

**Ferro-glaucophane****Na<sub>2</sub>[(Fe<sup>2+</sup>, Mg)<sub>3</sub>Al<sub>2</sub>]Si<sub>8</sub>O<sub>22</sub>(OH)<sub>2</sub>**

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**Crystal Data:** Monoclinic. *Point Group:* 2/*m*. [Elongated prismatic crystals.]*Twinning:* [Simple or multiple twinning || {100}.]**Physical Properties:** *Cleavage:* [Perfect on {110}, intersecting at ~58° and ~122°.]*Fracture:* [Conchoidal to uneven.] *Tenacity:* [Brittle.] *Hardness* = [6] *D*(meas.) = 3.18–3.34  
*D*(calc.) = 3.224**Optical Properties:** Semitransparent. *Color:* Blue to bluish gray. *Luster:* [Vitreous.]*Optical Class:* Biaxial (–). *Pleochroism:* Vivid; stronger with increasing iron content; *X* = colorless; *Y* = violet; *Z* = blue. *Orientation:* *Y* = *b*; *Z* ∧ *c* = 6°. *Dispersion:* *r* < *v*, weak.*α* = 1.62–1.64 *β* = 1.64–1.67 *γ* = 1.64–1.68 2*V*(meas.) = 42°–45°**Cell Data:** *Space Group:* *C*2/*m*. *a* = 9.587(4) *b* = 17.832(7) *c* = 5.315(2)*β* = 103.47(3)° *Z* = 2**X-ray Powder Pattern:** Bouehndep, New Caledonia. (ICDD 27-714).

8.31 (100), 3.06 (80), 2.756 (30), 2.701 (25), 4.47 (20), 3.23 (20), 3.35 (15)

| <b>Chemistry:</b>              | (1)   | (2)   |                   | (1)     | (2)   |
|--------------------------------|-------|-------|-------------------|---------|-------|
| SiO <sub>2</sub>               | 54.63 | 53.8  | MnO               | 0.08    | 0.1   |
| TiO <sub>2</sub>               | 0.06  |       | MgO               | 4.75    | 3.9   |
| Al <sub>2</sub> O <sub>3</sub> | 11.02 | 10.1  | CaO               | 0.98    | 0.9   |
| Fe <sub>2</sub> O <sub>3</sub> | 2.76  | 4.0   | Na <sub>2</sub> O | 6.25    | 6.8   |
| FeO                            | 16.02 | 17.88 | K <sub>2</sub> O  | 0.01    |       |
|                                |       |       | Total             | [96.56] | 97.48 |

(1) Calabria, Italy; by electron microprobe, Fe<sup>2+</sup>:Fe<sup>3+</sup> from Mössbauer spectroscopy, original total given as 97.56%; corresponding to (Na<sub>1.75</sub>Ca<sub>0.15</sub>)<sub>Σ=1.90</sub>(Fe<sub>1.94</sub><sup>2+</sup>Al<sub>1.83</sub>Mg<sub>1.03</sub>Fe<sub>0.31</sub><sup>3+</sup>Ti<sub>0.01</sub>Mn<sub>0.01</sub>)<sub>Σ=5.13</sub>(Si<sub>7.94</sub>Al<sub>0.06</sub>)<sub>Σ=8.00</sub>O<sub>22</sub>(OH)<sub>2</sub>. (2) Bouehndep, New Caledonia; by electron microprobe, FeO determined by wet chemical analysis, corresponding to (Na<sub>1.91</sub>Ca<sub>0.14</sub>)<sub>Σ=2.05</sub>(Fe<sub>2.17</sub><sup>2+</sup>Mg<sub>0.84</sub>)<sub>Σ=3.01</sub>(Al<sub>1.51</sub>Fe<sub>0.44</sub><sup>3+</sup>Mn<sub>0.01</sub>)<sub>Σ=1.96</sub>(Si<sub>7.79</sub>Al<sub>0.21</sub>)<sub>Σ=8.00</sub>O<sub>22</sub>(OH)<sub>2</sub>.

**Polymorphism & Series:** Forms a series with glaucophane.**Mineral Group:** Amphibole (alkali) group: Fe<sup>2+</sup>/(Fe<sup>2+</sup> + Mg) ≥ 0.5; Fe<sup>3+</sup>/(Fe<sup>3+</sup> + Al<sup>vi</sup>) < 0.3; (Na + K)<sub>A</sub> < 0.5; Na<sub>B</sub> ≥ 1.34.**Occurrence:** In metamorphic rocks of the high-pressure, low-temperature blueschist facies, commonly derived from either siliceous sedimentary, alkalic basaltic, or felsic volcanic predecessors.**Association:** Paragonite, lawsonite, albite, spessartine, almandine, epidote, omphacite.**Distribution:** Widespread. Representative occurrences include: from Bouehndep, and near Ouégoa, New Caledonia. At Champ de Praz, Val d'Aosta, Italy. From near Menai Bridge, Anglesey, Wales. In Scotland, from near Heriot. On the Ile de Groix, Bay of Biscay, off Morbihan, France.**Name:** For its high *ferrous* iron content and similarity to *glaucophane*.**Type Material:** n.d.

**References:** (1) Hoffmann, C. (1972) Natural and synthetic ferroglaucophane. *Contr. Mineral. Petrol.*, 34, 135–149. (2) Hawthorne, F.C. (1979) The crystal chemistry of the amphiboles. X. Refinement of the crystal structure of ferroglaucophane and an ideal polyhedral model for clinoamphiboles. *Can. Mineral.*, 17, 1–10. (3) Hoffmann, C. and K. Katz (1982) Trend surface analysis of some physical properties of alkali (sodic) amphiboles. *Lithos*, 15, 17–25. (4) Phillips, W.R. and D.T. Griffen (1981) Optical mineralogy, 237–241.

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