

**Crystal Data:** Monoclinic. *Point Group:* 2/m. Crystals are prismatic to acicular along [001], flattened on {010}, to 6 cm, prominent {010}, {201}, smaller {100}, {110}, {221}, in radiating sprays; as fibrous crusts, massive.

**Physical Properties:** *Cleavage:* On {010}, perfect. Hardness = 2–3 D(meas.) = 3.33 D(calc.) = 3.24

**Optical Properties:** Translucent. *Color:* White, colorless; light carmine, peach-blossom-red (cobaltian); blue, grayish blue (ferroan); in transmitted light, colorless, may be pale rose.

*Streak:* White to reddish white. *Luster:* Silky on cleavages.

*Optical Class:* Biaxial (+). *Pleochroism:* Weak; X = Y = colorless; Z = pale red. *Orientation:* X = b; Z ∧ c = 32°–37°. *Dispersion:* r < v. *Absorption:* Z > X = Y. α = 1.619–1.622 β = 1.638–1.645 γ = 1.671–1.681 2V(meas.) = 74°–85° 2V(calc.) = 72°–83°

**Cell Data:** *Space Group:* C2/m. a = 10.241–10.259 b = 13.405–13.430 c = 4.757–4.762 β = 105.21°–105.38° Z = 2

**X-ray Powder Pattern:** Schneeberg, Germany.

6.66 (100), 2.994 (90), 7.87 (70), 2.734 (60), 3.220 (50), 3.006 (50), 2.462 (50)

**Chemistry:**

	(1)	(2)	(3)
As <sub>2</sub> O <sub>5</sub>	[37.17]	39.5	37.18
CoO	6.91	5.39	
NiO	2.00	1.78	
ZnO	30.52	33.6	39.50
CaO	trace		
H <sub>2</sub> O	23.40	[19.73]	23.32
Total	[100.00]	[100.00]	100.00

(1) Schneeberg, Germany; As<sub>2</sub>O<sub>5</sub> by difference. (2) Do.; by electron microprobe, H<sub>2</sub>O by difference; corresponds to (Zn<sub>2.44</sub>Co<sub>0.42</sub>Ni<sub>0.14</sub>)<sub>Σ=3.00</sub>(AsO<sub>4</sub>)<sub>2</sub>•8H<sub>2</sub>O. (3) Zn<sub>3</sub>(AsO<sub>4</sub>)<sub>2</sub>•8H<sub>2</sub>O.

**Polymorphism & Series:** Forms a series with parasymplectite.

**Mineral Group:** Vivianite group.

**Occurrence:** A rare secondary mineral in the oxidation zone of some zinc deposits.

**Association:** Symplectite, parasymplectite, adamite, legrandite, metaköttigite, gypsum (Ojuela mine, Mexico); pharmacosiderite, legrandite, scorodite, adamite (Sterling Hill, New Jersey, USA); cuprian adamite (Tsumeb, Namibia).

**Distribution:** In Germany, from the Daniel mine, Schneeberg, Saxony; in the Richelsdorf Mountains, Hesse; at the Michael mine, Weiler, near Lahr, and the Clara mine, near Oberwolfach, Black Forest. At Jáchymov (Joachimsthal) and Příbram, Czech Republic. Large crystal groups from the Ojuela mine, Mapimí, Durango, Mexico. At Sterling Hill, Ogdensburg, Sussex Co., New Jersey, and in the Clan Alpine Mountains, east side of Stinger Valley, Churchill Co., Nevada, USA. From Tsumeb, Namibia. In the Ogibira mine, Osa, Okayama Prefecture, Japan. From the Puttapa zinc mine, near Beltana, South Australia.

**Name:** To honor Otto Köttig (1824–1892), chemist, of Schneeberg, Germany, who published the first description of the mineral.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 751–752. (2) Sturman, B.D. (1976) New data for köttigite and parasymplectite. Can. Mineral., 14, 437–441. (3) Cesbron, F., M.-C. Sichére, and H. Vachey (1977) Propriétés cristallographiques et comportement thermique des termes de la série köttigite-parasymplectite. Bull. Soc. fr. Minéral., 100, 310–314 (in French with English abs.). (4) Hill, R.J. (1979) The crystal structure of köttigite. Amer. Mineral., 64, 376–382.

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