Legrandite $Zn_2(AsO_4)(OH)\cdot H_2O$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As prismatic crystals, elongated along [001], to 28 cm, with dominant {110}, striated ‖ {001} and {$\bar{1}$11}, {100}, {001}; typically in sprays or sheaflike aggregates.

Physical Properties: *Cleavage:* Fair to poor on {100}. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 4.5 D(meas.) = 3.98–4.01 D(calc.) = 4.015

Optical Properties: Transparent to translucent. *Color:* Bright yellow, wax-yellow, colorless; pale yellow to colorless in transmitted light. *Luster:* Vitreous.
Optical Class: Biaxial (+). *Pleochroism:* $X = Y$ = colorless to yellow; Z = yellow. *Orientation:* $X = b$; $Z \wedge c = 40°$. *Dispersion:* $r < v$, distinct. $\alpha = 1.702(2)$ $\beta = 1.709(2)$ $\gamma = 1.740(2)$ 2V(meas.) = 50°

Cell Data: *Space Group:* $P2_1/c$. $a = 12.805(2)$ $b = 7.933(1)$ $c = 10.215(2)$ $\beta = 104°23.3(3)'$ Z = 8

X-ray Powder Pattern: Ojuela mine, Mexico.
4.08 (100), 6.68 (71), 5.93 (71), 3.09 (71), 4.19 (50), 12.36 (35), 3.03 (35)

Chemistry:

	(1)	(2)
As_2O_5	37.7	37.71
FeO	1.4	
MnO	1.7	
ZnO	50.1	53.42
H_2O^+	8.8	8.87
H_2O^-	0.1	
insol.	0.2	
Total	100.0	100.00

(1) Ojuela mine, Mexico; H_2O by the Penfield method. (2) $Zn_2(AsO_4)(OH)\cdot H_2O$.

Occurrence: An uncommon secondary mineral in the oxidized zone of Zn–As-bearing deposits; rare in granite pegmatite.

Association: Adamite, paradamite, köttigite, scorodite, smithsonite (Ojuela mine, Mexico); leiteite, smithsonite, reniérite (Tsumeb, Namibia); köttigite, adamite, pharmacosiderite, scorodite (Sterling Hill, New Jersey, USA).

Distribution: In Mexico, from the Flor de Peña mine, Lampazos, Nuevo León; large crystals found in the Ojuela mine, Mapimí, Durango; at the Potosí mine, Santa Eulalia, Chihuahua. From Tsumeb, Namibia. At Sterling Hill, Ogdensburg, Sussex Co., New Jersey, USA. In Japan, from the Ogibira mine, near Osa, Okayama Prefecture, and the Toroku mine, Miyazaki Prefecture. From Boa Vista, near Galiléia, Minas Gerais, Brazil.

Name: Honors a Mr. Legrand, Belgian mine manager, who collected the first specimen.

Type Material: The Natural History Museum, London, England, 1932,131; Harvard University, Cambridge, Massachusetts, 92567; National Museum of Natural History, Washington, D.C., USA, 114810.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 958–959. (2) Desautels, P.E. and R.S. Clarke, Jr. (1963) Re-examination of legrandite. Amer. Mineral., 48, 1258–1265. (3) McLean, W.J., J.W. Anthony, J.J. Finney, and R.B. Laughon (1971) The crystal structure of legrandite. Amer. Mineral., 56, 1147–1154.