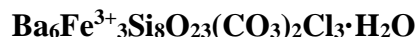


Fencooperite

Crystal Data: Hexagonal. *Point Group:* 3m. As anhedral to platy grains, to 100 μm, that form aggregates to 2 mm.

Physical Properties: *Cleavage:* None. *Tenacity:* Brittle. *Fracture:* Uneven to subconchoidal. VHN = 269-367, 321 average (10 g load). Hardness = 4.5-5 D(meas.) = n.d. D(calc.) = 4.338 Nonfluorescent.

Optical Properties: Opaque except at thin edges. *Color:* Jet-black to gray-brown. *Streak:* Grayish black. *Luster:* Vitreous to adamantine. *Optical Class:* Uniaxial (-). $\omega = 1.723(4)$ $\epsilon = 1.711(2)$ *Pleochroism:* Very strong; *O* = blue black, *E* = light greenish gray. *Absorption:* $O \gg E$.

Cell Data: *Space Group:* P3m1. $a = 10.7409(5)$ $c = 7.0955(4)$ $Z = 1$

X-ray Powder Pattern: Trumbull Peak, Mariposa County, California, USA. 3.892 (100), 2.820 (90), 2.685 (80), 3.148 (40), 2.208 (40), 2.136 (40), 1.705 (35)

| Chemistry: | (1) | (2) |
|--------------------------------|--------|--------|
| BaO | 50.51 | 50.31 |
| Fe ₂ O ₃ | 12.77 | 13.10 |
| MnO | 0.15 | |
| Al ₂ O ₃ | 1.35 | |
| SiO ₂ | 27.38 | 26.29 |
| P ₂ O ₅ | 0.16 | |
| Cl | 3.23 | 5.82 |
| CO ₂ | [4.81] | 4.81 |
| H ₂ O | [0.98] | 0.98 |
| -O = Cl | 0.73 | 1.31 |
| Total | 100.61 | 100.00 |

(1) Trumbull Peak, Mariposa County, California, USA; average electron microprobe analysis, H₂O and CO₂ calculated from structure; corresponds to Ba_{5.89}(Fe³⁺_{2.86}Mn²⁺_{0.04})_{Σ=2.90}(Si_{8.14}Al_{0.47}P_{0.04})_{Σ=8.65}O_{23.18}(CO₃)_{1.95}(Cl_{1.63}O_{1.37})_{Σ=3.00}·0.97H₂O. (2) Ba₆Fe³⁺₃Si₈O₂₃(CO₃)₂Cl₃·H₂O.

Occurrence: In gillespite-rich zones in sanbornite-quartz lenses in low-grade metasedimentary rocks.

Association: Titantaramellite, anandite, kinoshitalite, celsian, alforsite, barite, diopside, pyrrhotite.

Distribution: At Trumbull Peak, near El Portal, Mariposa County and at the Esquire no. 7 claim, Fresno County, California, USA.

Name: Honors mineral collector Joseph Fenimore ("Fen") Cooper, Jr. (b. 1937), of Santa Cruz, California, USA, who helped collect the samples in which the new phase was identified.

Type Material: National Mineral Collection, Geological Survey of Canada, Ottawa, Ontario (NMCC 68089).

References: (1) Roberts, A.C., J.D. Grice, G.E. Dunning, and K.E. Venance (2001) Fencooperite, Ba₆Fe³⁺₃Si₈O₂₃(CO₃)₂Cl₃·H₂O, a new mineral species from Trumbull Peak, Mariposa County, California. *Can. Mineral.*, 39, 1059-1064. (2) Grice, J.D. (2001) The crystal structure of fencooperite: unique [Fe³⁺₃O₁₃] pinwheels cross-connected by [Si₈O₂₂] islands. *Can. Mineral.*, 39, 1065-1071. (3) (2002) *Amer. Mineral.*, 87, 765-766 (abs. refs. 1 and 2).