

Guarinoite

$(\text{Zn, Co, Ni})_6(\text{SO}_4)(\text{OH, Cl})_{10} \cdot 5\text{H}_2\text{O}$

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Crystal Data: Hexagonal. *Point Group:* 6, 6/m, or 622. As thin hexagonal crystals, tabular on {0001}, to 0.2 mm; typically in rounded aggregates.

Physical Properties: *Cleavage:* On {0001}, perfect. *Fracture:* Irregular. *Tenacity:* "Fragile". Hardness = "Very soft". D(meas.) = 2.80(1) D(calc.) = 2.77

Optical Properties: Transparent. *Color:* Bright to deep pink. *Streak:* Pale pink.

Luster: Vitreous to pearly.

Optical Class: Uniaxial (-). *Pleochroism:* Strong; O = pink; E = pale pink. $\omega = 1.584(2)$
 $\epsilon = 1.544(2)$

Cell Data: *Space Group:* $P6_3$, $P6_3/m$ or $P6_322$. $a = 8.344(4)$ $c = 21.59(2)$ $Z = 3$

X-ray Powder Pattern: Cap Garonne mine, France.

10.8 (100), 3.300 (90), 2.725 (60), 2.563 (50), 2.351 (40), 1.575 (30), 5.40 (25)

Chemistry:

	(1)
SO ₃	11.85
CoO	22.17
NiO	6.74
CuO	0.05
ZnO	33.31
Cl	0.77
H ₂ O	24.4
-O = Cl ₂	0.17
Total	99.12

(1) Cap Garonne mine, France; by electron microprobe, average of five analyses, H₂O by CHN analyzer; corresponds to $(\text{Zn}_{2.99}\text{Co}_{2.16}\text{Ni}_{0.66})_{\Sigma=5.81}(\text{SO}_4)_{1.08}[(\text{OH})_{9.30}\text{Cl}_{0.16}]_{\Sigma=9.46} \cdot 5.23\text{H}_2\text{O}$.

Occurrence: A secondary mineral in the oxidized portions of a polymetallic sulfide deposit.

Association: Anglesite, antlerite, cobaltoan-nickeloan ktenasite, cerussite, brochantite, covellite, tennantite, gersdorffite, thérèsemagnanite, rutile, quartz.

Distribution: From the Cap Garonne mine, near le Pradet, Var, France.

Name: Honors André Guarino (1945–), mineral collector and medical technologist, Toulon, France, who first collected the mineral.

Type Material: Mineralogy Department, Natural History Museum, Geneva, Switzerland, 435/85.

References: (1) Sarp, H. (1993) Guarinoite $(\text{Zn, Co, Ni})_6(\text{SO}_4)(\text{OH, Cl})_{10} \cdot 5\text{H}_2\text{O}$ et therèsemagnanite $(\text{Co, Zn, Ni})_6(\text{SO}_4)(\text{OH, Cl})_{10} \cdot 8\text{H}_2\text{O}$, deux nouveaux minéraux de la Mine de Cap Garonne, Var, France. Archs. Sci. Genève, 46(1), 37–44 (in French with English abs.).

(2) (1993) Amer. Mineral., 78, 1314–1315 (abs. ref. 1).