

**Crystal Data:** Triclinic. *Point Group:* 1 or  $\bar{1}$ . As plates, to 3 mm, flattened on {010}.  
*Twinning:* Polysynthetic on {010}, universal.

**Physical Properties:** *Cleavage:* Perfect micaceous {010}; {100}, {001}, {101}, {10 $\bar{1}$ }, good.  
*Fracture:* Irregular. *Tenacity:* Flexible. Hardness = ~2 D(meas.) = n.d. D(calc.) = 6.37  
Slightly soluble in H<sub>2</sub>O.

**Optical Properties:** Transparent. *Color:* Colorless. *Streak:* White. *Luster:* Vitreous to pearly.

*Optical Class:* Biaxial (-). *Orientation:* Euler angles  $\phi = 67^\circ$ ;  $\psi = 60^\circ$ ;  $\theta = 76^\circ$ .

*Dispersion:*  $r < v$ , strong.  $\alpha = 1.678(2)$   $\beta = 1.690(2)$   $\gamma = 1.694(2)$   $2V(\text{meas.}) = 70(3)^\circ$   
 $2V(\text{calc.}) = 66^\circ$

**Cell Data:** *Space Group:*  $P1$  or  $P\bar{1}$ .  $a = 5.842(2)$   $b = 25.20(5)$   $c = 5.652(2)$   
 $\alpha = 93.84(4)^\circ$   $\beta = 90.14(4)^\circ$   $\gamma = 85.28(4)^\circ$   $Z = 4$

**X-ray Powder Pattern:** Grand Reef mine, Arizona, USA.  
3.134 (100), 12.5 (80), 3.65 (70), 3.50 (60), 3.33 (60), 2.916 (40), 2.822 (40)

Chemistry:	(1)	(2)
Pb	73.8	74.22
Al	3.6	3.22
F	21.0	20.41
H <sub>2</sub> O	[3.0]	2.15
Total	[101.4]	100.00

(1) Grand Reef mine, Arizona, USA; by electron microprobe, H<sub>2</sub>O estimated from IR; corresponds to Pb<sub>2.90</sub>Al<sub>1.09</sub>F<sub>9</sub>•1.36H<sub>2</sub>O. (2) Pb<sub>3</sub>AlF<sub>9</sub>•H<sub>2</sub>O.

**Occurrence:** In the oxidized zone of an epithermal Pb–Cu–Ag deposit hosted by a silicified rhyolite-schist breccia.

**Association:** Grandreefite, pseudograndreefite, laurelite, fluorite, galena, anglesite, linarite, caledonite, quartz.

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

**Name:** For the Aravaipa mining district, Arizona, USA, where the mineral occurs.

**Type Material:** Natural History Museum, Los Angeles, California, 33608; National Museum of Natural History, Washington, D.C., USA, 166058.

**References:** (1) Kampf, A.R., P.J. Dunn, and E.E. Foord (1989) Grandreefite, pseudograndreefite, laurelite, and aravaipaite: four new minerals from the Grand Reef mine, Graham County, Arizona. *Amer. Mineral.*, 74, 927–933. (2) 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.