NEW MINERAL NAMES*

JOHN L. JAMBO
CANMET, 555 Booth Street, Ottawa, Ontario K1A 0G1, Canada

EDWARD S. GREW
Department of Geological Sciences, University of Maine, Orono, Maine 04469, U.S.A.

Girvasite*


Electron-microprobe analyses (H₂O by coulometry and TGA; CO₂ by difference between total weight loss and H₂O) gave Na₂O 5.0, 5.0, CaO 16.7, 13.9, SrO 3.5, MgO 18.5, 17.2, MnO 0.1, 0.3, FeO 1.2, 1.5, P₂O₅ 32.6, 32.5, CO₂ 7.4, –, H₂O 18.0, –, sum 99.5, – wt%. The first analysis corresponds to Na₂Ca₇(Mg₃.0oMn₀.oOFe₆t1)};3.12-(CO₃)₁.10(PO₄)₃.65H₂O; the ideal formula from crystal-structure study is NaCa₉(Mg₆PO₄)₂[P₂O₅(OH)](CO₃)(OH)₂·4H₂O. No other constituents were detected. There is a strong endothermic peak at 370 °C and a weak one at 580 °C, the first corresponding to loss of H₂O, which is also lost at 700–750 °C. CO₂ is gradually lost between 400 and 1000 °C. Absorption features in the infrared spectrum are at 3450, 3200, 1640, 1520, 1435, 1110, 1090, 1035, 980, 880, 750, 715, 635, 615, 600, 575, and 560 cm⁻¹. The sharp feature at 3450 cm⁻¹ is evidence for OH, the feature at 1640 cm⁻¹ for molecular H₂O, whereas the features at lower wave numbers are assigned to CO₂ and PO₄ groups. Readily soluble in cold 10% HCl. The mineral forms spherulites to 1.5 mm in diameter, rarely single prismatic crystals elongate [100] and up to 1 mm long and 0.07 mm across. Color of spherulites creamy white; single crystals colorless and transparent; white streak, luster silky for aggregates, vitreous for single crystals; nonfluorescent, H₂O = 3.5, very brittle, cleavage (001) perfect, D_mew = 2.46(2) in heavy liquids, D_cal = 2.529(5) g/cm³ for Z = 4. Optically biaxial negative, α = 1.541(2), β = 1.557(2), γ = 1.565(2) for λ = 589 nm, 2V_cal = 60(5)°, 2V_mew = 71°, Y = b, a ∩ Z = 31°. Single-crystal X-ray study gave monoclinic symmetry, space group P2₁/c; a = 6.507(6), b = 12.267(5), c = 21.403(8) Å, β = 90.37(6)° from powder data (CuKa radiation, diffractometer). Strongest lines in the pattern (57 given) are 10.72(100,002), 3.57(80,006), 3.42(26,016, 115), 3.08(32,026,125), 2.817(26,043), 2.108(32), and 2.016(35). The mineral occurs in solution cavities in dolomite carbonatite at Kovdor, Kola Peninsula, USSR, where it intimately intergrown with bobieiirite; minor pyrite is also present, and dolomite lines the cavities. It is a low-temperature, hydrothermal mineral formed from phosphatic solutions at 100–250 °C. The name is for Lake Girvas. Samples have been deposited in the Fersman Mineralogical Museum, Moscow, and in the Mining Museum of the Leningrad Mining Institute.

Discussion. The mineral differs in chemical composition and crystal structure from other phosphate-carbonates: heneuite, bradleyite, sidorenkite, and bonshtedtite. Its crystal structure, briefly discussed in the present paper, is reported in more detail in Doklady Akad. Nauk SSSR, 311, 1372–1376, 1990 (in Russian). E.S.G.

