

Fluor-dravite**NaMg₃Al₆Si₆O₁₈(BO₃)₃(OH)₃F**

Crystal Data: Hexagonal. *Point Group:* 3m. As irregular grains to a few mm.

Physical Properties: *Cleavage:* None. *Fracture:* Conchoidal. *Tenacity:* Brittle.
Hardness = 7 D(meas.) = n.d. D(calc.) = 3.120

Optical Properties: Transparent. *Color:* Blackish brown. *Streak:* Pale brown. *Luster:* Vitreous.
Optical Class: Uniaxial (-). $\omega = 1.645(2)$ $\epsilon = 1.621(2)$ *Pleochroism:* O = pale yellow-brown; E = colorless.

Cell Data: *Space Group:* R3m. $a = 15.955(3)$ $c = 7.153(2)$ $Z = 3$

X-ray Powder Pattern: Crabtree emerald mine, Mitchell County, North Carolina, USA.
3.475 (100), 2.583 (67), 2.961 (60), 1.920 (27), 3.998 (22), 6.375 (19), 2.043 (19)

| Chemistry: | (1) | (2) | | (1) | (2) |
|--------------------------------|-------|-------|-------------------------------|---------|--------|
| SiO ₂ | 36.02 | 36.35 | Na ₂ O | 2.80 | 6.25 |
| Al ₂ O ₃ | 31.69 | 30.84 | TiO ₂ | 0.25 | |
| FeO | 6.41 | | F | 1.45 | 1.92 |
| MnO | 0.67 | | B ₂ O ₃ | [10.91] | 10.53 |
| ZnO | 0.05 | | Li ₂ O | [0.19] | 1.92 |
| CaO | 0.25 | | H ₂ O | [3.19] | 2.73 |
| MgO | 7.71 | 12.19 | - O = F ₂ | 0.61 | 0.81 |
| | | | Total | 101.00 | 100.00 |

(1) Crabtree emerald mine, Mitchell County, North Carolina, USA; average of 10 electron microprobe analyses supplemented by Mössbauer spectrometry, H determined by SIMS, B₂O₃ calculated from structure, Li derived by SREF; corresponds to $^{X}_{(Na_{0.88}Ca_{0.04})_{\Sigma=0.92}}^{Y}(Mg_{1.87}Fe_{0.87}Mn_{0.09}Zn_{0.01}Ti_{0.03}Li_{0.13})_{\Sigma=3.01}^{Z}Al_6^{T}(Si_{5.87}B_{0.05}Al_{0.08})O_{18}^{B}(BO_3)_3^{V}(OH)_3^{W}[F_{0.75}(OH)_{0.47}]_{\Sigma=1.22}$.
(2) NaMg₃Al₆Si₆O₁₈(BO₃)₃(OH)₃F.

Polymorphism & Series: Solid-solution exists with fluor-schorl.

Mineral Group: Tourmaline supergroup, alkali group, subgroup 1.

Occurrence: Formed near the contact between a granitic pegmatite and country rock.

Association: K-feldspar, plagioclase, quartz, beryl, muscovite, garnet, biotite, fluorite.

Distribution: From the Crabtree emerald mine, Mitchell County, North Carolina, USA.

Name: As a *dravite* with dominant *fluorine* in the W site.

Type Material: National Museum of Natural History, Washington, D.C., USA (121341).

References: (1) Clark, C.M., F.C. Hawthorne, and L. Ottolini (2011) Fluor-dravite, NaMg₃Al₆Si₆O₁₈(BO₃)₃(OH)₃F, a new mineral species of the tourmaline group from the Crabtree emerald mine, Mitchell County, North Carolina: Description and crystal structure. *Can. Mineral.*, 49, 57-62. (2) (2012) *Amer. Mineral.*, 98, 2067 (abs. ref. 1).