Kambaldaite  
\[ \text{NaNi}_4(\text{CO}_3)_3(\text{OH})_3 \cdot 3\text{H}_2\text{O} \]

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Crystal Data: Hexagonal. Point Group: 6. As hexagonal prisms \{1010\}, terminated by \{0001\} and \{1121\}, to about 50 \(\mu\)m, as individual crystals or in radiating spherical nodules; in cryptocrystalline veins, concretionary, chalky, massive.

Physical Properties: Hardness = \(\sim 3\). \(D(\text{meas.}) = 3.18\) \(D(\text{calc.}) = 3.193\)

Optical Properties: Transparent to translucent. Color: Bright grass-green to emerald-green, crystals may be zoned with a clear core and translucent margins; pale green if massive. 
Streak: Pale green. Luster: Silky on fractures.
Optical Class: Uniaxial (+). Pleochroism: \(O = \) pale green; \(E = \) emerald-green. \(\omega = 1.65\) \(\epsilon = 1.69\)

Cell Data: Space Group: \(P\overline{6}_3\). \(a = 10.340(3)\) \(c = 6.097(2)\) \(Z = 2\)

X-ray Powder Pattern: Kambalda, Western Australia. 9.03 (10), 4.490 (9), 3.613 (4), 2.681 (4), 2.584 (4), 2.519 (4), 2.263 (4)

Chemistry:
\[
\begin{align*}
\text{SO}_3 & \quad 0.3 \\
\text{SiO}_2 & \quad 0.2 \\
\text{CO}_2 & \quad 27.5 \quad 24.32 \\
\text{Al}_2\text{O}_3 & \quad 0.4 \\
\text{NiO} & \quad 52.9 \quad 55.04 \\
\text{MgO} & \quad 1.3 \\
\text{Na}_2\text{O} & \quad 3.0 \quad 5.71 \\
\text{H}_2\text{O} & \quad 12.5 \quad 14.93 \\
\text{Total} & \quad 98.1 \quad 100.00
\end{align*}
\]

(1) Kambalda, Western Australia; by electron microprobe, C and H by microanalysis; corresponds to \(\text{Na}_{0.52}(\text{Ni}_{1.90}\text{Mg}_{0.18})\Sigma=4.08[(\text{C}_{1.15}\text{Al}_{0.01}\text{Si}_{0.01})\Sigma=1.17\text{O}_{3.46}]\Sigma(\text{OH})_{1.98} \cdot 2.84\text{H}_2\text{O}\).
(2) \(\text{NaNi}_4(\text{CO}_3)_3(\text{OH})_3 \cdot 3\text{H}_2\text{O}\).

Occurrence: A secondary mineral in goethitic residues formed by oxidation of violarite–pyrite in the presence of wallrock carbonates and saline groundwater (Kambalda, Western Australia).

Association: Gaspéite, reevesite, aragonite, pyrite, goethite (Kambalda, Western Australia).

Distribution: In Australia, from the Otter Shoot, Kambalda, 56 km south of Kalgoorlie, and in the 132 North nickel mine, 4 km southwest of Widgiemooltha, Western Australia.

Name: For Kambalda, Western Australia, its locality of discovery.


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