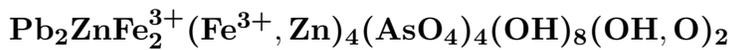


**Jamesite**

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**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . As crystals, tabular on {010} and elongated along [100], to 0.5 mm; in spherical radial aggregates.

**Physical Properties:** Hardness =  $\sim 3$  D(meas.) = n.d. D(calc.) = 5.084

**Optical Properties:** Transparent. *Color:* Red-brown. *Streak:* Pale brown.

*Luster:* Subadamantine.

*Optical Class:* Biaxial (-). *Pleochroism:* Strong; X = Y = pale brown; Z = deep red-brown.

*Orientation:*  $Y \wedge a \simeq 5^\circ$  on (001);  $Y \wedge a = 15^\circ$  on (010). *Dispersion:*  $r > v$ .  $\alpha = 1.960(5)$

$\beta = 1.995(5)$   $\gamma = 2.020(5)$   $2V(\text{meas.}) = 75(5)^\circ$

**Cell Data:** *Space Group:*  $P\bar{1}$ .  $a = 5.583\text{--}5.622$   $b = 9.542\text{--}9.593$   $c = 10.219\text{--}10.279$

$\alpha = 109.80^\circ\text{--}109.81^\circ$   $\beta = 90.54^\circ\text{--}90.57^\circ$   $\gamma = 97.69^\circ\text{--}97.71^\circ$   $Z = 1$

**X-ray Powder Pattern:** Tsumeb, Namibia.

3.40 (10), 3.04 (9), 9.67 (8), 4.70 (8), 3.26 (8), 2.92 (6), 2.04 (6)

**Chemistry:**

	(1)	(2)
SO <sub>3</sub>	trace	
As <sub>2</sub> O <sub>5</sub>	36.2	27.94
Al <sub>2</sub> O <sub>3</sub>		0.09
Fe <sub>2</sub> O <sub>3</sub>	25.5	23.30
Ga <sub>2</sub> O <sub>3</sub>		0.27
MnO	trace	
CuO	trace	0.21
ZnO	11.1	10.39
PbO	27.1	27.40
H <sub>2</sub> O	n.d.	[5.06]
Total	99.9	[94.66]

(1) Tsumeb, Namibia; by electron microprobe, total Fe as Fe<sub>2</sub>O<sub>3</sub>, (OH)<sup>1-</sup> assumed for charge balance; corresponding to Pb<sub>1.92</sub>Zn<sub>2.15</sub>Fe<sub>5.06</sub><sup>3+</sup>(AsO<sub>4</sub>)<sub>4.00</sub>(OH)<sub>11.32</sub>. (2) Do.; by electron microprobe, average of two analyses, total Fe as Fe<sub>2</sub>O<sub>3</sub>, H<sub>2</sub>O calculated by crystal-structure analysis; corresponds to Pb<sub>2.01</sub>Zn<sub>1.00</sub>Fe<sub>2.00</sub><sup>3+</sup>(Fe<sub>2.78</sub><sup>3+</sup>Zn<sub>1.09</sub>Ga<sub>0.05</sub>Cu<sub>0.04</sub>Al<sub>0.03</sub>)<sub>Σ=3.99</sub>(AsO<sub>4</sub>)<sub>3.99</sub>[(OH)<sub>9.20</sub>O<sub>0.80</sub>]<sub>Σ=10.00</sub>.

**Occurrence:** A secondary mineral in oxidized lead ore in a dolostone-hosted hydrothermal polymetallic ore deposit.

**Association:** Duftite, tsumcorite, goethite.

**Distribution:** From Tsumeb, Namibia.

**Name:** Honors Christopher James, one of the first mining engineers at the Tsumeb mine, Namibia.

**Type Material:** Institute for Mineralogy and Crystal Chemistry, University of Stuttgart, Stuttgart, Germany, NM05; National Museum of Natural History, Washington, D.C., USA, 143995.

**References:** (1) Keller, P., H. Hess, and P.J. Dunn (1981) Jamesit, Pb<sub>2</sub>Zn<sub>2</sub>Fe<sub>5</sub><sup>3+</sup>O<sub>4</sub>(AsO<sub>4</sub>)<sub>5</sub>, ein neues Mineral von Tsumeb, Namibia. Chem. Erde, 40, 105–109 (in German with English abs.). (2) (1981) Amer. Mineral., 66, 1275 (abs. ref. 1). (3) Cooper, M.A. and F.C. Hawthorne (1999) Local Pb<sup>2+</sup>–□ disorder in the crystal structure of jamesite, Pb<sub>2</sub>ZnFe<sub>2</sub><sup>3+</sup>(Fe<sub>2.8</sub><sup>3+</sup>Zn<sub>1.2</sub>) (AsO<sub>4</sub>)<sub>4</sub>(OH)<sub>8</sub>[(OH)<sub>1.2</sub>O<sub>0.8</sub>], and revision of the chemical formula. Can. Mineral., 37, 53–60.

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