NEW MINERAL NAMES

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A complete listing of all new minerals for the year 1985 is contained in the annual index under the heading "New Minerals".

Cualstibite*


Wet-chemical analysis of the mineral gave recalculated CuO 32.0, Al₂O₃ 10.4, Sb₂O₃ 36.8, H₂O 20.8, sum 100.0 wt.%, corresponding to Cu₂₉Al₂₉Sb₁₁₃(OH)₁₉·10 H₂O or idealized Cu₉Al₂₉Sb₁₁₃(OH)₁₉·10 H₂O. The presence of (SbO₃) groups has not yet been confirmed.

X-ray study shows the mineral to be trigonal, possible space groups are P3, P312, P321, P3m1, P6, P6m2 or P62m. Unit cell is a = 9.20, c = 9.73Å, Z = 1, D calc. 3.25, D meas. 3.18 ± 0.05. The strongest X-ray lines (30 given) are 4.89(100)(0002), 4.32(90)(3032), 2.33(90)(3032, 1014), 4.17(80)(1121, 1012); 1.793(80)(3251, 3034, 1125), 2.65(70)(3030, 1123), 1.388(50). No distinct cleavage, fracture conchoidal.

The blue-green, transparent to translucent mineral forms columnar, trigonal crystals, up to 0.05 mm long, in voids; also crustiform on barite and fluorite, radial aggregates, pseudomorphs after an unknown mineral, and massive. Associated with older corundum, ilmenite, younger arsenogoyazite, and goethite. Streak bluish white. Luster vitreous. No fluorescence. H above 7; at 100g load 2390–2390, at 150g load, 2380–2390 kg/sq. mm. Reflectances are given at 15 wave lengths (nm): 440, 46.2%; 520, 47.2%; 580, 47.5%; 640, 48.4%; 720, 51%.

The mineral occurs in parallel columnar aggregates up to 10–15 cm across, consisting of acicular individuals, associated with nepheline, K-feldspar, aegirine, and small amounts of fluorite, apatite, biotite, and yuksporite, in rischhoffite rocks of Evesloghchor and Yukspor Mts., Khibina massif, Kola Peninsula. Color gray with greenish tint, colorless under the microscope. Luster pearly. Fracture splintery. H 4–5. Optically biaxial, positive, nᵣ = 1.567, β = 1.568, γ = 1.576 (all ± 0.002); 2V could not be measured. A parting or cleavage was observed perpendicular to the elongation. The infra-red spectrum is given.


Khamrabaevite*


Electron microprobe analyses of 5 samples from basaltic porphyrite gave (range and average) Ti 68.44–69.50, 69.04; V 5.08–7.67, 6.74; Fe 1.08–2.11, 1.71; Si 0.09–0.12, not detd.; C 20.05 (calc.), sum 96.34–98.44%, corresponding to (Ti₀.₉₀ V₀.₀₉ Fe₀.₀₂)₁.₀₄ C₁.₀₄.

The X-ray pattern obtained was that of a mixture with iron (predominant) and magnetite. The strongest lines on a scale of 10 (after correcting for the impurities) (7 lines given) 2.163(10)(200), 1.529(8)(220), 1.299(8)(311), in good agreement with data for TiC (ASTM no. 6-0614). Cubic, space group Fm₃m, a = 4.319 ± 0.005Å, Z = 8, D calc. 10.01.

Color dark gray, luster metallic, fracture irregular, no cleavage. H above 9; at 100 g load 2290–2230, at 150 g load, 2380–2390 kg/sq. mm. Reflectances are given at 15 wave lengths (nm): 440, 46.2%; 520, 47.2%; 580, 47.5%; 640, 48.4%; 720, 51%.

The mineral occurs as skeletal cubic crystals, 0.1 to 0.3 mm., in suseite of Lower Permian amygdaloidal basaltic porphyrite of the Chalkal Range, Arashan Mts., central Asia. It was also found in granodiorites in the endcontact zone of the Chinorsaik massif, central Asia, in magnetic "spherules" consisting mainly of magnetite and native iron.

