Sinkankasite $Mn^{2+}Al(PO_3OH)_2(OH)\cdot 6H_2O$

Crystal Data: Triclinic. *Point Group:* $\overline{1}$. Crystals are bladed prismatic to acicular, elongated along [001], tabular on {100}, showing {100}, {010}, {001}, to 4 mm, typically parallel to divergent, and in spherical aggregates. *Twinning:* On {100}, common.

Physical Properties: *Cleavage:* On {100}, perfect; also a parting along {100} twin boundaries. *Tenacity:* Very brittle. Hardness = ∼4 D(meas.) = 2.27 D(calc.) = 2.25

Optical Properties: Transparent. *Color:* Colorless to white. *Luster:* Vitreous to dull, vitreous on cleavages.
Optical Class: Biaxial (–). *Orientation:* $Y \wedge c \simeq 11°$. *Dispersion:* $r < v$, moderate.
$\alpha = 1.511(2)$ $\beta = 1.529(2)$ $\gamma = 1.544(2)$ 2V(meas.) = n.d. 2V(calc.) = 84°

Cell Data: *Space Group:* $P\overline{1}$. $a = 9.590(2)$ $b = 9.818(2)$ $c = 6.860(1)$ $\alpha = 108.04(3)°$ $\beta = 99.63(3)°$ $\gamma = 98.87(3)°$ Z = 2

X-ray Powder Pattern: Barker mine, South Dakota, USA.
9.2 (100), 5.06 (60), 5.41 (50), 4.58 (40), 2.834 (40), 2.701 (40), 2.943 (30)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
P_2O_5	35.30	36.5	35.58	Na_2O	0.09		
Al_2O_3	9.35	12.6	12.78	F	n.d.	2.0	
FeO	7.4	6.9		H_2O^+	14.6		
MnO	12.5	11.3	17.78	H_2O^-	16.7		
ZnO	0.03			H_2O		31.3	33.86
MgO	0.25	0.2		$-O = F_2$		0.8	
CaO	3.31			Total	99.53	[100.0]	100.00

(1) Barker mine, South Dakota, USA; corresponds to $(Mn_{0.71}Ca_{0.24}Fe_{0.15}Mg_{0.02}Na_{0.01})_{\Sigma=1.13}(Al_{0.74}Fe^{3+}_{0.26})_{\Sigma=1.00}(PO_3OH)_{2.00}(OH)_{1.26}\cdot 6.35H_2O$. (2) Do.; by electron microprobe, total Fe as FeO, total Mn as MnO, H_2O by the Penfield method, normalized to 100.0% with H_2O as determined, from an original total of 106.5%, thought high due to loss of H_2O in the electron beam; then corresponds to $(Mn_{0.64}Fe_{0.38}Mg_{0.02})_{\Sigma=1.04}Al_{1.00}(PO_3OH)_{2.08}[(OH)_{0.44}F_{0.42}]_{\Sigma=0.86}\cdot 5.56H_2O$. (3) $MnAl(PO_3OH)_2(OH)\cdot 6H_2O$.

Occurrence: A late-stage hydrothermal alteration product of triphylite in complex zoned granite pegmatites.

Association: Vivianite, huréaulite, carbonate-apatite, strengite, barbosalite, fluellite (Barker pegmatite, South Dakota, USA).

Distribution: In the USA, from the Barker (Ferguson) mine, five km southeast of Keystone, Pennington Co., South Dakota; and in the Palermo #3 mine, near North Groton, Grafton Co., New Hampshire.

Name: To honor Dr. John Sinkankas (1915–2002), American author and bibliographer on mineralogical and gemological subjects.

Type Material: The Natural History Museum, London, England; National Museum of Natural History, Washington, D.C., USA, 149597.

References: (1) Peacor, D.R., P.J. Dunn, W.L. Roberts, T.J. Campbell, and W.B. Simmons (1984) Sinkankasite, a new phosphate from the Barker pegmatite, South Dakota. Amer. Mineral., 69, 380–382. (2) Burns, P.C. and F.C. Hawthorne (1995) The crystal structure of sinkankasite, a complex heteropolyhedral sheet mineral. Amer. Mineral., 80, 620–627.