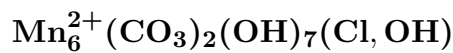


Holdawayite



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Crystal Data: Monoclinic. *Point Group:* $2/m$. Fibrous along [001]; commonly in granular aggregates, or massive, with individual grains to 2 cm.

Physical Properties: *Cleavage:* On {100}, perfect. *Fracture:* Irregular.
Tenacity: Moderately brittle. Hardness = ~ 3 D(meas.) = 3.19(4) D(calc.) = 3.24

Optical Properties: Transparent to translucent. *Color:* Pale to dark pink if fresh, turning brown on exposure, developing a dark sooty coating. *Streak:* Pale pink. *Luster:* Vitreous, silky in fibrous aggregates.

Optical Class: Biaxial (-). *Orientation:* $X = b$; $Z \wedge c = 45(3)^\circ$. *Dispersion:* $r < v$, moderate. $\alpha = 1.644(1)$ $\beta = 1.719(1)$ $\gamma = 1.721(1)$ $2V(\text{meas.}) = 12(3)^\circ$ $2V(\text{calc.}) = 18^\circ$

Cell Data: *Space Group:* $C2/m$. $a = 23.437(5)$ $b = 3.3137(3)$ $c = 16.618(6)$
 $\beta = 111.15(2)^\circ$ $Z = 4$

X-ray Powder Pattern: Kombat mine, Namibia.

10.93 (100), 5.459 (80), 3.879 (70), 2.690 (60b), 2.589 (50b), 7.77 (40), 2.926 (40)

Chemistry:

	(1)
CO ₂	14.2
B ₂ O ₃	1.2
FeO	0.2
MnO	64.6
MgO	4.4
CaO	0.5
Cl	4.4
H ₂ O	11.47
-O = Cl ₂	1.0
Total	100.0

(1) Kombat mine, Namibia; by electron microprobe, C by Leco analyzer, H₂O by the Penfield method, B may be due to sussexite contamination; corresponds to $(\text{Mn}_{5.24}\text{Mg}_{0.62}\text{Ca}_{0.06}\text{Fe}_{0.02})_{\Sigma=5.94}[(\text{CO}_3)_{1.86}(\text{BO}_3)_{0.20}]_{\Sigma=2.06}[(\text{OH})_{7.34}\text{Cl}_{0.74}]_{\Sigma=8.08}$.

Occurrence: Locally abundant as a rare vein mineral in low-grade metamorphosed Mn-rich sedimentary rocks intercalated with sedimentary iron deposits.

Association: Kutnohorite, ribbeite, alleghanyite, manganoan jacobsonite, pyrochroite, sussexite, galena, copper, hydroxylapatite, calcian rhodochrosite, hematite, siderite, dolomite, calcite (Kombat mine, Namibia).

Distribution: From the Kombat Cu-Pb-Ag mine, 49 km south of Tsumeb, Namibia. At Răzore, Preluca Mountains, Romania.

Name: Honors Dr. Michael Jon Holdaway (1936–), Professor of Petrology, Southern Methodist University, Dallas, Texas, USA.

Type Material: Canadian Museum of Nature, Ottawa, Canada, 51510, 51511; National Museum of Natural History, Washington, D.C., USA, 163209.

References: (1) Peacor, D.R., E.J. Essene, R.C. Rouse, P.J. Dunn, J.A. Nelen, J.D. Grice, J. Innes, and O. von Knorring (1988) Holdawayite, a new manganese hydroxyl-carbonate from the Kombat mine, Namibia. *Amer. Mineral.*, **73**, 632–636. (2) Peacor, D.R. and R.C. Rouse (1988) Holdawayite, $\text{Mn}_6(\text{CO}_3)_2(\text{OH})_7(\text{Cl}, \text{OH})$, a structure containing anions in zeolite-like channels. *Amer. Mineral.*, **73**, 637–642.

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