Komkovite*


Electron-microprobe analyses of four crystals gave BaO 28.23, 29.97, 27.49, 28.19, CaO 0.0, 0.04, 0.08, MnO 0.16, 0.21, 0.0, FeO 0.18, 0.10, 0.31, 0.33, K₂O 0.04, 0.06, 0.26, 0.13, ZrO₂ 24.45, 24.60, 23.41, 24.94, HFO₂ –, –, 0.31, 0.46, SiO₂ 32.90, 34.65, 34.24, 34.44, sum 85.96, 91.39, 86.06, 88.57 wt%. Coulometric analyses gave H₂O 10 to 11.5 wt% (average 10.7). The formula corresponding to the fourth analysis (plus H₂O analysis) is (Ba₀.₉₅Fe₀.₀₂-Ca₉₀.₀₀K₀.₀₀)₂₀.₉₂(Zr₁₀Hf₀.₀₁)₂₁₀.₉₁Si₁₉O₆.₃₀H₂O, ideally Ba₂Zr₂Si₃O₈·3H₂O. No other constituents were detected. There is one endothermic peak at 140 °C corresponding to the maximum loss of H₂O, which is lost completely at 600 °C. Absorption features in the infrared spectrum are at 3540, 3510, 1665, 1650, 1045, 970, 920, 740, 545, and 495 cm⁻¹, the first four corresponding to molecular H₂O. The mineral forms equant crystals, 1–5 mm across, with trigonal pyramidal faces; color brown, streak light brown, vitreous luster, nonfluorescent, light blue cathodoluminescence, H = 3–4, brittle, no cleavage, D_mew = 3.31(5) in heavy liquids, D_cal = 3.38(1) g/cm³ with Z = 6. Optically uniaxial negative, brown, nonpleochroic, ω = 1.671(1), ε = 1.644(1) for λ = 589 nm. Single-crystal X-ray study indicated hexagonal symmetry, space group P₆₃, a = 10.526(6), c = 15.736(9) Å. Strongest lines in the powder pattern (67 given) are 5.23(100,110,003), 3.59(80,104),...
3.02(80,300), 2.96(90,024,105), 2.571(60,214,025), and 2.106(60,230).

The mineral was found in dolomitic veinlets that cut metasomatically altered pyroxenites in the Vuoriyarvi carbonatite complex, Kola Peninsula, USSR. The mineral occurs in a drill core at 80–90 m depth, associated with dolomite, stromatolite, phlogopite, barite, georgechaitite, and pyrite, and apparently formed by alteration of cata-pleite. The new names honors Soviet mineralogist and crystallographer A.I. Komkov (1926–1987). The type specimen is in the Fersman Mineralogical Museum, Moscow. E.S.G.

**Kurilite**


Electron-microprobe analyses (two given here, together with ranges of all 12 reported) gave Ag 65.07, 61.72 (61.72–68.11), Au 1.17, 0.65 (0.10–3.58), Te 24.64, 34.77 (23.54–34.77), Se 9.14, 2.17 (1.43–9.14), S 0.10, 0.19 (0.10–3.93, seven analyses), sum 100.12, 99.50 (97.11–101.55 wt%, corresponding to Ag$_{65.26}$Au$_{0.92}$Te$_{0.63}$Se$_{0.35}$S$_{0.01}$ and Ag$_{97}$Au$_{0.01}$Te$_{0.92}$Se$_{0.09}$S$_{0.02}$ (normalized to total atoms = 3), which simplify to (Au,Ag)Te$_{0.92}$Se$_{0.09}$S$_{0.02}$. Occurs as anhedral grains, metallic luster, cleavage not observed, opaque. In reflected light, white, similar to galena. Isotropic, internal reflections absent. Reflectance at $\lambda = 580$ nm is 38.1% (WTiC standard): plot of variation of reflectance with $\lambda$ shows a monotonic decrease from 39% at 420 nm to 37% at 700 nm. X-ray powder study shows the mineral to be isotropic, space group $Pn3n$ or $P43n$, $a = 11.27(1)$ Å. The strongest lines (14 given) are 3.00(90,123), 2.52(50,240), and 2.427(50,332) (no line is given with 100 intensity).

