

Crystal Data: Hexagonal. *Point Group:* $\bar{3} 2/m$. As grains to 30 μm ; in aggregates to 150 μm .

Physical Properties: *Cleavage:* Imperfect on {00*1}. *Fracture:* n.d. *Tenacity:* Brittle. VHN = 380-492, 423 average (50 g load). Hardness = 4.5-5.5 D(meas.) = n.d. D(calc.) = 3.235

Optical Properties: Transparent. *Color:* Colorless. *Streak:* White. *Luster:* Vitreous. *Optical Class:* Uniaxial (-). $\omega = 1.643(3)$ $\epsilon = 1.639(3)$

Cell Data: Space Group: $R\bar{3}m$. $a = 7.1874(4)$ $c = 41.292(3)$ $Z = 3$

X-ray Powder Pattern: Calculated pattern.

3.103 (100), 2.753 (95), 2.750 (88), 2.665 (63), 1.797 (62), 1.539 (58), 2.141 (43)

Chemistry:	(1)	(2)		(1)	(2)
SO ₃	11.25	11.12	MgO	0.14	0.09
P ₂ O ₅	2.90	2.56	K ₂ O	0.94	1.11
TiO ₂	0.18	0.13	Na ₂ O	0.12	0.25
SiO ₂	18.26	18.74	F	0.72	1.32
Fe ₂ O ₃		0.20	CO ₂	0.12	0.11
Al ₂ O ₃	0.45	0.90	<u>-O = F</u>	<u>0.30</u>	<u>0.45</u>
BaO	9.21	8.19	Total	99.71	101.34
CaO	55.73	57.19			

(1) Hahal Darga, Palestinian Autonomy, Israel; average of 22 electron microprobe analyses supplemented by Raman spectroscopy; corresponds to (Ba_{0.72}K_{0.24}Na_{0.04}) $\Sigma=1$ (Ca_{11.95}Mg_{0.04}Na_{0.01}) $\Sigma=12$ ([SiO₄]_{0.91}[PO₄]_{0.05}[AlO₄]_{0.03}[Ti⁴⁺O₄]_{0.01}) $\Sigma=4$ ([SO₄]_{0.84}[PO₄]_{0.14}[CO₃]_{0.02}) $\Sigma=2$ (O_{2.54}F_{0.46}) $\Sigma=3$.

(2) Ma'ale Adumim, Israel; average of 16 electron microprobe analyses supplemented by Raman spectroscopy.

Polymorphism & Series: Solid solution with nabimusaite and ariegilatite.

Mineral Group: Arctite group.

Occurrence: Pyrometamorphic by-product of gases, fluids and melts transforming earlier mineral associations (larnite rocks) at ~900 °C (Israel). In an altered carbonate xenolith from the lava bed of the Shadi-Khokh volcano (Southern Ossetia).

Association: Larnite, fluorellestadite-fluorapatite, brownmillerite, fluormayenite-fluorkyuygenite, ye'elimitite, ternesite, shulamitite, periclase (Hahal Darga).

Distribution: At Jabel Harmun, Ma'ale Adumim, and the Hahal Darga, Judean Mts, West Bank, Palestinian Autonomy, Israel. From the Shadi-Khokh volcano, Southern Ossetia.

Name: For the canyon (Hahal) *Darga*, near where studied specimens were collected.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (4713/2).

References: (1) Galuskina, I.O., F. Gfeller, E.V. Galuskin, T. Armbruster, Y. Vapnik, M. Dulski, M. Gardocki, L. Ježak, and M. Murashko (2019) New minerals with modular structure derived from hatrurite from the pyrometamorphic rocks. Part IV: Dargaite, BaCa₁₂(SiO₄)₄(SO₄)₂O₃, from Nahal Darga, Palestinian Autonomy. *Mineral. Mag.*, 83(1), 81-88. (2) (2020) *Amer. Mineral.*, 105(8), 1277-1278 (abs. ref. 1).