Carlfriesite $CaTe_2^{4+}Te^{6+}O_8$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As euhedral prismatic crystals, to 5 mm, with an "axe head" appearance due to {010} and other forms being curved, in radial sprays; typically in botryoidal crusts.

Physical Properties: *Cleavage:* On {010}, fair. *Tenacity:* Brittle. Hardness = 3.5 D(meas.) = 6.3(0.25) D(calc.) = [5.70]

Optical Properties: Transparent. *Color:* Bright primrose-yellow; very pale buttery yellow in thin section. *Streak:* Very pale yellow.
Optical Class: Biaxial (–). *Pleochroism:* Weak; in yellows. *Orientation:* $Y = b$; $X \wedge c = 28°$.
Absorption: $X = Y < Z$. $\alpha = 1.982$ $\beta = 2.095$ $\gamma = 2.19$ 2V(meas.) = 80° 2V(calc.) = 79°

Cell Data: *Space Group:* $C2/c$. $a = 12.576(2)$ $b = 5.662(3)$ $c = 9.994(2)$ $\beta = 115.56(3)°$ $Z = 4$

X-ray Powder Pattern: Moctezuma mine, Mexico.
3.167 (10), 3.082 (9b), 5.063 (6), 2.832 (6), 3.369 (4), 4.825 (3), 2.698 (3)

Chemistry:

	(1)	(2)	(3)
TeO_3			31.88
TeO_2	87.0	89.5	57.94
CaO	10.2	10.5	10.18
H_2O	6.5		
Total	103.7	[100.0]	100.00

(1) Moctezuma mine, Mexico; by electron microprobe, average of three analyses, H_2O by the Penfield method. (2) Analysis (1) recalculated to 100.0% after deduction of H_2O. (2) $CaTe_2^{4+}Te^{6+}O_8$ as determined by crystal-structure analysis.

Occurrence: In cavities in an oxidized hydrothermal Au–Te deposit in intensely silicified brecciated rhyolite vitrophyre.

Association: Cerussite, chlorargyrite, argentian gold, cesbronite, calcite, dickite, barite, bornite, galena, hessite.

Distribution: From the Oriental (Bambollita) mine, northeast of the Moctezuma (Bambolla) mine, 12 km south of Moctezuma, Sonora, Mexico.

Name: Honors Carl Fries, Jr. (1910–1965), U.S. Geological Survey and the Geological Institute of the National University, Mexico City, Mexico, authority on the geology of large areas of Mexico.

Type Material: The Natural History Museum, London, England, 1976,406; University of Pierre and Marie Curie, Paris, France; Harvard University, Cambridge, Massachusetts, 119080; National Museum of Natural History, Washington, D.C., USA, 128393, 135058.

References: (1) Williams, S.A. and R.V. Gaines (1975) Carlfriesite, $H_4Ca(TeO_3)_3$, a new mineral from Moctezuma, Sonora, Mexico. Mineral. Mag., 40, 127–130. (2) (1976) Amer. Mineral., 61, 1053 (abs. ref. 1). (3) Effenberger, H., J. Zemann, and H. Mayer (1978) Carlfriesite: crystal structure, revision of chemical formula, and synthesis. Amer. Mineral., 63, 847–852.