Fernandinite

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

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

Physical Properties: Hardness = Soft. \(D(\text{meas.}) = 2.78 (5)\) \(D(\text{calc.}) = 3.07\) 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. Luster: Submetallic. Optical Class: Biaxial; strong birefringence. \(n = 2.05\) \(2V(\text{meas.}) = \text{n.d.}\)

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

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:

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

(1) Minasragra, Peru; by electron microprobe, average of five analyses, all V as \(\text{V}_2\text{O}_5\), \(\text{H}_2\text{O}\) by difference; assuming Si and Al as impurities, \(\text{V}^{5+}\):\(\text{V}^{4+}\) from crystal-structure analysis, corresponds to \((\text{Ca}_{0.86}\text{K}_{0.04})_{\Sigma=0.90}(\text{V}_{6.48}\text{V}_{1.39}\text{Fe}_{2.05}\text{Ti}_{0.02})_{\Sigma=7.94}\text{O}_{20}\cdot 2.5\text{H}_2\text{O}\).
(2) Do.; by electron microprobe, average of 10 analyses, all 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 \((\text{Ca}_{0.92}\text{K}_{0.04}\text{Na}_{0.01})_{\Sigma=0.97}(\text{V}_{6.73}\text{V}_{0.88}\text{Fe}_{2.34}\text{Ti}_{0.05})_{\Sigma=8.06}\text{O}_{20}\cdot 4.5\text{H}_2\text{O}\).

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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