

**Iangreyite****Ca<sub>2</sub>Al<sub>7</sub>(PO<sub>4</sub>)<sub>2</sub>(PO<sub>3</sub>OH)<sub>2</sub>(OH,F)<sub>15</sub>·8H<sub>2</sub>O**

**Crystal Data:** Hexagonal. *Point Group:* 32. As hexagonal tablets (sometimes warped), to 0.4 mm, exhibiting forms {001} and {100}; in subparallel stacked aggregates.

**Physical Properties:** *Cleavage:* Perfect, {001}. *Fracture:* Irregular. *Tenacity:* Brittle; somewhat flexible. *Hardness* = 3 *D(meas.)* = 2.46(3) *D(calc.)* = 2.451

**Optical Properties:** Transparent to translucent. *Color:* Colorless to white or cream, white, yellowish, or light pink. *Streak:* White.

*Luster:* Vitreous, pearly (aggregates).

*Optical Class:* Uniaxial (+).  $\omega = 1.544(2)$   $\varepsilon = 1.554(2)$

**Cell Data:** *Space Group:* P321.  $a = 6.988(1)$   $c = 16.707(3)$   $Z = 1$

**X-ray Powder Pattern:** Silver Coin mine, Nevada, USA.

16.739 (100), 2.967 (45), 2.219 (19), 6.054 (18), 1.744 (17), 5.687 (13), 1.896 (13)

<b>Chemistry:</b>	(1)	(2)		(1)	(2)
Na <sub>2</sub> O	0.27	0.04	ZnO	0.10	0.05
K <sub>2</sub> O	1.01	0.45	Al <sub>2</sub> O <sub>3</sub>	31.80	29.55
CaO	7.62	11.28	SiO <sub>2</sub>	0.19	2.42
FeO	0.16	0.82	As <sub>2</sub> O <sub>5</sub>	0.00	0.04
BaO	0.45	0.26	P <sub>2</sub> O <sub>5</sub>	25.90	24.05
SrO	0.10	1.13	SO <sub>3</sub>	0.40	0.05
MgO	0.34	0.04	F	9.53	8.23
PbO	0.00	0.04	- O = F	2.81	3.46
CuO	0.06	0.06	<u>H<sub>2</sub>O<sub>diff</sub></u>	<u>24.87</u>	<u>24.96</u>
MnO	0.00	0.00	Total	100.00	100.00

(1) Silver Coin mine, Nevada, USA; average of 7 electron microprobe analyses, H<sub>2</sub>O by difference, presence of H<sub>2</sub>O, OH, and PO<sub>4</sub> confirmed by IR and Raman spectroscopy; corresponding to

Ca<sub>1.42</sub>K<sub>0.22</sub>Na<sub>0.09</sub>Ba<sub>0.03</sub>Sr<sub>0.01</sub>Al<sub>6.51</sub>Mg<sub>0.09</sub>Fe<sub>0.02</sub>Cu<sub>0.01</sub>Zn<sub>0.01</sub>P<sub>3.81</sub>F<sub>5.24</sub>H<sub>30.21</sub>O<sub>33.76</sub>.

(2) Krásno ore district, Horní Slavkov, Czech Republic; average of 12 electron microprobe analyses, corresponding to Ca<sub>2.15</sub>K<sub>0.10</sub>Na<sub>0.01</sub>Ba<sub>0.02</sub>Sr<sub>0.12</sub>Al<sub>6.28</sub>Mg<sub>0.01</sub>Fe<sub>0.12</sub>Cu<sub>0.08</sub>Zn<sub>0.01</sub>P<sub>3.64</sub>Si<sub>0.43</sub>F<sub>4.65</sub>H<sub>29.62</sub>O<sub>34.35</sub>.

**Occurrence:** A weathering product derived from the breakdown of phosphate minerals (e.g. F-rich perhamite, “fluorapatite”) by acidic ground waters derived from the oxidation of sulfide minerals.

**Association:** Meurigite-Na, plumbogummite, kidwellite, lipscombite, strengite, chalcociderite, wardite, leucophosphite, wavellite, goethite, barite, quartz, and F-rich perhamite (Silver Coin mine, Nevada, USA); “fluorapatite” (Czech Republic).

**Distribution:** From the Silver Coin mine, Valmy, Iron Point district, Humboldt County, Nevada, USA; at the 5th level of the Huber shaft, Krásno ore district, near Horní Slavkov, Czech Republic.

**Name:** Honors Dr. Ian Edward Grey (b. 1944), formerly Chief Research Scientist at CSIRO Minerals, Melbourne, Australia, for his contributions to mineralogy, crystallography and the minerals-processing industry.

**Type Material:** Mineral Sciences Department, Natural History Museum of Los Angeles County, California, USA (57661 and 62519); Department of Mineralogy and Petrology, National Museum Prague, Czech Republic (PIP 20/2009).

**References:** (1) Mills, S.J., A.R. Kampf, J. Sejkora, P.M. Adams, W.D. Birch, and J. Plášil (2011) Iangreyite: a new secondary phosphate mineral closely related to perhamite. *Mineral. Magazine*, 75, 327-336. (2) (2013) *Amer. Mineral.*, 98, 280 (abs. ref. 1).