

**Crystal Data:** Hexagonal. *Point Group:*  $\bar{3} 2/m$ . As lamellar crystals to 0.05 mm, coarsely hexagonal or irregular and typically curved; in rose-like clusters or globular aggregates to 0.2 mm.

**Physical Properties:** *Cleavage:* Perfect on {0001}. *Fracture:* Laminated. *Tenacity:* Brittle. Hardness = ~3 D(meas.) = n.d. D(calc.) = 3.415 Dissolves in dilute HCl.

**Optical Properties:** Transparent. *Color:* Orange; reddish brown in transmitted light. *Streak:* Pale yellow-orange. *Luster:* Vitreous. *Optical Class:* Uniaxial (+).  $\omega = 1.827(8)$   $\epsilon = 1.843(8)$

**Cell Data:** *Space Group:*  $P\bar{3} m1$  (by analogy with martyite).  $a = 6.016(4)$   $c = 7.234(6)$   $Z = 1$

**X-ray Powder Pattern:** Little Eva mine, Grand County, Utah, USA. 7.15 (100), 2.95 (54), 2.60 (36), 2.44 (33), 4.20 (25), 3.59 (21), 2.77 (21)

<b>Chemistry:</b>	(1)
MgO	0.05
CaO	0.26
MnO	1.39
CoO	33.22
NiO	2.02
CuO	0.28
ZnO	12.66
V <sub>2</sub> O <sub>5</sub>	38.70
H <sub>2</sub> O	[11.61]
Total	100.19

(1) Little Eva mine, Grand County, Utah, USA; average of 12 electron microprobe analyses supplemented by Raman spectroscopy, H<sub>2</sub>O calculated from stoichiometry; corresponds to  $(\text{Co}_{2.06}\text{Zn}_{0.72}\text{Ni}_{0.13}\text{Mn}_{0.09}\text{Ca}_{0.02}\text{Cu}_{0.02}\text{Mg}_{0.01})_{\Sigma=3.05}\text{V}_{1.98}\text{O}_7(\text{OH})_2 \cdot 2\text{H}_2\text{O}$ .

**Polymorphism & Series:** Forms a nearly continuous series with martyite. The Co-richest and Zn-poorest composition found was  $(\text{Co}_{2.80}\text{Zn}_{0.09}\text{Ni}_{0.07}\text{Ca}_{0.05}\text{Mn}_{0.02}\text{Cu}_{0.02})_{\Sigma=3.05}\text{V}_{1.98}\text{O}_7(\text{OH})_2 \cdot 2\text{H}_2\text{O}$ ; the Co-poorest and Zn-richest composition was  $(\text{Co}_{1.46}\text{Zn}_{1.15}\text{Mn}_{0.21}\text{Ni}_{0.20})_{\Sigma=3.02}\text{V}_{1.99}\text{O}_7(\text{OH})_2 \cdot 2\text{H}_2\text{O}$ .

**Occurrence:** A secondary mineral formed during the post-mining oxidation of corvusite and montroseite in a moist environment at ambient temperatures.

**Association:** Martyite, quartz, gypsum, barite, roscoelite.

**Distribution:** From the Little Eva mine, Yellow Cat District, Grand County, Utah, USA.

**Name:** Honors Russian mineralogist Vladimir Yu. Karpenko (b. 1965), an expert on the mineralogy of vanadium.

**Type Material:** A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (4605/1).

**References:** (1) Kasatkin, A.V., J. Plášil, I.V. Pekov, D.I. Belakovskiy, F. Nestola, J. Čejka, M.F. Vigasina, F. Zorzi, and B. Thorne (2015) Karpenkoite,  $\text{Co}_3(\text{V}_2\text{O}_7)(\text{OH})_2 \cdot 2\text{H}_2\text{O}$ , a cobalt analogue of martyite from the Little Eva mine, Grand County, Utah, USA. *J. Geosciences*, 60(4), 251-257. (2) (2017) *Amer. Mineral.*, 102, 1963-1964 (abs. ref. 1).