

**Astrocyanite-(Ce)****Cu<sub>2</sub>(Ce, Nd, La)<sub>2</sub>(UO<sub>2</sub>)(CO<sub>3</sub>)<sub>5</sub>(OH)<sub>2</sub>•1.5H<sub>2</sub>O**

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**Crystal Data:** Hexagonal. *Point Group:* 6/m 2/m 2/m,  $\bar{6}m2$ , 6mm, or 622. Tabular {0001} crystals, to 1 mm, isolated or forming flat rosettes.

**Physical Properties:** *Cleavage:* On {0001}. *Hardness* = 2–3 *D(meas.)* = 3.80 *D(calc.)* = 3.95 *Radioactive.*

**Optical Properties:** *Translucent to opaque.* *Color:* Pale blue, bright blue, blue-green. *Luster:* Vitreous.

*Optical Class:* Uniaxial (-). *Pleochroism:* Strong; *O* = blue; *E* = nearly colorless. *Orientation:* *E* ⊥ {0001}.  $\omega = 1.688(2)$   $\epsilon = 1.638(2)$

**Cell Data:** *Space Group:* *P6/mmm*,  $P\bar{6}m2$ ,  $P\bar{6}2m$ , *P6mm*, or *P622*. *a* = 14.96(2) *c* = 28.86(4) *Z* = 12

**X-ray Powder Pattern:** Kamoto-East mine, Congo. 6.73 (100), 3.72 (90), 4.16 (60), 4.30 (50), 13.3 (40), 2.488 (40), 2.154 (40)

**Chemistry:**

	(1)
UO <sub>3</sub>	28.16
Ce <sub>2</sub> O <sub>3</sub>	11.83
Nd <sub>2</sub> O <sub>3</sub>	9.74
La <sub>2</sub> O <sub>3</sub>	3.38
Pr <sub>2</sub> O <sub>3</sub>	2.48
Sm <sub>2</sub> O <sub>3</sub>	2.00
Y <sub>2</sub> O <sub>3</sub>	0.15
CuO	15.55
CaO	0.61
CO <sub>2</sub>	21.40
H <sub>2</sub> O	[4.70]
Total	[100.00]

(1) Kamoto-East mine, Congo; by electron microprobe, average of six analyses, CO<sub>2</sub> by CHN, H<sub>2</sub>O by difference; corresponds to Cu<sub>2.02</sub>Ca<sub>0.11</sub>(Ce<sub>0.74</sub>Nd<sub>0.60</sub>La<sub>0.22</sub>Pr<sub>0.16</sub>Sm<sub>0.12</sub>Y<sub>0.01</sub>)<sub>Σ=1.85</sub>(UO<sub>2</sub>)<sub>1.02</sub>(CO<sub>3</sub>)<sub>5.02</sub>•2.70H<sub>2</sub>O.

**Occurrence:** In the oxidation zone of the uranium-bearing portion of a Cu–Co deposit.

**Association:** Uraninite, uranophane, kamotoite-(Y), françoisite-(Nd), shabaite-(Nd), schuilingite-(Nd), masuyite.

**Distribution:** From the Kamoto-East Cu–Co mine, five km west of Kolwezi, Katanga Province, Congo (Shaba Province, Zaire).

**Name:** From the Greek *astro* and *kyanos*, alluding to the starlike habit and blue color, and for *cerium* as the dominant rare-earth element.

**Type Material:** Royal Belgian Institute of Natural Sciences, Brussels, Belgium, RC3513.

**References:** (1) Deliens, M. and P. Piret (1990) L'astrocyanite-(Ce), Cu<sub>2</sub>(TR)<sub>2</sub>(UO<sub>2</sub>)(CO<sub>3</sub>)<sub>5</sub>(OH)<sub>2</sub>•1, 5H<sub>2</sub>O, nouvelle espèce minérale de Kamoto, Shaba, Zaïre. *Eur. J. Mineral.*, 2, 407–411 (in French with English abs.). (2) (1991) *Amer. Mineral.*, 76, 665 (abs. ref. 1).