

Modderite

(Co, Fe)As

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Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. As tiny grains, to 0.05 mm; massive.

Physical Properties: Hardness = ~ 4 VHN = 26 D(meas.) = n.d. D(calc.) = 8.28 for CoAs.

Optical Properties: Opaque. *Color:* Bluish white.

R: (400) —, (420) —, (440) 37.1, (460) 38.0, (480) 38.3, (500) 39.1, (520) 39.2, (540) 39.8, (560) 39.7, (580) 39.6, (600) 39.2, (620) 39.0, (640) 38.2, (660) 37.4, (680) 37.1, (700) 35.5

R₁–R₂: n.d.

Cell Data: *Space Group:* $Pm\bar{c}n$. $a = 3.458$ $b = 5.869$ $c = 5.292$ $Z = 4$.

X-ray Powder Pattern: Synthetic CoAs. (ICDD 9-94).

1.97 (100), 2.59 (90), 0.957 (70b), 2.55 (60), 1.047 (60), 0.999 (60), 0.927 (60)

Chemistry:

	(1)
Co	39.2
Fe	5.0
As	56.4
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Total	100.6

(1) Dashkesan deposit, Azerbaijan; by electron microprobe, average of 11 grains; corresponding to $(\text{Co}_{0.88}\text{Fe}_{0.12})_{\Sigma=1.00}\text{As}_{1.00}$.

Occurrence: In heavy mineral concentrates (Witwatersrand, South Africa).

Association: Nickeline, alloclasite, safflorite, glaucodot, cobaltite, pentlandite, pyrrhotite, chalcopyrite (Witwatersrand, South Africa); alloclasite, glaucodot, cobaltite, pentlandite, pyrrhotite, chalcopyrite (Dashkesan deposit, Azerbaijan).

Distribution: From the “Far East” Witwatersrand, Transvaal, South Africa [TL]. In the Dashkesan deposit, Middle Caucasus Mountains, Azerbaijan.

Name: Derivation not given; presumably named for the Modderfontein mine, South Africa.

Type Material: National Museum of Natural History, Washington, D.C., USA, 161217.

References: (1) Cooper, R.A. (1923) Mineral constituents of Rand concentrates. *J. Chem. Met. and Mining Soc. South Africa*, 24, 90. (2) (1926) *Amer. Mineral.*, 11, 77 (abs. ref. 1). (3) Cooper, R.A. (1924) Mineral constituents of Rand concentrates [discussion]. *J. Chem. Met. and Mining Soc. South Africa*, 24, 264–265. (4) Makhmudov, A.I. and I.P. Laputina (1977) First occurrence of modderite in the USSR. *Zap. Vses. Mineral. Obshch.*, 106, 347–350 (in Russian). (5) Heyding, R.D. and L.D. Calvert (1957) Arsenides of transition metals: the arsenides of iron and cobalt. *Can. J. Chem.*, 35, 449–457.