

Crystal Data: Hexagonal. *Point Group:* $6/m\ 2/m\ 2/m$. Crystals rare, thin tabular or needlelike, to 1 mm; arborescent, disseminated, massive. *Twinning:* Twin plane $\{10\bar{1}1\}$.

Physical Properties: *Fracture:* Subconchoidal to uneven. *Tenacity:* Brittle. Hardness = 5.5 VHN = n.d. $D(\text{meas.}) = 7.591\text{--}8.23$ $D(\text{calc.}) = 8.629$

Optical Properties: Opaque. *Color:* Pale copper-red, may be with violet tint. *Streak:* Reddish brown. *Luster:* Metallic. *Pleochroism:* Very distinct. *Anisotropism:* Very noticeable in air and oil.

$R_1\text{--}R_2$: (400) 44.9–49.0, (420) 43.1–48.1, (440) 41.4–47.1, (460) 39.6–46.4, (480) 38.2–45.8, (500) 36.9–45.2, (520) 35.9–45.5, (540) 37.4–47.7, (560) 39.5–49.4, (580) 42.0–51.6, (600) 44.5–53.4, (620) 46.8–55.1, (640) 49.1–56.9, (660) 51.1–58.4, (680) 52.6–59.8, (700) 53.9–61.1

Cell Data: *Space Group:* $P6_3/mmc$. $a = 3.946$ $c = 5.148$ $Z = 2$

X-ray Powder Pattern: Cobalt, Canada.

2.84 (100), 2.06 (70), 1.965 (70), 1.533 (30), 1.074 (30), 1.610 (20), 1.419 (20)

Chemistry:	(1)	(2)	(3)
Ni	32.09	32.7	32.52
Fe	0.04		
Co	0.59		
Sb	66.62	67.2	67.48
As	0.58		
S	0.00		
Total	99.92	99.9	100.00

(1) Hudson Bay mine, Cobalt, Canada; in part due to nickeline. (2) St. Andreasberg, Germany; by electron microprobe. (3) NiSb.

Mineral Group: Nickeline group.

Occurrence: In hydrothermal calcite veins associated with Co–Ni–Ag ores.

Association: Silver, nickeline, maucherite, cobaltite, ullmannite, tetrahedrite, pyrrhotite, cubanite, chalcopyrite, sphalerite, galena, calcite.

Distribution: In Germany, from St. Andreasberg, Harz Mountains [TL??], and in the Merkur mine, Bad Ems, Rhineland-Palatinate. In France, at Ar, Pyrénées-Atlantiques, and Pierrefitte, Hautes-Pyrénées. On Monte Narba, Sarrabus, Sardinia, Italy. From Tunaberg, Saxberget, and Långsjön, Sweden. At Sulitjelma, Norway. From the Ilímaussaq intrusion, southern Greenland. At Broken Hill, New South Wales, Australia. From the Noril'sk region, western Siberia, Russia. In the Natsume mine, Hyogo Prefecture, Japan. At the Kolar Gold Fields, Karnataka, India. In Canada, from the Cobalt district, near Red Lake; in the Silver Islet mine and the Hemlo gold deposit, Thunder Bay district, Ontario. In the USA, from Coyote Peak, near Orick, Humboldt Co., California. Several additional localities are known.

Name: To honor Saxon mineralogist Johann Friedrich August Breithaupt (1791–1873).

References: (1) Palache, C., H. Berman, and C. Frondel (1944) Dana's system of mineralogy, (7th edition), v. I, 238–239. (2) Beran, A. and T. Mohsenzadeh (1982) A reflected light investigation of nickeline, breithauptite and millerite. *Tschermaks Mineral. Petrog. Mitt.*, 30, 267–275. (3) De Jong, W.F. (1925) De structuur van breithauptiet. *Physica*, 241–243 (in Dutch). (4) Berry, L.G. and R.M. Thompson (1962) X-ray powder data for the ore minerals. *Geol. Soc. Amer. Mem.* 85, 62.

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