

Kochite**Ca₂MnZrNa₃Ti(Si₂O₇)₂(OF)₂**

Crystal Data: Triclinic. *Point Group:* $\bar{1}$. As lath-shaped to acicular grains, elongate along [010], in parallel to subparallel aggregates to 1.0 mm.

Physical Properties: *Cleavage:* Perfect {100}. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 5 (by analogy to rosenbuschite) D(meas.) = 3.32(1) D(calc.) = 3.31

Optical Properties: Transparent. *Color:* Pale brown. *Streak:* n.d. *Luster:* Vitreous. *Optical Class:* Biaxial (+). $\alpha = 1.684(2)$ $\beta = 1.695(4)$ $\gamma = 1.718(2)$ $2V(\text{meas.}) = 73(2)^\circ$ $2V(\text{calc.}) = 70^\circ$ *Orientation:* $X = c$, $Z \wedge [100] = \sim 20^\circ$. *Pleochroism:* Weak, $X =$ colorless, $Z =$ pale yellow.

Cell Data: *Space Group:* $P\bar{1}$. $a = 10.032(2)$ $b = 11.333(2)$ $c = 7.202(1)$ $\alpha = 90.192(4)^\circ$ $\beta = 100.334(5)^\circ$ $\gamma = 111.551(4)^\circ$ $Z = 2$

X-ray Powder Pattern: Hvide Ryg, Werner Bjergerange, eastern coast of Greenland. 2.908 (100), 2.600 (80), 3.028 (60), 1.868 (60), 1.670 (50), 3.951 (30), 2.462 (20)

Chemistry:	(1)		(1)
Na ₂ O	10.33	Ce ₂ O ₃	0.57
CaO	21.39	SiO ₂	31.55
SrO	0.12	TiO ₂	8.44
MgO	0.01	ZrO ₂	12.12
MnO	4.92	HfO ₂	0.09
FeO	1.08	Nb ₂ O ₅	1.86
Al ₂ O ₃	0.05	Ta ₂ O ₅	0.02
V ₂ O ₃	0.03	F	6.83
Y ₂ O ₃	0.39	<u>- O = F</u>	<u>2.88</u>
La ₂ O ₃	0.25	Total	97.71

(1) Hvide Ryg, Werner Bjergerange, eastern coast of Greenland; average of four electron microprobe analyses supplemented by IR spectroscopy; corresponds to (Na_{0.85}Sr_{0.01}) $\Sigma=0.86$ (Na_{1.38}Ca_{0.62}) $\Sigma=2.00$ (Ca_{1.70}Na_{0.30}) $\Sigma=2.00$ (Mn_{0.53}Ca_{0.41}Y_{0.02}Ce_{0.02}La_{0.01}) $\Sigma=0.98$ (Zr_{0.70}Fe_{0.12}Ca_{0.18}Hf_{0.005}) $\Sigma=1.00$ (Ti_{0.80}Nb_{0.10}Zr_{0.05}Al_{0.02}V_{0.01}) $\Sigma=0.98$ (Si₂O₇)₂F₂(O_{1.20}F_{0.74}) $\Sigma=1.94$.

Mineral Group: Seidozerite supergroup, rinkite group.

Occurrence: An accessory phase in nepheline syenite in an alkaline complex.

Association: Nepheline, alkali feldspar, l avenite.

Distribution: In a loose block found between the Sirius Glacier and the northern side of Hvide Ryg, Werner Bjergerange, eastern coast of Greenland.

Name: Honors Danish geologist Lauge *Koch* (1892-1964), who mapped Werner Bjergerange.

Type Material: Geological Museum, University of Copenhagen, Denmark (GM 2002.94).

References: (1) Christiansen, C.C., R.A. Gault, J.D. Grice, and O. Johnsen (2003) Kochite, a new member of the rosenbuschite group from the Werner Bjergerange alkaline complex, East Greenland. *Eur. J. Mineral.*, 15, 551-554. (2) (2004) *Amer. Mineral.*, 89(1), 250 (abs. ref. 1). (3) Sokolova E. and F. C amara (2017) The seidozerite supergroup of TS-block minerals: nomenclature and classification, with change of the following names: rinkite to rinkite-(Ce), mosandrite to mosandrite-(Ce), hainite to hainite-(Y) and innelite-1T to innelite-1A. *Mineral. Mag.*, 81(6), 1457-1484.