

# Clinosafflorite

# (Co, Fe, Ni)As<sub>2</sub>

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**Crystal Data:** Monoclinic. *Point Group:* 2/*m*. Very fine grained; intimately intergrown with other sulfides.

**Physical Properties:** Hardness = 4.5–5 VHN = 719–875 (100 g load). D(meas.) = n.d. D(calc.) = 7.46

**Optical Properties:** Opaque. *Color:* Tin-white. *Luster:* Metallic.

R<sub>1</sub>–R<sub>2</sub>: (400) 50.7–54.8, (420) 59.8–55.0, (440) 59.0–55.1, (460) 58.0–55.3, (480) 57.1–55.5, (500) 56.3–55.6, (520) 55.4–55.6, (540) 54.5–55.4, (560) 53.8–55.2, (580) 53.0–54.9, (600) 52.4–54.5, (620) 51.9–54.2, (640) 51.4–53.5, (660) 50.9–53.3, (680) 50.6–52.9, (700) 50.4–52.6

**Cell Data:** *Space Group:* P2<sub>1</sub>/*n*. *a* = 5.040 *b* = 5.862 *c* = 3.139  $\beta$  = 90°13' *Z* = 2

**X-ray Powder Pattern:** Cobalt, Canada.

2.531 (100), 2.427 (80), 2.422 (80), 2.671 (40), 2.657 (40), 1.865 (30), 1.656 (30)

## Chemistry:

	(1)	(2)
Co	27.4	25.7
Ni	0.7	
Fe	0.4	4.1
Cu	0.0	
As	70.1	67.9
S	0.6	2.3
Total	99.2	100.0

(1) Nord mine, Sweden; by electron microprobe, corresponding to (Co<sub>0.98</sub>Ni<sub>0.02</sub>Fe<sub>0.01</sub>)<sub>Σ=1.01</sub>(As<sub>1.96</sub>S<sub>0.04</sub>)<sub>Σ=2.00</sub>. (2) Bou Azzer, Morocco; by electron microprobe, corresponding to (Co<sub>0.89</sub>Fe<sub>0.15</sub>)<sub>Σ=1.04</sub>(As<sub>1.85</sub>S<sub>0.15</sub>)<sub>Σ=2.00</sub>. (3) Cobalt, Canada; by electron microprobe, analyses of three samples, not given, stated to correspond to (Co<sub>0.76</sub>Fe<sub>0.14</sub>Ni<sub>0.10</sub>)<sub>Σ=1.00</sub>As<sub>2.00</sub>; (Co<sub>0.73</sub>Fe<sub>0.26</sub>Ni<sub>0.01</sub>)<sub>Σ=1.00</sub>As<sub>2.00</sub>; and (Co<sub>0.70</sub>Fe<sub>0.21</sub>Ni<sub>0.09</sub>)<sub>Σ=1.00</sub>As<sub>2.00</sub>.

**Polymorphism & Series:** Dimorphous with safflorite.

**Mineral Group:** Arsenopyrite group.

**Occurrence:** In hydrothermal Co–Ni sulfide ores, typically silver-bearing.

**Association:** Skutterudite, cattierite, cobaltite, siegenite, bismuth, silver, molybdenite, dolomite, barite.

**Distribution:** From Cobalt, Ontario, Canada [TL]. At the London mine, National district, Humboldt Co., Nevada, USA. In the Aghbar (Arhbar) mine, Bou Azzer district, Morocco. At the Nord mine, Nordmark district, and from near Filipstad, Värmland, Sweden. In Germany, in the Richelsdorf Mountains, Hesse. At the Alva silver mine, Ochil Hills, central Scotland.

**Name:** In reference to the monoclinic symmetry of this saffloritelike species.

**Type Material:** Department of Geological Sciences, Queen's University, Kingston, Ontario, Canada.

**References:** (1) Radcliffe, D. and L.G. Berry (1971) Clinosaflorite: a monoclinic polymorph of safflorite. *Can. Mineral.*, 10, 877–881. (2) (1972) *Amer. Mineral.*, 57, 1552 (abs. ref. 1). (3) Burke, E.A.J. and M.A. Zakrzewski (1983) A cobalt-bearing sulfide–arsenide assemblage from the Nord mine (Finnshytteberg), Sweden: A new occurrence of clinosaflorite. *Can. Mineral.*, 21, 129–136. (4) Darmon, R. and M. Wintenberger (1966) Structure cristalline de CoAs<sub>2</sub>. *Bull. Minéral.*, 213–215 (in French). (5) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 102.

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