## Calcioaravaipaite $PbCa_2Al(F,OH)_9$



**Crystal Data:** Monoclinic. *Point Group:* 2, $m$, or $2/m$. Crystals flattened on {100}, elongated ‖ [011], showing {100} and {011}, to 0.7 mm; massive. *Twinning:* On {100}, universal.

**Physical Properties:** *Cleavage:* {100}, good. *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = ∼2.5 D(meas.) = 4.85(5) D(calc.) = 4.71

**Optical Properties:** Transparent. *Color:* Colorless. *Streak:* White. *Luster:* Vitreous. *Optical Class:* Biaxial (–). *Orientation:* $Y = b$; $Z \wedge c = 73°$. *Dispersion:* $r > v$, strong. $\alpha = 1.510(1)$ $\beta = 1.528(1)$ $\gamma = 1.531(1)$ 2V(meas.) = 36(2)° 2V(calc.) = 44°

**Cell Data:** *Space Group:* $A2$, $Am$, or $A2/m$. a = 23.906(5) $b = 7.516(2)$ $c = 7.699(2)$ $\beta = 92.25°$ Z = 8

**X-ray Powder Pattern:** Grand Reef mine, Arizona, USA.
11.9 (100), 3.51 (85), 3.71 (70), 2.981 (60), 2.943 (60), 2.028 (60), 1.971 (60)

**Chemistry:**

| | (1) |
|---|---|
| $Al_2O_3$ | 10.8 |
| PbO | 46.4 |
| CaO | 23.5 |
| F | 30.9 |
| $H_2O$ | [1.4] |
| $-O = F_2$ | 13.0 |
| Total | [100.0] |

(1) Grand Reef mine, Arizona, USA; by electron microprobe, average of five analyses, $H_2O$ by difference; corresponds to $Pb_{1.02}Ca_{2.05}Al_{1.04}[F_{7.97}(OH)_{0.76}O_{0.27}]_{\Sigma=9.00}$.

**Occurrence:** In the oxidized zone of an epithermal Cu–Pb–Ag deposit.

**Association:** Artroeite, quartz, anglesite, fluorite, galena, linarite, muscovite.

**Distribution:** From the Grand Reef mine, near Klondyke, Aravaipa district, Graham Co., Arizona, USA.

**Name:** For its CALCIum content and relation to *aravaipaite*.

**Type Material:** Natural History Museum, Los Angeles, California, USA, 39338.

**References:** (1) Kampf, A.R. and E.E. Foord (1996) Calcioaravaipaite, a new mineral, and associated lead fluoride minerals from the Grand Reef mine, Graham County, Arizona. Mineral. Record, 27, 293–300.