New Mineral Names*

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ALSAKHAROVITE-ZN*


Electron microprobe analysis gave Na2O 2.04, K2O 2.43, CaO 1.48, SrO 4.49, BaO 3.65, MgO 0.01, FeO 0.22, ZnO 5.02, Al2O3 0.15, SiO2 39.33, TiO2 18.89, Nb2O5 12.57, H2O (TGA) 11.1, sum 100.5 wt%, corresponding to (Na0.66Ca0.32)1.00(Sr0.53Na0.12)0.20,Al2O3·Ba0.20,Fe0.97Mg0.01(Ti1.48Nb0.15)2.00(Al3.18(Si3.86Al0.14)2.06)[O2.38(OH),Al0.12]·6.80H2O. Simplified as in the title. Occurs as white, pale brown, or colorless crystals up to 0.5 × 2 × 8 mm, elongate [010], vitreous luster, transparent to translucent, brittle, white streak, no cleavage, uneven fracture, H = 5, Dcalc = 2.90, Dmeas = 2.93 g/cm3 for Z = 2, microtwinned on (001) and (401). Optically biaxial positive, α = 1.680(1), β = 1.687(2), γ = 1.787(5), 2Vmeas = 25(10), 2Vcalc = 31°, nonpleochroic, no dispersion observed, orientation 1 = b. Single-crystal X-ray structure study (R = 0.058) indicated monoclinic symmetry, space group Cm, a = 14.495(10), b = 13.945(10), c = 7.838(8) Å, β = 117.75(7)°, gutkovite structural type. Strongest lines of the X-ray powder pattern (57 mm camera, FeKα radiation) are 6.96(100,020,001), 3.21(80,421,400), 3.11(90,041,022,240), 2.50(40, 441, 403), and 1.70(40,463,444,461,442).

The mineral occurs in cavities in eudialyte-aegirine-feldspar pegmatite at Mt. Lepkhe-Nelm, Lovozero alkaline massif, Kola Peninsula, Russia. Among the associated minerals are lamprophyllite, natrolite, halloysite, rancicite, kuzmenkoite-Zn, and tsepinite-Na. The new mineral name is for Russian geologist Aleksey S. Sakharov (1910–1996) and for the predominance of Zn at the D site. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. J.L.J.

CAICHENGYUNIT


The mineral forms grayish white, filiform, fibrous aggregates in which the grains are up to 30 mm long and 0.01 mm in diameter. Transparent, vitreous to silky luster, white streak, H = 1½–2, nonfluorescent, rapidly soluble in water, Dmeas = 2.20, Dcalc = 2.19 g/cm3 for the ideal formula and Z = 4. Optically colorless, non-pleochroic, biaxial positive, α = 1.4756, β = 1.4775, γ = 1.4805; inclined extinction of 5–10° parallel to the fibers. Wet-chemical analysis gave FeO 16.15, Al2O3 7.90, SO3 33.96, H2O 37.64, H2O 3.56, insoluble 0.32, sum 99.53 wt%, which for SO4 = 6 and H2O = 3.56 corresponds to Fe3.17Al1.19(SO4)6(H2O)0.36, ideally Fe2Al(SO4)6·30H2O. Indexing of the X-ray powder diffractogram (39 lines listed) gave a monoclinic cell with a = 7.63, β = 24.13, c = 22.64 Å, β = 111.06°. Strongest peaks are 5.494(14,121), 4.886(100,131), 3.776(21,124), 3.252(13,036), and 2.727(12,205,117). TGA and DTA patterns are illustrated; TGA shows a two-step weight loss that, on the DTA curve, corresponds to strong and moderate endothermic peaks at ~172 and ~756 °C, respectively. The infrared spectrum, also illustrated, has strong sorptions for H2O and SO4.

The mineral occurs with pyrite, galena, sphalerite, chalcopryite, limonite, and clay minerals on the underground walls of an oxidized Pb-Zn ore deposit at the village of Longshu, Huidong County, Sichuan Province, China. The new mineral name refers to Chinese female geological professor Cai Chen Yung (1907–1982), where Cai is the surname. No repository for type material is given.

Discussion. Contrary to the statement in the text, data have not been submitted to the CNMMN for a vote on the mineral or new name. J.L.J.

