Schorl $NaFe^{2+}_3Al_6(BO_3)_3Si_6O_{18}(OH)_4$

Crystal Data: Hexagonal. *Point Group:* $3m$. Crystals prismatic to acicular, or may be flattened along [0001], with prominent trigonal prism and pyramid, to 1.5 m. Commonly hemimorphic, and striated ‖ [0001]. Also radial, fibrous, and massive. *Twinning:* Rarely on $\{10\bar{1}0\}$, $\{40\bar{4}1\}$.

Physical Properties: *Cleavage:* $\{11\bar{2}0\}$, $\{10\bar{1}1\}$, very poor. *Fracture:* Uneven to conchoidal. *Tenacity:* Brittle. Hardness = 7 D(meas.) = 3.18–3.22 D(calc.) = 3.244 Pyroelectric and piezoelectric.

Optical Properties: Transparent to nearly opaque. *Color:* Black, brownish black, bluish black; in thin section, bluish yellow. *Streak:* White. *Luster:* Vitreous to resinous.
Optical Class: Uniaxial (–); under strain may show slight biaxiality. *Pleochroism:* Very strong; O = yellow-brown; E = pale yellow, pale brown. ω = 1.660–1.671 ϵ = 1.635–1.650

Cell Data: *Space Group:* $R3m$. a = 15.93–16.03 c = 7.12–7.19 Z = 3

X-ray Powder Pattern: Brazil.
3.48 (100), 2.587 (100), 2.96 (93), 6.39 (62), 4.01 (56), 4.23 (55), 2.046 (48)

Chemistry:

	(1)		(1)
SiO_2	36.04	MgO	0.42
TiO_2	0.54	CaO	1.01
B_2O_3	[10.43]	Li_2O	[n.d.]
Al_2O_3	30.83	Na_2O	2.72
$Fe_2O_3 + FeO$	17.59	K_2O	0.05
MnO	0.11	Total	[99.74]

(1) St. Andreasberg, Germany; by electron microprobe, B_2O_3 calculated from stoichiometry, Fe^{2+}:Fe^{3+} from Mössbauer spectroscopy; stated to correspond to $(Na_{0.88}Ca_{0.11}K_{0.01})_{\Sigma=1.00}(Fe^{2+}_{1.64}Al_{0.44}Fe^{3+}_{0.42}Mg_{0.11}Ca_{0.07}[Li_{0.07}]Ti_{0.07}Mn_{0.02})_{\Sigma=2.84}(Al_{5.61}Fe^{2+}_{0.39})_{\Sigma=6.00}(BO_3)_3Si_6O_{18}[(OH)_{3.70}O_{0.30}]_{\Sigma=4.00}$.

Polymorphism & Series: Forms a series with dravite.

Mineral Group: Tourmaline group.

Occurrence: In granites and granite pegmatites, high-temperature hydrothermal veins, and some metamorphic rocks; also detrital.

Association: Quartz, albite, microcline, orthoclase, epidote, garnet, muscovite, topaz, cassiterite, scheelite, fluorite, beryl.

Distribution: Many localities, but few for fine crystals. From Sonnenberg, near St. Andreasberg, Harz Mountains, Germany. At Bovey Tracey, Devon, England. From San Piero in Campo, Elba, Italy. Around Alabashka and Mursinka, Ural Mountains, Russia. In the USA, from Haddam, Middlesex Co., Connecticut; at Pierrepont and elsewhere in St. Lawrence Co., New York; from Stony Point, Alexander Co., and near Statesville, Iredell Co., North Carolina; in the Little Three mine, Ramona, San Diego Co., California. At Santa Cruz, Sonora, Mexico. Around Bom Jesus de Lapa and Mendes Pimental, Minas Gerais, Brazil. At Anibib and Farm Etemba, Namibia. From the Nuristan district, Laghman Province, Afghanistan.

Name: From the Old German *Schürl*, of uncertain derivation, perhaps meaning *impurities*.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 551–558 [tourmaline]. (2) Deer, W.A., R.A. Howie, and J. Zussman (1986) Rock-forming minerals, (2nd edition), v. 1B, disilicates and ring silicates, 559–602. (3) Fortier, S. and G. Donnay (1975) Schorl refinement showing composition dependence of the tourmaline structure. Can. Mineral., 13, 173–177. (4) Dietrich, R.V. (1985) The tourmaline group. Van Nostrand, New York, 64.