Manganvesuvianite $Ca_{19}Mn^{3+}Al_{10}Mg_2(SiO_4)_{10}(Si_2O_7)_4O(OH)_9$

Crystal Data: Tetragonal. *Point Group*: 6. As prismatic, often striated, crystals, to 1.5 cm, with {100} dominant, {110} minor, and {101} termination. *Twinning*: Merohedral{110}.

Physical Properties: *Cleavage*: n.d. *Tenacity*: Brittle. *Fracture*: Subconchoidal. Hardness = 6-7 D(meas.) = n.d. D(calc.) = 3.404

Optical Properties: Transparent, opaque (thick crystals). *Color:* Maroon-red to black with dark red internal reflections. *Streak*: Colorless. *Luster*: Vitreous.
Optical Class: Uniaxial (-). ε = 1.731(1) ω = 1.719(1) *Pleochroism*: Strong, *E* = yellowish, *O* = dark red.

Cell Data: *Space Group*: *P*4/*n*. *a* = 15.575(2) *c* = 11.824(2)

X-ray Powder Pattern: n.d. Chemically zoned material precluded a good pattern.
Similar to other vesuvianite group members.

Chemistry:

	(1)
SiO_2	36.15
Al_2O_3	14.73
Fe_2O_3	1.12
Mn_2O_3	6.79
MgO	2.35
CaO	35.73
CuO	0.02
SrO	0.11
Na_2O	0.03
F	0.12
Cl	0.01
H_2O	[2.67]
-O = (F, Cl)	0.07
Total	99.76

(1) N'Chwaning II mine, South Africa; average electron microprobe analysis, H_2O calculated; corresponds to simplified formula $Ca_{19}Mn^{3+}(Al,Mn^{3+},Fe^{3+})_{10}(Mg,Mn^{2+})_2Si_{18}O_{69}(OH)_9$.

Mineral Group: Vesuvianite group.

Occurrence: In calc-silicate lenses formed by hydrothermal alteration of primary sedimentary and low-grade metamorphic manganese ores.

Association: Grossular, xonotlite, calcite, serandite-pectolite, strontiopiemontite-tweddillite, mozartite, hydrogrossular, henritermierite.

Distribution: At the Wessels mine and N'Chwaning II mine [TL], Kalahari manganese fields, South Africa.

Name: Prefix, *mangan*, indicates a *vesuvianite* group mineral with the five-coordinated (Y′) position occupied by Mn^{3+}.

Type Material: Natural History Museum, Bern, Switzerland (NMBE 35474).

References: (1) Armbruster, T., E. Gnos, R. Dixon, J. Gutzmer, C. Hejny, N. Döbelin, and O. Medenbach (2003) Manganvesuvianite and tweddillite, two new Mn^{3+}-silicate minerals from the Kalahari manganese fields, South Africa. Mineral. Mag., 66(1), 137-150. (2) (2002) Amer. Mineral., 88, 251-252 (abs. ref. 1).