NEW MINERAL NAMES*

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Doyleite*


Doyleite is a new polymorph of Al(OH)$_3$ that occurs at Mont St. Hilaire and at the Francon quarry, Montreal, Quebec, Canada. Wet chemical analysis gave Al$_2$O$_3$ 65.2, CaO 0.48, H$_2$O (TGA to 1100°C) 35.76, sum 101.44 wt%, corresponding to Al$_{38}$Ca$_{0.01}$(OH)$_{90}$. Trace amounts of Na, Fe, Mg, and Si were detected by electron-microprobe analysis. The mineral is not attacked by 1:1 HCl, H$_2$SO$_4$, or HNO$_3$ at room temperature. TGA showed a weight loss of 25.63% between 280 and 410°C and a further gradual loss to 1000°C, giving a total weight loss of 35.76%. The infrared spectrum showed bands due to OH-stretching (3300-3700 cm$^{-1}$), OH-bending (700-1100 cm$^{-1}$), and AlO-stretching (200-600 cm$^{-1}$) and is similar to but simpler than those of gibbsite or nordstrandite.

Single-crystal X-ray study shows the mineral to be triclinic, space group $P1$ or $P1$ (P1 from morphology), unit cell $a = 5.002(1)$, $b = 5.157(1)$, $c = 4.980(2)$ Å, $\alpha = 97.50(1)^\circ$, $\beta = 118.60(1)^\circ$, $\gamma = 104.74(1)^\circ$, $Z = 2$. The strongest lines (35 given) are 4.794(100)(010), 2.360(40)(101), 1.972(30)(221), 1.857(30)(111), and 1.842(30)(122).

At Mont St. Hilaire, doyleite occurs as rosettes of platy crystals with calcite and pyrite in a vein in albite veins in nepheline syenite. At the Francon quarry, it is found sparingly in vugs with calcite and pyrite in a vug in albitite veins in nepheline syenite. The name is for Mr. E. J. Doyle who first found the mineral.

Gerdremmelite*


*Minerals marked with asterisks were approved before publication by the Commission on New Minerals and Mineral Names of the International Mineralogical Association.

An average of three typical microprobe analyses gave ZnO 19.75, CuO 0.02, Fe$_2$O$_3$ 10.81, Al$_2$O$_3$ 24.97, As$_2$O$_3$ 31.91, MoO$_3$ 1.08, H$_2$O (TGA) 11.25, sum 99.79 wt%, corresponding to (Zn$_{11}$Fe$_{10}$,Fe$_{50}$)$_{33}$[(AsO$_4$)$_0$]$_{33}$[(OH)$_0$]$_{33}$, or ideally (Zn,Fe)$_2$[(Al,Fe)$_3$]$_{33}$[(AsO$_4$)]$_{33}$[(OH)]$_{33}$. Isomorphous replacement of (Zn,Fe) and (Al,Fe) is indicated. The valence state of Fe is uncertain owing to the small amount of pure material available. The mineral is insoluble in HCl. TGA shows a dehydration reaction between 460 and 520°C with a weight loss of approximately 11 wt%.

Indexing of the X-ray powder data (Guinier camera) led to a small triclinic cell with lattice constants $a = 5.169(5)$, $b = 13.038(9)$, $c = 4.931(4)$ Å, $\alpha = 98.78(7)^\circ$, $\beta = 108.00(6)^\circ$, $\gamma = 78.73(6)^\circ$, $Z = 2$. The space group is uncertain owing to the lack of suitable single crystals for X-ray study. The strongest lines (38 given) are 12.771(010)(100), 4.801(001)(040), 4.220(030)(040), 3.878(111)(50), 3.631(021)(121), and 3.140(111)(50).