The mineral is associated with Au-Ag tellurides in the Prasolov occurrence, where it forms isolated, xenomorphic segregations in quartz; locally replaces tetrahedrite-tennantite or is intergrown with hessite and petzite such that hessite is overgrown by the mineral, whereas petzite forms tiny oval grains in it. The mineral is inferred to have formed as the activities of Se and Te increased at roughly 150–200 °C during a relatively late stage of mineralization.

**Discussion.** The authors report that the mineral differs optically from hessite in being isotropic and in lacking the rose-brown tint characteristic of hessite, and from petzite in being white, like galena, not gray with a brown tint as for petzite. The reflection spectra for hessite, petzite, and the unnamed mineral are shown to be distinct from one another. A footnote in the paper indicates that the mineral was submitted to the IMA under the name Kurilite. No submission has been made. E.S.G.

**Moissanite-6H, -33R, -15R, $\beta$-SiC**


Electron-microprobe analyses of the Yakutian $\alpha$-SiC (moissanite) gave Si 66.612, 51.880, 65.20, Fe 0.038, 0.495, – wt%. Spectral analyses show insignificant amounts of Al, Mg, Ca, Ti, Mn, and Cr. Fuxian moissanite forms crystals to 5 mm in diameter, deep blue when larger, color-zoned when smaller. Platy crystals have the form (1010) well developed and are elongate parallel to the $a$ axis; crystals are commonly rounded, resorbed. Yakutian moissanite forms rounded to euhedral, pinacoidal crystals 0.5–1.2 mm across. Most crystals are blue-green; fewer are blue, green, or colorless; rare ones are yellow. Pleochroism is weak in the strongly colored varieties. Cleavage is weak parallel to basal pinacoid. Optically, $\epsilon > 2.7$, $D_{\text{max}} = 3.27–3.29$ g/cm$^3$. Single-crystal studies of the Fuxian mineral show that a dark crystal is the well-ordered 6H polytype of $\alpha$-SiC; Laue diagrams of the Yakutian material indicate that the 6H and 33R polytypes are present; the 15R polytype is also reported. The X-ray powder pattern of the 6H polytype has the strongest lines (23 given) 2.49(100), 2.33(60), 1.52(100), 1.34(100), and 1.13(60); that of the 33R polytype has the strongest lines (23 given) 2.50(100), 2.38(50), 1.53(200), 1.43(40), and 1.31(40); that of the 15R polytype has the strongest lines (16 given) 2.57(20), 2.50(90), 2.39(240), 1.53(80), 1.31(90), and 1.00 Å (30, broad).

The Fuxian moissanite occurs in a diamond-bearing kimberlite pipe emplaced in the Sino-Korean craton near Fuxian, Liaoning, China. The mineral is overgrown by vesicular $\beta$-SiC and forms epitaxial intergrowths with $\beta$-SiC; its crystal faces are coated by Si; quartz is also present. Moissanite is inferred to have formed with Si and diamond in the Earth’s mantle at extremely low $f_O$. The Yakutian moissanite occurs in kimberlite from Yakutia, USSR. It encloses Si and, less commonly, $\beta$-SiC and FeSi$_2$.

**$\beta$-SiC**

Electron-microprobe analyses of the Yakutian $\beta$-SiC gave Si 63.347, 61.568, 61.707, 64.20, Fe 0.045, 0.015, 0.015, – wt%. Fuxian $\beta$-SiC forms vesicular, milky masses on the order of 0.3 mm to 1.5 mm across that enclose moissanite, quartz, and transparent $\beta$-SiC euhedra; also occurs in epitaxial overgrowths on moissanite such that [110] of $\beta$-SiC is parallel to [1010] of the moissanite. Yakutian $\beta$-SiC occurs as rare black rounded grains about 0.1 mm in diameter, intergrown or enclosed in moissanite. Single-crystal studies of Fuxian material show that the light-colored material intergrown with moissanite is the well-ordered 3C polytype of $\beta$-SiC. The X-ray powder pattern of the Yakutian material has the lines 2.513(100),
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2.181(10), 1.542(30), 1.313(30), 1.262(10), 1.091(10), 0.999(20), 0.992(20), and 0.987(10) Å. The Fuxian mineral is inferred to have formed during rapid ascent and consequent vesiculation of CO2-rich kimberlitic magma at P-T conditions where high quartz is also stable, viz., P < 20–28 kbar but > 10 kbar and T near 1000 °C, and under more oxidizing conditions than earlier formed moissanite and diamond. The Yakutian material occurs in kimberlite from Yakutia, USSR. In the case studied in detail, β-SiC occurs with SiO2 in moissanite-15R.

