NEW MINERAL NAMES*

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Arhbarite*


Arhbarite is found as blue, spherulitic aggregates on massive dolomite, associated with hematite, löllingite, phacoselite, erythrite, talc and mguinnessite. Arhbarite is optically biaxial with 2V = 90° and indices n₁ = 1.720(5) and n₂ = 1.740(5) (parallel and perpendicular to the fiber axis); extinction is inclined at =45°, X' turquoise blue, Z' deep turquoise blue. Microprobe analysis gave CuO 41.00, CoO 0.03, ZnO 0.01, FeO 0.04, As₂O₅ 29.19% (H₂O by difference 29.73%) corresponding closely to the formula Cu₂[OH₂AsO₄]₆H₂O. Among the 23 lines of the powder pattern tabulated the strongest are: 4.57(100), 4.51(90), 3.72(60), 2.60(50), 2.474Å(50). The name is for the Arhbar mine in the Bou-Azzer district. A.P.

Berdessinskiite*


Two microprobe analyses of (5 g) yield TiO₂, 34.34, 33.53; Al₂O₃ 1.38, 0.64; V₂O₅ 62.87, 65.25; Cr₂O₃ 1.43, 1.43; MnO = 0.01; sum 100.02, 100.86%. These yield the idealized formula V₂TiO₅, with V assumed to be trivalent based on associated graphite and analogy to other vanadium phases.

Single crystals were not found. The X-ray powder pattern was indexed by analogy with CrFe₅TiO₅ and yields a monoclinic cell with a = 10.11(1), b = 5.084(4), c = 7.03(1)Å, β = 111.46(6)°, V = 336.37Å³, and possible space groups C2/c, C/c, P2₁/c, P2₁/c, or Pcc; Z = 4. The strongest lines in the powder diffraction data are: 3.316(202), 2.895(112), 2.676(310), 2.447(112), 1.730(422), 1.648(402), 1.450(312).

Berdessinskiite forms black 15–30 μm grains which are reddish brown in reflected light and microscopically indistinguishable from schreyerite. It is weakly anisotropic with reflectivities (nm, %) 470, 18.1–18.7; 546, 19.6–20.5; 589, 20.1–21.2; 650, 20.6–21.6. Polishing hardness is about the same as that of rutile.

Berdessinskiite is from a kornerupine deposit 6 km SE of Lasamba Hill, Kwale district, south of Voi, Kenya, and is found as rims around schreyerite and as isolated grains. The name is for Dr. W. Berdesinski, Professor of mineralogy and crystallography at the University of Heidelberg. Type material is at the Universities of Bochum, Hamburg, and Heidelberg. P.J.D.

Bonshtedtite*


Microprobe analyses from Vuonnemioi, Khibina massif, by VVE and from the Kovdor massif by G. N. Utochkina gave, respectively, Na₃O 35.34, 33.00; K₂O 0.03, 0.35; CaO 0.03, 0.26, MgO 2.54, 4.61; MnO 1.65, 0.30; FeO 16.66, 16.80; P₂O₅ 26.17, 25.80, CO₂ (16.09) (calc.), 14.70, SiO₂ 0.43; loss on ignition = 4.33, sum 98.51, 100.15%. The Kovdor sample contained forsterite and shortite (each about 1%). These analyses yield the formulas, respectively, Na₃(Fe₃O₉)₃(Mg₀.₈₃Mn₀.₁₇)(PO₄)₁₋₀.₀₁(CO₃)₀.₉₁. The mineral is the ferrous iron analogue of bradleyite (Mg) and of siderenkeite (Mn) (64, 1332 (1979)).

X-ray study shows the mineral to be monoclinic, space group probably P2₁/m, a = 8.921, b = 6.631, c = 5.151Å, β = 90°25', Z = 2. The strongest X-ray lines (45 given) are 8.923(20(100), 3.318(100)(020), 2.662(30)(121, 220, 121), 2.578(20)(301, 301).

Bonshtedtite is colorless with rose, yellowish, or greenish tint. Luster vitreous, pearly on cleavages. H ~ 4, G 2.95 (Khibina), 3.16 (Kovdor). Cleavages (101), (100) perfect. Brittle. Optically biaxial, negative, α = 1.525, β = 1.570, γ = 1.597 (Kovdor), α = 1.520, β = 1.568, γ = 1.591, 2V = 68° (Khibina), X = b, Y = c, Z = a. The mineral occurs as fine-grained aggregates in shortite and as crystals up to 0.5 × 2 × 5 mm showing eleven forms.