The name is for I. Kh. Khamrabaev, Russian geologist. Type material is at the Fersman Mineralogical Museum, Moscow. M.F.

Denisovite*


Analysis by S. M. Mishina on 2 g gave SiO₂ 49.83, TiO₂ 0.13, Al₂O₃ 0.65, Fe₂O₃ 0.55, Nb₂O₅ 0.14, Ta₂O₅ 0.001, FeO 0.06, MgO 0.35, MnO 0.58, CaO 31.16, SrO 0.35, Na₂O 2.66, K₂O 8.94, Li₂O 0.008, Rb₂O 0.09, P₂O₅ 0.04, F 3.95, H₂O 1.16, H₂O 0.11, sum 101.06 – (F₂) 1.62 = 99.44%. After deducting the small amounts of aegirine, biotite, yuksporite, apatite, and fluorite, this is calculated to the formula (Ca₉Na₀.₆Rb₀.₀₂Mn₀.₀₉) (K₁₄Na₀.₆Rb₀.₀₁Si₆O₁₆) (F₁.₀₀OH₀.₉₃), or (K, Na)₂Ca Si₆O₁₆(F,OH), a potassium analogue of the formula of peolotite. The DTA curve shows an endothermic effect with max. at 1020°C. When heated to 1200°C the mineral is converted into pseudowollastonite.

X-ray study shows Denisovite to be monoclinic, a = 30.92 ± 0.07, b = 7.20 ± 0.03 c = 18.27 ± 0.05Å, β = 95°, Z = 20 (K, Na)₂Ca Si₆O₁₆(F,OH), D calc. 2.81, measured 2.76. The strongest X-ray lines (110 given) are 3.65(8)(105), 3.22(9)(1015), 3.08(8)(1015–0.0, 415) 3.03(9)(006,505), 2.79(8)(110–0.0, 2.78(8)(721), 2.75(10)(2244), 2.69(8)(705).

0003–004X/85/1112–1329$02.00

The mineral occurs in parallel columnar aggregates up to 10–15 cm across, consisting of acicular individuals, associated with nepheline, K-feldspar, aegirine, and small amounts of fluorite, apatite, biotite, and yuksporite, in rischhoffite rocks of Evesloghchor and Yukspor Mts., Khibina massif, Kola Peninsula. Color gray with greenish tint, colorless under the microscope. Luster pearly. Fracture splintery. H 4–5. Optically biaxial, positive, nᵣ = 1.567, β = 1.568, γ = 1.576 (all ± 0.002); 2V could not be measured. A parting or cleavage was observed perpendicular to the elongation. The infra-red spectrum is given.


Lapieite*


Analysis by electron microprobe (average of four grains) gave Cu 18.5, Ni 17.1, Fe 0.2, As 0.2, Sb 35.0, S 27.7, sum 98.7%. This
A.-M. Fransolet, P. Oustriere, F. Fontan and F. Pillard (1984) from three randomly oriented grains are: (300) 33.4° intense yellowish pink rotation tints. H 4.5 - 5. Reflectance data gray to gray, and strongly anisotropic with very pale blue to length. It is moderately bireflectant and pleochroic greenish opaque, has metallic luster, and forms subhedral grains to 150 mica, associated with Ni-rich pyrite, gersdorffite, polydymite, mellite, tetrahedrite, marcasite, and chalcopyrite. The mineral is mainly of quartz, magnesite, spinel, and disseminated Cr-bearing Cation parallel to [100] fair.

Mineral occurrence in the metamorphic glacial erratic consisting of quartz, magnetite, spinel, and disseminated C-bearing mica. associated with Ni-rich pyrite, gersdorffite, polydymite, mellite, tetrahedrite, marcasite, and chalcopyrite. The mineral is mainly of quartz, magnesite, spinel, and disseminated C-bearing Cation parallel to [100] fair.