Discussion. X-ray data for Yakutian moissanite-15R and chemical and X-ray data for Yakutian β-SiC were previously published by V.I. Marshinstev et al. (Doklady Akad. Nauk, 262, 204–206, 1982; English translation, Doklady, Earth Science Sections, 262, 163–166). Available information does not exclude the possibility that the SiC reported from Yakutia resulted from contamination by carborundum used in preparing the samples for study. The carbon isotopic composition is reported to be close to that in synthetic SiC. E.S.G.

Tuliokite*

Electron-microprobe analyses of three crystals (first two riddled with abundant inclusions of organic material) gave Na2O 16.2, 16.9, 17.9, K2O 0.1, 0, 0, CaO 0.1, 0.1, SrO 0.2, 0, 0, BaO 14.6, 15.1, 14.6, Fe2O3 0.1, 0.4, ThO2 29.5, 26.5, 24.3. Measured Na2O values are probably low because of volatization under the microprobe beam. Other elements with Z > 11 were not detected by microprobe, and Be, B, and Li were not detected by laser spectroscopy. The Penfield method and coulometry gave H2O 14.0 wt%; H2O is lost between 150 and 250 °C, which suggests molecular H2O. CO2, not analyzed because of the small amount of material available, was calculated to be 25.5 wt% from stoichiometry. The sum for the third crystal (which contains few inclusions) is 96.8 wt%, and the corresponding empirical formula normalized to eight cations is Na3.96

Bi3(Se2TeS)34

Electron-microprobe analyses gave Ag 0.12, Pb 5.27, 2.54, Bi 59.84, 64.48, Sn 0.22, Te 15.30, 12.68, S 3.27, 2.74, Se 15.39, 16.87, sum 99.42, 99.31 wt%, which correspond to (Pb0.96Ag0.04)Bi10.06(Se16.64Te7.76S6.64)S31.04, Pb0.96Bi10.06(Se16.64Te7.76S6.64)S31.04, ideally Bi3(Se2TeS)34. In reflected light, white with a weak yellow tint, brighter than wittite; weak bireflectance, no color effect with the anisotropy. The X-ray pattern (not given) is similar to that of laitakarite. Occurs as isolated segregations, up to 0.15 mm across, between lamellar grains of wittite. The Se mineralization, which also includes laitakarite, nevskite, bohdanowiczite, selenian bismuthinite, and selenian cosalite, accompanies a chloritic paragenetic association with arsenopyrite, chalcopyrite, sphalerite, galena, and tetrahedrite-tennantite at the Neva tin deposit, Magadan District, northeastern USSR. The cylindrical ore body is related to steep-dipping fractures near the tectonic contact between upper Cretaceous alaskitic granite and
lower Cretaceous terrigenous sediments. The depth of ore deposition is estimated to have not exceeded 500–1000 m.

