Arsenowagnerite $Mg_2(AsO_4)F$

Crystal Data: Monoclinic. *Point Group*: 2/*m*. As crude to equant or tabular crystals to 0.5 mm, as distorted skeletal, typically case-like crystals to 1 mm and in open-work aggregates forming crusts.

Physical Properties: *Cleavage:* Distinct on {001} (by analogy with wagnerite and sarkinite). *Tenacity*: Brittle. *Fracture*: Uneven. Hardness = ~5 D(meas.) = n.d. D(calc.) = 3.698 Fluoresces orange-red weakly under SW UV.

Optical Properties: Transparent. *Color*: Light to lemon-yellow, sometimes greenish yellow or colorless; colorless in transmitted light. *Streak*: White. *Luster*: Vitreous. *Optical Class*: Biaxial (+). α = 1.614(2) β = 1.615(2) γ = 1.640(2) 2V(meas.) = 25(5)° 2V(calc.) = 23°

Cell Data: *Space Group*: $P2_1/c$. a = 9.8638(3) b = 12.9830(3) c = 12.3284(3) β = 109.291(3)° Z = 16

X-ray Powder Pattern: Arsenatnaya fumarole, Tolbachik volcano, Kamchatka, Russia. 3.043 (100), 3.339 (98), 2.940 (72), 3.155 (65), 2.787 (51), 5.80 (41), 3.916 (37)

Chemistry:

	(1)	(2)
MgO	38.72	39.03
CaO	0.23	
MnO	0.32	
CuO	0.60	
ZnO	0.05	
Fe_2O_3	0.11	
TiO_2	0.03	
SiO_2	0.08	
P_2O_5	0.18	
V_2O_5	0.03	
As_2O_5	54.96	55.64
SO_3	0.10	
F	8.91	9.20
- O = F_2	3.75	3.87
Total	100.57	100.00

(1) Arsenatnaya fumarole, Tolbachik volcano, Kamchatka, Russia; average of 6 electron microprobe analyses supplemented by IR spectroscopy; corresponds to $(Mg_{1.98}Cu_{0.02}Mn_{0.01}Ca_{0.01})_{\Sigma=2.02}(As_{0.99}P_{0.01})_{\Sigma=1.00}O_{4.03}F_{0.97}$. (2) $Mg_2(AsO_4)F$.

Mineral Group: Triplite-triploidite supergroup, triplite group.

Occurrence: A sublimate around an active fumarole.

Association: Anhydrite, tilasite, johillerite, hematite, fluorophlogopite, cassiterite, calciojohillerite, aphthitalite, nickenichite, svabite, berzeliite, metathénardite, krasheninnikovite, fluoborite.

Distribution: From the Arsenatnaya fumarole, Second scoria cone of the Northern Breakthrough of the Great Tolbachik Fissure Eruption, Tolbachik volcano, Kamchatka, Russia.

Name: The prefix, *arseno*, indicates the arsenate analogue of *wagnerite* $Mg_2(PO_4)F$.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (95000).

References: (1) Pekov, I.V., N.V. Zubkova, A.A. Agakhanov, V.O. Yapaskurt, N.V. Chukanov, D.I. Belakovskiy, E.G. Sidorov, and D.Yu. Pushcharovsky (2018) New arsenate minerals from the Arsenatnaya fumarole, Tolbachik volcano, Kamchatka, Russia. VIII. Arsenowagnerite, $Mg_2(AsO_4)F$. Mineral. Mag., 82(4), 877-888. (2) (2021) Amer. Mineral., 106, 158-159 (abs. ref. 1).