

Crystal Data: Hexagonal. *Point Group:* 6. Crystals, prismatic on $\{10\bar{1}0\}$ and striated along $[0001]$, to 2 mm; as grains to 1 cm.

Physical Properties: *Cleavage:* Perfect on $\{10\bar{1}0\}$. *Fracture:* n.d.
Tenacity: Brittle. Hardness = 5 D(meas.) = 2.48(1) D(calc.) = 2.486(12)

Optical Properties: Transparent. *Color:* Colorless. *Streak:* n.d.
Luster: Vitreous.
Optical Class: Uniaxial (+). $\omega = 1.523(2)$ $\epsilon = 1.525(2)$

Cell Data: *Space Group:* $P6_3$. $a = 12.695(2)$ $c = 5.325(1)$ $Z = 1$

X-ray Powder Pattern: Monte Somma–Vesuvio volcanic complex, Campania, Italy.
 4.797 (100), 3.281 (73), 2.662 (58), 3.669 (57), 2.446 (31), 2.120 (18), 2.754 (16)

Chemistry:	(1)
SiO ₂	32.38
Al ₂ O ₃	27.28
CaO	12.70
Na ₂ O	13.05
K ₂ O	3.08
Cl	7.43
SO ₃	1.96
CO ₂	3.24
H ₂ O	0.19
-O=Cl ₂	1.68
Total	99.63

(1) Monte Somma–Vesuvio volcanic complex, Campania, Italy; average of 5 analyses, CO₂ by selective sorption, H₂O by Penfield method and confirmed by IR, corresponding to $\text{Na}_{4.70}\text{Ca}_{2.53}\text{K}_{0.73}(\text{Si}_{6.02}\text{Al}_{5.98}\text{O}_{23.995})\text{Cl}_{2.34}(\text{CO}_3)_{0.82}(\text{SO}_4)_{0.27} \cdot 0.12 \text{H}_2\text{O}$.

Mineral Group: Cancrinite group.

Occurrence: A product of metasomatic reaction between alkaline magma and limestone.

Association: Orthoclase, phlogopite, clinohumite, calcite, diopside, pargasite, haüyne, apatite.

Distribution: Monte Somma–Vesuvio volcanic complex, Campania, Italy.

Name: Honors the Italian crystallographer Paolo Ballirano (b. 1964), Department of Earth Sciences, University of Rome, for contributions to the crystal chemistry of cancrinite group minerals.

Type Material: A.E. Fersman Mineralogical Museum, Russian Academy of Sciences, Moscow, Russia (catalog no. 3756/1).

References: (1) Chukanov, N.V., N.V. Zubkova, I.V. Pekov, L.V. Olysysh, E. Bonaccorsi, and D.Y. Pushcharovski (2010) Balliranoite, $(\text{Na,K})_6\text{Ca}_2(\text{Si}_6\text{Al}_6\text{O}_{24})\text{Cl}_2(\text{CO}_3)$, a new cancrinite-group mineral from Monte Somma–Vesuvio volcanic complex, Italy. *Eur. J. Mineral.*, 22, 113–119. (2) (2010) *Amer. Mineral.*, 95, 1595–1596 (abs. ref. 1).