Kanonerovite $Na_3MnP_3O_{10}\cdot 12H_2O$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. Crystals are doubly terminated, platy prismatic to a few tenths of a millimeter, elongate along [001], platy on {100}, showing {010}, {001}, {023}, {423}, and {210}; in crusts to 1.2 mm.

Physical Properties: *Cleavage*: Poor on {010}. *Tenacity*: Brittle. *Fracture*: Uneven. Hardness = 2.5-3 D(meas.) = 1.91(2) D(calc.) = 1.90

Optical Properties: Transparent. *Color*: Snow-white to colorless. *Streak*: White. *Luster*: Vitreous. *Optical Class*: Biaxial (-). α = 1.453(2) β = 1.459(2) γ = n.d. 2V = n.d. *Orientation*: $X \wedge c$ = 0-7°.

Cell Data: *Space Group*: $P2_1/n$. a = 14.71(1) b = 9.33(1) c = 15.13(2) β = 89.8(1)° Z = 4

X-ray Powder Pattern: Kazennitsa pegmatite, Alabashka pegmatite field, Middle Urals, Russia. 7.36 (100), 6.95 (90), 10.50 (75), 3.316 (60), 2.889 (60), 3.162 (50), 2.391 (48)

Chemistry:

	(1)
Na_2O	14.80
K_2O	0.05
CaO	0.20
MgO	0.14
MnO	11.20
FeO	0.15
P_2O_5	35.23
H_2O	[36.46]
Total	98.23

(1) Kazennitsa pegmatite, Alabashka pegmatite field, Middle Urals, Russia; average electron microprobe analysis, H_2O calculated for the ideal formula; corresponds to $(Mn_{0.95}Mg_{0.02}Fe_{0.01})_{\Sigma=0.98}(Na_{2.86}Ca_{0.02}K_{0.01})_{\Sigma=2.89}P_{2.98}O_{9.87}\cdot 12.13H_2O$.

Occurrence: In the vuggy, microcline-albite-quartz-muscovite central zone of a granitic pegmatite vein.

Association: Quartz, topaz, cassiterite, coated by muscovite and stellerite.

Distribution: From the Kazennitsa pegmatite, Alabashka pegmatite field, Middle Urals, Russia.

Name: Honors mining historian Aleksandr *Kanonerov* Anatol'evich (1955-2003) of the Nizhnii Tagil Museum of Mining Industry of the Middle Urals, who first collected the mineral in 1995.

Type Material: Mineralogical Museum, Ilmen Natural Reserve, Miass, Russia (ms6160).

References: (1) Popova, V.I., V.A. Popov, E.V. Sokolova, G. Ferraris, and N.V. Chukanov (2002) Kanonerovite, $MnNa_3P_3O_{10}\cdot 12H_2O$, first triphosphate mineral (Kazennitsa pegmatite, Middle Urals, Russia). Neues Jahrb. Mineral. Mon., 117-127. (2) (2002) Amer. Mineral., 87, 1732 (abs. ref. 1). (3) Lightfoot, P. and A.K. Cheetham (1987) Structure of manganese(II) trisodium tripolyphosphate dodecahydrate. Acta Crystal., C43, 4-7.