

## Drugmanite

## HPb<sub>2</sub>(Fe<sup>3+</sup>, Al)(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>2</sub>

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**Crystal Data:** Monoclinic, pseudo-orthorhombic. *Point Group:* 2/m. Pseudorhombic crystals, to 0.2 mm, with prominent {001}, also {110}, flattened on [001], elongated along [010], in aggregates.

**Physical Properties:** Hardness = < 6 D(meas.) = > 4.1 D(calc.) = 5.55

**Optical Properties:** Transparent. *Color:* Pale yellow to colorless; in transmitted light, colorless with anomalous interference colors. *Streak:* White. *Luster:* Adamantine. *Optical Class:* Biaxial (-). *Orientation:* OAP = (010);  $X \simeq \perp (001)$ . *Dispersion:*  $r < v$ , strong.  $n = [1.87]$   $\alpha = > 1.74$   $\beta = > 1.74$   $\gamma = > 1.74$ ;  $\gamma - \beta = 0.020(2)$  in (001) section.  $2V(\text{meas.}) = 33(2)^\circ$

**Cell Data:** *Space Group:*  $P2_1/a$ .  $a = 11.111(5)$   $b = 7.986(5)$   $c = 4.643(3)$   
 $\beta = 90.41(3)^\circ$   $Z = 2$

**X-ray Powder Pattern:** Richelle, Belgium.  
3.752 (10), 4.63 (9), 2.912 (9), 3.350 (8), 3.247 (8), 2.714 (7b), 2.391 (6)

Chemistry:	(1)	(2)
P <sub>2</sub> O <sub>5</sub>	20.37	20.85
Al <sub>2</sub> O <sub>3</sub>	1.61	3.74
Fe <sub>2</sub> O <sub>3</sub>	8.85	5.87
PbO	64.37	65.57
H <sub>2</sub> O	[3.87]	3.97
Total	[99.07]	100.00

(1) Richelle, Belgium; by electron microprobe, average of eight analyses; total Fe as Fe<sub>2</sub>O<sub>3</sub>, H<sub>2</sub>O calculated for 10 O<sup>2-</sup>; corresponds to HPb<sub>2</sub>(Fe<sub>0.78</sub>Al<sub>0.22</sub>)<sub>Σ=1.00</sub>(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>2</sub>.  
(2) HPb<sub>2</sub>(Fe, Al)(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>2</sub> with Fe:Al = 1:1.

**Occurrence:** Very rare, formed at low temperatures in vugs in mineralized limestones, an oxidation product of disseminated sulfides.

**Association:** Anglesite, corkite, pyromorphite, phosphosiderite.

**Distribution:** From Richelle, near Visé, Belgium.

**Name:** To honor Dr. Julien Drugman (1875–1950), Belgian mineralogist.

**Type Material:** Belgian Royal Institute of Natural Sciences, Brussels, RC5210; University of Liège, Liège, Belgium, 19347.

**References:** (1) van Tassel, R., A.-M. Fransolet, and K. Abraham (1979) Drugmanite, Pb<sub>2</sub>(Fe<sup>3+</sup>, Al)(PO<sub>4</sub>)<sub>2</sub>(OH)•H<sub>2</sub>O, a new mineral from Richelle, Belgium. *Mineral. Mag.*, 43, 463–467. (2) (1980) *Amer. Mineral.*, 65, 809 (abs. ref. 1). (3) King, G.S.D. and L. Sengier-Roberts (1988) Drugmanite, Pb<sub>2</sub>(Fe<sub>0.78</sub>Al<sub>0.22</sub>)H(PO<sub>4</sub>)<sub>2</sub>(OH)<sub>2</sub>: its crystal structure and place in the datolite group. *Bull. Minéral.*, 111, 431–437.