**Discussion.** The authors note that the mineral has a Te/Se ratio of 0.5, similar to that in skippinite, but differs from skippinite in the ratio of cations to anions and in that significant Pb and S are present. However, Pb content is variable, suggesting Pb ≈ Bi substitution. E.S.G.

\[(\text{Ag, Cu})\text{Bi}_3(\text{Se, S})_5 \text{ and Te}_2\text{Se}_4\]


\[\text{Te}_2\text{Se}_4\]

An electron-microprobe analysis gave Te 54.11, Se 44.99, sum 99.10 wt%, corresponding to \(\text{Te}_2\text{Se}_4\) (normalization to Se + Te = 7), ideally \(\text{Te}_2\text{Se}_4\). In reflected light, color and reflectance are very close to those of Te. The mineral forms margins, 4–6 μm wide, between segregations of claustralite and Te, which are intergrown with each other, sylvanite, and naummanite. These intergrowths do not exceed 50 μm in diameter, and they fill interstices among quartz grains. The mineral is inferred to have been one of the last to form, possibly metastably, as the activities of Se and Te increased during a relatively late stage of mineralization, at roughly 150–200 °C, in the Prasodov occurrence, Kurile Islands, USSR.

\[(\text{Ag, Cu})\text{Bi}_3(\text{Se, S})_5\]

Electron microprobe analyses of four grains in two samples gave Ag 6.10, 10.15, 8.56, 5.85, Cu 2.38, –, 1.00, 2.53, Bi 59.66, 55.84, 56.80, 56.82, Pb –, 1.11, 1.09, 1.01, As –, 0.37, 0.36, 0.33, Se 27.80, 27.51, 26.76, 26.50, Te 0.20, 0.37, 0.36, 0.33, S 3.74, 3.76, 3.65, 4.55, sum 99.88, 99.11, 98.28, 97.92 wt%; the first two analyses correspond to \(\text{Ag}_{1.29}\text{Cu}_{0.50}\text{Bi}_{3.00}\text{Se}_{3.79}\text{Te}_{0.25}\) (normalized to total atoms = 9), ideally \(\text{Ag}_{1.29}\text{Cu}_{0.50}\text{Bi}_{3.00}\text{Se}_{3.79}\text{Te}_{0.25}\). Grains do not exceed 60–80 μm. In reflected light, light gray with a bluish tint; under crossed nicols, weak bireflectance and strong anisotropy. The X-ray powder pattern is very weak because of the limited amount of material available; lines correspond to the strongest lines of pavonite. The mineral forms accumulations of isolated xenomorphic grains in quartz in proximity to Au and a mineral of composition (Bi, As, Te, Se, O), at the Ozerov and Rodnikov occurrences, Kamchatka, USSR. These and the Prasodov occurrence resulted from epithermal mineralization associated with magmatism of the late, island-arc stage proper in the Kurile-Kamchatka belt. The mineral is inferred to have formed as the activity of Se and Te increased at roughly 150–200 °C during a relatively late stage of mineralization.

**Discussion.** The authors infer that the (Ag, Cu)Bi₃(Se, S)₅ mineral is the Se analogue of pavonite, noting similarities in optical properties and in chemical substitutions, i.e., Cu for Ag or Pb for Bi. E.S.G.

\[\text{Ag}_1\text{FeAs}_4(\text{Se, S})_{12.5}\]


Electron-microprobe analyses of three grains gave Ag 51.90, 51.92, 51.15, Fe 2.90, 2.95, 2.30, As 12.94, 12.78, 12.80, Sb 0.17, 0, 0, S 6.78, 5.71, 5.63, Se 24.93, 26.74, 27.26, Te 0.56, 0.70, 0.58, sum 100.18, 100.40, 99.72 wt%, corresponding to \(\text{Ag}_{1.29}\text{Fe}_{1.21}\text{As}_{4.04}\text{Sb}_{0.03}\text{Se}_{2.97}\text{Te}_{3.95}\text{Te}_{0.10}\text{Cu}_{12.44}\), \(\text{Ag}_{1.29}\text{Fe}_{1.21}\text{As}_{4.04}\text{Sb}_{0.03}\text{Se}_{2.97}\text{Te}_{3.95}\text{Te}_{0.10}\text{Cu}_{12.44}\), and \(\text{Ag}_{1.29}\text{Fe}_{1.21}\text{As}_{4.04}\text{Sb}_{0.03}\text{Se}_{2.97}\text{Te}_{3.95}\text{Te}_{0.10}\text{Cu}_{12.44}\) (normalized to total atoms = 29), ideally \(\text{Ag}_1\text{FeAs}_4(\text{Se, S})_{12.5}\). In reflected light, similar to tetrahedrite-tennantite: gray, with hardly noticeable rose tint, darker than hessite and close to naummanite. Under crossed nicols, isotropic, polishes well.

