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New minerals from Italy: zincalstibite and a new member of the cancrinite-sodalite group

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Zincalstibite, a new mineral occurring within the cavities of marble of the Apuan Alps, Tuscany, Italy, has chemical formula $Zn_2AlSb(OH)_{12}$, space group $P\bar{3}$, a = 5.3270(8), c = 9.792(2) Å. It is associated with submillimetric tufts of white crystals of mimetite and submillimetric stalactite aggregates of opal and an amorphous copper-silicate phase (possibly crisocolla). The crystals are colorless, transparent, with vitreous luster, white streak and {001} cleavage. They are trigonal prismatic, with forms {110}, {001}, elongated [001], generally less than 10 × 10 × 40÷50 μm, with few larger crystals. The stronger reflections are [(hkl), d(Å), I_{rel}]: (002), 4.904, 100; (100), 4.620, 35; (101), 4.179, 57; (103, 110), 2.669, 31; (112, 11-2), 2.343, 88; (114, 11-4), 1.805, 57. Zincalstibite is structurally related to cualstibite, as evidenced by the structural determinations and refinements we present for both minerals. They are built up by layers of isolated $Sb(OH)_6$ 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 $a_{cualstibite}$ = 9.150(2) Å ≈ $\sqrt{3}$ $a_{zincalstibite}$. The superstructure of cualstibite could be refined by using synchrotron radiation data; on the other hand, no superstructure reflections could be observed in the synchrotron X-ray pattern of zincalstibite. 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).

A new mineral belonging to the cancrinite-sodalite group occurs at Sacrofano, Latium, Italy. It has ideal chemical formula $Na_3K_3Ca_2(Si_6Al_6O_{24})(SO_4)_{1.8}Cl_{0.4}.0.5H_2O$, Z = 9, space group $P3$, a = 12.904(2) Å, c = 47.802(4) Å and corresponds to a 18-layer member of the family. Its framework is characterized by layers containing six-membered rings of tetrahedra, stacked in the **c** direction according to the sequence ACBACABABACACABACB, Zdhanov symbol (8)211(2)112. It contains 8 cancrinite cages, 6 sodalite cages, 2 losod cages and 2 liottite cages, which host the extra-framework cations, sulphate groups, chlorine anions and water molecules. The reduction from the topological symmetry $P\bar{3}m1$ to the observed space group $P3$ is due to the ordering of Si and Al cations within the tetrahedral sites.