Wupatkiite  
\((\text{Co}, \text{Mg})\text{Al}_2(\text{SO}_4)_4 \cdot 22\text{H}_2\text{O})\)

Crystal Data: Monoclinic.  Point Group: 2/m.  Fibers, to 8 mm, in incrustations composed of cross-fiber veins.

Physical Properties: Cleavage: One at 70° to fiber length.  Hardness = 1.5, in aggregates.  
\(D(\text{meas.}) = 1.92 \quad D(\text{calc.}) = 1.87 \)  Soluble in \(\text{H}_2\text{O}\).

Optical Class: Biaxial.  Pleochroism: Weak; very pale pink \(\parallel\) fiber bundles.  Orientation: \(Z\) ∧ extinction up to 12°.  \(\alpha = 1.477 \quad \beta = \text{n.d.} \quad \gamma = 1.484 \quad 2V(\text{meas.}) = \text{n.d.}\)

Cell Data: 
Space Group: \([P2_1/c]\) (by analogy to halotrichite). 
\(a = 6.819(4) \quad b = 24.234(10) \quad c = 21.204(10)\).  
\(\beta = 100.33(5)° \quad Z = 4\).

X-ray Powder Pattern: 
Cameron district, Arizona, USA.  
4.790 (100), 3.494 (92), 3.768 (33), 4.295 (27), 3.945 (26), 6.03 (22), 4.106 (22)

Chemistry: 
\[
\begin{array}{ccc}
\text{SO}_3 & (1) & 35.97 \\
\text{Al}_2\text{O}_3 & (1) & 11.30 \\
\text{Fe}_2\text{O}_3 & (2) & 9.81 \\
\text{FeO} & (2) & [2.43] \\
\text{MnO} & (2) & 0.15 \\
\text{CuO} & (2) & [3.25] \\
\text{CoO} & (1) & 0.17 \\
\text{MgO} & (2) & 3.92 \\
\text{NiO} & (2) & 0.52 \\
\text{H}_2\text{O} & (2) & 42.26 \\
\text{Total} & \text{insol.} & [100.00]
\end{array}
\]

(1) Cameron district, Arizona, USA; by AA, CoO by colorimetry, CaO by ICP-ES, H\(_2\)O by the Penfield method, insoluble by difference, quartz and clay; corresponds to \((\text{Co}_{0.42}\text{Mg}_{0.38}\text{Ni}_{0.07}\text{Mn}_{0.02}\text{Fe}_{0.02}\text{Cu}_{0.01}\zeta_{0.93}\text{Al}_{2.06}\text{SO}_4)_{4.18}\cdot 21.83\text{H}_2\text{O}\).  
(2) Lorena deposit, Australia; by ICP, after deduction of insoluble 2.5%, original partial analysis here converted to oxides; \(\text{FeO}:\text{Fe}_2\text{O}_3\) partitioned for stoichiometry; corresponds to \((\text{Co}_{0.47}\text{Fe}_{0.41}\text{Mg}_{0.07}\text{Ni}_{0.04}\text{Mn}_{0.02})\zeta_{0.01}(\text{Al}_{1.73}\text{Fe}_{0.27})\zeta_{2.09}\text{SO}_4\cdot 22\text{H}_2\text{O}\).

Mineral Group: Halotrichite group.


Association: Pickeringite, moorhouseite, nickel-boussingaultite, quartz, clay (Cameron district, Arizona, USA).

Distribution: From a prospect 13 km east-southeast of Gray Mountain, Cameron district, Coconino Co., Arizona, USA.  Abundant in the Lorena gold deposit, near Cloncurry, Queensland, Australia.

Name: For the prehistoric Wupatki Indian pueblos, now a National Monument, nearby the Cameron district, Arizona, USA.

Type Material: National School of Mines, Paris, France.

References:  

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