The mineral occurs in drill cores associated with shortite, thermomatrite, etelite, trona, neighborbite, and other minerals. The name is for El'ze Bonshtedt-Kupletskaya (1897–1974), Russian mineralogist. Type material is at the Mineralogical Museum, Acad. Sci. USSR (Moscow), the Mining Institute (Leningrad), Leningrad Univ., and the Kola Branch, Acad. Sci. USSR (Apatite). M.F.

Kamikoiite*


No chemical analytical data are given but the formula is stated as Fe₇O₆O₆.

The mineral occurs often as euhedral, hexagonal grains up to 50 μm. It is usually found as inclusions in domeykite or algodinite, associated with calcite filling small cavities. It polishes well, H = 4.5. In reflected light it is gray with distinct pleochroism. Strongly anisotropic with rotation tints of brownish yellow. Reflectance is weak, similar to sphalerite or magnetite. Reflectance measurements in air (%R₉ max, %R₉ min, nm) gave 25.0, 18.6 (420); 24.6, 18.2 (440); 24.2, 17.8 (460); 23.8, 17.4 (480); 23.5, 17.1 (500); 23.2, 16.8 (520); 23.0, 16.6 (540); 22.7, 16.4 (560); 22.5, 16.1 (580); 22.3, 15.9 (600); 22.2, 15.8 (620); 22.3, 15.8 (640); 22.4, 15.9 (660); 22.6, 16.0 (680); 22.7, 16.3 (700).

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

0003-004X/83/0910-1038$0.50

American Mineralogist, Volume 68, pages 1038–1041, 1983

0003-004X/83/0910-1038$0.50
It has been identified in the ores of the Mohawk and Ahmeek mines, Michigan as well as the Kamioka mine, Japan from whence it takes its name. J.D.G.

**Loudounite**


Microprobe analyses yielded SiO₂ 45.8, Al₂O₃ 0.8, FeO 2.0, MnO tr., MgO 0.3, CaO 12.1, ZrO₂ 25.7, Na₂O 1.3, K₂O 0.2, with H₂O by difference 11.8, sum = 100.0%. This yields the formula, calculated on the basis of 26 cations: (Na₀.₈₅ K₀.₀₆Ca₀.₀₆)₂₁(Al₄.₃₂Si₆.₄₄Fe₀.₂₅Mg₀.₀₂Zr₄.₂₅)₂(Al₄.₃₂Si₆.₄₄Fe₀.₂₅Mg₀.₀₂Zr₄.₂₅)₂₁.7₆O₆(OH)₁₀.₇₀₆.₇₂H₂O, or ideally, NaCa₅Zr₄Si₁₅O₆(OH)₁₁.₈H₂O as the tentative formula.

Single crystals were not found. The strongest lines in the X-ray powder diffraction pattern are: 7.37(6), 5.81(5), 4.06(7b), 3.527(4), 2.931(10b), 2.694(4).

Loudounite occurs as spherical light-green to white aggregates composed of fibrous crystals; most spherules are less than 0.1 mm in diameter. The hardness (Mohs) is approximately 5; the streak is colorless; D (meas) = 2.48(3). Loudounite is not fluorescent in ultraviolet radiation. Optically, loudounite is biaxial with wavy extinction; fibrous fragments are length-slow. The indices of refraction are α = 1.536(4) and γ = 1.550(4).

Loudounite is found associated with chlorite, stilbite, actinolite, albite, zircon, prehnite, and analcite. All observed loudounite was coated with analcite crystals. Loudounite occurs at the Goose Creek Quarry, Loudoun County, Virginia. The name is for the County. Type material is preserved at the Smithsonian Institution. P.J.D.