Mineral occurrence in the metamorphic glacial erratic consisting of quartz, magnetite, spinel, and disseminated C-bearing Cation parallel to [100] fair.

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Mineral occurrence in the metamorphic glacial erratic consisting of quartz, magnetite, spinel, and disseminated C-bearing Cation parallel to [100] fair.
**NEW MINERAL NAMES**

**Mushistonite**


An abstract of this mineral (then unnamed) was published in Am. Mineral. 65, 1069–1070 (1980). Microprobe analyses of 6 grains gave Sn 37.0–42.0, Cu 10.1–11.9, Zn 2.7–9.0, Fe 2.6–9.2, Ag 0.0–0.2%, giving the formula above. Cu is the major divalent cation; thus Fe₉.2, Zn₂.7% is calculated to give Zn₀.₄₆Fe₀.₅₁ in the formula. Readily soluble in dilute HCI.

**Perilaitie**


Chemical analysis by T. S. Romanova on 300 mg gave SiO₂ 50.72, TiO₂ 0.01, Al₂O₃ 20.13, Fe₂O₃ 0.92, FeO 0.21, MgO 0.07, SrO 1.65, CaO 0.96, Na₂O 0.98, K₂O 14.86, H₂O 9.52, sum 100.03%, corresponding to the formula K₉Na₀.₈₁(Ca₀.₄₄Sr₀.₄₆Fe²O₇Fe₄O₁₈)(Al₁₁₁₃Fe₂₃Mg₀.₃3)Si₄₂O₇₂·1₅₂H₂O. The D.T.A. curve shows an endothermic break at 200°C, corresponding to the loss of most of the zeolitic water at 20–450°C, followed by slow loss up to 800°C. No change in X-ray pattern was found up to 900°C; at 950–1000°C it became amorphous; at 1100–1150°C, it gave the X-ray pattern of leucite.

The mineral occurs in radiating-fibrous aggregates up to 2 cm in diameter in nepheline-microcline and sodalite-astrophyllite veins and in nepheline-feldspar and sodalite-microcline pegmatites of Mts. Eveslogchorr and Yukspor, Khibina massif, Kola Peninsula, U.S.S.R. Associated minerals include pectolite, kalsilite, aegirine, wadeite, and yuksporite.

The name is for Lily Alekseevna Perekrest, instructor in mineralogy of the Kirov Mining Technical School. Type material is preserved at the Fersman Mineralogical Museum, Moscow, and the Geol. Museum, Kola branch, Acad. Sci. U.S.S.R., Apatit. M.F.

**Perlialite**


Microprobe analyses (7) gave Au 55.9–60.5, av. 58.6; Ag 29.8–33.3, av. 31.0; S 9.08–9.73, av. 9.54; Se 1.00–1.84, av. 1.35, sum 99.9–101.1, av. 100.5, corresponding to the average formula, Au₉Ag₃(S,Se)₃. The mineral does not react with FeCl₃, KOH, or HCl; a brown film is formed with : 1 HNO₃.

The X-ray pattern is similar to that of synthetic Au₉Ag₃S. It is indexed on a monoclinic cell, space group P2₁/m, P2₁, or Pm, with a = 4.943(9), b = 6.670(9) Å, c = 7.221(9) Å, β = 95.68°. Z = 4, D calc. 9.5. Intensities of the 28 lines are not given. From the intensities given for the synthetic compound, the strongest lines of the mineral are 2.77(10,102,112,120), 2.63(5)(121), 2.39(4)(003,201), 2.25(4)(013,221,211).

The mineral is dark gray to black, streak dark gray, sometimes with a reddish-brown tint, luster dull, metallic. Brittle. Hardness 39.9–47.8 kg/sq.mm. – 2.5–2.5 Mohs. In section resembles argentite. Reflectances at 440 to 740 nm. show variation from 26.6 to 28.9% with max. at 560, min. at 680 nm.

