

Sveinbergeite

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. Crystals lamellar, to 10 mm, in rosette-like divergent groups and spherical aggregates, also as scaly, radiating masses.

Physical Properties: *Cleavage:* Perfect on {001}. *Fracture:* Uneven. *Tenacity:* Flexible. Hardness = 3 D(meas.) = n.d. D(calc.) = 3.152

Optical Properties: Transparent. *Color:* Dark green. *Streak:* Pale green. *Luster:* Vitreous to pearly.

Optical Class: Biaxial (+). $\alpha = 1.745(2)$ $\beta = 1.746(2)$ $\gamma = 1.753(2)$ $2V(\text{meas.}) = 20(3)^\circ$ $2V(\text{calc.}) = 41.5^\circ$ *Orientation:* $X \wedge (001)$, $Y \wedge b = 12^\circ$, $Z = a$. *Pleochroism:* Medium, $Z = \text{deep green}$, $X = Y = \text{brownish green}$. *Absorption:* $Z > X \sim Y$.

Cell Data: *Space Group:* $P\bar{1}$. $a = 5.329(4)$ $b = 11.803(8)$ $c = 11.822(8)$ $\alpha = 101.140(8)^\circ$ $\beta = 98.224(8)^\circ$ $\gamma = 102.442(8)^\circ$ $Z = 1$

X-ray Powder Pattern: Buer syenite pegmatite, Larvik plutonic complex, Oslo Region, Norway. 11.395 (100), 2.880 (38), 2.640 (31), 1.643 (24), 2.492 (20), 1.616 (15), 1.573 (14)

Chemistry:	(1)	(2)		(1)	(2)
Nb ₂ O ₅	0.55		CaO	3.87	4.23
TiO ₂	10.76	12.06	MgO	0.52	
ZrO ₂	0.48		K ₂ O	0.49	
SiO ₂	34.41	36.29	Na ₂ O	0.27	
Al ₂ O ₃	0.34		F	0.24	
Fe ₂ O ₃	5.57	6.03	H ₂ O	[8.05]	8.84
FeO	29.39	32.54	-O=F	0.10	
MnO	1.27		Total	96.11	100.00

(1) Buer syenite pegmatite, Larvik plutonic complex, Oslo Region, Norway; electron microprobe analysis, Fe²⁺/Fe³⁺ ratio calculated from structure re data, H₂O calculated from structure analysis and OH confirmed by IR, corresponding to (Ca_{0.95}Na_{0.12}K_{0.14}) $\Sigma=1.21$ Fe²⁺_{5.65}Fe³⁺_{0.93}Mn_{0.25}Mg_{0.18}) $\Sigma=7.01$ (Ti_{1.86}Nb_{0.06}Zr_{0.05}Fe³⁺_{0.03}) $\Sigma=2$ (Si_{7.91}Al_{0.09}) $\Sigma=8$ O_{34.61}H_{12.34}F_{0.17}. (2) Ca(Fe₆²⁺Fe³⁺)Ti₂(Si₄O₁₂)₂O₂(OH)₅(H₂O)₄.

Mineral Group: Astrophyllite group.

Occurrence: A late forming mineral in cavities in syenite pegmatite in an alkaline plutonic complex.

Association: Microcline, magnesiokatophorite, aenigmatite, aegirine, albite, calcite, fluorapatite, molybdenite, galena, a hochelagaite-like mineral.

Distribution: Buer syenite pegmatite, Larvik plutonic complex, Vesterøya peninsula, Sandefjord, Oslo Region, Norway.

Name: Honors Svein Arne Berge (b. 1949), the Norwegian amateur mineralogist who observed and collected the first specimens.

Type Material: A.E. Fersman Mineralogical Museum, Academy of Science, Moscow, Russia (3966) and the Natural History Museum, Section of Geology, University of Oslo, Norway (42259 and 42260).

References: (1) Khomyakov, A.P., F. Cámara, E. Sokolova, Y. Abdu, and F.C. Hawthorne (2011) Sveinbergeite, Ca(Fe₆²⁺Fe³⁺)Ti₂(Si₄O₁₂)₂O₂(OH)₅(H₂O)₄, a new astrophyllite-group mineral from the Larvik Plutonic Complex, Oslo Region, Norway: Description and crystal structure. *Mineralogical Magazine*, 75, 2687-2702. (2) (2014) *Amer. Mineral.*, 99, 873-874 (abs. ref. 1).