Fernandinite

\[
\text{Ca(V}^{5+}, \text{V}^{4+}, \text{Fe}^{2+})_8\text{O}_{20} \cdot 4\text{H}_2\text{O}
\]

Crystal Data: Monoclinic. \( \text{Point Group: } 2/m \). Rare crystals are platy, rectangular, to 10 \( \mu \text{m} \); fibrous, cryptocrystalline, porous massive.

Physical Properties: Hardness = Soft. \( \text{D(meas.) = 2.78(5) D(calc.) = 3.07} \) Somewhat soluble in cold \( \text{H}_2\text{O} \), giving a yellow solution.

Optical Properties: Opaque to translucent. Color: Dull green; light green, dark olive-green, brownish green in transmitted light. \( \text{Luster: } \text{Submetallic.} \)

Optical Class: Biaxial; strong birefringence. \( n = 2.05 \) \( 2V(\text{meas.}) = \text{n.d.} \)

Cell Data: Space Group: \( \text{C}2/m \). \( a = 11.680(1) \) \( b = 3.6537(4) \) \( c = 11.023(2) \beta = 105.00(2)^\circ \) \( Z = [1] \)

X-ray Powder Pattern: Minasragra, Peru; very close to corvusite. 10.68 (100), 3.483 (26), 1.836 (8), 2.826 (7), 1.949 (6), 3.545 (4), 2.549 (4)

Chemistry:

\[
\begin{align*}
\text{V}_2\text{O}_5 & \quad 83.7 & \quad 76.6 \\
\text{SiO}_2 & \quad 2.3 & \quad 1.0 \\
\text{TiO}_2 & \quad 0.17 & \quad 0.40 \\
\text{Al}_2\text{O}_3 & \quad 1.4 & \quad 0.7 \\
\text{Fe}_2\text{O}_3 & \quad 0.5 & \quad 1.5 \\
\text{CaO} & \quad 5.6 & \quad 5.7 \\
\text{Na}_2\text{O} & \quad 0.00 & \quad 0.04 \\
\text{K}_2\text{O} & \quad 0.2 & \quad 0.5 \\
\text{H}_2\text{O} & \quad [6.1] & \quad [13.6] \\
\text{Total} & \quad [100.0] & \quad [100.0]
\end{align*}
\]

(1) Minasragra, Peru; by electron microprobe, average of five analyses, all \( \text{V} \) as \( \text{V}_2\text{O}_5 \), \( \text{H}_2\text{O} \) by difference; assuming \( \text{Si} \) and \( \text{Al} \) as impurities, \( \text{V}^{5+}:\text{V}^{4+} \) from crystal-structure analysis, corresponds to \( (\text{Ca}_{0.86}\text{K}_{0.04})\Sigma=0.90(\text{V}^{5+}_6\text{V}^{4+}_1\text{Fe}^{2+}_{0.05}\text{Ti}_{0.02})\Sigma=7.99\text{O}_{20} \cdot 2.5\text{H}_2\text{O} \). (2) Do.; by electron microprobe, average of 10 analyses, all \( \text{V} \) as \( \text{V}_2\text{O}_5 \), \( \text{H}_2\text{O} \) by difference; \( \text{V}^{5+}:\text{V}^{4+} \) from crystal-structure analysis, corresponds to \( (\text{Ca}_{0.92}\text{K}_{0.04}\text{Na}_{0.01})\Sigma=0.97(\text{V}^{5+}_{0.73}\text{V}^{4+}_{0.88}\text{Fe}^{2+}_{0.34}\text{Ti}_{0.05})\Sigma=8.00\text{O}_{20} \cdot 4.5\text{H}_2\text{O} \).

Occurrence: In a rich vanadium deposit in fissures that cut red shales and that were probably filled by a remobilized asphaltite deposit.

Association: Hewettite, quartz.

Distribution: From Minasragra, 46 km from Cerro de Pasco, Peru. In the USA, at the Monument No. 2 mine, Monument Valley, Apache Co., Arizona; from the Cactus Rat mine group, Yellow Cat district, 24 km southeast of Thompson, Grand Co., Utah; in the Spring Creek Mesa area, Uravan district, Montrose Co., Colorado.

Name: For Eulagio E. Fernandini, formerly an owner of the Minasragra, Peru deposit.

Type Material: Harvard University, Cambridge, Massachusetts, 101718; National Museum of Natural History, Washington, D.C., USA, 87661, R5706.


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