Perlialite occurs in the lower part (depth 60–65 m) of the Makain gold deposit, central Kazakhstan, as fine-grained rims (10–20 mm) on native gold, also associated with chlorargyrite.

The name is for Nina Petrovskaya, Russian mineralogist. Type material is at the Central Siberian Geological Museum, Novosibirsk. M.F.
**NEW MINERAL NAMES**

P-ourayite

Analysis by electron microprobe was useful only in estimating the composition of the mineral, owing to its fine-grained character. Averaging of analyses that approximate the mineral gives Ag 12.2, Cu 0.8, Pb 26.3, Bi 44.3, S 170, sum 100.6%. Combined with modal and crystal chemical considerations, the empirical formula is Pb$_2$Ag$_{1.8}$Bi$_{1.8}$S$_{1.8}$. The mineral is a Ag–Pb–Bi sulfosalt of the illianite homologous series.

Single-crystal X-ray study shows the mineral to be orthorhombic, space group Pbnm or Pbn2, with a = 13.15(2), b = 44.17(4), c = 4.05(2)Å.

The mineral occurs in fine-grained ore fragments from the Ivigtut cryolite deposit. It forms very fine (100) exsolution lamellae in a matrix of B-centered ourayite, which is in turn associated with beryl, aikenite, galena, matildite, chalcopryite, pyrite, native bismuth, and native gold. The mineral exhibits extinction parallel to that of the ourayite matrix.


**Discussion**

Although the authors indicate that P-ourayite is merely a "working name," the mineral is not an IMA-approved species and should not have been named. D.A.V.

Retzian-(La)°

Analysis by electron microprobe gave MnO 25.2, MgO 3.7, ZnO 1.2, As$_2$O$_3$ 26.5, La$_2$O$_3$ 10.6, Ce$_2$O$_3$ 8.8, Nd$_2$O$_3$ 8.2, Pr$_2$O$_3$ 5.1, Sm$_2$O$_3$ 2.2, Y$_2$O$_3$ 2.5, H$_2$O 7.7 (est.), sum 101.7%. This gives the formula based on two divalent cations (Mn$_{1.29}$Mg$_{0.43}$Zn$_{0.13}$) La$_{0.28}$Ce$_{0.23}$Nd$_{0.04}$Pr$_{0.04}$Y$_{0.01}$Sm$_{0.05}$As$_{0.09}$O$_{1.64}$OH$_{1.8}$. The mineral is the La-dominant member of the retzian series, and ideally is Mn$_{0.73}$La$_{0.27}$As$_{0.62}$O$_{1.40}$OH$_{1.8}$

Single-crystal X-ray study shows the mineral to be orthorhombic, space group Pbnm, with a = 5.670(8), b = 120.1(1), c = 4.869(9)Å, Z = 2, D meas. > 4.2, calc. 4.49. The strongest powder diffraction lines (32 given) are 3.51(80)111), 2.715(100)113), 1.848(50)061), 1.45(80).

The mineral forms 0.5 mm euhedral pseudohexagonal crystals composed of the forms [011], [010], [110], and [100]. It occurs on a fracture surface in a specimen of calcite willemite-franklinite ore. It is reddish-brown, with vitreous luster, no cleavage. H about 3–4. It does not fluoresce under UV light. Optically biaxial, positive, n$_d$ = 1.77(3), b = 1.78(5), g = 1.78(5), 2V = 82°. Dispersion strong, r > v; orientation X = c, Y = b, Z = a. Weak patchy pleochroism is pale brown to violet-brown. Absorption Z > Y > X.

The name is in accordance with the standard convention of naming rare-earth analogues of known species. Type material is at the Smithsonian Institution. D.A.V.