**Natrodufrenite**


Natrodufrenite, the natural (Zn,Fe)-analogue of symplectite, is found on massive samples of fine-grained goethite and smithsonite from the Ojuela mine, together with köttigite and adamite. Natrodufrenite occurs in minute, bluish-gray crystals in oriented intergrowth with köttigite, the name being chosen from the relation of dimorphism. The new mineral is considered an iron-bearing, triclinic, dimorph of the monoclinic köttigite, relations between the two being strictly similar to those of vivianite and metavivianite (50, 896). In the absence of untwinned crystals, cell dimensions were determined from the powder pattern, indexed in analogy with that of symplectite, to be: a = 7.962(2), b = 9.442(2), c = 4.721(2)Å, α = 95.6(2)°, β = 97.02(2)°, γ = 107.8(2)°; strongest lines of the powder pattern are: 8.898(400), 6.909(100), 3.926(300), 3.001(300), 2.512(300), in (200, 310, 311, 211, 212, 111, 211). In the intergrowth with köttigite the c axis is in common and the perfect (110) cleavage of metaköttigite is parallel to the perfect (010) cleavage of köttigite. (110) is also the twin plane of metaköttigite. Its optical properties are: 2Vₚ = 93°, α = 1.648(3), β = 1.680(1), γ = 1.716(2), strongly pleochroic: X dark blue, Y yellow, Z pale yellow. Microprobe analyses of the new mineral show an average composition of CoO 0.09, ZnO 22.50, FeO (total Fe as FeO) 14.71, and As₂O₃ 37.36%. The formula given is based on these data and the interpretation of Mössbauer spectra from two mixed samples in one of which köttigite predominated and another in which metaköttigite predominated. It is considered that oxidation of Fe²⁺ to Fe³⁺ and the simultaneous conversion of H₂O to OH⁻ determines the transition from monoclinic to triclinic as in the change from vivianite to metavivianite. A.P.

**Reinhardbraunsite**


Microprobe analysis yielded SiO₂ 26.97, CaO 65.68, P₂O₅ 0.69, F 4.24, H₂O (calc.) 2.66, less O = 1.78, sum = 98.64%, which on the basis of Si + P + 2 = 2 yields Ca₅(PO₄)₃(OH,F)₂, or ideally, Ca₅Si₃O₁₀(F,OH)₂, with Z = 2. Single-crystal X-ray study showed it to be monoclinic, space group P₂₁/a with a = 11.458(2), b = 5.052(1), c = 8.840(2)Å, β = 108.91(1)°, V = 484.1Å³. The strongest lines in the X-ray powder diffraction pattern are 3.806(400), 3.322(500), 3.035(200), 2.941(500), 2.903(700), 2.862(500), 2.711(700), 2.532(500), 2.387(700), 2.247(700), 2.151(700), 1.989(700), 1.923(700), 1.838(700), 1.510(700), 1.483(700), 1.378(700), 1.347(700), 1.320(700), 1.302(700), 1.286(700), 1.263(700).
Reinhardbraunsite occurs as light pink crystals with vitreous luster; hardness (Mohs) is 5–6; cleavage is distinct (001); twinning on (001) is observed on recrystallized grains; D meas. = 2.84, calc. 2.885. Optically, the mineral is biaxial negative, 2V = 44–50°, with indices of refraction α = 1.606(2), β = 1.617(2), γ = 1.620(2). Dispersion is distinct r > v; orientation is Z = b, X ≤ c = 18°.

Reinhardbraunsite occurs in xenoliths in scoria at the Ettringer Bellerberg Volcano, near Mayen, Laacher See volcanic area, West Germany. It is associated with ellastecitad, cuspidine, gehlenite, brownmillerite, mayenite, periclase and another new mineral of approximate composition 4Ca₂SiO₄MgCl₂.

The name honors Dr. Reinhard Brauns, (1861–1937) former professor of mineralogy at the University of Bonn. Type material is preserved at the Mineralogisches-Petrologisches Institut und Museum der Universität Bonn. P.J.D.

Wadsleyite*


The average microprobe analysis (calculated here as oxides) yielded: MgO 38.21, SiO₂ 38.70, CaO 0.07, Cr₂O₃ 0.01, MnO 0.43, FeO 22.37, NiO 0.11, ZnO 0.10, sum = 100.00%, corresponding to an idealized composition of (Mg₁₋₂Fe₂₋₃SiO₄. This has the structure of the β-phase polymorph of (Mg,Fe)₂SiO₄.

X-ray study by the powder method showed wadsleyite to be orthorhombic with probable space group Ima₂ and unit cell parameters a = 5.70(2), b = 11.51(7), and c = 8.24(4)Å, Z = 8. The strongest lines in the X-ray powder pattern are: 2.886(50)(040), 2.691(40)(013), 2.452(100)(141), 2.038(80)(240), 1.442(80)(244).