KOZOITE-(LA)*


Pale violet spherules, <1 mm in diameter, consist of kozoite-(Nd) that is chemically concentrically zoned, with compositions extending to the La-dominant analog for which

* Before publication, minerals marked with an asterisk were approved by the Commission on New Minerals and Mineral Names, International Mineralogical Association.
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the average of four listed electron microprobe analyses is La₂O₃ 35.55, Pr₂O₃ 4.68, Nd₂O₃ 17.60, Sm₂O₃ 1.15, Gd₂O₃ 1.49, Dy₂O₃ 0.09, Er₂O₃ 0.04, Y₂O₃ 3.88, CaO 6.30, SrO 1.36, CO₂ (calc.) 23.17, H₂O (calc.) 5.87, sum 101.19 wt%, corresponding to (La₀.₈₁Nd₀.₄₀Y₀.₁₂Pr₁₊x₂(Si₂O₆)₂(SO₃)₂)₁.₁₅(Ca₀.₆₂Sr₀.₃₀)₀.₄₀(CO₂)₁.₀₂(Y)₂·0.₄₈H₂O, simplified as (La(Nd,Ca)(CO₂))[(OH₃),(H₂O)]. Ideally La(CO₂)₉(OH). An IR spectrum confirmed the presence of OH and CO₂. The La-dominated zones have a radius of up to 0.15 mm. Pale purple to white color, vitreous luster, Dcalc = 4.16 g/cm³ for Z = 4, readily soluble with effervescence in dilute HCl. Indexing of the X-ray powder pattern (114 mm Gandolfi, CuKα radiation) gave an orthorhombic cell with a = 4.986(4), b = 8.513(6), c = 7.227(10) Å; strongest lines are 4.31(100,110,020), 3.69(72,111,021), 2.93(57,121,102), 2.33(50,131), 2.06(48,221), and 1.994(35,212).

The mineral is associated with kozokoite-(Nd), lanthanite-(Nd), kimuraite-(Y), kokatake-(Y), calcite, aragonite, and opal in cavities within alkali olivine basalt at Mitsukishi, Saga Prefecture, Japan. Type material is in the National Science Museum, Tokyo. J.L.J.


The mineral forms fan-shaped aggregates of columnar to acicular crystals, elongate [100] and up to 1 cm long. Colorless to white, transparent to translucent, vitreous to pearly luster, white streak, H = 5, brittle, splintery fracture, perfect {101} and indistinct {010} cleavages, Dmeas = 2.77(2), Dcalc = 2.76 g/cm³ for Z = 1, weak yellow-green fluorescence under ultraviolet light at 240–400 nm, insoluble in 1:1 HCl and HNO₃ at room temperature. Optically biaxial negative, α = 1.707(2), β = 1.741(2), γ = 1.755(2), 2Vmeas = 64(1), 2Vcalc = 64°, dispersion r > v, orientation b ≈ Z, a ∝ X = 30°, negative elongation. Electron microprobe analysis gave Na₀.₇₇, K₀.₇₇, HCl 0.87, MgO 0.13, BeO (calc.) 0.76, Al₂O₃ 6.12, Fe₂O₃ 4.11, TiO₂ 29.59, Nb₂O₅ 0.50, SiO₂ 43.54, H₂O (calc.) 6.23, sum 99.62 wt%, corresponding to (Na₀.₃₉K₀.₆₁)[(Ti₀.₄₅Fe₀.₅₃)O₂]·(Si₂O₆)·(Si₂AlO₁₀)(OH)(H₂O)·H₂O. Single-crystal X-ray structure study (R = 0.0445) indicated trigonal symmetry, space group P3₁; a = 5.246(1), b = 8.734(3), c = 12.968(5) Å, α = 70.32(1), β = 79.01(1), γ = 80.90(2)° as refined from a powder pattern (diffractometer, CuKα radiation) with strongest lines of 11.95(58,001), 5.98(35,002), 5.88(65,011,012), 4.35(38,021,102), 3.18(22,001,013,048), and 3.08(20,123).

The mineral occurs as growths on albite in maarolic cavities within a pegmatite at Mt. Kukisvumchorr, Khibina alkaline massif, Kola Peninsula, Russia. Associated minerals are carbonatelfluorapatite, ancylite-(Ce), natrolite, aegirine, nepheline, K-feldspar, analcime, biotite, chlorite, and others. The new mineral name alludes to the close relationship of the crystal structure and chemical composition to those of vinogradovite. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. J.L.J.