Sverigeite*

Analysis by electron microprobe (except Be and H$_2$O) gave SiO$_2$ 33.5, FeO 0.3, ZnO 1.2, MgO 8.1, MnO 11.8, Na$_2$O 6.1, BeO 9.7, SnO$_2$ 28.5, H$_2$O 1.2, sum 100.4%. This gives the formula Na$_{1.14}$Mg$_{0.26}$Mn$_{1.29}$Fe$_{0.29}$Zn$_{0.21}$Be$_{0.22}$Sn$_{0.20}$Si$_{1.18}$O$_{4.87}$H$_{2.23}$. The ideal formula is NaMgMnBe$_2$Sn$_3$O$_{14}$(OH)$_3$.

X-ray study shows the mineral to be orthorhombic, space group Ibmm or Ibm2, a = 6.818(6), b = 13.273(8), c = 10.813(8)Å, Z = 4, D calc. 3.61; meas. 3.60. The strongest lines (43 given) are 6.63(50)020), 5.77(70)101), 4.33(70)121), 2.98(60)220), 2.884(100)202), 2.826(90)042), 2.706(50)004), 2.644(60)222).

The mineral occurs on a mine dump specimen as irregular platy segregations up to 10 mm in a calcite matrix, associated with mimetite, an amphibole, and jaspis. Crystals up to 2 mm long are elongated on [001]. The mineral is yellow, light yellow streak. H about 6.5, vitreous luster, dull crystal faces, cleavage [010] perfect. Optically biaxial, positive, n$_d$ = 1.67(4), b = 1.68(4), g = 1.69(4), 2V = 67°. Dispersion strong, r > v; pleochroism moderate X = yellow, Y ≈ Z = pale yellow, absorption X ≈ Y ≈ Z. Orientation X = h, XY plane parallel to the prominent cleavage. The mineral does not fluoresce in UV light.

The name is for the country in which it was found. Type material is at the Smithsonian Institution. D.A.V.

**Tuperssuatsiaite**
S. Karup-Møller and O. V. Petersen (1984) Tuperssuatsiaite, a new mineral species from the Iluusauqaq intrusion in South Greenland. Neues Jahrb. Mineral., 107, 597–604 (in French). Electron microprobe analysis gave Pb 34.8, Sb 34.4, Ag 5.9, Mn 2.8, Fe 0.2, S 21.1, Se 0.3, sum 99.5% corresponding to Ag$_{0.93}$(Mn$_{0.89}$Fe$_{0.06}$Zn$_{0.07}$)$_{2}$Pb$_{0.04}$Sb$_{0.06}$(Si$_{1.1}$Se$_{0.07}$)O$_{12}$ or ideally, Ag$_{3}$Mn$_{2}$Pb$_{3}$Sb$_{5.12}$.

The X-ray powder pattern is indexed on the basis of it being in the...
the andorite series with orthorhombic symmetry. The lack of systematic absences indicate possible space group \( Pnnm, P222 \) or \( Pnnm \) with \( a = 12.67, b = 19.32, c = 4.38 \AA, Z = 2, D calc. = 5.61 g/cm\(^3\). The strongest X-ray lines (17 are given) are \( 3.80(30121), 3.49(30131), 3.30(100250), 2.90(80321051), 2.75(30331), 2.29(10171), 2.19(10511002), 2.08(30531181). \)

The grey, metallic mineral occurs as anhedral grains and subhedral crystals to 200 \( \mu \)m. In reflected light it is anisotropic; poly-synthetic twinning along one direction indicates a true monoclinic symmetry. Maximal and minimal reflectances in air \([R_{\alpha}, R_{\beta}]\): 44.2, 36.3 (420); 43.9, 35.0 (480); 42.4, 33.2 (600); 41.2, 32.3 (660); 39.7, 30.8 (720) and 39.2, 30.0 (780). The Vickers microhardness \((VHN_{100})\) is about 168 kgf/mm\(^2\).

