Zincowoodwardite $(Zn_{1-x}Al_x)(OH)_2(SO_4)_{x/2}\cdot nH_2O$ ($x < 0.5$, $n < 3x/2$)

Crystal Data: Hexagonal. *Point Group*: $\bar{3}$ for 1*T*; $\bar{3}$ 2/*m* for 3*R*. As botryoidal crusts of tabular crystals with hexagonal outline, to 10 μm.

Physical Properties: *Cleavage*: None. *Fracture*: n.d. *Tenacity*: Sectile.
Hardness = 1 D(meas.) = 2.66 for 3*R* polytype D(calc.) = 2.71

Optical Properties: Translucent. *Color*: Pale blue to bluish white. *Streak*: White to bluish white. *Luster*: Waxy.
Optical Class: Uniaxial. ω = 1.5636(5) for 3*R*; n(max) = 1.558(2) for 1*T*

Cell Data: Space Group: $R\bar{3}\,m$. a = 3.065(1) c = 25.42(2) for 3*R* Z = 3

$P\bar{3}$. a = 3.064(4) c = 8.85(2) for 1*T* Z = 1

X-ray Powder Pattern: Greece.
8.50 (100), 4.248 (33), 2.600 (5), 2.354 (4), 2.039 (3) 3*R* polytype
8.81 (100), 4.406 (21), 2.654 (4), 2.545 (5) 1*T* polytype

Chemistry:

	(1)
CuO	10.4
ZnO	33.3
Al_2O_3	17.2
SO_3	12.6
H_2O	25.1
Total	98.6

(1) Laurion (Lavrion, Laurium), Greece; wet-chemical analysis, H_2O by TGA; corresponds to $[Zn_{0.47}Cu_{0.15}Al_{0.38}(OH)_{2.00}][(SO_4)_{0.18}O_{0.01}(H_2O)_{0.59}$.

Polymorphism & Series: Polytypes 3*R* and 1*T*.

Mineral Group: Hydrotalcite supergroup, woodwardite group.

Occurrence: n.d.

Association: The 3*R* and 1*T* polytypes commonly are intergrown. Serpierite, hemimorphite (Christiana mine); glaucocerinite, natroglaucocerinite, zaccagnaite (Hilarion mine); glaucocerinite (Laurion).

Distribution: From Laurion (Lavrion, Laurium) and the Hilarion and Christiana mines at Kamariza, near Laurion, Attica, Greece.

Name: The *zinc* analog of *woodwardite*.

Type Material: The Mineral Collection, Bergakademie, Freiberg, Germany, and the Natural History Museum, Vienna, Austria (H 858, G 2172).

References: (1) Witzke, T. and G. Raade (2000) Zincowoodwardite, $[Zn_{1-x}Al_x(OH)_2][(SO_4)_{x/2}(H_2O)_n]$, a new mineral of the hydrotalcite group. Neues Jahrb. Mineral. Mon., 455-465. (2) (2001) Amer. Mineral., 86, 769 (abs. ref. 1). (3) Mills, S.J., A.G. Christy, J.-M.R. Génin, T. Kameda, and F. Colombo (2012) Nomenclature of the hydrotalcite supergroup: natural layered double hydroxides. Mineral. Mag., 76(5), 1289-1336.