

Crystal Data: Tetragonal. *Point Group:* $4/m$. Thin tabular, square to rectangular crystals, with {001}, {010}, and {110}, striated on {001} || [100] and [110], to 1 cm, may be composite; in rosettes, crudely radial and in scaly aggregates; botryoidal to nodular massive. *Twining:* On {110}, rare.

Physical Properties: *Cleavage:* Perfect on {001}; good on {110}; poor on {010}. *Tenacity:* Brittle. Hardness = Soft. $D(\text{meas.}) = \sim 2.84\text{--}2.98$ $D(\text{calc.}) = 2.970$

Optical Properties: Translucent to transparent in small grains. *Color:* Leek-green, olive-green, pale green, blue-green, brownish green; in transmitted light, light green, olive-green, brownish green, yellowish green, bluish green, typically zoned parallel {001}. *Streak:* Green. *Luster:* Vitreous, submetallic if partially dehydrated. *Optical Class:* Uniaxial (-), partially biaxial (-) if dehydrated. *Pleochroism:* Strong; $O = Z =$ gray-green; $E = X =$ nearly colorless to pale yellow. *Dispersion:* $r > v$, faint. $\omega = \sim 1.680$ $\epsilon = \sim 1.655$ $\alpha = 1.670\text{--}1.675$ $\beta = 1.690$ $\gamma = 1.693\text{--}1.694$ $2V(\text{meas.}) = 10^\circ\text{--}83^\circ$

Cell Data: *Space Group:* $P4_2/n$. $a = 8.895\text{--}9.08$ $c = 12.727\text{--}12.86$ $Z = [4]$

X-ray Powder Pattern: Black Hills, South Dakota, USA.

6.35 (100), 3.190 (80), 3.511 (60), 2.682 (50), 2.907 (40), 2.100 (40), 3.841 (25)

Chemistry:

	(1)	(2)	(3)
P_2O_5	31.7	31.37	31.27
V_2O_5	0.0		
V_2O_4	36.3	36.44	36.54
CaO	12.1	12.51	12.35
H_2O	19.9	[19.68]	19.84
insol.	0.3		
Total	100.3	[100.00]	100.00

(1) Sincos, Peru. (2) Black Hills, South Dakota, USA; by electron microprobe, average of three analyses, total V as V_2O_4 , H_2O by difference. (3) $\text{CaV}_2(\text{PO}_4)_2(\text{OH})_4 \cdot 3\text{H}_2\text{O}$.

Occurrence: In veinlets in black carbonaceous shale (Sincos, Peru).

Association: Gypsum (Sincos, Peru); minyulite (Ross Hannibal mine, South Dakota, USA).

Distribution: From Sincos, Junin Province, Peru. In the USA, large crystals in the Ross Hannibal mine, about four km southwest of Lead, Lawrence Co., South Dakota; from Bloomington, Bear Lake Co., and in the Enoch Valley phosphate mine, Soda Springs, Caribou Co., Idaho; in the Wilson Springs (Potash Sulphur Springs) mine, Garland Co., Arkansas; from the Gold Quarry mine, near Carlin, Maggie Creek district, Eureka Co., Nevada. At an unspecified locality in Kazakhstan.

Name: For its originally noted occurrence near Sincos, Peru.

Type Material: National School of Mines, Paris, France; Harvard University, Cambridge, Massachusetts, 99139, 101699; National Museum of Natural History, Washington, D.C., USA, 95096.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 1057–1058. (2) Zolensky, M.E. (1985) New data on sincosite. *Amer. Mineral.*, 70, 409–410. (3) Shitov, V.A., E.V. Prozorovskaya, I.G. Smyslova, and L.G. Kuznetsova (1984) Sincosite – rare vanadium phosphate. *Zap. Vses. Mineral. Obsch.*, 113, 56–59 (in Russian).