The mineral forms prismatic to acicular poorly terminated crystals, up to 0.2 × 0.6 × 5 mm, that are commonly in open-work aggregates or in sheaf-like clusters to 1 cm and 2 × 6 mm, respectively. Transparent, colorless to white and pale brown, vitreous luster, brittle, no cleavage, uneven fracture, H = 5, probable forms {100} and {010}, nonfluorescent, Dmeas = 2.73, Dcalc = 2.72 g/cm³ for Z = 4. Optically biaxial positive, α = 1.666(2), β = 1.676(2), γ = 1.780(4), 2Vmeas = 30(10)°, 2Vcalc = 36°, weak dispersion r < v, Y = b. Electron microprobe analysis gave Na₀.₃₂, K₀.₃₂, CaO 2.23, CaO 5.79, SrO 3.01, BaO 3.52, MnO 0.16, FeO 0.04, ZnO 0.12, Al₂O₃ 0.04, SiO₂ 41.06, TiO₂ 21.95, Nb₂O₅ 9.08, H₂O (TG) 13.30, sum 101.12 wt%, which for Si + Al = 8 corresponds to (Ca₀.₃₂K₀.₃₂Na₀.₃₂Zr₀.₃₂Ba₀.₃₂Mn₀.₀₂T₀.₂₃O₀.₇₄Fe₀.₂₄O₀.₃₂(Nb₀.₃₂Ti₀.₃₂Al₀.₃₂)O₀.₃₂[(OH)₂₋₂O₁₋₁]·2.₃₅H₂O, simplified as in the title. Single-crystal X-ray structure study (R = 0.11) indicated monoclinic symmetry, space group C2/m, a = 14.484(4), b = 14.191(4), c = 7.907(2) Å, β = 117.26(2)°. Strongest lines of the powder pattern (86 mm camera, FeKα radiation) are 7.02(60,020,001), 3.53(45,131), 3.16(100,041,022), 2.62(45,203,202), 2.51(85,441,403,042), and 1.718(50, several).

The mineral, which is in the vuoriyarvite subgroup of the labunsovite group and which is the Ca-dominated analog of tsepinite-Na and tsepinite-K, is most closely associated with natrolite and ancyelite-(Ce) that occur mainly in cavities formed by the hydrothermal leaching of rinkite in a pegmatite that cuts nepheline syenite in the underground Lovkhorrite mine at Hackman Valley, Mount Yuskop, Khibiny alkaline massif, Kola Peninsula, Russia. Type material is in the Fersman Mineralogical Museum, Moscow, Russia. J.L.J.


Tsepinite-K

The mineral occurs as short prismatic crystals up to 0.4 mm long, showing {010}, {010}, {100}, and {201} Light brown, white, or colorless, vitreous luster, transparent, brittle, H = 5, imperfect cleavage, Dmeas = 2.88(3), Dcalc = 2.79 g/cm³ for Z = 4. Biaxial positive, α = 1.690(3), β = 1.701(3), γ = 1.800(5), 2Vmeas
= 25–40°. Electron microprobe analysis gave Na₂O 2.14, K₂O 6.54, BaO 11.28, MnO 1.15, FeO 0.37, SiO₂ 38.86, TiO₂ 21.47, Nb₂O₅ 7.05, H₂O (TGA) 10.34, sum 99.20 wt%, corresponding to (K₂O₀.২BaO₀.০MnO₀.২Nb₂O₅)₀.২₁67(Ti₃.₆6Nb₁.₈3Fe₀.১2Si₀.২₂(OH)₀.২2)O₀.২₉ - 2.9H₂O, simplified as given in the title. Single-crystal X-ray structure study (R = 0.033) indicated monoclinic symmetry, space group Cm, α = 14.327(3), b = 13.802(2), c = 7.783(1) Å, β = 116.95(1)°. Strongest lines of the X-ray powder pattern (114 mm Debye–Scherrer camera, FeKα radiation) are 6.87 (100,001,020), 3.20 (60,400), 3.05 (80,022,041), 3.00 (60,240,241), and 2.56 (90,203,331).