### unnamed sulfosalt


**NEW MINERAL NAMES**

**NEW DATA**

**Betpakdalite**


Microprobe analysis of the mineral gave \( Na_2O 0.20–0.48, K_2O 0.51–3.52, CaO 5.21–6.10, ZnO 0.38–0.96, Fe_2O_3 11.3–12.6, WO_3 0.55–1.45, MoO_3 52.3–55.2, As_2O_3 9.0–10.1 wt.\% with \( Cd = \) trace. This is calculated on the basis of 21 oxygens as: \((Ca_{0.40}Y_{0.39}Fe_{0.09}Ce_{0.07}La_{0.07})_2(OH)_3\] polyhedra with \( O \geq 1 \leq 2 \). Single crystal studies show the mineral to be monoclinic, space group \( P2_1/m \), unit cell \( a = 19.44(1), b = 11.09(6), c = 15.25(1) \AA, \beta = 131.28(4)^\circ \). \( R = 8.8\% \). The strongest X-ray lines (27 given) are 8.91(100111), 7.30(505200), 11.49(40001), 3.645(404040). The general structure building unit consists of \( Fe-O \) and \( Mo-O \) octahedra and an \( As-O \) tetrabrendon forming an open framework structure with voids containing \([K(H_2O)_6]_3[Ca(H_2O)_6]_4[Mo_16As_4Fe_6O_{48}]_4\] \( 3H_2O \) with water assumed. The mineral occurs in pale green hexagonal crystals, space group \( \text{P6}_3/m \), with \( a = 13.583(2) \), and \( c = 5.895(1) \AA, Z = 2 \). The specimen is from Setoda, Hiroshima, Japan.

**Discussion**

This is an unrecognized new species, the \( Ca \)-analogue of agard-ite. Additional physical and paragenetical data are needed. The phase should be named in accordance with Levinson's Rules when submitted to the Commission on New Minerals and Mineral Names, I.M.A. P.J.D.

**unnamed sulfosalt**


Compositions are given as follows: Phase A: \( Pb_3Sb_2S_4Cl_{14.5} \); Phase B: \( Pb_4Sb_4S_4Cl_{3.4} \); Phase C: \( Pb_5Sb_4S_{2.7}Cl_{0.31} \).


The phases listed above were synthesized. Strongest lines of the powder pattern are: Phase A: 3.40 (100), 2.85 (50), 2.79 (45), 2.09 (50); Phase B: 3.85 (100), 3.75 (50), 3.38 (90), 2.73 (50); Phase C: 3.96 (6) 3.54 (10), 2.81 (7), 2.08 (9). M.F.

**Cornubite**


Microprobe analysis of single crystals gave \( CuO 58.60, Al_2O_3 32.01, P_2O_5 0.25, Fe_2O_3 0.32, SiO_2 0.34, Al_2O_3 0.15, H_2O 5.27, sum 96.94 wt.\%, corresponding to \( Cu_5.03(Al_{1.90}P_{0.02})Fe_{0.02}As_0.03Sb_0.03Sb_2.01O_{4.94}OH_{0.5} \). X-ray study shows the triclinic (\( P1 \)) mineral to have \( a = 6.121(1), b = 6.251(1), c = 6.790(1) \AA, Z = 1; \( \alpha = 92.93(1), \beta = 111.30(1), \gamma = 107.47(1)^\circ \), \( D = 4.85 \text{ calc.} \). Atomic coordinates \( R = 0.026, F_p = 2436 \) and \( Cu-O \) distances smaller than \( 3 \) \AA are given.

Crystals are from a silicified quartz (originally barite, VG) vein near Reichenbach in the Odenwald, Germany. V.G.

**Edingtonite**


Data from previous studies of the zeolite edingtonite, \( Ba_4(Al_{15}Si_{20}O_{80}) \) \( 8H_2O \), are reviewed, and the results of the struc-
ture refinements of two samples, from Old Kilpatrick, Dunbartonshire, Scotland, and Ice River, British Columbia, Canada, are reported. Traditionally, edingtonite has been found to be either metrically tetragonal with biaxial optics or fully orthorhombic. It has generally been treated as an orthorhombic mineral possessing nearly perfect (Si, Al)-order.

