Cacoxenite

\[ \text{Fe}_{24}^3+\text{AlO}_6(\text{PO}_4)_{17}(\text{OH})_{12}\cdot\text{nH}_2\text{O} \ (n \sim 75) \]

Crystal Data: Hexagonal. Point Group: 6/m. Crystals, may be crudely hexagonal, acicular along [0001], typically in compact concentric spherical to radial aggregates, to 8 mm; in bundles, randomly fibrous; as coatings or an intergranular cement.

Physical Properties: Hardness = 3–4  D(meas.) = 2.2–2.6  D(calc.) = 2.217

Optical Properties: Semitransparent. Color: Yellow to brownish yellow or reddish orange, golden yellow, deep orange, rarely greenish; yellow in transmitted light. Luster: Silky. Optical Class: Uniaxial (+). Pleochroism: O = pale yellow; E = canary-yellow to yellow-orange. \( \omega = 1.575–1.585 \quad \epsilon = 1.635–1.656 \)

Cell Data: Space Group: P6_3/m. \( a = 27.559(1) \quad c = 10.550(1) \quad Z = 2 \)


Chemistry:
\[
\begin{array}{|c|c|c|c|}
\hline
 & (1) & (2) & (3) \\
\hline
\text{P}_2\text{O}_5 & 25.71 & 26.18 & 26.04 \\
\text{Al}_2\text{O}_3 & 2.89 & 1.10 & \\
\text{Fe}_2\text{O}_3 & 41.46 & 40.37 & 41.36 \\
\text{H}_2\text{O} & 32.81 & 30.59 & 31.50 \\
in\text{sol.} & 0.14 & \\
\hline
\text{Total} & 99.98 & 100.17 & 100.00 \\
\hline
\end{array}
\]

(1) Svátá Dobrotívá (St. Benigna), Czech Republic. (2) Eleonore mine, Germany. (3) \( \text{Fe}_{24}\text{AlO}_6(\text{PO}_4)_{17}(\text{OH})_{12}\cdot7\text{H}_2\text{O} \).

Occurrence: A common accessory mineral in oxidized magnetite and “limonite” iron ores; in Fe,Mn-bearing novaculites; a rare constituent of iron-rich sediments and soils.

Association: Dufrénete, rockbridgeite, beraunite, strengite, wavellite, magnetite, “limonite”.


Name: From the Greek for a bad guest, for the phosphorus content that degrades the quality of iron made from the host ores.