
9.725 (10), 3.208 (9), 3.047 (5), 4.476 (4), 2.680 (4), 2.153 (4), 1.604 (4)

Chemistry:

	(1)
SO_4	9.7
As_2O_3	36.2
Fe_2O_3	44.3
H_2O	9.8
Total	100.0

(1) U.S. mine, Utah, USA; average electron microprobe analysis supplemented by ZANES, total Fe as Fe_2O_3, H_2O by the Penfield method; corresponds to $Fe_6[(AsO_3)_4(SO_4)]_{\Sigma=5}(OH)_4 \cdot 4H_2O$.

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: (1) Cesbron. F.P. and S.A. Williams (1992) Tooeleite, a new mineral from the U.S. Mine, Tooele County, Utah. Mineral. Mag., 56, 71-73. (2) (1992) Amer. Mineral., 77, 1306-1307 (abs. ref. 1). (3) Morin, G., G. Rousse, and E. Elkaim (2007) Crystal structure of tooeleite, $Fe_6(AsO_3)_4SO_4(OH)_4 \cdot 4H_2O$, a new iron arsenite oxyhydroxysulfate mineral relevant to acid mine drainage. Amer. Mineral., 92, 193-197.