

Stillwellite-(Ce)**(Ce, La, Ca)BSiO₅**

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Crystal Data: Hexagonal. *Point Group:* 3. As flat rhombohedral crystals, to 4 cm, and massive. *Twinning:* Observed about [100].

Physical Properties: *Cleavage:* One imperfect. *Fracture:* Conchoidal. Hardness = ~6.5
D(meas.) = 4.57–4.60 D(calc.) = 4.67

Optical Properties: Transparent to translucent. *Color:* Red-brown to pale pink; colorless in thin section. *Streak:* White.

Optical Class: Uniaxial (+) to biaxial (+). $\omega = 1.765\text{--}1.784$ $\epsilon = 1.780\text{--}1.787$
2V(meas.) = 0°–6°

Cell Data: *Space Group:* P3₁. $a = 6.841\text{--}6.844$ $c = 6.700\text{--}6.702$ Z = 3

X-ray Powder Pattern: Mary Kathleen mine, Australia.

3.43 (s), 2.96 (s), 2.13 (ms), 4.44 (m), 1.864 (m), 2.71 (mw), 2.24 (mw)

Chemistry: (1)		(2)	(1)		(2)	(1)		(2)
SiO ₂	22.40	22.06	La ₂ O ₃	27.95	19.12	MgO	0.06	
UO ₂		0.22	Ce ₂ O ₃	33.15	30.82	CaO	0.95	0.34
ThO ₂		5.41	Pr ₂ O ₃		1.82	F	0.30	
B ₂ O ₃	12.23	[13.46]	Nd ₂ O ₃		5.36	H ₂ O ⁺	0.85	
Al ₂ O ₃	0.42		Sm ₂ O ₃		0.34	H ₂ O ⁻	0.10	
Y ₂ O ₃	0.74	0.28	Fe ₂ O ₃	0.18		P ₂ O ₅	0.67	
						Total	[100.00]	[99.26]

(1) Mary Kathleen mine, Australia; recalculated to 100.00% after removal of very small amounts of uraninite and apatite determined by separate analysis. (2) Vico volcano, near Vetralla, Italy; by electron microprobe, B₂O₃ calculated from stoichiometry, original total given as 99.23%; corresponds to (Ce_{0.50}La_{0.31}Nd_{0.08}Th_{0.05}Pr_{0.03}Ca_{0.02}Sm_{0.01})_{Σ=1.00}B_{1.02}Si_{0.97}O₅.

Occurrence: Locally abundant as a metasomatic replacement of metamorphosed calcareous sediments (Mary Kathleen mine, Australia); in alkalic pegmatites in syenite in an alkalic massif (Dara-i-Pioz massif, Tajikistan).

Association: Allanite, garnet, uraninite (Mary Kathleen mine, Australia); calcite, monazite, bastnäsite, thorite, uranothorite, thorianite (Desmont mine, Canada); pyrochlore, tienshanite, sogdianite, thorite, cesium kupletskite, reedmergerite, steacyite, pectolite, quartz (Dara-i-Pioz massif, Tajikistan).

Distribution: In the Mary Kathleen mine, about 55 km east of Mt. Isa, Queensland, Australia. At the Desmont mine, near Wilberforce, Ontario, and at Mont Saint-Hilaire, Quebec, Canada. From Mineville, Essex Co., New York, USA. Large crystals in the Dara-i-Pioz massif, Alai Range, Tien Shan, Tajikistan. From the Inagli massif, 30 km west of Aldan, Yakutia, Russia. Found around the Langesundsfjord, Norway. In the Ilímaussaq intrusion, southern Greenland. At Bassano Romano and on the Vico volcano, near Vetralla, Lazio, Italy.

Name: For Dr. Frank Leslie Stillwell (1888–1963), Australian ore mineralogist, and its predominant *cerium* content.

Type Material: National Museum of Natural History, Washington, D.C., USA, 113038.

References: (1) McAndrew, J. and T.R. Scott (1955) Stillwellite, a new rare-earth mineral from Queensland. *Nature*, 176, 509–510. (2) (1956) *Amer. Mineral.*, 41, 370 (abs. ref. 1). (3) Gay, P. (1957) An X-ray investigation of some rare-earth silicates: cerite, lessingite, beckelite, britholite, and stillwellite. *Mineral. Mag.*, 31, 455–468. (4) Dusmatov, V.D., A.F. Efimov, and Y.I. Semenov (1963) First discoveries of stillwellite in the USSR. *Doklady Acad. Nauk SSSR*, 153, 913–915 (in Russian). (5) Dusmatov, V.D. (1964) First discovery of stillwellite in USSR. *Dokl. Akad. Nauk Tadzh. SSR*, 7, 33–35. (6) Callegari, A., G. Giuseppetti, F. Mazzi, and C. Tadini (1992) The refinement of the crystal structure of stillwellite: RE[BSiO₅]. *Neues Jahrb. Mineral., Monatsh.*, 49–57. (7) Burns, P.C., F.C. Hawthorne, D.J. MacDonald, G.D. Ventura, and G.C. Parodi (1993) The crystal structure of stillwellite. *Can. Mineral.*, 31, 147–152.

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