

Fillowite**Na₂Ca(Mn²⁺, Fe²⁺)₇(PO₄)₆**

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Crystal Data: Hexagonal. *Point Group:* $\bar{3}$. Rarely as tiny rhombohedral crystals, showing {01 $\bar{1}$ 2}, {0001}; usually in granular aggregates.

Physical Properties: *Cleavage:* {0001}, nearly perfect. *Fracture:* Uneven. *Tenacity:* Brittle. Hardness = 4.5 D(meas.) = 3.43 D(calc.) = 3.55

Optical Properties: Transparent to translucent. *Color:* Wax-yellow, pale yellow, greenish yellow, reddish brown, colorless; colorless to yellow in transmitted light. *Streak:* White.

Luster: Subresinous to greasy.

Optical Class: Uniaxial (+), anomalously biaxial. *Dispersion:* $r < v$, strong. $\omega = 1.672(3)$
 $\epsilon = 1.676(3)$ $2V(\text{meas.}) = 30^\circ$

Cell Data: *Space Group:* $R\bar{3}$. $a = 15.282(2)$ $c = 43.507(3)$ $Z = 18$

X-ray Powder Pattern: Branchville, Connecticut, USA.

2.814 (100), 3.017 (70), 3.640 (60), 2.552 (60), 3.789 (40), 1.888 (40), 11.44 (35)

Chemistry:

	(1)	(2)	(3)
P ₂ O ₅	39.10	39.68	40.80
FeO	9.33	9.69	24.10
MnO	39.42	39.58	23.79
CaO	4.08	3.63	5.37
Li ₂ O	0.06	0.07	
Na ₂ O	5.74	5.44	5.94
H ₂ O ⁺	1.66	1.58	
insol.	0.88	1.02	
Total	100.27	100.69	100.00

(1) Branchville, Connecticut, USA; average of two analyses, insoluble is quartz. (2) Do.; insoluble is quartz. (3) Na₂Ca(Mn, Fe)₇(PO₄)₆ with Mn:Fe = 1:1.

Occurrence: A primary accessory mineral in a zoned granite pegmatite (Branchville, Connecticut, USA).

Association: Triploidite, fairfieldite, reddingite (Branchville, Connecticut, USA).

Distribution: In the USA, from Branchville, Fairfield Co., Connecticut; in the White Picacho district, Maricopa and Yavapai Cos., Arizona; at the Animike Red Ace pegmatite, Florence Co., Wisconsin. From Buranga, Kiluli, and Rusororo, Rwanda. At Kabira, Uganda.

Name: In honor of Abijah N. Fillow (1822–1895), Branchville, Connecticut, USA, who early supplied minerals from his quarry at the locality.

Type Material: Yale University, New Haven, Connecticut, 3.3094, 3.3096; Harvard University, Cambridge, Massachusetts, USA, 96840.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 719–720. (2) Fisher, D.J. (1965) Dickinsonites, fillowite and alluaudites. *Amer. Mineral.*, 50, 1647–1669. (3) Araki, T. and P.B. Moore (1981) Fillowite, Na₂Ca(Mn, Fe)₇²⁺(PO₄)₆: its crystal structure. *Amer. Mineral.*, 66, 827–842. (4) Moore, P.B. (1989) Perception of structural complexity: fillowite revisited and α -iron related. *Amer. Mineral.*, 74, 918–926.