The mineral is the K-dominant analog of tsepinite-Na. The holotype locality is Mt. Kamasurt, Lovozero alkaline massif, Kola Peninsula, Russia, at which the mineral occurs in alkaline pegmatites as pseudomorphs after murmanite and is associated with other labunstovite-group minerals, aegirine, mannagepetunite, natrolite, chabazite-Ca, yofortierite, nontronite, and kaolinite-group minerals. Data are also given for occurrences at Mt. Kukisvumchorr and Mt. Eveslogchorr, Khibiny massif. The mineral is closely associated with söhngente and siderite in vugs within specimens of tennantite-germanite ore that were collected in the late 1960s by the chief mine geologist at the second oxidation zone of the Tsumeb deposit, Namibia. The new mineral name refers to the locality and chemical composition. Type material is in the Mineralogical Museum of the University of Hamburg, Germany.

**WATATSUMIITE**


The mineral forms yellowish green short prismatic crystals, elongate [001] and <0.8 mm in length, and massive aggregates <2 mm in diameter. Electron microprobe analysis gave Na₂O 7.10, K₂O 4.89, Li₂O (by LAM–ICP–MS) 1.6, CaO 0.03, MgO 1.61, BaO 0.88, MnO 12.28, FeO 0.35, VO 15.10, TiO₂ 3.13, SiO₂ 52.64, sum 100.61 wt%, corresponding to (K₂O₀.২BaO₀.২Na₂O₀.২MnO₁.২V₃SiₐO₁₁)₀.২₉ calculated for the empirical formula and Z = 4. Optically biaxial positive, α = 1.686(2), β = 1.694, γ = 1.720(5), 2Vmeas = 60°(5), VHNₐ₀ = 707–946, H = 5½, Dcalc = 3.24 g/cm³ for the empirical formula and Z = 4. Optically biaxial positive, α = 1.667(2), β = 1.96–1.97. Indexing of the X-ray powder pattern (Guinier camera, MoKα radiation) and Rietveld refinement (R = 0.039) indicated orthorhombic symmetry, space group Pbnm, a = 4.512(5), b = 9.772(8), c = 2.967 Å, isostructural with goethite and diaspore. Strongest lines of the powder pattern are 4.08(100,110), 2.63(33,130), 2.53(22,021), 2.40(100,111), 1.690(26,221), and 1.538(21,151,160).

The mineral is closely associated with söhngente and siderite in vugs within specimens of tennantite-germanite ore that were collected in the late 1960s by the chief mine geologist at the second oxidation zone of the Tsumeb deposit, Namibia. The new mineral name refers to the locality and chemical composition. Type material is in the Mineralogical Museum of the University of Hamburg, Germany.

**CUBIC CARBON**


A 70 μm platelet in a polished section of diamond-bearing...
shocked gneiss from the Popigai crater, Russia, consists of pure carbon encompassed within cristobalite and quartz in a matrix of melted plagioclase. Raman spectroscopy indicated that the outermost portion of the platelet contains polycrystalline graphite, and synchrotron X-ray diffraction mapping revealed that the transparent interior consists of a cubic carbon mineral enveloped by lonsdaleite. The cubic mineral has a polishing hardness even greater than that of lonsdaleite, and the Raman spectrum consists of two broad bands at ~1390 and 1600 cm⁻¹, which differ from those of previously known carbon polymorphs. The X-ray pattern has 23 diffraction lines (listed, no intensities), indexable with a cubic cell, space group Pm3m, a = 14.697(1) Å. A species of this type has not been synthesized and its existence has not been predicted by theoretical calculations. J.J.L.J.

**Ag₄Cu₁TeS**


One of five listed electron microprobe analyses has Ag 44.04, Cu 25.91, Bi 0.18, Sb 0.03, Te 22.96, sum 100.64 wt%, corresponding to (Ag₀.₃₄Cu₀.₆₆)Σ₁.₀₀(Te₀.₃₀S₀.₇₀Se₀.₀₀)Σ₁.₀₀, simplified as Ag₄Cu₁TeS. Minor compositional variation with respect to Ag/(Ag + Cu) and Te/(Te + S) has been detected, but a large compositional gap between Cu-bearing cervelleite and Ag₂Cu₆TeS is present. The mineral, which occurs in grains up to about 30 µm, is optically isotropic, blue-gray in reflected light, and has a noticeably lower reflectance than that of cervelleite. The two minerals are commonly associated in the Băiţa Bihor and Ocna de Fier skarn deposits in western Romania. J.J.L.J.