Chemical and X-ray analyses yielded the following results for the Canadian and Scottish specimens, respectively: 

- For the Ice River sample, \( a = 9.584(5), b = 9.652(5), c = 6.512(3) \) Å, space group \( P4_2/m \);

- For the Old Kilpatrick sample, \( a = 9.584(5), b = 9.652(5), c = 6.512(3) \) Å, space group \( P4_2/m \).

The strongs lines in the powder XRD pattern of the sample from Ice River, Canada are (d in Å, l/h/k): 4.81(75)(020,200), 4.70(47)(111), 3.587(100)(121,211), 3.92(46)(220), 3.02(47)(130,310), 2.26(75)(330).

Structure refinements were performed in space group \( P4_2/m \) to \( R = 0.03 \) (1985 independent reflections) and \( R = 0.039 \) (2565 independent reflections) for the Ice River and Old Kilpatrick samples, respectively. In both cases, the resulting tetrahedral bond lengths were interpreted as indicators of nearly complete disorder in the (Si, Al) distribution.

Discussion

The authors conclude that two types of edingtonite occur, "orthorhombic edingtonite" and "tetragonal edingtonite". The former, exemplified by samples from Böhlen Mine, Sweden, [Galli (1976) Acta Cryst. B32, 1623] is characterized by orthorhombic cell parameters \( a = 9.539(5), b = 9.652(5), c = 6.512(3) \) Å, splitting of the (hkI) and (khl) powder XRD peaks, apparent (Si, Al) order, and an IR spectral profile with two peaks in the range 1200-1900 cm\(^{-1}\) and one sharp peak in the range 760 cm\(^{-1}\). The latter type of edingtonite is characterized by tetragonal metrics (within experimental error), absence of peak splitting, apparent (Si, Al) disorder, and an IR profile with five peaks in the range 1200-1900 cm\(^{-1}\) and only a small peak around 760 cm\(^{-1}\). There is, however, no difference between the thermal curves of the two types of edingtonite, and both types are optically biaxial negative.

It should be noted that, under this system of classification, the original type specimen [described by Haidinger (1825) Edinburgh J. Sci. 3, 316] would be a "tetragonal edingtonite", while the generally accepted description of edingtonite would correspond to that of "orthorhombic edingtonite". At the same time, the authors state that their "proposal of naming the two samples studied here tetragonal edingtonites does not necessarily mean that they are absolutely tetragonal: more detailed studies could demonstrate a small deviation from the highest symmetry; their optical biaxiality is already an evidence for such a deviation." In new of these remaining uncertainties, such terms are "ordered" and "disordered" edingtonite might be considered as alternatives to "orthorhombic" and "tetragonal" edingtonite. J.A.A. Z.
sum 100.64%. These results indicate that Fe₂O₃ is not essential in mpororoite, that the ideal formulae of mpororoite and anthoinite, respectively, should be WAIO₃(OH)₂·2H₂O and WAIO₃(OH)₃, and that the unit cells must be at least doubled to meet their unit cell contents.

Discussion

The reported formulae differ from the originally proposed compositions, (WA)₂O₃·H₂O and (WA)O₃(OH)₂, of mpororoite and anthoinite. Although new, augmented cell dimensions are not given, the original parameters proposed were a = 8.27, b = 9.32, c = 16.4, β = 92°29'. [Min. Record 12, 83; Am. Min. 58, 1112].

Richtetite occurs at the Shinkolobwe uranium deposit in Shaba, Zaire. Analysis by microprobe gave PbO 16.38, U₂O₅ 78.28 and H₂O 5.6 (by difference).