The mineral occurs as a secondary phase in deeply oxidized ore specimens from Tsumeb, Namibia. It forms spherulitic aggregates of tabular crystals up to 3 μm in size and approximately 1 μm in length. Associated minerals include hematite, quartz, scorodite, powellite, betapakdalite, and kaolinite. Gerdremmelite is yellowish brown to dark brown. It is transparent with an adamantine luster, a white streak, and no fracture or visible cleavage. Mean refractive index 1.73–1.74, high birefringence. No fluorescence under ultraviolet light. $D_{\text{obs}}$ 3.66 g/cm$^3$.

The name is for Dr. Gerd Tremmel who first recognized the mineral. Type material is preserved at the University of Heidelberg, Germany. J.E.S.

Arsenogoyazite*


Arsenogoyazite, a member of the candallite group and the arsenate analogue of goyazite, is a new mineral of secondary origin from the Black Forest region of Germany. Microprobe analysis gave SrO 10.1, CaO 0.8, BaO 6.5, FeO 0.2, Al$_2$O$_3$ 30.9, As$_2$O$_3$ 25.3, P$_2$O$_5$ 8.9, F 3.6, H$_2$O (by difference) 13.2, total 101.5, less O = F 1.5, sum 100.00%. This corresponds to $\text{Sr}_6\text{Ca}_2\text{Ba}_2\text{Al}_2\text{Fe}_{11.5}\text{PO}_{33}\text{As}_{33}\text{F}_{33}\text{OH}_{33}\text{H}_{2}O$, or ideally, $\text{Sr}_4\text{Al}_2\text{As}_2\text{O}_{33}\text{OH}_{33}\text{H}_{2}O$.

X-ray study shows the mineral to be hexagonal, space group $R3m$ or $R3m$, unit cell $a = 7.10$, $c = 17.16$ Å, $Z = 3$, or $a = 7.04$, $c = 60.60$, $Z = 1$ (calculated from the powder pattern). The strongest X-ray lines (22 given) are 5.84(70)(1011), 3.56(80) (1120), 3.03(100)(0221), 2.31(40)(2131), 1.93(30)(3033,0333).

The mineral forms crusts on quartz and barite in association with malachite, brochantite, olivenite, barium-pharmacosiderite, and sulfate-free weilerite. The crusts have a reniform appearance. Indistinct rhombohedral-like crystal faces can be observed on the surface of the crusts. In the case of small tabular crystals,
Phyllostungstite


Microprobe analysis gave CaO 1.8, PbO 2.1, FeO, 13.3, WO, 72.7, H, O, by difference 10.1, sum 100.00%, corresponding to Ca9,Fe1,1Pbo,1Fe,1,W1,5H2,1O1, or ideally, Ca9Fe9(WO4)10H, O. X-ray study shows the mineral to be orthorhombic, space group P222, Pmm2, or Pmmm, unit cell a: 7.29, b: 12.59, c: 19.55 with goyazite. Type material is at the University of Stuttgart.

The name is for the chemical composition and the relationship with goyazite. Type material is at the University of Stuttgart. J.E.S.

Yushkinite*


Microprobe analyses (3 given) of potassium phase occurring in eclogite xenoliths from Yakutia kimberlite pipes gave SiO, 47.22, TiO, 0.32, AlO, 14.12, CrO, 1.26, FeO, 7.61, MnO, 0.27, MgO, 12.08, CaO, 9.57, NaO, 0.54, K, O, 7.40, sum 100.39, corresponding to (K, Na), Ca, Al, Mg, Si, (Mg, Al, Si), O.

The authors term this phase "terrestrial yagiite," but almost complete occupancy of 9- and 12-coordinated sites and high K and Ca content suggest that this is not the case.

Discussion. An incomplete description suggesting the existence of a new member of the osmium group. J.P.

Yushkinite* 


Microprobe analysis of a grain around native Fe and adjacent to ilmenite and magnetite yielded FeO, 22.39, TiO, 41.20, CrO, 0.15, MnO, 12.14, CaO, 3.92, AlO, 7.18, SiO, 11.12, sum = 98.1 wt%.