The mineral occurs in the sulfide-selenide-telluride mineralization of the Prasodov occurrence, Kurile Islands, USSR, which resulted from epithermal mineralization associated with the magmatism of the late, island-arc stage proper in the Kurile-Kamchatka belt. The mineral occurs in relict segregations 20–50 μm in diameter within paratellurite. In places the mineral is surrounded by a narrow rim of naummanite, and commonly it encloses tiny inclusions of chalcopyrite. The mineral is inferred to have formed as the activity of Se increased at roughly 150–100 °C during a relatively late stage of mineralization. E.S.G.

\[\text{θ-Al}_2\text{O}_3, \text{δ-Al}_2\text{O}_3\]


Electron-microprobe analyses of θ-Al₂O₃ and of associated δ-Al₂O₃ and corundum gave Al₂O₃ 83–87, impurities < 1 wt%, whereas laser microspectroscopy detected only Al. The low analytical totals are attributed to the high microporosity of the analyzed material. Reflective indices of θ-Al₂O₃ and of associated δ-Al₂O₃ and corundum range from 1.69 to 1.74, and bireflectance is < 0.006. An X-ray powder diagram for θ-Al₂O₃ gave well-defined, intense reflections, of which the strongest (28 given) are 2.88(40), 2.71(60), 2.42(40), 2.28(30), 2.01(40), 1.537(30), and 1.386(100) Å. The pattern agrees in \(δ\) values and relative intensities with the standard pattern for θ-Al₂O₃ (PDF 4–875).

For δ-Al₂O₃, an X-ray powder diagram gave weak, washed-out lines as follows: 2.76(20), 2.59(10), 2.43(30), 2.30(20), 2.11(10), 2.01(30), 1.96(20), 1.52(10), and
1.39(100) Å, which agree in $d$ values and relative intensities with the most intense lines in a standard pattern for $\delta-\text{Al}_2\text{O}_3$ (PDF 16–384), lacking only one line with $I \geq 50$. The minerals form yellowish, polycrystalline spherules about 0.1 mm in diameter that, together with corundum, constitute 2–3% of the heavy fraction of minerals separated from loam and sandy loam of upper Pleistocene to Holocene age in different areas of Yakutiya, USSR. These sediments were frozen during deposition in river valleys and on gentle slopes. The spherules of $\text{Al}_2\text{O}_3$ are confined to layers with well-defined features of cryogenic soil formation. The formation of metastable modifications of $\text{Al}_2\text{O}_3$ is attributed to the dehydration of colloidal aluminum hydroxides at subfreezing temperatures maintained over an extended period in the presence of saline pore solutions; crystallization pressure is exerted by growing ice crystals.

**Discussion.** The material used in this study was obtained from natural exposures and from cores out of drillholes, all located in uninhabited areas. The samples were prepared by elutriation. Consequently, the authors exclude the possibility of contamination by synthetic substances. E.S.G.

