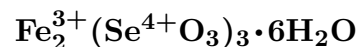


Mandarinoite



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Crystal Data: Monoclinic. *Point Group:* $2/m$. Crystals are swordlike, elongated along [001], flattened on {100}, exhibiting {100}, {110}, {011}, rarely $\{\bar{1}01\}$, to 3 mm; typically in rosettes and subparallel aggregates. *Twining:* Common as contact twins with {100}, twin and composition plane.

Physical Properties: *Cleavage:* Probable parting on {100}. *Hardness* = ~ 2.5
D(meas.) = 2.93(3) D(calc.) = 3.04

Optical Properties: Transparent. *Color:* Pale yellowish green; nearly colorless in thin section. *Streak:* Very pale green. *Luster:* Vitreous to slightly greasy. *Optical Class:* Biaxial (-). *Pleochroism:* X = colorless; $Y = Z$ = pale green. *Orientation:* $X = b$; $c \wedge Z = 2(1)^\circ$. *Dispersion:* Strong, crossed. *Absorption:* $X < Y \leq Z$. $\alpha = 1.715$
 $\beta = 1.797\text{--}1.80$ $\gamma = 1.86\text{--}1.87$ $2V(\text{meas.}) = 80^\circ\text{--}85^\circ$

Cell Data: *Space Group:* $P2_1/c$. $a = 16.810(4)$ $b = 7.880(2)$ $c = 10.019(2)$
 $\beta = 98.26(2)^\circ$ $Z = 4$

X-ray Powder Pattern: Pacajake mine, Bolivia.
7.10 (100), 2.977 (70), 3.55 (50), 3.43 (40), 2.804 (20), 1.521 (15), 1.482 (15)

Chemistry:

	(1)	(2)
SeO ₂	59.53	55.42
Fe ₂ O ₃	28.68	26.59
H ₂ O	[11.79]	17.99
Total	[100.00]	100.00

(1) Pacajake mine, Bolivia; by electron microprobe, average of two analyses, Fe³⁺ confirmed by microchemical tests, H₂O by difference, with about 1/3 apparently lost to heating in the electron beam; corresponds to Fe_{2.01}Se_{2.99}O₉•3.65H₂O. (2) Fe₂(SeO₃)₃•6H₂O as determined by crystal-structure analysis.

Occurrence: Probably formed by the simultaneous oxidation of penroseite and pyrite in a selenium-rich ore deposit (Pacajake mine, Bolivia).

Association: Penroseite, siderite, goethite, quartz (Pacajake mine, Bolivia); chalcomenite, krutaite (El Dragón mine, Bolivia); chlorargyrite (De Lamar mine, Idaho, USA); poughite (El Plomo mine, Honduras).

Distribution: In Bolivia, from the Pacajake mine, Hiaco, 30 km east-northeast of Colquechaca, and at the El Dragón mine, 30 km southwest of Cerro Rico de Potosí, Potosí, Bolivia. In the USA, from the De Lamar mine, Silver City, Owyhee Co., Idaho; in the Gold Quarry mine, near Carlin, Maggie Creek district, Eureka Co., and as large crystals from the Wind Mountain mine, San Emidio district, Washoe Co., Nevada; at Darwin, Inyo Co., California. From the El Plomo mine, Ojojona district, Tegucigalpa, Honduras. In the Skouriotissa mine, Cyprus. From the Baccu Locci mine, near Villaputzzu, Sarrabus district, Sardinia, Italy.

Name: To honor Dr. Joseph Anthony Mandarino (1929–), American–Canadian mineralogist, Emeritus Curator of Mineralogy, Royal Ontario Museum, Toronto, Canada.

Type Material: Royal Ontario Museum, Toronto, Canada, 35273; Harvard University, Cambridge, Massachusetts, 111364, 111368D; National Museum of Natural History, Washington, D.C., USA, 142878.

References: (1) Dunn, P.J., D.R. Peacor, and B.D. Sturman (1978) Mandarinoite, a new ferric-iron selenite from Bolivia. *Can. Mineral.*, 16, 605–609. (2) (1980) *Amer. Mineral.*, 65, 206 (abs. ref. 1). (3) Lasmanis, R., J. Nagel, B.D. Sturman, and R.I. Gait (1981) Mandarinoite from the De Lamar mine, Owyhee County, Idaho, U.S.A. *Can. Mineral.*, 19, 409–410. (4) Hawthorne, F.C. (1984) The crystal structure of mandarinoite, Fe₂³⁺Se₃O₉•6H₂O. *Can. Mineral.*, 22, 475–480.

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