

Strontio-orthojoaquinite

Crystal Data: Orthorhombic. *Point Group:* mm2. In aggregates of angular grains to 3 mm.
Twinning: Forms polysynthetic twins.

Physical Properties: *Cleavage:* Perfect on {001}. Hardness = 5-5.5 D(meas.) = 3.62
D(calc.) = 3.87

Optical Properties: Transparent. *Color:* Yellow to brownish yellow. *Luster:* n.d.
Optical Class: Biaxial (+). $\alpha = 1.707(3)$ $\beta = \text{n.d.}$ $\gamma = 1.778(3)$ $2V(\text{meas.}) = 42-48^\circ$
Pleochroism: Weak; X = Y = colorless, Z = pale yellow.

Cell Data: *Space Group:* $P2_1am$. $a = 10.602(9)$ $b = 9.841(9)$ $c = 22.621(16)$ $Z = [4]$

X-ray Powder Pattern: Ohmi region, Niigata prefecture, Japan.
2.799 (100), 2.611 (41), 2.966 (36), 4.47 (33), 2.441 (32), 2.239 (31), 5.60 (30)

Chemistry:	(1)	(2)		(1)	(2)
SiO ₂	35.12	40.16	CaO	trace	0.00
TiO ₂	12.48	12.87	SrO	5.85	13.71
Al ₂ O ₃	0.27	0.10	BaO	31.31	25.58
ZrO	0.19	0.06	Na ₂ O	2.74	2.98
RE ₂ O ₃	1.12	0.13	K ₂ O	0.94	0.02
Nb ₂ O ₅	1.42	0.00	H ₂ O ⁺	2.59	n.d.
FeO	4.75	4.90	<u>H₂O⁻</u>	<u>0.47</u>	<u>n.d.</u>
MnO	trace	0.16	Total	99.28	100.79
MgO	0.03	0.12			

(1) Ohmi, Japan; method of analysis not given, original total given as 99.36%; corresponds to $(\text{Ba}_{2.76}\text{Sr}_{0.76}\text{RE}_{0.12}\text{Mg}_{0.01})_{\Sigma=3.65}(\text{Na}_{1.20}\text{Fe}^{2+}_{0.91}\text{Nb}_{0.13}\text{K}_{0.03}\text{Zr}_{0.02})_{\Sigma=2.29}\text{Ti}_{2.13}(\text{Si}_{7.98}\text{Al}_{0.06})_{\Sigma=8.04}\text{O}_{24.66}(\text{OH})_{3.02}$.
(2) Ohmi region, central Japan; 4O polytype; electron microprobe analysis corresponds to $(\text{Ba}_{1.99}\text{Sr}_{1.58}\text{RE}_{0.02}\text{Mg}_{0.04})_{\Sigma=3.63}(\text{Na}_{1.15}\text{Fe}^{2+}_{0.74}\text{K}_{0.01}\text{Zr}_{0.01})_{\Sigma=1.91}\text{Ti}_{1.92}(\text{Si}_{7.98}\text{Al}_{0.02})_{\Sigma=8.00}\text{O}_{24.66}(\text{OH})_{3.02}$.

Polymorphism & Series: Dimorphous with strontiojoaquinite; 1M, 2O and 4O polytypes.

Mineral Group: Joaquinite group.

Occurrence: In an amphibole-albite block embedded in serpentinite.

Association: Benitoite, leucosphenite, ohmilite, Sr-apatite, albite.

Distribution: Ohmi region, Niigata prefecture, Japan.

Name: For its ORTHORhombic symmetry, and relation to *strontiojoaquinite*.

Type Material: n.d.

References: (1) Chihara, K., M. Komatsu, and T. Mizota (1974) A joaquinite-like mineral from Ohmi, Niigata Prefecture, Central Japan. *Mineral. J.*, 7, 395-399. (2) Kato, T. and T. Mizota (1990) The crystal structure of strontio-orthojoaquinite. *Journal of the Faculty of Liberal Arts, Yamaguchi University (Natural Science)*, 24, 23-32. (3) Mashima, H. and J. Akai (2008) Four-layer orthorhombic polytype (4O) in strontio-joaquinite group minerals found in the Ohmi region, central Japan. *J. Mineral. and Petrol. Sci.*, 103 (6), 407-411. (4) Sakai, M. and J. Akai (1994) Strontium, barium and titanium-bearing minerals and their host rocks from Ohmi, Japan. *Science Reports of Niigata University, Series E: Geology and Mineralogy*, 9, 97-118.