Carbonate-hydroxylapatite Ca$_5$(PO$_4$, CO$_3$)$_3$(OH)

Crystal Data: Hexagonal. Point Group: 6/m. Cryptocrystalline; as fibrous or laminated botryoidal crusts.

Physical Properties: Cleavage: Poor on {0001} and {10T0}. Tenacity: Brittle. Hardness = 5 D(meas.) = 2.9–3.2 D(calc.) = 2.87 (synthetic).


X-ray Powder Pattern: Synthetic Ca$_5$(PO$_4$)$_1.5$CO$_3$)$_1.5$(OH). (ICDD 19-272). 2.78 (100), 2.68 (40), 3.46 (25), 2.231 (16), 1.929 (16), 1.838 (16), 3.04 (10)

Chemistry:

(1) SO$_3$ 0.45
P$_2$O$_5$ 38.7
CO$_2$ 0.87
SiO$_2$ 1.13
La$_2$O$_3$ 0.14
Ce$_2$O$_3$ 0.37
CaO 54.8
SrO 0.32
F 0.93
Cl 0.20
OH 2.42
−O = (F, Cl, OH)$_2$ 1.57
Total 98.76

(1) The Kaiserstuhl, Germany; by electron microprobe and coulometric analysis, average of six analyses, (OH)$^{1−}$ calculated for stoichiometry; corresponding to (Ca$_{4.97}$Sr$_{0.02}$Ce$_{0.01}$)$_5$[ (PO$_4$)$_{2.77}$) (CO$_3$)$_{0.10}$ (SiO$_2$)$_{0.10}$ (SO$_3$)$_{0.03}$]$_{Σ=5.00}$ [ (OH)$_{3.00}$ (F)$_{0.72}$ (Cl)$_{0.25}$]$_{Σ=1.00}$

Mineral Group: Apatite group.

Occurrence: As cement in phosphatic soils and bioclastic limestones. An accessory mineral in carbonatites and alkaline igneous rocks.

Association: Calcite.

Distribution: Carbonatian hydroxylapatite has been analyzed from many localities, although the species is not well-characterized, as the mechanism whereby carbonate is incorporated is controversial. At the Ødeɡ˚ arden apatite mines, Bamble, Norway. From the Kaiserstuhl, Baden-Württemberg, Germany. Found on Tuvalu (Ellice Islands), central Pacific. At Phalaborwa, Transvaal, South Africa. From Magnet Cove, Hot Spring Co., Arkansas, USA.

Name: For a carbonate-rich hydroxylapatite.

Type Material: n.d.