Wadsleyite occurs as 0.5 mm diameter microcrystalline aggregates with actual grain size between 0.5 and 5.0 μm. The wadsleyite aggregates have a felsitic texture, are fractured, and have a pale fawn color. Detailed optical data could not be obtained due to the small crystal size. However wadsleyite is anisotropic with low first-order birefringence colors and mean index of refraction of n = 1.76. D (calc.) = 3.84.

Wadsleyite occurs in the Peace River meteorite (an L6 hypersthene-olivine chondrite), associated with majorite and ringwoodite, and is believed to have formed during an extraterrestrial shock event. The name honors the late Dr. A. D. Wadsley. Type material is preserved at the University of Alberta, Canada. P.J.D.

Zakharovite*


Analysis by M.E.K. gave SiO₂ 48.74, Fe₂O₃ 2.70, MnO 25.63, MgO 0.05, CaO 2.11, SrO 0.09, Na₂O 7.95, K₂O 0.41, H₂O 12.25, sum 99.93%, corresponding to the formula (Na₃₋₁₆Ca₄₋₁₀K₀₋₁₀Si₇₋²Fe₃₋₂Mn₂₋₀₂O₉₋₀₂)₂₋₄Si₂O₂₄(OH)₆H₂O, or ideally, Na₄Mn₇₋²SiO₉(OH)₆H₂O, or possibly Na₃Mn₇₋²SiO₉(OH)₆H₂O. Thermal analysis (by G.O.P.) showed loss of water 2.0% at 12°, 9.0% at 120–300°, and 3.0% at 300–500°. The IR spectrum confirms the presence of bound water. Readily decomposed by cold 10% HCl.

X-ray and electron diffraction study (Z.V.V. and B.B.Z.) showed the mineral to be trigonal, space group P3₁m or P3m1, a = 14.58, c = 34.7Å. (refined from the powder data to a = 14.58, c = 37.1Å, Z = 9. The discrepancy in c is explained as being due to contraction of the c axis under the high vacuum of the electron microscope. The water is therefore probably interlayer. The strongest X-ray lines (29 given) are 12.57(100)(0110), 3.427(15)(000011), 3.160(40) (0442, 2246), 3.064(15)(0443), 2.820(15)(2353, 0446).

The mineral occurs at Mt. Karnasurt, Lovozero massif, and at Yukspor and Koashva Mts., Khibina massif, Kola Peninsula, as platy aggregates. Color yellowish to bright yellow, luster pearly to dull waxy, fracture conchoidal, cleavage perfect [001]. H. about 2. Strongly electromagnetic. D. 2.58, 2.64. Optically uniaxial, negative, ω = 1.565, ε = 1.535 (both ± 0.002).

The name is for E. E. Zakharov (1902–1980), director of the Moscow Geological-Exploration Institute. Type material is at the Mineralogical Museum, Acad. Sci. USSR, Moscow, and at its Kola Branch, Apatite. M.F.

Unnamed Ca-(Mg)-Fe-Al-(Ti) silicates


The average of five electron microprobe analyses for each of two distinct minerals gave SiO₂ 13.35, TiO₂ 3.02, Al₂O₃ 14.34, Fe₂O₃ 47.36, Cr₂O₃ 0.06, MgO 8.01, CaO 12.71, MnO 0.42, Na₂O 0.34, sum 99.62% and SiO₂ 23.56, TiO₂ 20.28, Al₂O₃ 7.83, Fe₂O₃ 17.84, Cr₂O₃ 0.06, MgO 0.07, CaO 27.96, MnO 0.16, Na₂O 0.08, sum 97.85%.

These two minerals are found within the septa of reef coral replacing rhönite and associated with fassaite. J.D.G.

Unnamed TiHgAs₃S₆

P. Engel and W. Nowacki (1982) The crystal structure of a new sulfosalt, TiHgAs₃S₆, from Allchar, Yugoslavia. Fortschr. Min., 60, 68. (abstr. in German).

Microprobe analysis of a red sulfosalts, in 0.1–0.2 mm crystals, associated with rebullite (Am. Min. 68, 644) indicated it is TiHgAs₃S₆ (no analysis given). X-ray study showed it to be monoclinic, space group P2₁/n, with a = 5.948(2), b = 11.404(6), c = 15.979(5)Å, β = 90.15°(3), Z = 4. It was found at the Allchar deposit in Yugoslavia. P.J.D.

