Volkonskoite $Ca_{0.3}(Cr^{3+}, Mg, Fe^{3+})_2(Si, Al)_4O_{10}(OH)_2 \cdot 4H_2O$

Crystal Data: Monoclinic, presumably. *Point Group:* n.d. Fine scaly to fibrous; massive.

Physical Properties: *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 1–2 D(meas.) = 2.11–2.36 D(calc.) = n.d. Positive identification of minerals in the smectite group may need data from DTA curves, dehydration curves, and X-ray powder patterns before and after treatment by heating and with organic liquids.

Optical Properties: Translucent. *Color:* Bright to dark green, emerald-green; in transmitted light, emerald-green. *Luster:* Dull.
Optical Class: Biaxial (–). $\alpha = 1.551$–1.560 $\beta = 1.569$ $\gamma = 1.564$ 2V(meas.) = Small.

Cell Data: *Space Group:* n.d. Z = n.d.

X-ray Powder Pattern: n.d.

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
SiO_2	37.70	41.5	40.4	CaO	2.45	1.39	2.56
TiO_2	0.06	0.07	0.05	Na_2O		< 0.15	< 0.15
Al_2O_3	4.93	5.16	4.13	K_2O	0.10	0.15	0.21
Fe_2O_3	4.89	4.52	5.16	H_2O^+	20.19	16.83	16.75
Cr_2O_3	23.50	20.4	23.5	CO_2		1.94	2.60
FeO		0.40	0.1	P_2O_5		0.07	< 0.05
MnO	0.36	0.07	0.05	Total	100.97	[99.57]	101.46
MgO	6.79	7.07	5.95				

(1) Okhansk region, Russia. (2) Mt. Efimyatskaya, Russia; by XRF and TGA, Fe^{2+}:Fe^{3+} by Mössbauer spectroscopy, original total given as 99.73% with additional "carbonate carbon;" corresponds to $(Ca_{0.11}Mg_{0.11}Fe^{2+}_{0.03}K_{0.02})_{\Sigma=0.27}(Cr_{1.18}Mg_{0.78}Fe^{3+}_{0.29}Ca_{0.02})_{\Sigma=2.27}(Si_{3.50}Al_{0.51})_{\Sigma=4.01}O_{10}(OH)_2 \cdot 3.64H_2O$. (3) Okhansk region, Russia; do.; corresponds to $(Ca_{0.25}Mg_{0.05}K_{0.03}Fe^{2+}_{0.01}Mn_{0.01})_{\Sigma=0.35}(Cr_{1.07}Mg_{0.75}Fe^{3+}_{0.35})_{\Sigma=2.17}(Si_{3.59}Al_{0.43})_{\Sigma=4.02}O_{10}(OH)_2 \cdot 4.22H_2O$.

Mineral Group: Smectite group.

Occurrence: An epigenetic mineral in sandstones, conglomerates, and red beds, commonly filling voids from the decomposition of organic matter (Okhansk region, Russia); a weathering product of serpentinite (Gotse Delchev, Bulgaria).

Association: Chlorite, tridymite.

Distribution: On Mt. Efimyatskaya and elsewhere in the Okhansk region, middle Kama River area, Perm basin, Ural Mountains, Russia. In the Belgorod-Dnestrovskii (Akkerman) area, Ukraine. In Bulgaria, near Gotse Delchev (Nevrokop), Pirin Mountains.

Name: For Prince Petr Mikhailovich Volkonskii (1776–1852), Minister of the Imperial Court, Russia, patron of the natural sciences.

Type Material: National Museum of Natural History, Washington, D.C., USA, R4820, 16308.

References: (1) Dana, E.S. (1892) Dana's system of mineralogy, (6th edition), 696–697. (2) Khoury, H.N., R.C. Mackenzie, J.D. Russell, and J.M. Tait (1984) An iron-free volkonskoite. Clay Minerals, 19, 43–57. (3) Foord, E.E., H.C. Starkey, J.E. Taggart, Jr., and D.R. Shawe (1987) Reassessment of the volkonskoite-chromium smectite nomenclature problem. Clays and Clay Minerals, 35, 139–149.