

Crystal Data: Hexagonal. *Point Group:* 3m. As prismatic crystals striated along [0001], to 1 cm.

Physical Properties: *Cleavage:* Poor/indistinct on {0001}. *Fracture:* Irregular, uneven to subconchoidal. *Tenacity:* Brittle. *Hardness* = 7 D(meas.) = 3.20(3) D(calc.) = 3.23

Optical Properties: Translucent to transparent. *Color:* Pale brownish to pale grayish-bluish black. *Streak:* Bluish white. *Luster:* Vitreous.

Optical Class: Uniaxial (-). $\omega = 1.660(2)$ $\varepsilon = 1.636(2)$ *Pleochroism:* O = brown to gray-brown (Zschorlau), blue (Grasstein); E = pale gray-brown (Zschorlau), cream (Grasstein).

Cell Data: *Space Group:* R3m. $a = 16.005(2)$ $c = 7.176(1)$ $Z = 3$ (Zschorlau)

X-ray Powder Pattern: Grasstein, Trentino, South Tyrol, Italy.

2.584 (100), 3.469 (99), 2.959 (83), 2.044 (80), 4.234 (40), 4.005 (39), 6.382 (37)

Chemistry:	(1)	(2)		(1)	(2)
Li ₂ O	0.04	n.d.	Al ₂ O ₃	31.09	31.76
Na ₂ O	2.44	2.35	B ₂ O ₃	9.86	n.d.
K ₂ O	0.05	0.04	B ₂ O ₃	[10.00]	[10.12]
CaO	0.06	0.02	TiO ₂	0.73	0.17
MgO	0.89	0.07	SiO ₂	33.44	34.38
ZnO	0.09	0.12	F	1.20	1.40
MnO	0.10	0.89	H ₂ O	2.70	n.d.
FeO _{total}	16.49	15.84	H ₂ O	[2.88]	[2.83]
FeO	15.83	13.15	$\frac{-\text{O} = \text{F}_2}{\text{Total}}$	0.51	0.59
Fe ₂ O ₃	0.73	2.99		99.06	99.70

(1) Zschorlau, Germany; average of 20 electron microprobe analyses supplemented by Mössbauer and secondary-ion mass spectrometry; corresponds to $^{\text{X}}(\text{Na}_{0.82}\text{K}_{0.01}\text{Ca}_{0.01}\square_{0.16})^{\text{Y}}(\text{Fe}^{2+}_{2.30}\text{Al}_{0.38}\text{Mg}_{0.23}\text{Li}_{0.03}\text{Mn}^{2+}_{0.02}\text{Zn}_{0.01}\square_{0.03})_{\Sigma=3.00}^{\text{Z}}(\text{Al}_{5.80}\text{Fe}^{3+}_{0.10}\text{Ti}^{4+}_{0.10})^{\text{T}}(\text{Si}_{5.81}\text{Al}_{0.19}\text{O}_{18})(\text{BO}_3)_3^{\text{V}}(\text{OH})_3^{\text{W}}[\text{F}_{0.66}(\text{OH})_{0.34}]$.

(2) Grasstein, Italy; average of 8 electron microprobe analyses supplemented by Mössbauer and secondary-ion mass spectrometry; corresponds to $^{\text{X}}(\text{Na}_{0.78}\text{K}_{0.01}\square_{0.21})^{\text{Y}}(\text{Fe}^{2+}_{1.89}\text{Al}_{0.58}\text{Fe}^{3+}_{0.13}\text{Mn}^{2+}_{0.13}\text{Ti}^{4+}_{0.02}\text{Mg}_{0.02}\text{Zn}_{0.02}\square_{0.21})_{\Sigma=3.00}^{\text{Z}}(\text{Al}_{5.74}\text{Fe}^{3+}_{0.26})^{\text{T}}(\text{Si}_{5.90}\text{Al}_{0.10}\text{O}_{18})(\text{BO}_3)_3^{\text{V}}(\text{OH})_3^{\text{W}}[\text{F}_{0.76}(\text{OH})_{0.24}]$.

Polymorphism & Series: Complete solid-solution exists between fluor-schorl and schorl.

Mineral Group: Tourmaline supergroup.

Occurrence: A pneumatolytic phase associated with tin mineralization (Zschorlau) and in high-temperature hydrothermal veins in granitic pegmatites (Grasstein).

Association: Quartz, biotite, albite, orthoclase, schorl, apatite, beryl, cassiterite, “wolframite” (Zschorlau).

Distribution: From alluvial tin deposits near Steinberg, Zschorlau, Erzgebirge (Saxonian Ore Mountains), Saxony, Germany, and from pegmatites near Grasstein (area from Mittewald to Sachsenklemme), Trentino, South Tyrol, Italy.

Name: As the F-analogue of schorl.

Type Material: Natural History Museum, Vienna, Austria (N8165 and N8166); the Museum of Nature, South Tyrol, Bozen/Bolzano, Italy (MIN 9777); and Mineralogische Sammlung, Geowissenschaftliche Sammlungen, TU Bergakademie Freiberg, Saxony, Germany (MiSa 83180).

References: (1) Ertl, A., U. Kolitsch, M.D. Dyar, H.-P. Meyer, G.R. Rossman, D.J. Henry, M. Prem, Th. Ludwig, L. Nasdala, C.L. Lengauer, E. Tillmanns, and G. Niedermayr (2016) Fluor-schorl, a new member of the tourmaline supergroup, and new data on schorl from the cotype localities. *Eur. J. Mineral.*, 28(1), 163-177. (2) (2016) *Amer. Mineral.*, 101, 2358 (abs. ref. 1).