

**Orthojoaquinite-(La)**

**Crystal Data:** Orthorhombic. *Point Group:* 2/m 2/m 2/m. As masses of bent flakes, to 1 mm.

**Physical Properties:** *Cleavage:* Good on {001}. *Fracture:* n.d. *Tenacity:* n.d. *Hardness* = ~ 5  
VHN = 350-430. D(meas.) = 4.1 D(calc.) = 4.14

**Optical Properties:** Transparent. *Color:* Brown. *Streak:* n.d. *Luster:* Silky.  
*Optical Class:* Biaxial (+).  $\alpha = 1.754$   $\beta = 1.760$   $\gamma = 1.797$   $2V(\text{meas.}) = 40^\circ$   $2V(\text{calc.}) = 45^\circ$   
*Pleochroism:* Strong, yellow-green. *Absorption:*  $Z > X$ . *Orientation:*  $Z = c$ .

**Cell Data:** Space Group: *Ccmm* (probable).  $a = 10.539(10)$   $b = 9.680(5)$   $c = 22.345(10)$   $Z = 4$

**X-ray Powder Pattern:** Ilímaussaq alkaline complex, Greenland.  
2.80 (100), 5.58 (68), 2.95 (17), 1.596 (13), 2.91 (10), 3.00 (9), 2.232 (8)

Chemistry:	(1)		(1)
Na <sub>2</sub> O	2.41	Pr <sub>2</sub> O <sub>3</sub>	[0.99]
K <sub>2</sub> O	0.22	Nd <sub>2</sub> O <sub>3</sub>	[2.15]
CaO (+SrO)	0.03	SiO <sub>2</sub>	33.82
MnO	0.70	TiO <sub>2</sub>	9.20
FeO	4.78	ThO <sub>2</sub>	0.38
BaO	21.46	Nb <sub>2</sub> O <sub>5</sub>	2.31
Fe <sub>2</sub> O <sub>3</sub>	0.39	H <sub>2</sub> O	1.50
La <sub>2</sub> O <sub>3</sub>	[10.05]	F	0.38
Ce <sub>2</sub> O <sub>3</sub>	[9.40]	<u>-O = F<sub>2</sub></u>	<u>0.16</u>
		Total	100.01

(1) Ilímaussaq alkaline complex, Greenland; wet chemical analysis, supplemented by IR spectroscopy, rare-earths calculated from total (REE)<sub>2</sub>O<sub>3</sub>; corresponds to (Ba<sub>1.99</sub>Ca<sub>0.01</sub>)<sub>Σ=2.00</sub> (Na<sub>1.11</sub>K<sub>0.07</sub>)<sub>Σ=1.18</sub> (La<sub>0.88</sub>Ce<sub>0.81</sub>Nd<sub>0.18</sub>Pr<sub>0.09</sub>)<sub>Σ=1.96</sub> (Fe<sup>2+</sup><sub>0.95</sub>Mn<sub>0.14</sub>)<sub>Σ=1.09</sub> (Ti<sub>1.64</sub>Nb<sub>0.25</sub>Fe<sup>3+</sup><sub>0.07</sub>Th<sub>0.02</sub>)<sub>Σ=1.98</sub> Si<sub>8.01</sub>O<sub>26.00</sub>[(OH)<sub>0.37</sub>O<sub>0.35</sub>F<sub>0.28</sub>]<sub>Σ=1.00</sub>•1.00H<sub>2</sub>O.

**Polymorphism & Series:** Dimorphous with joaquinite-(La).

**Mineral Group:** Joaquinite group.

**Occurrence:** In the intermediate zone of nepheline-sodalite syenite pegmatite in an alkaline igneous complex.

**Association:** Riebeckite, analcime, sodalite, steenstrupine-(Ce).

**Distribution:** From the Ilímaussaq alkaline complex, on the right bank of the Narsaq River at the foot of Kvanefjeld Mountain, south Greenland.

**Name:** An orthorhombic member of the *joaquinite* group with *La* as the dominant rare-earth element.

**Type Material:** n.d.

**References:** (1) Semenov, E.I., V.I. Bukin, Yu.A. Balashov, and H. Sørensen (1967) Rare earths in minerals of the joaquinite group. *Amer. Mineral.*, 52, 1762-1769. (2) Matsubara, S., J.A. Mandarino, and E.I. Semenov (2001) Redefinition of a mineral in the joaquinite group: orthojoaquinite-(La). *Can. Mineral.*, 39, 757-760. (3) (2002) *Amer. Mineral.*, 87, 355 (abs. ref. 2).