

Kombatite

$\text{Pb}_{14}\text{O}_9(\text{VO}_4)_2\text{Cl}_4$

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Crystal Data: Monoclinic, pseudotetragonal. *Point Group:* $2/m$. Anhedral grains, to 0.2 mm.

Physical Properties: *Cleavage:* On {010}, perfect. *Tenacity:* Brittle. Hardness = [Very soft; 2–3] (by analogy to sahlinite). $D(\text{meas.}) = > 4.3$ $D(\text{calc.}) = 7.979$

Optical Properties: Semitransparent. *Color:* Bright yellow. *Streak:* Pale yellow. *Luster:* Adamantine. *Optical Class:* Biaxial (–). $n = > 1.90$

Cell Data: *Space Group:* $C2/c$. $a = 12.682(2)$ $b = 22.566(2)$ $c = 11.279(2)$
 $\beta = 118.11(1)^\circ$ $Z = 4$

X-ray Powder Pattern: Kombat mine, Namibia; pattern close to sahlinite.
3.006 (10), 2.958 (10), 2.812 (10), 2.253 (7), 1.756 (7), 1.590 (6), 1.989 (5)

Chemistry:

	(1)	(2)
V_2O_5	5.9	5.33
PbO	92.4	91.46
Cl	4.2	4.15
$-\text{O} = \text{Cl}_2$	0.9	0.94
Total	101.6	100.00

- (1) Kombat mine, Namibia; by electron microprobe, corresponds to $\text{Pb}_{13.7}\text{V}_{2.10}\text{O}_{17.1}\text{Cl}_{3.9}$.
(2) $\text{Pb}_{14}\text{O}_9(\text{VO}_4)_2\text{Cl}_4$.

Occurrence: A rare component of layered manganese ores.

Association: Hematite, calcite, hausmannite, kentrolite, a mineral similar to harkerite.

Distribution: At the Kombat Cu–Pb–Ag mine, 49 km south of Tsumeb, Namibia.

Name: For the Kombat mine, Namibia, in which it occurs.

Type Material: Canadian Geological Survey, Ottawa, Canada, 64563.

References: (1) Rouse, R.C., P.J. Dunn, and J. Innes (1986) Kombatite, the vanadium analogue of sahlinite, from the Kombat mine, South West Africa. *Neues Jahrb. Mineral., Monatsh.*, 519–522. (2) (1988) *Amer. Mineral.*, 73, 928 (abs. ref. 1). (3) Cooper, M. and F.C. Hawthorne (1994) The crystal structure of kombatite, $\text{Pb}_{14}(\text{VO}_4)_2\text{O}_9\text{Cl}_4$, a complex heteropolyhedral sheet mineral. *Amer. Mineral.*, 79, 550–554.