

Shafranovskite **$\text{Na}_3\text{K}_2(\text{Mn, Fe, Na})_4[\text{Si}_9(\text{O, OH})_{27}](\text{OH})_2 \cdot n\text{H}_2\text{O}$**

Crystal Data: Hexagonal. *Point Group:* $3m$. As granular aggregates, to 5 mm.

Physical Properties: *Cleavage:* Well developed on $\{00\cdot1\}$. *Fracture:* Conchoidal. Hardness = 2-3 in aggregate. $D(\text{meas.}) = 2.76\text{-}2.78$ $D(\text{calc.}) = 2.83$ Strongly electromagnetic.

Optical Properties: Translucent. *Color:* Dark green to olive-green or yellow-green, after exposure to air, becomes yellow; pale yellow-green in thin section. *Luster:* Vitreous.

Optical Class: Uniaxial (-). $\omega = 1.587(2)$ $\varepsilon = 1.570(2)$

Cell Data: *Space Group:* $P31c$. $a = 14.519(3)$ $c = 21.062(6)$ $Z = 6$

X-ray Powder Pattern: Kola Peninsula, Russia.

10.54 (100), 3.51 (70), 2.787 (60), 2.975 (50b), 3.60 (45b), 10.77 (35)

Chemistry:	(1)
SiO ₂	47.52
TiO ₂	0.12
Al ₂ O ₃	0.39
Fe ₂ O ₃	1.85
FeO	6.10
MnO	14.50
MgO	0.34
CaO	0.61
Na ₂ O	10.24
K ₂ O	7.82
<u>H₂O</u>	<u>9.78</u>
Total	99.27

(1) Kola Peninsula, Russia; corresponds to $(\text{Na}_{3.63}\text{K}_{1.82}\text{Mn}^{2+}_{0.29}\text{Ca}_{0.12})_{\Sigma=5.86}(\text{Mn}^{2+}_{1.95}\text{Fe}^{2+}_{0.93}\text{Mg}_{0.09}\text{Ti}_{0.02}\text{Fe}^{3+}_{0.01})_{\Sigma=3.00}(\text{Si}_{8.68}\text{Fe}^{3+}_{0.24}\text{Al}_{0.01})_{\Sigma=8.93}\text{O}_{24} \cdot 5.96\text{H}_2\text{O}$.

Occurrence: Produced by late-stage crystallization of alkalic nepheline syenite magmas in pegmatites in differentiated alkalic massifs.

Association: Thermonatrite, natrophosphate, nacaphite, olympite, sidorenkite, aegirine, villiaumite, phosinaite, rasvumite.

Distribution: On Mts. Rasvumchorr [TL], Niorkpakhk, Koashkar, and Koashva, Khibiny massif, and at the Jubilee pegmatite, Mt. Karnasurt, and several other localities in the Lovozero massif, Kola Peninsula, Russia.

Name: Honors Professor Ilarion Ilarionovich *Shafranovskii* (1907-1994), mineralogist and crystallographer at the Mining Institute, St. Petersburg, Russia.

Type Material: Geology Museum, Kola Branch, Academy of Sciences, Apatity, 5713/1; Mining Institute, St. Petersburg, 1202/1; Vernadsky Geological Institute, 57772; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 81593.

References: (1) Khomyakov, A.P., Z.V. Vrubelevskaya, B.B. Zvyagin, N.A. Mateeva, and G.O. Piloyan (1982) Shafranovskite $(\text{Na, K})_6(\text{Mn, Fe})_3\text{Si}_9\text{O}_{24} \cdot 6\text{H}_2\text{O}$; a new mineral. *Zap. Vses. Mineral. Obsch.*, 111, 475-480 (in Russian). (2) (1983) *Amer. Mineral.*, 68, 644 (abs. ref. 1). (3) (1983) *Chem. Abs.*, 98, 19574 (abs. ref. 1). (4) (1983) *Mineral. Abs.*, 34, 1961 (abs. ref. 1). (5) Krivovichev, S.V., V.N. Yakovenchuk, T. Armbruster, Y.A. Pakhomovsky, H.-P. Weber, and W. Depmeier (2004) Synchrotron X-ray diffraction study of the structure of shafranovskite, $\text{K}_2\text{Na}_3(\text{Mn, Fe, Na})_4[\text{Si}_9(\text{O, OH})_{27}](\text{OH})_2 \cdot n\text{H}_2\text{O}$, a rare manganese phyllosilicate from the Kola peninsula, Russia. *Amer. Mineral.*, 89, 1816-1821.