

**Lindackerite****Cu<sub>5</sub>(AsO<sub>4</sub>)<sub>2</sub>(AsO<sub>3</sub>OH)<sub>2</sub>·9H<sub>2</sub>O**

**Crystal Data:** Triclinic. *Point Group:*  $\bar{1}$ . Crystals are lathlike, showing {010}, {001}, {101}, to 0.3 mm; in rosettes and crusts.

**Physical Properties:** *Cleavage:* {010}, perfect. *Fracture:* Conchoidal. Hardness = 2-2.5  
D(meas.) = 3.35(2) D(calc.) = 3.312

**Optical Properties:** Transparent. *Color:* Apple-green; pale green to colorless in transmitted light. *Streak:* Pale green to white. *Luster:* Vitreous.  
*Optical Class:* Biaxial (+).  $\alpha = 1.626-1.632$   $\beta = 1.662$   $\gamma = 1.725-1.728$   $2V(\text{meas.}) = 74^\circ$   
 $2V(\text{calc.}) = 72^\circ-73^\circ$  *Pleochroism:* Weak;  $X = Y =$  colorless;  $Z =$  green. *Dispersion:*  $r < v$ , strong.  
*Orientation:*  $Y \wedge a = 21.3^\circ$  on {010} and  $34.4^\circ$  on {001}.

**Cell Data:** *Space Group:*  $P\bar{1}$ .  $a = 6.415(1)$   $b = 8.048(1)$   $c = 10.332(1)$   $\alpha = 85.41(1)^\circ$   $\beta = 79.50(1)^\circ$   
 $\gamma = 84.71(1)^\circ$   $Z = 1$

**X-ray Powder Pattern:** Jáchymov, Czech Republic.

10.2 (100), 8.02 (70), 3.668 (60), 3.154 (60), 2.665 (50), 4.001(40), 3.064 (40)

Chemistry:	(1)	(2)	(3)
As <sub>2</sub> O <sub>5</sub>	44.2	44.64	43.71
CoO		3.39	1.24
NiO		0.00	0.50
CuO	39.4	33.04	36.47
H <sub>2</sub> O	16.4	[18.93]	[18.08]
Total	100.0	[100.00]	[100.00]

(1) Jáchymov, Czech Republic. (2) Do.; by electron microprobe, H<sub>2</sub>O by difference, corresponds to (Cu<sub>4.36</sub>Co<sub>0.47</sub>) $\Sigma=4.83$ (AsO<sub>4</sub>)<sub>2.03</sub>[(AsO<sub>3</sub>)<sub>2.03</sub>(OH)<sub>1.55</sub>] $\cdot 10.2\text{H}_2\text{O}$ . (3) Cap Garonne mine, France; by electron microprobe, H<sub>2</sub>O by difference; corresponds to (Cu<sub>4.90</sub>Co<sub>0.18</sub>Ni<sub>0.07</sub>) $\Sigma=5.15$ (AsO<sub>4</sub>)<sub>2.02</sub>[(AsO<sub>3</sub>)<sub>2.03</sub>(OH)<sub>2.21</sub>] $\cdot 9.61\text{H}_2\text{O}$ .

**Mineral Group:** Lindackerite supergroup, lindackerite group.

**Occurrence:** In the oxidized zone of some arsenic-rich copper deposits.

**Association:** Erythrite, pitticite, annabergite, lavendulan (Jáchymov, Czech Republic); olivenite, chalcantite, antlerite, pushcharovskite, covellite, tennantite, quartz (Cap Garonne mine, France).

**Distribution:** From the Geister and Červená veins, Eliáš mine, Jáchymov (Joachimsthal), Czech Republic. At the Cap Garonne mine, near le Pradet, Var, and in the Salsigne mine, 15 km north of Carcassone, Aude, France. From the Carmenes copper mine, Villamanin, Léon Province, Spain. Found at the Talmessi mine, 35 km west of Anarak, Iran.

**Name:** To honor Joseph *Lindacker*, Austrian pharmacist-chemist, who made the first analyses.

**Type Material:** National School of Mines, Paris, France.

**References:** (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 1007-1008. (2) Sarp, H. and B. Dominik (1995) Redefinition of lindackerite: new chemical formula and new crystallographic and optical data. Archs Sci. Genève, 48(3), 239-250 (in French with English abs.). (3) Hybler, J., P. Ondruš, I. Císařová, V. Petříček, and F. Veselovský (2003) Crystal structure of lindackerite, (Cu,Co,Ni)Cu<sub>4</sub>(AsO<sub>4</sub>)<sub>2</sub>(AsO<sub>3</sub>OH)<sub>2</sub>·9H<sub>2</sub>O from Jáchymov, Czech Republic. Eur. J. Mineral., 15, 1035-1042. (4) (2004) Amer. Mineral., 89, 1833 (abs. ref. 3).