

Crystal Data: Monoclinic. *Point Group:* 2/m. As equant to prismatic crystals, elongated along [001], to 200 μm (Utah); as lozenge-shaped to acicular crystals in radiating aggregates (Italy); granular massive.

Physical Properties: *Cleavage:* Presumed on {010}. *Fracture:* Uneven to conchoidal. *Tenacity:* Brittle. Hardness = 4 VHN = 183-280, 229 average (100 g load). D(meas.) = 6.5(1) (synthetic). D(calc.) = 6.494

Optical Properties: Transparent. Color: Colorless. Streak: White. Luster: Adamantine. *Optical Class:* Biaxial. α = [1.91] β = n.d. γ = [1.99] 2V(meas.) = n.d. 2V(calc.) = n.d.

Cell Data: Space Group: *P*2₁/*c*. *a* = 7.7196(5) *b* = 13.8856(9) *c* = 5.6980(4) β = 109.174(1)° Z = 4

X-ray Powder Pattern: Tunnel Extension mine, Utah, USA. 3.206 (100), 1.984 (90), 2.924 (70), 3.644 (60), 3.466 (60), 2.782 (50), 3.513 (40)

Chemistry:	(1)	(2)	(3)
SO ₃	14.18	14.33	14.20
Bi ₂ O ₃	82.53	77.87	82.61
F		0.28	
H ₂ O	[3.29]	n.d.	3.19
-O = F ₂		0.12	
Total	[100.00]	92.35	100.00

(1) Tunnel Extension mine, Utah, USA; by electron microprobe, average of ten analyses, recalculated from an elemental analysis; H₂O by difference, presence of (OH)⁻ by analogy to the synthetic compound; then corresponds to Bi_{1.99}O(S_{0.99}O₄)(OH)_{2.08}. (2) Near Alfenza, Crodo, Italy; electron microprobe, average of ten analyses supplemented by Raman and FTIR spectroscopy that confirm presence of OH⁻ and not H₂O, low total due to beam damage, corresponds to Bi_{1.95}S_{1.04}O₆(OH)_{1.91}F_{0.09}. (3) Bi₂O(SO₄)(OH)₂.

Occurrence: An alteration product in Cu-Bi-Au-sulfide deposits.

Association: Covellite, cuprobismutite, bismuthinite, quartz (Marysvale, Utah); bismuthinite, pyrite, arsenopyrite, cosalite, bornite, anglesite, micas (Italy).

Distribution: From the Tunnel Extension mine, Marysvale, Ohio district, Piute Co., Utah, USA. Near Alfenza, Crodo, Italy.

Name: Honors Benjamin Bartlett Cannon, V (b. 1950), amateur mineralogist of Seattle, Washington, USA, who recognized the first specimens.

Type Material: The Natural History Museum, London, England (1992,239, 1992,240, and E.1456); Canadian Geological Survey, Ottawa, Ontario, Canada (67428).

References: (1) Stanley, C.J., A.C. Roberts, D.C. Harris, A.J. Criddle, and J.T. Szymański (1992) Cannonite, Bi₂O(OH)₂SO₄, a new mineral from Marysvale, Utah, USA. *Mineral. Mag.*, 56, 605-609. (2) (1993) *Amer. Mineral.*, 78, 845 (abs. ref. 1). (3) Golič, L., M. Graunar, and F. Lazarni (1982) *catena*-Di-μ-hydroxo-μ₃-oxo-dibismuth(III) sulphate. *Acta Cryst.*, 38, 2881-2883. (4) Capitani, G.C., T. Catelani, P. Gentile, A. Lucotti, and M. Zema (2013) Cannonite [Bi₂O(SO₄)(OH)₂] from Alfenza (Crodo, Italy): crystal structure and morphology. *Mineral. Mag.*, 77(8), 3067-3079. (5) (2014) *Amer. Mineral.*, 99(11-12), 2443 (abs. ref. 4).