American Mineralogist, Volume 96, pages 268–273, 2011

Gelosaite, $BiMo^{6+}_{(2-5x)}Mo^{5+}_{6x}O_7(OH)\cdot H_2O$ ($0 \le x \le 0.4$), a new mineral from Su Senargiu (CA), Sardinia, Italy, and a second occurrence from Kingsgate, New England, Australia

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Abstract

Gelosaite, $BiMo^{6+}_{(2-5x)}Mo^{5+}_{6x}O_7(OH)\cdot H_2O$ ($0 \le x \le 0.4$), occurs at the type locality in quartz veins hosted by granitic rocks at Su Senargiu, near Sarroch, Sardegna, Italy. The name is in memory of Mario Gelosa (1947–2006) who first found the mineral. The mineral also occurs in the oxidized zones of the Old 25 and Wolfram pipes at Kingsgate, New South Wales, Australia. Both the mineral and its name have been approved by the IMA CNMNC (IMA 2009-022). Gelosaite occurs as yellow, yellowish green, and pale blue, prismatic crystals with a white streak. It is transparent with an adamantine luster, non-fluorescent, brittle, and has a conchoidal fracture. Mohs hardness is ~3. The mineral is monoclinic, space group $P2_1/n$, with a = 5.8505(4), b = 9.0421(6), c = 13.917(1) Å, β = 100.42(1)°, V = 724.1(1) Å^3, Z = 4 (yellow Su Senargiu crystal); a = 5.8570(5), b = 9.0517(8), c = 13.992(1) Å, β = 100.44(1)°, V = 729.5(1) Å^3, Z = 4 (pale blue Su Senargiu crystal); a = 5.837(3), b = 9.040(5), c = 13.904(7) Å, β = 100.64(1)°, V = 721.0(6) Å^3, Z = 4 (blue Kingsgate crystal). Strongest lines in the powder X-ray pattern [d (Å)(I_{rel})] are 4.83(100), 3.41(21), 3.30(25), 3.015(50), 2.755(60), 2.080(50), 1.688(20), and 1.509(30). The single-crystal X-ray structure of gelosaite was determined for three separate crystals, two from Su Senargiu and one from Kingsgate. The structure consists of layers of distorted MoO_6 octahedra, plus minor amounts of interstitial Mo ions, and layers made up of eight-coordinate Bi^{3+} ions, plus further small amounts of interstitial Mo ions. The theoretical Mo(VI) end-member has the stoichiometry $BiMo^{6+}_2O_7(OH)\cdot H_2O$ and excess Mo in the interstices requires increasing amounts of Mo(V) to be present. The theoretical Mo(V) end-member has the stoichiometry $BiMo^{5+}_{2.4}O_7(OH)\cdot H_2O$.

Keywords: Gelosaite, new mineral, crystal structure, Su Senargiu, Kingsgate