Without additional data, this is suggested to be a garnet of calculated composition (Fe, Fe, Mn, Al, Ti, Mg, Si), (Fe, Fe, Mn, Al, Ti, Mg, Si), (Fe, Fe, Mn, Al, Ti, Mg, Si), (Fe, Fe, Mn, Al, Ti, Mg, Si), (Fe, Fe, Mn, Al, Ti, Mg, Si), (Fe, Fe, Mn, Al, Ti, Mg, Si), (Fe, Fe, Mn, Al, Ti, Mg, Si), (Fe, Fe, Mn, Al, Ti, Mg, Si), (Fe, Fe, Mn, Al, Ti, Mg, Si), (Fe, Fe, Mn, Al, Ti, Mg, Si).

Discussion. Without data on the oxidation state of Fe and Ti (3+ or 4+), this analysis is difficult to interpret as a garnet. If the Fe in the garnet is that of a titanate garnet, with Ti > Si. The analysis is simply calculated, on the assumption of Fe3+ and Ti4+, as (Mn,Fe,Ca)(Ti, Si, Al, Cr)O.


Microprobe analysis (3 given) gave V 32.48, S 32.93, Mg 10.17, Al 5.66, O 19.89, H 1.26, sum 102.48 (O and H calculated on the basis of structure).

Electron diffraction study shows the mineral to have hybrid structure consisting of brucite [a = 3.06(1), c = 11.13(1) Å] and sulfide [hexagonal, a = 3.20(1), c = 11.13(1) Å] layers, analogous to valleriite.

X-ray diffraction pattern of the mineral was indexed on a hexagonal cell (P63/m), a = 3.21, c = 11.3 Å. The strongest X-ray lines (16 given, most of them broad) are 5.68(10)(0002), 2.76(6)(1010), 1.59(4)(120), 1.57(5)(1121,1016). IR spectrum of the mineral is discussed. The formula V, S, n[(Mg,Al)(OH)], (n = 0.612) is given by analogy with valleriite.

The color is pinkish violet; in reflected light, anisotropic; strong bireflectance. Isotropic sections and fragments are orange red with weak lilac tint. Anisotropic fragments have tints from red lilac to pinkish dark gray. No internal reflections. In polarized light, strong red anisotropic effects, similar to those of covellite. Reflectance measurements (nm, R%) gave 440, 26.0; 460, 22.4; 480, 19.0; 500, 17.6; 520, 17.8; 540, 18.7; 560, 20.7; 580, 23.3; 600, 21.3; 620, 23.3; 660, 32.8; 680, 35.7; 730, 38.2; 700, 40.1; 720, 41.5; 740, 42.3.

Very soft, plastic. Microhardness 2–6.98 MPa (9.81 mN load), Mohs hardness < 1. D = 2.94(2), D = 3.00. Becomes dark red in concentrated HCl and HNO3; quickly becomes brown in 10% FeCl3.

The mineral occurs with cadmium sphalerite, fluorite, and sulvanite in quartz-carbonate veins within carbonate rocks of Pay-Khoy, in the middle stream of Silova-Yakha River. It forms fine flaky, scaly aggregates up to 2–8 mm or 5–12-mm-long veins within quartz and calcite.

The name is for Russian mineralogist N. P. Yushkin.

Type material is at the A. E. Fersman Mineralogical Museum Acad. Sci. USSR (Moscow), Institute of Geology, Petrography, Mineralogy and Geochemistry of Ore Deposits (Moscow) and in the Komi Branch of Acad. Sci. USSR. J.P.

AgInS₂. Electron-microprobe analysis yielded Ag 36.3, In 40.2, S 21.4, sum = 97.9. It is anisotropic and shows twin lamellae with red internal reflections. It occurs as minute (30 μm) brownish-gray inclusions (reflectance data given) in galena.

(Zn,Fe)₃CuInS₄. Electron-microprobe analysis yielded Zn 8.39, Fe 4.84, Cu 20.3, In 37.1, S 28.3, sum = 98.63; which corresponds to (Zn₁₀₋₃₄Fe₃₄)Cu₃₄In₃₄S₄₀₉. It occurs as isotropic, small (20 μm) gray-brown inclusions in galena.

