Hydroxylapatite \( \text{Ca}_5(\text{PO}_4)_3(\text{OH}) \)

Crystal Data: Hexagonal. Point Group: \( 6/m \). As tabular to prismatic crystals, to 30 cm; usually as stalagmites, nodules, in crystalline to massive crusts.

Physical Properties: Cleavage: Poor on \{0001\} and \{10\overline{1}0\}. Fracture: Conchoidal. Tenacity: Brittle. Hardness = 5 D(meas.) = 3.14–3.21 D(calc.) = 3.16


Cell Data: Space Group: \( P6_3/m \). \( a = 9.4166 \) \( c = 6.8745 \) \( Z = 2 \)

X-ray Powder Pattern: Synthetic. (ICDD 9-432). 2.814 (100), 2.778 (60), 2.720 (60), 3.44 (40), 1.841 (40), 1.943 (30), 2.631 (25)

Chemistry:

\[
\begin{array}{lll}
\text{P}_2\text{O}_5 & 42.05 & 42.39 \\
\text{MnO} & 0.07 & \\
\text{MgO} & 0.10 & \\
\text{CaO} & 55.84 & 55.82 \\
\text{F} & 0.16 & \\
\text{Cl} & \text{trace} & \\
\text{H}_2\text{O} & 1.86 & 1.79 \\
-\text{O} = (\text{F, Cl}) & 0.07 & \\
\hline \text{Total} & 100.01 & 100.00 \\
\end{array}
\]

(1) Holly Springs, Georgia, USA; corresponding to \( (\text{Ca}_{5.05}\text{Mg}_{0.01})\Sigma=5.06(\text{PO}_4)_3[\text{OH}]_{1.04}\text{F}_{0.08}\) \( \Sigma=1.12 \). (2) \( \text{Ca}_5(\text{PO}_4)_3(\text{OH}) \).

Mineral Group: Apatite group; OH > F or Cl.

Occurrence: Much less common than fluorapatite. Formed by the reaction of limestone with phosphatic solutions derived from guano. In talc schists associated with serpentine. As a fracture-localized alteration of montebrasite in a complex granite pegmatite.

Association: Brushite, calcite (caves); talc, serpentine (schists); montebrasite, crandallite, muscovite (pegmatite).

Distribution: From Chämleten (Kemmleten), near Hospental, Uri, Switzerland. In the Kaiserstuhl, Baden-Württemberg, Germany. At Punta della Rossa, Val Devero, Ossola, Italy. In the USA, in the Verde Antique quarry, Holly Springs, Cherokee Co., Georgia; from the Midnight Owl pegmatite, White Picacho district, Maricopa Co., Arizona. Large crystals in the Gardiner complex, beyond the head of Kangerdlugssuaq Fiord, East Greenland. On Mona Island, West Indies, Caribbean Sea. From caves worldwide; studied material from Low Water Bridge Cave, Greene Co., Missouri, USA.

Name: For dominant hydroxyl and membership in the apatite group; see fluorapatite.


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