Unnamed uranium silicates


Microprobe analyses of polished sections of ores from two localities, Zirovsky Vrh, Slovenia, Yugoslavia, and Forstau,
Salzburg, Austria, indicated the presence of a number of previously unknown uranium silicate minerals. They occur as irregular grains, sometimes equant, and vary in color from black to gray to lighter gray. Their hardness is approximately 5. Microprobe analyses are given of samples from the Zirovsky deposit and are clustered in 5 groups (#3, omitted here, is coiffite). No X-ray or optical data are given.

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*-----Includes 0.31% CuO.
**-----Includes 0.83% PbO.
***-----Includes 0.11% CuO

P.J.D.

**Unnamed sulfosalt**


Analyses by electron microprobe on two samples gave: S 19.51, 16.31; Bi 43.36, 44.48; Sb 1.32, 1.71; As none; Pb 36.47, 37.03; Ag none; Zn 0.04, none; Cu none; Fe 0.08, none; sum 100.78, 99.52%. These correspond to Pb₄₋₈(Sb₀.₇₋₂,Sb₁₋₀)S₁₃₋₈ and Pb₄₋₈Bi₂₋₃Bi₂₋₀S₁₃₋₈.

X-ray data on the sample of the first analysis gave strongest lines (21 given) 4.12(10), 3.56(7), 3.13(8), 2.98(5), 2.83(6), 2.27(5).

M.F.

**Unnamed uranium–titanium silicates**


Unknown U-Ti-silicates from the Dog Mine, Ambrosia Lake, New Mexico, occur as formless aggregates associated with unidentified uranium silicates and pyrite. X-ray, optical, and chemical data are not given. Two phases are analyzed from the Lake Ambrosia deposit, yielding for one phase: UO₂ 65.3,69.86; CaO 1.42,1.51; TiO₂ 10.7,11.44; SiO₂ 15.6,16.68; totals 93.48, 100.02%, and for the other phase: UO₂ 50.9,53.71; ThO₂ 0.09,0.1; CaO 0.72,0.75; TiO₂ 34.1,35.98; SiO₂ 8.1,8.54; totals 94.76, 100.03%. The unknown phase from the Mitterberg deposit yielded: UO₂ 50.3,53.26; ThO₂ 2.52,2.67; CaO 0.66,0.70; TiO₂ 29.6,31.34; SiO₂ 11.1,11.75; totals 94.45, 100.00%. P.J.D.

NEW DATA

**Creedite**


Based on a crystal structure study with refinement to R = 0.015, Bolivian creedite is found to have the new formula Ca₃Al₂Fe₅(OH)₄(SO₄)₂·2H₂O. Crystal data are: monoclinic, space group C2/c, a = 13.936(1), b = 8.606(1), c = 9.985(1)Å, β = 94.39°, Z = 4, P.J.D.

**Dervillite**


New single crystal X-ray data shows the mineral is monoclinic, space group P2/a, unit cell a = 6.833, b = 12.932, c = 9.638Å, β = 99°33'.

In reflected light it is white, resembling lauitite. It is moderately anisotropic with rotation tints of red. VHN 50 g & 100 g = 19.5 kg/mm.

Electron microprobe analysis gave Ag 61.39, As 19.03, S 18.06, sum 98.48% corresponding to Ag₈₂₋₅₂As₀₋₀,S₂₋₀. J.D.G.

**Shakhovite**


Microprobe analysis of several single crystals from a new occurrence of shakhovite from Moschelandsberg yield an average of 77.3% Hg and 3.8% Sb, in good agreement with the chemical composition of the original material (66, 1101). New single-crystal X-ray study shows shakhovite to be monoclinic, space group Pm, with a = 4.871(1), b = 15.098(3), c = 5.433(1)Å, β = 98.86(2°). This cell can be transformed into a triclinic primitive cell with a = 5.43, b = 4.87, c = 8.25Å, α = 104°, β = 74°, and γ = 81°, in close agreement with the triclinic cell proposed in the original description. Crystal structure analysis, combined with infrared analysis, indicates the formula is Hg₅Sb(OH)O₂, Z = 2. The new spelling of the name, changed from shakhovite, is adopted from the thirty-second list of new mineral names (Mineral. Mag., 46, 515–528). P.J.D.

**Wehrlite**


Microprobe analyses are given of 8 samples. The analyses yield the formula (Bi,Ag,Pb)₄₋ₓ Te₄₊ₓ, with x ranging from 0.11 to 0.28, Ag 0.42 max., Pb 0.7 max. Unit cell contents varied only from a = 4.432–4.437, c = 41.98–42.00Å. M.F.