

Holdenite



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Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. As complex crystals tabular on {100}, with {110}, {7.16.2}, {211}, {131}, to 1 cm. In aggregates of highly irregular microcrystals; fibrous, fine-grained, massive.

Physical Properties: *Cleavage:* {010}, poor. *Fracture:* Subconchoidal. Hardness = 4
D(meas.) = 4.11(1) D(calc.) = 4.11

Optical Properties: Transparent to translucent. *Color:* Pink, orange, yellowish to deep red; pink in thin section. *Luster:* Vitreous.

Optical Class: Biaxial (+). *Orientation:* $X = c; Y = b; Z = a$. *Dispersion:* $r > v$, distinct.
 $\alpha = 1.769\ \beta = 1.770\ \gamma = 1.785\ 2V(\text{meas.}) = 30^\circ 20'\ 2V(\text{calc.}) = 28^\circ 58'$

Cell Data: *Space Group:* $Abma$. $a = 11.99(1)\ b = 31.46(4)\ c = 8.697(6)\ Z = 8$

X-ray Powder Pattern: Franklin, New Jersey, USA.
2.838 (10), 3.582 (8), 2.583 (8), 1.531 (8), 2.464 (7), 3.406 (6), 5.740 (5)

Chemistry:	(1)	(2)	(3)
SiO ₂	6.4	5.9	5.92
As ₂ O ₅	21.4	22.3	22.65
MnO	38.1	39.1	38.09
ZnO	23.9	23.4	24.06
MgO	3.5	2.5	2.18
H ₂ O	[7.1]	[7.1]	7.10
Total	[100.4]	[100.3]	100.00

- (1) Franklin, New Jersey, USA; by electron microprobe, H₂O from theoretical composition.
- (2) Sterling Hill, New Jersey, USA; by electron microprobe, H₂O from theoretical composition.
- (3) $(\text{Mn}_{5.45}\text{Mg}_{0.55})_{\Sigma=6.00}\text{Zn}_3(\text{AsO}_4)_2(\text{SiO}_4)(\text{OH})_8$.

Occurrence: A secondary mineral in veinlets, on slip surfaces, and as interstitial fillings within a metamorphosed stratiform zinc deposit (Franklin, New Jersey, USA).

Association: Franklinite, willemite, pyrochroite, barite, kolicite, sussexite, kraisslite, zincite, sphalerite, galena, calcite, rhodochrosite.

Distribution: From Franklin and Sterling Hill, Ogdensburg, Sussex Co., New Jersey, USA.

Name: For the mining engineer Albert Fairchild Holden (1866–1913), of Salt Lake City, Utah, USA, in whose collection the mineral was first noticed.

Type Material: Harvard University, Cambridge, Massachusetts, 89996; National Museum of Natural History, Washington, D.C., USA, 95434, 162601.

References: (1) Palache, C. and E.V. Shannon (1927) Holdenite, a new arsenate of manganese and zinc, from Franklin, New Jersey. *Amer. Mineral.*, 12, 144–148. (2) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 775–777. (3) Moore, P.B. and T. Araki (1977) Holdenite, a novel cubic close-packed structure. *Amer. Mineral.*, 62, 513–521. (4) Dunn, P.J. (1981) Holdenite from Sterling Hill and new chemical data. *Mineral. Record*, 12, 373–375.