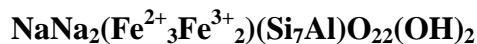


Ferro-ferri-nybøite

Crystal Data: Monoclinic. *Point Group:* 2/m. Crystals are stubby prismatic, elongated along [001] and displaying {100} and {110}, to 3 cm.

Physical Properties: *Cleavage:* Perfect on {110}, (planes intersecting at $\sim 56^\circ$). *Fracture:* Splintery. *Tenacity:* Brittle. Hardness = ~ 6 D(meas.) = n.d. D(calc.) = 3.424

Optical Properties: Translucent. *Color:* Jet-black. *Streak:* Grayish green to black. *Luster:* Vitreous. *Optical Class:* Biaxial. *Pleochroism:* Strong, shades of dark greenish blue to black.

Cell Data: *Space Group:* C2/m. $a = 9.9190(5)$ $b = 18.0885(8)$ $c = 5.3440(3)$ $\beta = 103.813(1)^\circ$ $Z = 2$

X-ray Powder Pattern: Poudrette quarry, Mont Saint-Hilaire, Québec, Canada.
8.520 (100), 3.162 (55), 2.834 (24), 1.671 (19), 2.732 (10), 2.552 (10), 2.344 (9)

| Chemistry: | (1) | (1) | |
|--------------------------------|-------|---|--------|
| SiO ₂ | 45.80 | MgO | 0.23 |
| Al ₂ O ₃ | 3.11 | CaO | 0.99 |
| TiO ₂ | 0.50 | Na ₂ O | 8.01 |
| Fe ₂ O ₃ | 11.18 | K ₂ O | 1.30 |
| FeO | 23.45 | F | 0.81 |
| MnO | 2.28 | H ₂ O | [1.47] |
| ZnO | 0.12 | <u>$\frac{-\text{O}=\text{F}_2}{\text{Total}}$</u> | 0.34 |
| | | Total | 98.91 |

(1) Poudrette quarry, Mont Saint-Hilaire, Québec, Canada; average of 10 electron microprobe analyses supplemented by Mossbauer spectroscopy, H₂O calculated from stoichiometry; corresponding to $(\text{Na}_{0.66}\text{K}_{0.27})_{\Sigma=0.93}(\text{Na}_{1.83}\text{Ca}_{0.17})_{\Sigma=2.00}(\text{Mg}_{0.06}\text{Fe}^{2+}_{3.15}\text{Mn}_{0.31}\text{Zn}_{0.01}\text{Fe}^{3+}_{1.38}\text{Ti}_{0.06}\text{Al}_{0.03})_{\Sigma=5.00}(\text{Si}_{7.35}\text{Al}_{0.65})_{\Sigma=8.00}\text{O}_{22}(\text{OH}_{1.58}\text{F}_{0.42})_{\Sigma=2.00}$.

Mineral Group: Amphibole supergroup, sodium amphibole subgroup.

Occurrence: The earliest mineral in an igneous microbreccia in an alkaline syenite-gabbro complex.

Association: An astrophyllite-group mineral, a eudialyte-group mineral, albite, nepheline.

Distribution: From Poudrette quarry, Mont Saint-Hilaire, La Vallée-du-Richelieu RCM, Montérégie (formerly Rouville County), Québec, Canada.

Name: Signifies an amphibole in the compositional range of nybøite with a dominance of Fe²⁺ and Fe³⁺ substituting for Mg and Al respectively.

Type Material: Royal Ontario Museum, Toronto, Ontario, Canada (M55980).

References: (1) Lussier, A.J., F.C. Hawthorne, Y.A. Abdu, N.A. Ball, K.T. Tait, M.E. Back, A.H. Steede, R. Taylor, and A.M. McDonald (2014) Ferro-ferri-nybøite, $\text{NaNa}_2(\text{Fe}^{2+}_3\text{Fe}^{3+}_2)(\text{Si}_7\text{Al})\text{O}_{22}(\text{OH})_2$, a new clinopyroxene from Mont Saint-Hilaire, Québec, Canada: description and crystal structure. *Can. Mineral.*, 52(6), 1019-1026. (2) (2016) Amer. Mineral., 101, 1492 (abs. ref. 1). (3) Hawthorne, F.C., R. Oberti, G.E. Harlow, W.V. Maresch, R.F. Martin, J.C. Schumacher, and M.D. Welch (2012) Nomenclature of the amphibole supergroup. *Amer. Mineral.*, 97, 2031-2048.