**Ralstonite-like**


The mineral occurs as colorless to white octahedral crystals, up to 2 mm across, in an assemblage containing morinite, geerskutite, potassium feldspar, siderite, and vivianite that encrust quartz and fluorite in specimens from the former Cleveland tin mine near Waratah, Tasmania. Electron-microprobe analyses gave $\text{Al} 6.21, \text{Mg} 15.09, \text{Ca} 8.71, 8.83, \text{Na} 14.12, 14.15, \text{P} 0.53, 0.36, \text{F} 49.16, 49.27, \text{O} 52.5, 4.76, \text{H} (\text{calc.}) 0.18, 0.14, \text{sum} 99.25, 98.92$ wt%, the first corresponding to $\text{(Na}_{0.47-\text{Ca}_{0.53})}_{2.99}\text{(Mg}_{0.48-\text{Al}_{0.95})}\text{F}_{0.52-0.58}\text{O}_{(OH)_{0.5-0.6}}\text{F}_{0.21-0.26}$ Reff. Refractive index $1.40, D_{x-ray} = 2.99(1), D_{meas} = 3.06 \text{g/cm}^3$. X-ray single-crystal study showed strong streaking, indicating strong disorder and the possibility of small compositional domains. A 57.3-mm Gandolfi pattern (Co radiation) gave strongest lines of 2.906(100,222), 2.314(50,331), 1.940 (20,511), 1.783 (60,440), and 1.524 (50,622), $a = 10.08(1)$ Å. Compared to the general ralstonite formula $\text{Na}_{x}(\text{Al}_{2-x}\text{Mg})_{x}(\text{F,OH})_y\text{H}_2\text{O}$, the Tasmanian mineral can be visualized as $\text{Na}_x\text{Mg}_y(\text{F,OH})_z\text{H}_2\text{O}$ but with substitution of $\text{Ca}+\text{(OH, F)}$ for $\text{H}_2\text{O}$ and $\text{Na}+\text{Mg}$ for Al. J.L.J.

**PbCO$_3$, PbO**


The compound occurs as white, clay-like, slightly waxy pseudomorphs after cerussite and as irregular patches on specimens of old fill material (i.e., not in situ) now found at the Kintore open pit, Broken Hill, New South Wales. Electron-microprobe and TG–DSC analyses gave $\text{Pb} 90.4, \text{SO}_2 0.1, \text{CO}_2 9.7$, sum 100.2 wt%, corresponding to $\text{Pb}_{1.97}\text{C}_{1.00}\text{O}_{1.48}$, ideally $\text{PbCO}_3 \cdot \text{PbO}$, which is known as a phase formed in the thermal decarbonatization of lead carbonate. Indexing of the Gouinier-Hägg powder pattern (100-mm diameter, Cu radiation) led to an orthorhombic cell, $a = 9.32(9), b = 8.996(9), c = 5.143(6)$ Å; strongest lines of the pattern are 4.118(50,210), 4.007(60,111), 3.220(100,211), 3.175(100,121), 2.857(50,130), and 2.569(35,002). The compound is thought to have formed by the roasting of cerussite during underground mine fires early in 1906.

**Discussion.** Although it would seem that the lack of an in situ occurrence would negate the possibility that the oxycarbonate be accepted as a new mineral, the CNMMN ruled that the compound is not a mineral because it formed as the result of an artificial process (the mine fires). This poses an interesting question in that several new minerals formed as the result of burning of coal dumps have been accepted recently. Although the fires apparently start by spontaneous combustion, the circumstances that lead to the combustion clearly are manmade and artificial. The line is obviously a fine one. What about romarchite and hydromarchite, which formed on manmade archeological (pewter) objects? These comments are philosophical and are not intended to second-guess the difficult decisions faced by the CNMMN. J.L.J.

**Cu-Al analogues of honessite, hydrohonessite**


Specimens from one of the dumps near an old nickel mine (pyrrhotite, pentlandite, chalcopyrite) at Craigburne, Scotland, have blue-green, multilayer coatings and pocket linings of [microcrystalline to cryptocrystalline] honessite-like and hydrohonessite-like coatings. Some of the colomorphic layers in the coatings are less than 1 μm wide. Electron-microprobe analyses, of areas for which X-ray powder patterns were taken, show a wide variation in compositions in which Cu nearly always exceeds Ni, and Al exceeds Fe; substantial Si (commonly double-digit values) is present in many of the analyses and is attributed to amorphous allophane. Infrared spectra gave absorption bands characteristic for water, and sulfate $>\text{carbonate}$. X-ray powder patterns (114.6-mm camera, Fe radiation) gave broad lines and high backgrounds; for the hydrohonessite-like phase the six lines listed are 11.3(100,003), 5.67(10,006), 3.80(10,009), 2.61(15,101,012), 2.45(10,015), and 1.50(5,110) Å, corresponding to $a = 3.00, c = 32.4$; no X-ray data are given for the honessite-like phase. J.L.J.
Unnamed iron silicide


