Hemusite $Cu_4^{1+}Cu_2^{2+}Sn^{4+}Mo^{4+}S_8$

Crystal Data: Cubic. *Point Group:* $4/m\ \bar{3}\ 2/m$, 432, or $\bar{4}3m$. As rounded grains and aggregates of irregular shape, to 0.05 mm.

Physical Properties: Hardness = ∼4 VHN = 145; 210–215 D(meas.) = n.d. D(calc.) = 4.469–4.55

Optical Properties: Opaque. *Color:* Gray; in polished section, violet-gray to ash-gray. R: (400) 22.9, (420) 23.1, (440) 23.5, (460) 24.3 (480) 24.9, (500) 25.6, (520) 26.0, (540) 26.2, (560) 26.2, (580) 26.2, (600) 26.3, (620) 26.5, (640) 26.8, (660) 27.0, (680) 27.0, (700) 26.9

Cell Data: *Space Group:* $Fm3m$, $F432$, or $F\bar{4}3m$. $a = 10.80$–10.83 $Z = 4$

X-ray Powder Pattern: Chelopech, Bulgaria. 3.11 (10), 1.919 (5), 1.858 (3), 1.632 (3) 3.61 (2), 2.87 (2), 2.55 (2)

Chemistry:

	(1)	(2)	(3)
Cu	43.6	43.80	44.73
Sn	12.8	12.09	13.92
Fe	2.6	0.60	
Mn		0.08	
Zn		0.08	
Cd		0.04	
Mo	11.7	10.38	11.26
Ag		0.06	
As	0.1		
Bi		1.42	
Se		1.06	
Te		0.50	
S	28.0	29.82	30.09
Total	98.8	99.88	100.00

(1) Chelopech, Bulgaria; by electron microprobe, corresponds to $Cu_{5.98}Sn_{0.94}Fe_{0.40}As_{0.01}Mo_{1.06}S_{7.61}$. (2) Kawazu mine, Japan; by electron microprobe, corresponds to $(Cu_{5.91}Fe_{0.09}Zn_{0.01}Ag_{0.01})_{\Sigma=6.02}(Sn_{0.87}Bi_{0.06}Te_{0.03})_{\Sigma=0.96}Mo_{0.93}(S_{7.97}Se_{0.12})_{\Sigma=8.09}$. (3) $Cu_4^{1+}Cu_2^{2+}SnMoS_8$.

Occurrence: Of hydrothermal origin, early formed in the mineral association (Chelopech, Bulgaria); in a polymetallic deposit in carboniferous porphyritic andesites (Kochbulak deposit, Uzbekistan).

Association: Enargite, luzonite, colusite, stannoidite, reniérite, tennantite, chalcopyrite, pyrite (Chelopech, Bulgaria).

Distribution: At the Chelopech deposit, Sofia, Bulgaria [TL]. From the Kochbulak gold deposit, Chatkal-Kuramin Mountains, eastern Uzbekistan. In Japan, in the Kawazu mine, Shizuoka Prefecture, and at the Iriki mine, Kagoshima Prefecture.

Name: After an ancient name for the Balkan Mountains, on the southern slope of which the Chelopech deposit occurs; probably of Thracian origin.

Type Material: University of Sofia, Sofia; Geological Institute, Bulgarian Academy of Sciences, Sofia, Bulgaria.

References: (1) Terziev, G.I. (1971) Hemusite – a complex copper-tin-molybdenum sulfide from the Chelopech ore deposit, Bulgaria. Amer. Mineral., 56, 1847–1854. (2) Shimizu, M., A. Kato, and S. Matsubara (1988) Hemusite and paraguanajuatite from the Kawazu mine, Shizuoka Prefecture, Japan. Mineral. J. (Japan), 13, 92–100. (3) Shimizu, M., C.J. Stanley, A.J. Criddle, A. Kato, and S. Matsubara (1991) New compositional and optical data for antimonian and bismuthian varieties of hemusite from Japan. Mineral. Petrol., 45, 11–17.