

Crystal Data: Orthorhombic. *Point Group:* 222. Crystals are prismatic along [001], may be flattened on {010}, may be rough due to alteration; exhibiting forms {010}, {110}, {011}, rare {073}, to 2 cm; commonly as crusts and aggregates.

Physical Properties: *Cleavage:* On {010}, good; on {001} and {100}, poor.
Tenacity: Brittle. Hardness = 2.5 D(meas.) = 3.80 D(calc.) = 3.86

Optical Properties: Semitransparent. *Color:* Cerulean blue, Cobalt blue, bluish gray; in transmitted light, bright blue to greenish blue. *Streak:* Pale blue.
Optical Class: Biaxial (-). *Pleochroism:* X = greenish blue; Y = blue; Z = Indigo blue.
Orientation: X = a; Y = b; Z = c. *Absorption:* Z > Y > X. $\alpha = 1.767$ $\beta = 1.782$ $\gamma = 1.791$
 2V(meas.) = 36°

Cell Data: *Space Group:* $P2_12_12_1$ (synthetic). $a = 6.634(4)$ $b = 9.597(5)$ $c = 7.428(4)$
 Z = 4

X-ray Powder Pattern: Teine mine, Japan.
 3.45 (10), 5.45 (9b), 3.06 (8), 2.94 (7), 2.880 (7), 2.392 (7), 5.87 (6)

| Chemistry: | (1) | (2) |
|------------------|----------|--------|
| SO ₃ | 6.96 | |
| TeO ₃ | 50.63 | 58.00 |
| CuO | 29.54 | 28.91 |
| H ₂ O | 12.87 | 13.09 |
| Total | [100.00] | 100.00 |

(1) Teine mine, Japan; recalculated to 100% from an original total of 100.9% after deducting insoluble 6.1%. (2) $\text{CuTeO}_3 \cdot 2\text{H}_2\text{O}$.

Occurrence: A rare secondary mineral formed by oxidation of copper- and tellurium-bearing sulfides.

Association: Tellurite, tellurium, pyrite, tetrahedrite, sphalerite, azurite, malachite, quartz, barite (Teine mine, Japan); hessite, galena, bornite, cerussite, azurite, chlorargyrite, quetzalcoatlite, quartz, barite, clay (Moctezuma mine, Mexico); cuprite, malachite, graemite (Cole shaft, Arizona, USA).

Distribution: In Japan, from the Teine mine, Sapporo, Hokkaido, and in the Kawazu mine, three km north of Shimoda, Shizuoka Prefecture. At the Moctezuma (Bambolla) mine, 12 km south of Moctezuma, Sonora, Mexico. In the USA, in Arizona, large crystals from the Cole shaft and in the Shattuck mine, Bisbee, Warren district, Cochise Co., and in the Dome Rock Mountains, La Paz Co.; from the Lone Pine mine, Wilcox district, Catron Co., New Mexico. At Salmchâteau, near Ottré, Belgium. From Åmotsdal, Norway. At the Aginsk gold telluride deposit, Kamchatka, Far Eastern Region, Russia.

Name: For the Teine mine, Japan, in which specimens were first found.

Type Material: University of Hokkaido, Sapporo, Japan; Harvard University, Cambridge, Massachusetts, USA, 94749.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 635–636. (2) Effenberger, H. (1977) Verfeinerung der Kristallstruktur von synthetischem Teineit, $\text{CuTeO}_3 \cdot 2\text{H}_2\text{O}$. *Tschermaks Mineral. Petrog. Mitt.*, 24, 287–298 (in German with English abs.). (3) Mandarino, J.A. (1964) X-ray powder data for teineite and chalcocite. *Amer. Mineral.*, 49, 1481–1485. (4) Yosimura, T. (1939) Teineite, a new tellurate mineral from the Teine mine, Hokkaido, Japan. *Jour. Fac. Sci., Hokkaido Imp. Univ., Series IV*, no. 3–4, 465–470.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without the prior written permission of Mineral Data Publishing.