Lyonsite  

\[ \text{Cu}_3 \text{Fe}^{3+}_4 (\text{VO}_4)_6 \]

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Crystal Data:  Orthorhombic.  \textit{Point Group}: \(2/m \ 2/m \ 2/m\).  As euhedral crystals, lathlike, flattened on \{010\}, to 230 \(\mu\)m.

Physical Properties:  \textit{Cleavage}: Good on \{001\}.  \textit{Tenacity}: Brittle.  \textit{Hardness} = n.d.  \(D(\text{meas.}) = \text{n.d.} \quad D(\text{calc.}) = 4.215\)


\(R_1 - R_2\):  (481) 17.5–23.1, (547) 16.6–22.3, (591) 14.7–20.7, (644) 14.4–18.8

Cell Data:  \textit{Space Group}: \(Pmcn\).  \(a = 10.296(1) \quad b = 17.207(2) \quad c = 4.910(1) \quad Z = 2\)

X-ray Powder Pattern:  Izalco volcano, El Salvador.  
3.279 (100b), 2.526 (60), 4.423 (40), 2.779 (40), 2.722 (40), 1.591 (40), 1.550 (40), 1.550 (40)

Chemistry:

\[
\begin{array}{ccc}
\text{V}_2\text{O}_5 & \text{TiO}_2 & \text{Fe}_2\text{O}_3 \\
47.74 & 2.27 & 24.83 \\
\text{Mn}_2\text{O}_3 & \text{CuO} & \\
\hline
\text{Total} & 100.24 & 100.00 \\
\end{array}
\]

(1) Izalco volcano, El Salvador; by electron microprobe, average of three analyses, total Fe as \(\text{Fe}_2\text{O}_3\), total Mn as \(\text{Mn}_2\text{O}_3\); corresponds to \(\text{Cu}_{0.94}\text{(Fe}_{3.43}\text{Mn}_{0.48}\text{Ti}_{0.32})\Sigma = 4.23(\text{V}_{0.96}\text{O}_4)_6\).

(2) \(\text{Cu}_3\text{Fe}_4(\text{VO}_4)_6\).

Occurrence:  In summit crater fumaroles, as a sublimate formed at \(\leq 800 \, ^\circ\)C.

Association:  Thenardite, howardevansite.

Distribution:  On the Izalco volcano, El Salvador.

Name:  To honor Dr. John Bartholomew Lyons (1916– ), Professor of Mineralogy, Dartmouth College, Hanover, New Hampshire, USA.


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