

Parasymplesite



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Crystal Data: Monoclinic. *Point Group:* $2/m$. Prismatic crystals are elongated along $[001]$, flattened on $\{010\}$, with prominent $\{010\}$, $\{100\}$, $\{201\}$, $\{110\}$, $\{221\}$, $\{502\}$, $\{401\}$, many others, to 5 mm; usually in radiating sprays.

Physical Properties: *Cleavage:* On $\{010\}$, perfect. *Tenacity:* Flexible. Hardness = 2–3
D(meas.) = 3.07–3.12 D(calc.) = 3.10–3.13

Optical Properties: Semitransparent. *Color:* Pale blue to greenish blue, green to leek-green; in transmitted light, pale blue to colorless. *Streak:* Very pale blue or green. *Luster:* Vitreous to waxy.

Optical Class: Biaxial (+). *Pleochroism:* Weak; X = bluish green to pale blue; Y = yellowish to colorless; Z = brownish yellow to colorless. *Orientation:* X = b; Z \wedge c = 29°–31°. *Dispersion:* r < v. *Absorption:* X > Y = Z. $\alpha = 1.620\text{--}1.628$ $\beta = 1.648\text{--}1.660$ $\gamma = 1.685\text{--}1.705$
2V(meas.) = 86° 2V(calc.) = 85°

Cell Data: *Space Group:* $C2/m$. a = 10.335(4) b = 13.491(8) c = 4.777(2)
 $\beta = 105.04(4)^\circ$ Z = 2

X-ray Powder Pattern: Ojuela mine, Mapimí, Mexico.
6.68 (100), 3.013 (90), 7.91 (70), 3.237 (50), 2.749 (50), 4.407 (40), 2.469 (40)

Chemistry:

	(1)	(2)	(3)
As ₂ O ₅	38.43	38.12	38.99
Fe ₂ O ₃	0.81		
FeO	37.72	18.98	36.56
ZnO		16.86	
H ₂ O ⁺	12.70		
H ₂ O [−]	10.67		
H ₂ O			24.45
Total	100.33		100.00

(1) Kiura mine, Japan. (2) Ojuela mine, Mapimí, Mexico; by electron microprobe, partial analysis; corresponds to $(\text{Fe}_{1.68}\text{Zn}_{1.33})_{\Sigma=3.00}(\text{AsO}_4)_2 \cdot 8\text{H}_2\text{O}$. (3) $\text{Fe}_3(\text{AsO}_4)_2 \cdot 8\text{H}_2\text{O}$.

Polymorphism & Series: Dimorphous with symplesite; forms a series with köttigite.

Mineral Group: Vivianite group.

Occurrence: A rare secondary mineral in the oxide zone of some arsenic-rich hydrothermal base-metal mineral deposits.

Association: Symplesite, köttigite, pharmacosiderite, scorodite, arsenopyrite, löllingite.

Distribution: From the Kiura mine, Oita Prefecture, Japan. At the Kaatiala pegmatite, Kuortane, Finland. In the Glück Auf mine, Rauenthal, near Sainte-Marie-aux-Mines, Haut-Rhin, France. In Germany, in the Richelsdorf Mountains, Hesse; from St. Andreasberg, Harz Mountains; at the Clara mine, near Oberwolfach, and from Weiler, near Lahr, Black Forest; at Ramsbeck, North Rhein-Westphalia. From Mitterberg, Salzburg, Austria. At Laurium, Greece, in slag. From Bou Azzer, Morocco. Large crystals from the Ojuela mine, Mapimí, Durango, Mexico. At the White Elephant mine, near Pringle, Pennington Co., South Dakota, USA. In the Puttapa zinc mine, near Beltana, South Australia.

Name: From the Greek *para*, for *near*, and its dimorphous relation to *symplesite*.

Type Material: National Science Museum, Tokyo, Japan, M24052.

References: (1) Ito, T., H. Minato, and K. Sakurai (1954) Parasymplesite, a new mineral polymorphous with symplesite. Proc. Japan Acad., 30, 318–324. (2) (1955) Amer. Mineral., 40, 368 (abs. ref. 1). (3) Sturman, B.D. (1976) New data for köttigite and parasymplesite. Can. Mineral., 14, 437–441. (4) Cesbron, F., M.-C. Sichére, and H. Vachey (1977) Propriétés cristallographiques et comportement thermique des termes de la série köttigite–parasymplesite. Bull. Minéral., 100, 310–314 (in French with English abs.).

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