Discussion. The unnamed AgInS₂ mineral was described in 1980 by Ohta (see Am. Mineral., 68, 851). J.D.G.

Unnamed goldfieldite-like mineral

Microprobe analysis (4 given) of fahlo ore from Ozerhnoe deposit, Kamchatka Peninsula, USSR, gave Cu 44.4, Ag 0.1, Au 0.1, Te 15.9, As 6.0, Sb 3.5, Bi 0.1, S 19.5, Se 11.5, total 101.1. This corresponds to (Cu₁₅₋₇Ag₀₋₆Au₀₋₁)₁₀₋₃₉Cu₂₀₃₉(Te₃₂₋₂₅As₁₋₂₅Sb₀₋₅₇Bi₁₋₀₁(Sb₀₋₄₅Se₁₋₅₁)₁₂₋₅₎, supposed by the authors to be not-described-earlier selenious goldfieldite.

Discussion. Because goldfieldite has the formula Cu₅₋₇(Sb,As)₅(Te,Se), and the site assignments in the Ozerhnoe deposit are ambigious, this mineral might be a new species, but requires additional work. J.P.

Unnamed Bi-Cu-Pb-Se-Te sulfides

Three unnamed bismuth sulfide minerals identified as Minerals A, B, and C with the general formula Biₓ(Se,Te), have been found at Mazenod Lake, Northwest Territories, Canada.

An average of three electron-microprobe analyses of Mineral A gave Bi 47.53, Cu 6.30, Pb 10.43, Fe 1.31, Ag 0.11, Te 33.33, S 0.87, sum 99.88 wt%, corresponding to an ideal formula of BiₓCuₓPbₓSeₓTeₓ. The mineral is found in one veinlet in blebs up to 100 μm or more in diameter interstitial to primary hematite. These blebs contain exsolved covellite, the reverse relationship is occasionally observed. Hardness (VHN₅₀) = 199–205. Reflectance (nm, %) 547, 51.1; 591, 51.6.

An average of two microprobe analyses of Mineral B yielded Bi 54.35, Cu 2.92, Fe 1.31, S 0.74, Se 19.45, Te 17.5, sum 96.27 wt%, corresponding possibly to BiₓSeₓTe. It occurs as minor exsolution blebs about 2 x 10 μm in Mineral A; the low analysis totals are likely due to contamination by surrounding phases. Mineral B was observed to turn brown under the electron beam. It has rather higher reflectivity than Mineral A. Other associated minerals include hematite and covellite.

Mineral C occurs as a few single grains up to 4 μm in diameter, intergrown with uraninite or primary hematite. Microprobe analysis of one such grain gave Bi 55.1, Cu 0.69, Fe 1.63, S 14.6, Te 25.1, sum 97.25 wt%, or BiₓSeₓTeₓ.

All three minerals occur at the Dianne mineral claims of the Noranda Exploration Company, Ltd., at Mazenod Lake. The minerals are found with kawazulite, tellurobismuthite, selenian covellite, uraninite, and hematite in a mineralized breccia pipe. The pipe cuts through dacitic plutonic volcanic suite. J.E.S.

New Data
Lammerite

Microprobe analyses of lammerite from cavity on the area of Great Tolbachinsk Fissure Extrusion, Kamchatka Peninsula, USSR, gave CuO 59.21, 56.23, 54.64; ZnO 0.14, 0.18, 0.11; FeO 0.04, 0.11, 0.06; As₂O₃ 13.04, 26.83, 32.64; P₂O₅ 27.26, 16.68, 12.40; sum 99.69, 100.13, 99.85; corresponding to Cu₅[(As,P)₂O₄]₂, x = 0.23–0.62.

Discussion. This suggests that previously described lammerite Cu₅[AsO₄]₂ (TMPM, 28, 157–164) is the endmember of Cu₅[AsO₄]₂–Cu₅[PO₄]₂ series. One of the given analyses has P > As and is therefore a new endmember in the series. J.P.