

**Crichtonite****(Sr, La, Ce, Y)(Ti, Fe<sup>3+</sup>, Mn)<sub>21</sub>O<sub>38</sub>**

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**Crystal Data:** Hexagonal. *Point Group:*  $\bar{3}$ . As elongated rhombohedral crystals, to 1.2 cm, with prominent basal face and striae on the primary rhombohedron. *Twinning:* Polysynthetic, probable.

**Physical Properties:** Hardness = 4.5–5 D(meas.) = 4.46(4) D(calc.) = [4.55]

**Optical Properties:** Opaque. *Color:* Black. *Luster:* Metallic, dull to bright.

*Optical Class:* Uniaxial.

R<sub>1</sub>–R<sub>2</sub>: n.d.

**Cell Data:** *Space Group:*  $R\bar{3}$ . *a* = 10.374(3) *c* = 20.746(6) *Z* = 3

**X-ray Powder Pattern:** Bourg d'Oisans, France.

3.39 (s), 2.875 (s), 2.131 (s), 2.838 (ms), 2.243 (ms), 1.796 (ms), 0.90061 (ms)

**Chemistry:**

	(1)	(2)		(1)	(2)
U <sub>3</sub> O <sub>8</sub>		0.40	Nd <sub>2</sub> O <sub>3</sub>	0.02	0.20
V <sub>2</sub> O <sub>5</sub>	0.61	0.45	Fe <sub>2</sub> O <sub>3</sub>	21.14	11.17
TiO <sub>2</sub>	60.49	61.38	Cr <sub>2</sub> O <sub>3</sub>	0.15	
ZrO <sub>2</sub>	0.10	0.10	FeO	8.18	12.28
HfO <sub>2</sub>	0.23	0.10	MnO	2.78	0.90
ThO <sub>2</sub>	0.01		ZnO		1.37
Al <sub>2</sub> O <sub>3</sub>	0.02	0.10	PbO	0.78	1.73
Sc <sub>2</sub> O <sub>3</sub>		0.46	CaO	0.06	0.10
Y <sub>2</sub> O <sub>3</sub>	0.21	2.50	SrO	4.17	3.67
La <sub>2</sub> O <sub>3</sub>	0.29	0.22	BaO		1.23
Ce <sub>2</sub> O <sub>3</sub>	0.27	0.35	rem.		0.21
Dy <sub>2</sub> O <sub>3</sub>		0.34			
			Total	99.51	99.26

(1) “Dauphiné region”, France; by electron microprobe, Fe<sup>2+</sup>:Fe<sup>3+</sup> calculated from crystal-structure analysis; corresponds to [Sr<sub>0.71</sub>(RE, Pb)<sub>0.19</sub>]<sub>Σ=0.90</sub>[Ti<sub>13.43</sub>Fe<sub>6.71</sub>Mn<sub>0.69</sub>(V, Cr)<sub>0.17</sub>]<sub>Σ=21.00</sub>O<sub>38</sub>. (2) Selva, Switzerland; by electron microprobe, remnant CoO, NiO, CuO, Fe<sup>2+</sup>:Fe<sup>3+</sup> determined separately; corresponding to [Sr<sub>0.65</sub>Ba<sub>0.15</sub>(RE, Ca, U)<sub>0.15</sub>Pb<sub>0.14</sub>]<sub>Σ=1.09</sub>[Ti<sub>14.06</sub>Fe<sub>3.13</sub>Fe<sub>2.56</sub>(Y, Zn, Mn, Sc, V, Al, RE)<sub>1.30</sub>]<sub>Σ=21.05</sub>O<sub>38</sub>.

**Mineral Group:** Crichtonite group.

**Occurrence:** In alpine-type fissure veins.

**Association:** Quartz, chlorite.

**Distribution:** From St. Christophe, Bourg d'Oisans, Isère, France. At Selva, Tavetsch, Graubünden and Wannigletscher, Binntal, Valais, Switzerland. In Russia, from the Khibiny massif, Kola Peninsula. At Fazenda Guariba, 40 km south of Diamantina, Minas Gerais, Brazil.

**Name:** For Sir Alexander A. Crichton (1763–1856), Scottish physician and mineral collector, once physician to the Russian Czar Alexander I.

**Type Material:** The Natural History Museum, London, England, 1926,1191.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 534 [crichtonite = ilmenite, in error]. (2) Hey, M.H., P.G. Embrey, and E.E. Fejér (1969) Crichtonite, a distinct species. *Mineral. Mag.*, 37, 349–356. (3) Grey, I.E., D.J. Lloyd, and J.S. White, Jr. (1976) The structure of crichtonite and its relationship to senaite. *Amer. Mineral.*, 61, 1203–1212. (4) Stalder, H.A. and C. Bühler (1987) Geochemische untersuchungen an Mineralien der Crichtonit-Gruppe aus alpinen Zerrklüften. *Schweiz. Mineral. Petrog. Mitt.*, 67, 93–102 (in German with English abs.).

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