

Zincalstibite, a new mineral, and cualstibite: Crystal chemical and structural relationships

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ABSTRACT

Zincalstibite, a new mineral occurring within the cavities of marble of the Apuan Alps, Tuscany, Italy, has chemical formula $\text{Zn}_2\text{AlSb}(\text{OH})_{12}$, space group $P\bar{3}$, $a = 5.321(1)$, $c = 9.786(2)$ Å. It is associated with sub-millimeter tufts of white crystals of mimetite and sub-millimetric stalactite aggregates of opal and an amorphous copper-silicate phase (possibly crisocolla). The crystals are trigonal prismatic, with forms $\{110\}$, $\{001\}$, elongated $[001]$, generally less than $10 \times 10 \times 40 \div 50$ μm , with few larger crystals. They are colorless, transparent, with vitreous luster, white streak and $\{001\}$ cleavage. The stronger reflections are $[(hkl), d$ (Å), $I_{\text{rel}}]$: (002), 4.904, 100; (100), 4.620, 35; (101), 4.179, 57; (103, 110), 2.669, 31; (112, $11\bar{2}$), 2.343, 88; (114, $11\bar{4}$), 1.805, 57. Zincalstibite is structurally related to cualstibite, as evidenced by the structural determinations and refinements we present for both the minerals. They are built up by layers of isolated $\text{Sb}(\text{OH})_6$ octahedra alternating along c with trioctahedral layers, which contain Zn and Al cations and Cu and Al cations in zincalstibite and cualstibite, respectively. In cualstibite the ordering of Al and Cu within these trioctahedral layers results in a supercell, with $a_{\text{cual}} = 9.150(2)$ Å $\approx \sqrt{3} a_{\text{zinc}}$. The name of zincalstibite is related to its chemical composition and points to its relationships with cualstibite. Both the mineral and its name were approved by the IMA Commission for New Minerals and Mineral Names (IMA 1998-033).

Keywords: Zincalstibite, cualstibite, new mineral, crystal structure, XRD data