Paratooite-(La) $(REE,Ca,Na,Sr)_6Cu(CO_3)_8$

Crystal Data: Orthorhombic. *Point Group*: 222, *mm*2, or 2/*m* 2/*m* 2/*m*. As sheaves and radiating sprays of blade-like to tabular crystals to 200 μm.

Physical Properties: *Cleavage*: None observed, TEM suggests cleavage on {100}. *Fracture*: n.d. *Tenacity*: n.d. *Hardness* = 4 (By analogy to other REE carbonates). D(meas.) = 3.68(3) D(calc.) = 3.78 Effervescence in dilute HCl.

Optical Properties: Transparent. *Color*: Pale turquoise-blue to light blue, very pale blue in transmitted light. *Streak*: Pale blue. *Luster*: Vitreous to pearly.
Optical Class: Biaxial (-). α = 1.605(3) β = 1.696(3) γ = 1.752(2) 2V(calc.) = 72.6°
Pleochroism: Moderate, X = very pale blue, $Y = Z$ = greenish blue. *Absorption*: $Z \approx Y >> X$.

Cell Data: *Space Group*: *P*222, *Pmmm*, $P222_1$ or *Pmm*2. a = 10.0862(5) b = 12.8088(6) c = 7.2360(4) Z = 2

X-ray Powder Pattern: Paratoo Copper Mine, Australia.
2.927 (100), 5.047 (53), 2.530 (52), 4.786 (49), 3.957 (43), 3.468 (43), 2.344 (22)

Chemistry:

	(1)
Y_2O_3	0.72
La_2O_3	26.47
Pr_2O_3	7.74
Nd_2O_3	8.15
Sm_2O_3	0.66
Gd_2O_3	0.85
CaO	7.57
SrO	3.15
CuO	5.77
Na_2O	3.30
F	0.24
CO_2	32.05
NO_2	1.12
H_2O^-	2.34
-O = F	0.10
Total	100.03

(1) Paratoo Copper Mine, Australia; electron microprobe analysis supplemented by IR spectroscopy and CHN analysis, corresponds to $(La_{3.54}Ca_{2.94}Na_{2.32}Nd_{1.05}Pr_{1.03}Sr_{0.66}Y_{0.14}Gd_{0.10}Sm_{0.0.8})_{\Sigma=11.86}Cu_{1.58}(C_{15.84}N_{0.53})O_{47.76}F_{0.24}$.

Occurrence: A secondary weathering mineral in a mineralized dolomitic slatestone cut by chalcopyrite and magnetite-bearing quartz veins.

Association: Kamphaugite-(Y), donnayite-(Y), bastnssite-(La), malachite, nontronite, "limonite".

Distribution: From the Paratoo Copper Mine, 30 km southwest of Yunta, on the western edge of the Olary Province, South Australia.

Name: For the locality that produced the first specimens – *Paratoo* Copper Mine, Australia and the dominant rare earth element, *La*nthanum.

Type Material: The South Australian Museum, Adelaide, Australia (G29614).

References: (1) Pring, A., K. Wallwork, J. Brugger, and U. Kolitsch (2006) Paratooite-(La), a new lanthanum-dominant rare-earth copper carbonate from Paratoo, South Australia. Mineral. Mag., 70(1), 131-138. (2) (2006) Amer. Mineral., 91, 1455-1456 (abs. ref. 1).