Quenstedtite $Fe_2^{3+}(SO_4)_3 \cdot 10-11H_2O$

Crystal Data: Triclinic, pseudomonoclinic. *Point Group:* $\overline{1}$. Tabular crystals, flattened on {010}, or short prismatic along [100], to 1 mm, which may be highly modified in the [001] and [100] zones, with about 30 forms observed; commonly in crusts and aggregates. *Twinning:* Common on {010}.

Physical Properties: *Cleavage:* Perfect on {010}; good on {100}. Hardness = 2.5 D(meas.) = 2.11–2.15 D(calc.) = 2.14 Soluble in H_2O.

Optical Properties: Transparent. *Color:* Pale violet, reddish violet; colorless to pale rose in transmitted light.
Optical Class: Biaxial (+). *Orientation:* X (–43°,45°); Y (128°,43°); Z (–138°,88°) [with c (0°,0°) and b^* (0°,90°) using (ϕ,ρ)]. *Dispersion:* $r < v$, strong, horizontal. $\alpha = 1.547$ $\beta = 1.566$ $\gamma = 1.594$ 2V(meas.) = 70°

Cell Data: *Space Group:* $P\overline{1}$. $a = 6.184(5)$ $b = 23.60(2)$ $c = 6.539(5)$ $\alpha = 94.18(8)°$ $\beta = 101.73(8)°$ $\gamma = 96.27(8)°$ Z = 2

X-ray Powder Pattern: Tierra Amarilla, Chile.
4.08 (FFF), 5.78 (FF), 4.19 (FF), 3.80 (F), 5.03 (mF), 5.57 (mf), 5.34 (mf)

Chemistry:

	(1)	(2)	(3)
SO_3	39.83	41.41	40.16
Fe_2O_3	27.66	27.53	26.70
CaO	0.40		
H_2O	31.35	31.06	33.14
Total	99.24	100.00	100.00

(1) Tierra Amarilla, Chile; a separate determination by the Penfield method gave H_2O 33.4%, also crystal-structure analysis indicates 11 H_2O positions, two of which are interlayer zeolitic. (2) $Fe_2(SO_4)_3 \cdot 10H_2O$. (3) $Fe_2(SO_4)_3 \cdot 11H_2O$.

Occurrence: An uncommon mineral formed in the oxidized zone of pyrite-rich mineral deposits especially in arid regions.

Association: Coquimbite, copiapite, römerite.

Distribution: In Chile, from Tierra Amarilla, southeast of Copiapó, Atacama, and at Alcaparrosa, near Cerritos Bayos, southwest of Calama, Antofagasta. From the Sulphur Hole prospect, near Borate, about 10 km northeast of Yermo, Calico Mountains, San Bernardino Co., California, USA. At Baňská Štiavnica (Schemnitz), Slovakia. In Germany, in the Richelsdorfer Mountains, Hesse. From the Dyakhtardakh cassiterite–sulfide deposit, northeastern Sakha, Russia.

Name: To honor Professor Friedrich August Quenstedt (1809–1889), German mineralogist and paleontologist, University of Tübingen, Tübingen, Germany.

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

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 535–536. (2) Cesbron, F. (1964) Contribution à la minéralogie des sulfates de fer hydratés. Bull. Soc. fr. Minéral., 87, 125–143 (in French). (3) Thomas, J.N., P.D. Robinson, and J.H. Fang (1974) Crystal structures and mineral chemistry of hydrated ferric sulfates. IV. The crystal structure of quenstedtite. Amer. Mineral., 59, 582–586.