Maxwellite $NaFe^{3+}(AsO_4)F$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As blocky to short prismatic crystals, dominated by {013}, {526}, {$\bar{5}$26}, {011}, to 1 mm.

Physical Properties: *Cleavage:* Good on {110}. *Fracture:* Irregular to conchoidal. Hardness = 5–5.5 D(meas.) = 3.90(2) D(calc.) = 3.95

Optical Properties: Transparent to translucent. *Color:* Medium to dark red. *Streak:* Medium to pale red-orange. *Luster:* Vitreous. *Optical Class:* Biaxial (+). *Pleochroism:* $X = Y$ = medium yellow-orange; Z = dark orangish red. *Orientation:* $Y = b$; $X \wedge c = 11°$; $Z \wedge a = 35.5°$. *Dispersion:* $r > v$; strong. *Absorption:* $Z > X = Y$. $\alpha = 1.748(3)$ $\beta = 1.772(3)$ $\gamma = 1.798(3)$ 2V(meas.) = 86° 2V(calc.) = 89°

Cell Data: *Space Group:* $C2/c$. $a = 6.667(2)$ $b = 8.781(4)$ $c = 7.134(2)$ $\beta = 114.50(2)°$ Z = 4

X-ray Powder Pattern: Squaw Creek, New Mexico, USA.
3.290 (100), 2.614 (80), 3.039 (75), 4.844 (70), 2.637 (50), 3.642 (35), 3.437 (35)

Chemistry:

	(1)	(2)		(1)	(2)
As_2O_5	51.0	48.54	ZnO	0.1	
Nb_2O_5	0.2		MgO	3.5	
TiO_2	5.0		CaO	8.0	
SnO_2	0.6		Li_2O	0.1	
ZrO_2	0.3		Na_2O	8.0	13.09
Al_2O_3	5.0		F	6.0	8.02
Fe_2O_3	14.0	33.73	$-O = F_2$	2.5	3.38
Mn_2O_3	0.5		Total	99.8	100.00

(1) Squaw Creek, New Mexico, USA; by electron microprobe, average of 43 analyses, total Fe as Fe_2O_3, total Mn as Mn_2O_3, Li by ion microprobe; corresponding to $(Na_{0.59}Ca_{0.33}Li_{0.02})_{\Sigma=0.94}(Fe_{0.40}Al_{0.22}Mg_{0.20}Ti_{0.14}Mn_{0.01}Sn_{0.01}Zr_{0.01})_{\Sigma=0.99}(As_{1.01}O_4)(F_{0.72}O_{0.28})_{\Sigma=1.00}$. (2) $NaFe(AsO_4)F$.

Polymorphism & Series: Forms two series, with durangite, and with tilasite.

Occurrence: Rarely formed in miarolitic cavities in rhyolite adjacent to high-temperature veins in hydrothermal tin deposits.

Association: Squawcreekite, cassiterite, hematite, quartz, tridymite, pseudobrookite, sanidine, chernovite-(Y), gasparite-(Ce), tilasite, heulandite, stilbite, calcite.

Distribution: From the Squaw Creek tin prospect, Catron Co., and in Willow Spring Draw, Sierra Co., Taylor Creek district, New Mexico, USA.

Name: Honors Charles Henry Maxwell (1923–), geologist with the U.S. Geological Survey, who studied the Taylor Creek district.

Type Material: National Museum of Natural History, Washington, D.C., USA, 166613.

References: (1) Foord, E.E., P.F. Hlava, J.J. Fitzpatrick, R.C. Erd, and R.W. Hinton (1991) Maxwellite and squawcreekite, two new minerals from the Black Range tin district, Catron County, New Mexico, U.S.A. Neues Jahrb. Mineral., Monatsh., 363–384. (2) (1992) Amer. Mineral., 77, 449 (abs. ref. 1). (3) Cooper, M.A. and F.C. Hawthorne (1995) The crystal structure of maxwellite. Neues Jahrb. Mineral., Monatsh., 97–104.