X-ray study gave triclinic P1 or P1, a = 20.81, b = 12.06 c = 16.30 Å, α = 103.8, β = 115.1, γ = 90.4°, V = 3570 Å³ and Z = 9. A new X-ray powder pattern is given.

The mineral occurs as black, hexagonal plates with forms {001}, {110}, {110} and {010}. It is biaxial negative with α ~ 1.9, β and γ ~ 2.0, 2V large, X || c*, YA[110] = 85°, ZA[110] = 5°. J.D.G.

BOOK REVIEWS


The editors of this 430 page basalt volume guide the readers through nearly 60 "benchmark" papers claimed to be either "widely recognized to have had a profound effect on our thinking" or expected "to be the wave of the future." The collection is grouped under seven headings covering aspects of classification, experimental work, mantle evolution, major basalt types, and tectonic environment. Mineralogy and isotope studies are lightly covered by the volume. Introductions to the various parts place the selected papers into their historical and scientific contexts. The introductions are carefully referenced and the volume contains a detailed author index.

It is a pleasure to renew old acquaintances with significant papers highlighting the development of modern classification schemes for basalts and basaltic series (Kennedy, Tilley, Macdonald, Katsura, and Kuno). The editors have also made a wise selection of experimental work related to basalt petrogenesis, many of which my generation of igneous petrologist probably have never read. Here is an opportunity to read classical papers by Bowen, Fenner, Osborn, Yoder, Tilley, Green, Ringwood, O'Hara, and Kushiro together with more recent papers by Pressnall, Walker, and Stolper. These papers are commonly cited in petrological literature and an imprint seems useful. The first two sections on classification and petrogenesis occupy well over half of the entire book; the remaining are devoted to chemical mantle evolution and major basalt types.

Some readers may be in vain for papers which they believe to have shaped our present understanding. However, the editors, taking the limited space in this volume into considerations, should not be blamed for such omissions. More serious is that the editors may be attempting to shape "the wave of the future" by including very recent papers whose content and data is still debated in the open literature (e.g., the Pressnall, Walker and Stolper papers). Many papers throughout the volume are of local geological, volcanological and geochemical interest and could have been deleted without great loss (this goes in particular for three papers authored or co-authored by the second editor). It is also not clear to the reviewer why five papers on komatiite and shoshonite are included in the classification chapter when other high-magnesian and/or potassic basaltic types are totally ignored. Furthermore none of these "unusual" rocks are covered by the subsequent sections.

If this Benchmark volume on Basalts really contained all that it promised, this reviewer would have had no reservation in recommending it. However, the problem is that it does not. At the best, the editors have included excerpts and more typically only single figures and abstracts. Only 13 papers are presented in their full length. Thus, the reader is frequently referred to missing introductions, data, discussions and figures, and is unable to evaluate the conclusions. Such an evaluation is crucial for all scientific work. Interested readers would therefore have to, and hopefully will, consult their own libraries for the full text. This Benchmark volume does not fulfill its intention to be a reference for the petrologist and geochemist without access to a good library. If the editors want to present a textbook, they should be encouraged to do the full work and write an advanced textbook on basalt chemistry and genesis. They clearly demonstrate that they are capable of doing so.

The philosophy behind the editorial work on this book seems to assume that major scientific knowledge should be made easily accessible and carefully "condensed" before being offered to the researcher and advanced student. If this philosophy should be embraced in editorial work on future Benchmark volumes and in geology classrooms, we might expect that coming generations of geologists will lose their basic training in reading original scientific communications. There seem to be good reasons to discontinue that editorial practice and the publisher should be held responsible for bringing out the book. This despite the fact that reprint collections of some of the included papers certainly could be used by the petrological community (e.g., the Yoder and Tilley, Green and Ringwood, and O'Hara papers on experimental petrology). And if the publishers are searching for old papers to reprint, why not a fully annotated edition of, for example, Bowens early experimental papers? The present book cannot be recommended and in this reviewer's opinion copyright holders are urged to exercise better control over their rights.

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