

Crystal Data: Monoclinic. *Point Group:* 2/m. As grains to ~1 mm.

Physical Properties: *Cleavage:* Perfect on {100}. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = 3.963

Optical Properties: Transparent to translucent. *Color:* Cyan to pale royal blue. *Streak:* Pale green. *Luster:* Vitreous.

Optical Class: Biaxial (+). $\alpha = 1.756(5)$ $\beta = 1.794(5)$ $\gamma(\text{calc.}) = 1.925$ $2V(\text{meas.}) = 60(1)^\circ$ $2V(\text{calc.}) = \text{n.d.}$ *Pleochroism:* Weak, greenish blue. *Absorption:* $X \approx Z > Y$. *Dispersion:* $r < v$. *Orientation:* $Y = b$, $X \wedge a = 41^\circ$ in obtuse β , one optical axis $\approx \perp$ to (001).

Cell Data: Space Group: $P2_1/c$. $a = 7.4049(2)$ $b = 7.7873(2)$ $c = 8.5217(2)$ $\beta = 110.203(3)^\circ$ $Z = 4$

X-ray Powder Pattern: Gråurdfjellet, Oppdal, Norway.

6.954 (100), 3.558 (64), 2.838 (47), 2.675 (43), 3.175 (39), 3.338(31), 3.236 (30)

Chemistry:	(1)	(2)	(3)
CuO	30.14	30.27	28.91
SeO ₂	0.78	0.52	
TeO ₂	60.25	58.28	58.00
<u>H₂O</u>	<u>13.79</u>	<u>13.09</u>	<u>13.09</u>
Total	104.96	102.16	100.00

(1-2) Gråurdfjellet, Oppdal, Norway; average electron microprobe analysis supplemented by Raman spectroscopy, H₂O calculated from structure; corresponds to Cu_{0.99}(Te_{0.98}Se_{0.02})O₃·2H₂O.

(3) CuTeO₃·2H₂O.

Polymorphism & Series: Polymorph of teineite.

Occurrence: A secondary mineral found within vugs, interstices and along cracks in granular quartz from a single boulder of quartz-rich granite, probably a glacial erratic. Oxidation of primary sulfides and tellurides under near-surface, wet, oxidizing conditions created the secondary assemblage.

Association: Teineite, malachite, U-rich mc Alpineite, schmitterite, a copper sulfate (probably brochantite), goethite, an amorphous Cu-Te-Si gel-like material.

Distribution: From Gråurdfjellet, Oppdal, Norway.

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Type Material: Natural History Museum, London, England (BM 2011,243).

References: (1) Rumsey, M.S., M.D. Welch, F. Mo, A.K. Kleppe, J. Spratt, A.R. Kampf, and M.P. Raanes (2018) Millsite, CuTeO₃·2H₂O: a new polymorph of teineite from Gråurdfjellet, Oppdal, Norway. *Mineral. Mag.*, 82(2), 433-444. (2) (2019) *Amer. Mineral.*, 104(4), 627 (abs. ref 1).