Kidwellite  
\[
\text{NaFe}^{3+}_9(\text{PO}_4)_6(\text{OH})_{10}\cdot 5\text{H}_2\text{O}
\]

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**Crystal Data:** Monoclinic.  
*Point Group:* 2/m, m, or 2.  
Acicular crystals are elongated along [010] and flattened on \{100\}, to 50 µm; typically in mats, tufts, or rosettes of feathery crystals; as spheroidal to botryoidal masses and crusts.

**Physical Properties:**  
*Cleavage:* Perfect on \{100\}.  
*Hardness:* 3  
*D(meas.)* = > 3.3  
*D(calc.)* = 3.34

**Optical Properties:**  
*Transparent to translucent.*  
*Color:* Bright yellow to greenish yellow, pale chartreuse-green, greenish white; colorless in transmitted light.  
*Streak:* Yellow.  
*Luster:* Silky.  
*Optical Class:* Biaxial (−).  
*Orientation:* \(Y = b, \alpha = 1.787(5), \beta = 1.800(5), \gamma = 1.805(5)\)  
*2V(meas.)* = Large.

**Cell Data:**  
*Space Group:* A2/m, Am, or A2.  
\(a = 20.61(7)\)  
\(b = 5.15(1)\)  
\(c = 13.75(6)\)  
\(\beta = 112.64(15)^{\circ}\)  
*Z = 2*

**X-ray Powder Pattern:**  
Fodderstack Mountain, Arkansas, USA.  
9.41 (100), 3.413 (55), 3.813 (40), 3.193 (40), 4.017 (35), 3.173 (35), 6.43 (30)

**Chemistry:**

\[
\begin{array}{ccc}
\text{Chemistry:} & \text{(1)} & \text{(2)} \\
\text{P}_2\text{O}_5 & 31.3 & 31.41 \\
\text{SiO}_2 & 0.27 & \\
\text{Al}_2\text{O}_3 & 0.98 & \\
\text{Fe}_2\text{O}_3 & 52.3 & 53.01 \\
\text{MnO} & 0.02 & \\
\text{MgO} & 0.01 & \\
\text{Na}_2\text{O} & 1.60 & 2.29 \\
\text{H}_2\text{O}^+ & 13.3 & \\
\text{H}_2\text{O}^- & 0.3 & \\
\text{H}_2\text{O} & 13.29 & \\
\text{Total} & [100.08] & 100.00
\end{array}
\]

(1) Fodderstack Mountain, Arkansas, USA; original total given as 100.07%, corresponds to \(\text{Na}_{0.71}(\text{Fe}^{3+}_{8.91}\text{Al}_{0.26})\text{Si}=9.17(\text{PO}_4)_6(\text{OH})_{10}\cdot 5\text{H}_2\text{O}\).  
(2) \(\text{NaFe}^{3+}_9(\text{PO}_4)_6(\text{OH})_{10}\cdot 5\text{H}_2\text{O}\).

**Occurrence:**  
As a late-stage replacement of earlier phosphate minerals.

**Association:**  
Rockbridgeite, beraunite, strengite, laubmannite, dufrénite, chalcosiderite, goethite.

**Distribution:**  
In the USA, in Arkansas, from the Coon Creek and York mines, Polk Co;  
on Fodderstack Mountain, Montgomery Co.; and on Buckeye Mountain, at Three Oak Gap;  
in Alabama, from Indian Mountain, Cherokee Co.; at Irish Creek, Rockbridge Co., Virginia.  
In Germany, from the Rotläufchen mine, Waldgirmes, near Giessen, and the Eleonore mine, Hesse; and in the Clara mine, near Oberwolfach, Black Forest.  
At the Phoenix United mines, Linkinhorne, Cornwall, England.  
In Australia, from Broken Hill, New South Wales; in the Iron Monarch quarry, Iron Knob, South Australia; and at the Lake Boga granite quarry, near Swan Hill, Victoria.  
In the Okatjimukuju pegmatite, near Karibib, Namibia.

**Name:**  
Honors Albert Laws Kidwell (1919– ), Houston, Texas, USA, for his study of Arkansas phosphate deposits.

**Type Material:**  

**References:**  
(1) Moore, P.B. and J. Ito (1978) Kidwellite, \(\text{NaFe}^{3+}_9(\text{OH})_{10}(\text{PO}_4)_6\cdot 5\text{H}_2\text{O}\), a new species. Mineral. Mag., 42, 137–140.  

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