

Crystal Data: Cubic. *Point Group:* $2/m\bar{3}$. Crystals are cubes, octahedra, dodecahedra, to 9 cm; rarely prismatic; in skeletal growth forms, distorted aggregates; also massive, granular and dense. *Twinning:* On {112} as sixlings and complex shapes; also reported on {011}.

Physical Properties: *Cleavage:* Distinct on {001} and {111}; in traces on {011}. *Fracture:* Conchoidal to uneven. Hardness = 5.5–6 VHN = 606–824; 810–915 (100 g load). D(meas.) = 6.5 D(calc.) = 6.821

Optical Properties: Opaque. *Color:* Tin-white to silver-gray, tarnishes gray or iridescent; in polished section, gray, creamy or golden white. *Streak:* Black. *Luster:* Metallic. R: (400) 55.3, (420) 56.0, (440) 56.4, (460) 56.6, (480) 56.4, (500) 56.1, (520) 55.7, (540) 55.3, (560) 55.0, (580) 54.7, (600) 54.4, (620) 54.1, (640) 53.8, (660) 53.5, (680) 53.1, (700) 52.7

Cell Data: *Space Group:* $Im\bar{3}$. $a = 8.195(3)$ $Z = 8$

X-ray Powder Pattern: Synthetic CoAs₃. 2.592 (100), 2.193 (35), 1.835 (35), 1.609 (30), 1.675 (20), 0.9537 (20), 3.35 (18)

Chemistry:	(1)	(2)	(3)	(4)
Co	19.70	19.0	28.23	20.77
Fe	2.80	2.0		
Ni		1.8		
As	76.41	75.7	71.77	79.23
S	1.03	2.1		
Total	[99.94]	100.6	100.00	100.00

(1) Skutterud, Norway; recalculated after deduction of SiO₂ 5.63%; corresponding to (Co_{0.87}Fe_{0.13})_{Σ=1.00}(As_{2.65}S_{0.08})_{Σ=2.73}. (2) Cobalt, Canada; by electron microprobe, corresponding to (Co_{0.83}Fe_{0.09}Ni_{0.08})_{Σ=1.00}(As_{2.60}S_{0.17})_{Σ=2.77}. (3) CoAs₂. (4) CoAs₃.

Polymorphism & Series: Forms a series with nickel-skutterudite.

Occurrence: Typically in medium- to high-temperature hydrothermal veins with other Ni–Co sulfide minerals.

Association: Nickeline, cobaltite, arsenopyrite, silver, silver sulfosalts, bismuth, calcite, siderite, barite, quartz.

Distribution: From many localities as an accessory mineral, only rarely as an important ore or in fine specimens. In Norway, from Skutterud, Modum [TL]. At Schneeberg, Annaberg, and Freiberg, Saxony, Germany. From Austria, at Lölling, Carinthia. In Spain, in the valley of Gistain, Huesca Province. From France, at Riomanou, Hautes-Pyrénées, and on Mount Chalanches, Isère. At Talnotry, Kirkcudbrightshire, Scotland. From a number of mines in Cornwall, England. At Khovu-Akay, Tuva, Russia. Well-crystallized from the Aghbar (Arhbar) and Irhitem (Ighitem) mines, Bou Azzer district, Morocco. In the USA, in Connecticut, at Chatham, Middlesex Co.; and from Mine la Motte, Madison Co., Missouri. In Canada, in large amounts at Cobalt; in South Lorrain Township; at Sudbury; and Gowanda, Ontario.

Name: For the Norwegian locality at Skutterud.

Type Material: Mining Academy, Freiberg, Germany, 3910.

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 342–346. (2) Roseboom, E.H., Jr. (1962) Skutterudites (Co, Ni, Fe)As_{3-x}: composition and cell dimensions. *Amer. Mineral.*, 47, 310–327. (3) Radcliffe, D. (1971) Structural formula and composition of skutterudite. *Can. Mineral.*, 9, 559–563. (4) Mandel, N. and J. Donohue (1971) The refinement of the crystal structure of skutterudite, CoAs₃. *Acta Cryst.*, 27, 2288–2289. (5) Pauling, L. (1978) Covalent chemical bonding of transition metals in pyrite, cobaltite, skutterudite, millerite and related minerals. *Can. Mineral.*, 16, 447–452. (6) (1960) NBS Circ. 539, 10, 21. (7) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 515, 516.

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