

Ferro-richterite**Na[NaCa](Fe²⁺, Mg)₅Si₈O₂₂(OH)₂**

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Crystal Data: Monoclinic. *Point Group:* 2/m. Crystals prismatic; in reticulated masses; as overgrowths on clinopyroxene. *Twinning:* [Simple or multiple twinning || {100}.]

Physical Properties: *Cleavage:* [Perfect on {110}, intersecting at ~56° and ~124°; partings on {100}, {001}.] *Fracture:* [Uneven.] *Tenacity:* [Brittle.] *Hardness:* = 5–6 *D(meas.)* = n.d. *D(calc.)* = 3.46 (synthetic ferro-richterite).

Optical Properties: Semitransparent. *Color:* Brown to green. *Streak:* [White.] *Luster:* [Vitreous.]

Optical Class: Biaxial (-). *Pleochroism:* Strong; X = yellow; Y = blue-black; Z = dark blue-green. *Orientation:* Y = b. *Dispersion:* r < v. α = 1.688 β = 1.699 γ = 1.704 2V(meas.) = 35°

Cell Data: *Space Group:* [C2/m.] a = 9.982(7) (synthetic ferro-richterite). b = 18.223(6) c = 5.298(5) β = 103°44(7)' Z = 2

X-ray Powder Pattern: Synthetic ferro-richterite.

8.58 (100), 2.739 (70), 3.18 (65), 2.540 (50), 3.43 (35), 2.615 (35), 3.32 (25)

Chemistry:	(1)	(2)		(1)	(2)
SiO ₂	48.85	51.15	MnO	1.31	1.84
TiO ₂	1.02	1.33	MgO	4.20	8.08
Al ₂ O ₃	2.39	1.35	CaO	6.10	5.04
Fe ₂ O ₃		0.82	Na ₂ O	4.37	6.62
Cr ₂ O ₃	0.04		K ₂ O	1.24	1.10
FeO	30.19	20.98	Total	[99.71]	98.31

(1) Baie-des-Moutons, Quebec, Canada; by electron microprobe, Fe²⁺:Fe³⁺ calculated from stoichiometry, original total given as 99.68%, corresponding to (Na_{0.59}K_{0.25})_{Σ=0.84}(Ca_{1.02}Na_{0.73}Mn_{0.17}Fe_{0.08}²⁺)_{Σ=2.00}(Fe_{3.85}²⁺Mg_{0.98}Ti_{0.12}Al_{0.05})_{Σ=5.00}(Si_{7.61}Al_{0.39})_{Σ=8.00}O₂₂(OH)₂. (2) Kangerdlugssuaq Fjord, Greenland; by electron microprobe, Fe²⁺:Fe³⁺ calculated; corresponding to (Na_{0.77}K_{0.21})_{Σ=0.98}(Ca_{1.82}Na_{0.18})_{Σ=2.00}(Fe_{2.67}²⁺Mg_{1.83}Mn_{0.24}Ti_{0.15}Fe_{0.09}³⁺Al_{0.02})_{Σ=5.00}(Si_{7.78}Al_{0.22})_{Σ=8.00}O₂₂(OH)₂.

Polymorphism & Series: Forms a series with richterite.

Mineral Group: Amphibole (sodic-calcic) group: Mg/(Mg + Fe²⁺) < 0.5; (Na + K)_A ≥ 0.5; 0.67 Na_B 1.33; (Ca + Na)_B ≥ 1.34; Si ≥ 7.5.

Occurrence: A rare accessory mineral in sodium-rich syenites and their volcanic equivalents; replacing ferromagnesian minerals in granite.

Association: Feldspar, pyroxenes, zircon, fayalite, ferro-actinolite.

Distribution: From the Baie-des-Moutons complex, La Tabatière, Quebec, Canada. At the Kangerdlugssuaq Fjord, Greenland. From the Tibchi ring complex, Nigeria.

Name: For the *ferrous* iron in its composition and similarity to *richterite*.

Type Material: n.d.

References: (1) Deer, W.A., R.A. Howie, and J. Zussman (1963) Rock-forming minerals, v. 2, chain silicates, 352–358. (2) Charles, R.W. (1974) The physical properties of the Mg–Fe richterites. *Amer. Mineral.*, 59, 518–528. (3) Lalonde, A.E. and R.F. Martin (1983) The Baie-des-Moutons syenitic complex, La Tabatière, Québec: II. The ferromagnesian minerals. *Can. Mineral.*, 21, 81–91. (4) Brooks, C.K. and R.C.O. Gill (1982) Compositional variation in the pyroxenes and amphiboles of the Kangerdlugssuaq intrusion, East Greenland: further evidence for the crustal contamination of syenite magma. *Mineral. Mag.*, 45, 1–9. (5) Ike, E.C., P. Bowden, and R.F. Martin (1985) Amphibole in the porphyries of the Tibchi anorogenic ring-complex, Nigeria: product of deuteric adjustments. *Can. Mineral.*, 23, 447–456.

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