**Fe₃Cr₄O₉, ORTHORHOMBIC**


The Suizhou chondrite meteorite contains shock-produced veins, up to 90 µm wide, that contain ringwoodite, monticellite, NaAlSi₃O₈ with the hollandite structure, and euctectic intergrowths of trolite–FeNi; also present is a mineral that occurs within the veins as homogeneous grains, <20 µm across, and as polycrystalline aggregates up to 40 µm across adjacent to the veins. Electron microprobe analysis gave MgO 2.62, MnO 0.81, FeO 29.70, Al₂O₃ 5.94, Cr₂O₃ 57.30, V₂O₅ 0.97, TiO₂ 2.59, sum 99.93 wt% [corresponding to (Fe₀.₈₈Mg₀.₁₂Mn₀.₀₂)Σ₁.₀₀₃(Al₁.₆₀K₀.₂₅T₁₀.₇₁V₀.₀₃)Σ₁.₀₀₉O₈; the composition is almost identical to that of coexisting chromite, and in some particles the two minerals are separated by an intermediate zone of complex mutual intergrowth. The Raman spectrum has bands at 601, 637, and 664 cm⁻¹, which differ from the bands in the spectrum of chromite. Synchrotron X-ray diffraction gave a powder pattern in which a minor amount of chromite is present and in which the 21 listed lines (no intensities) are indexable with an orthorhombic CaTi₃O₈ structure, space group Bbnm, yielding a = 9.462(6), b = 9.562(9), c = 2.916(1) Å; D₁= 5.63 g/cm³ for Z = 4 and the ideal formula Fe₃Cr₄O₉₃[O₈ = 5.35 g/cm³ for the empirical formula]. The mineral assemblage in the shock veins constrains their pressure of formation to 20–23 GPa at 1800–2000 °C. J.J.L.J.

**NEW DATA**

**ARHBARITE**


Electron microprobe analysis of arhbarite from the type locality (Bou Azzer, Morocco) and from the El Guanaco mine, Chile, gave respective values of MgO 10.20, 8.36, CuO 47.46, 50.71, NiO 0.20, not detected (nd), CoO 0.24, nd, ZnO nd, 0.13, P₂O₅ not measured, 0.10, As₂O₃ 33.85, 33.05, SiO₂ 0.10, 0.24, H₂O (calc.) 7.58, 7.49, sum 99.63, 100.08 wt%, which for O = 7 correspond to Cu₁₉₉(Mg₀.₈₃Cu₀.₇₆Ni₀.₀₁Co₀.₀₁)Σ₁.₀₀(AsO₄)₁.₀₁(H₂O)₁.₇₂ and Cu₁₉₉(Mg₀.₇₅Cu₀.₂₅Zn₀.₀₁)Σ₁.₀₀(AsO₄)₁.₀₁(SiO₄)₀.₀₁(H₂O)₁.₇₂, thus confirming the essential presence of previously overlooked Mg. Rietveld refinement of X-ray diffractometer powder data for material from the type locality gave triclinic symmetry, space group P1, a = 5.315(4), b = 5.978(6), c = 5.030(6) Å, α = 113.58(6), β = 97.14(7), γ = 89.30(8)°, Z = 1, isotypic with gilmarine Cu₄(AsO₄)(OH)₃. The CNMMN has approved the redefinition. J.J.L.J.

**HÜGELITE**


Single-crystal X-ray structure study (R = 0.033) of hügelite from Geroldseck, Baden, which is in the vicinity of the type locality, showed that the mineral is twinned by pseudo-mero-hedry. The new unit cell is monoclinic, space group P2₁/m, a = 31.066(3), b = 17.303(2), c = 7.043(1) Å, β = 96.492(2)°, D₁= 5.74 g/cm³ for Pb₂[(UO₂)₃(O₄)₃H₂O]₃, and Z = 8. Although hügelite is chemically the As analog of dumontite, the two are not isomorphous. J.J.L.J.

**ERRATA**

In the abstract for torbernite–zeunerite–metatorbernite–metazeunerite (Am. Mineral., 88, p. 252, 2003), the formula for zeunerite should read Cu[(UO₂)(AsO₄)]₃(H₂O)₁₂ and a = 7.1797(3) Å. J.J.L.J.