

Crystal Data: Monoclinic, pseudo-hexagonal. *Point Group:* 2/m. Crystals are prismatic, to 100 μm, composed of stacked pseudo-hexagonal plates; as subhedral grains. *Twinning:* Polysynthetically twinned, common; twin law matrix [100/01.0/1.01.] with (001) as the twin plane.

Physical Properties: Hardness = n.d. VHN = 150 (100 g load). D(meas.) = n.d. D(calc.) = 6.80

Optical Properties: Opaque. *Color:* Steel-gray; pale gray to white in reflected light.

Anisotropism: Weak to strong. *Birefractance:* Very weak.

R₁-R₂: (400) -, (420) 40.2-45.3, (440) 40.9-45.7, (460) 40.9-45.2, (480) 40.8-45.1, (500) 40.4-44.5, (520) 39.9-43.9, (540) 39.4-43.5, (560) 39.0-43.1, (580) 38.6-42.6, (600) 38.3-42.3, (620) 39.0-42.1, (640) 37.8-41.8, (660) 37.5-41.5, (680) 37.2-41.0, (700) 36.9-40.9

Cell Data: *Space Group:* P2₁/m. *a* = 8.621(4) *b* = 26.03(1) *c* = 8.810(4) β = 119.21(1)° *Z* = 2

X-ray Powder Pattern: Kirki, Greece.

3.260 (100), 3.070 (70), 3.475 (60), 2.854 (60), 2.190 (50), 3.65 (50), 1.815 (50)

Chemistry:	(1)	(2)	(3)
Pb	59.4	58.57	58.65
Bi	15.2	17.78	17.75
As	6.2	6.38	6.36
Sb	0.5		
S	17.4	16.74	17.24
Se	0.96	0.99	
Cl		0.06	
Total	98.7	100.53	100.00

(1) Kirki, Greece; by electron microprobe, average of six analyses; corresponding to Pb_{10.15}(As_{2.93}Bi_{2.57}Sb_{0.14})_{Σ=5.64}S_{19.21}. (2) Vulcano, Italy; by electron microprobe, average of 20 analyses; corresponding to Pb_{10.00}(As_{3.01}Bi_{3.01})_{Σ=6.02}(S_{18.47}Se_{0.44}Cl_{0.06})_{Σ=18.97}. (3) Pb₁₀As₃Bi₃S₁₉.

Occurrence: In a hydrothermal Pb-Zn deposit (Kirki, Greece); in a volcanic fumarole, formed at about 470 °C (Vulcano, Italy).

Association: Cosalite, bismuthinite, bismuthian jordanite, seligmannite, levyclaudite, sphalerite, pyrite, galena (Kirki, Greece); vurroite, galena, bismuthinite, galenobismutite, cannizzarite, lillianite, heyrovskýite (Vulcano, Italy).

Distribution: From the Aghios Philippos Pb-Zn deposit, near Kirki, Thrace, Greece [TL]. At the La Fossa crater, Vulcano, Lipari Islands, Italy.

Name: For Kirki, Greece.

Type Material: n.d.

References: (1) Möelo, Y., E. Oudin, E. Makovicky, S. Karup-Møller, F. Pillard, M. Bornuat, and E. Evangelou (1985) La kirkiite, Pb₁₀Bi₃As₃S₁₉, une nouvelle espèce minérale homologue de la jordanite. *Bull. Minéral.*, 108, 667-677 (in French with English abs.). (2) (1986) *Amer. Mineral.*, 71, 1278-1279 (abs. ref. 1). (3) Borodaev, Y.S., A. Garavelli, O.V. Kuzmina, N.N. Mozgova, N.I. Organova, N.V. Trubkin, and F. Vurro (1998) Rare sulfosalts from Vulcano, Aeolian Islands, Italy. I. Se-bearing kirkiite, Pb₁₀(Bi, As)₆(S, Se)₁₉. *Can. Mineral.*, 36, 1105-1114. (4) Pinto, D., T. Balić-Žunić, A. Garavelli, C. Garbarino, E. Makovicky, and F. Vurro (2006) First occurrence of close-to-ideal kirkiite at Vulcano (Aeolian Islands, Italy): chemical data and single-crystal X-ray study. *Eur. J. Mineral.*, 18, 393-401. (5) (2007) *Amer. Mineral.*, 92(4), 706 (abs. ref. 4). (6) Makovicky, E., T. Balić-Žunić, L. Karanović, and D. Poleti (2006) The crystal structure of kirkiite, Pb₁₀Bi₃As₃S₁₉. *Can. Mineral.*, 44, 177-188.