Electron-microprobe analyses gave Si 56.87, Fe 44.17, sum 101.04 wt%. The X-ray powder pattern has lines at 5.12(10), 2.38(20), 1.89(30), 1.85(100), 1.33(10), 1.16(8), 1.08(20), and 1.06(10) Å. The mineral occurs as rare inclusions in moissanite in kimberlite at Yakutiya, USSR.

Discussion. Available information does not exclude the possibility that the FeSi$_2$-bearing moissanite resulted from contamination by carborundum used in preparing the samples for study. A compound Fe$_3$Si$_7$(Si$_{54.09}$, Fe$_{45.9}$, P$_{0.1}$, Al$_{0.1}$, Mn$_{0.7}$, sum 101.7 wt%) was reported by Essene and Fisher to occur in a fulgurite (Science, 234, 189–193, 1986). Data for inclusions approximating FeSi$_2.3$ were abstracted in Am. Mineral., 76, p. 301, 1991. E.S.G.

New Data

Alvanite


Electron-microprobe analysis gave Al$_2$O$_3$.34.2, FeO 0.3, ZnO 7.6, NiO 4.2, V$_2$O$_5$ 27.5, H$_2$O (by difference) 26.2, sum 100 wt%, corresponding to Al$_{8.18}$Fe$_{0.05}$Zn$_{1.14}$Ni$_{0.68}$V$_{3.66}$O$_{40.99}$, ideally (Zn,Ni)Al$_4$(VO$_4$)$_2$(OH)$_2$.2H$_2$O. $D_{\text{meas}} = 2.492$ g/cm$^3$ for the ideal formula with $Z = 2$ and Zn:$\text{Ni} = 1.70:1$. X-ray single-crystal study gave monoclinic symmetry, space group $P2_1/n$, $a = 17.808(8)$, $b = 5.132(3)$, $c = 8.881(4)$ Å, $\beta = 92.11(3)^\circ$ as refined from a 114.6-mm Gandolfi pattern (Cu radiation) with strongest lines of 8.91(90,200), 7.85(80,101), 5.02(50,301), 4.46(100,400), 3.287(45,112), 2.957(45,312), and 1.481 (50,033,006). Crystal-structural study ($R = 0.056$) confirmed the presence of (VO$_4$) groups. The unit cell and formula are new. J.L.J.

Amarillite


X-ray single-crystal structural study ($R = 0.0374$) of amarillite, NaFe$_{2+}$Fe$_{2+}$(SO$_4$)$_2$.6H$_2$O, from Qinghai Province, China, gave monoclinic symmetry, space group $C2/c$, $a = 8.4190(61)$, $b = 10.8409(40)$, $c = 12.4717(50)$ Å, $\beta = 95.495^\circ$, $D_{\text{calc}} = 2.2217$ g/cm$^3$ with $Z = 4$. The cell and space group are new. J.L.J.

Georgeite


Chemical analyses of synthetic georgeite gave CuO 72.3, 71.0, CO$_2$ 20.0, 19.7, H$_2$O 7.7, 9.3, sum 100.0, 100.0 wt%. Analysis of georgeite from the Carr Boyd mine, Western Australia, gave Cu 71.0, CO$_2$ 20.1, H$_2$O 9.5, sum 100.6 wt%; the requirements for the formula Cu$_3$CO$_3$(OH)$_2$ are CuO 71.9, CO$_2$ 19.9, H$_2$O 8.2 wt%. Comparison of the infrared spectra of the synthetic compound and of georgeite from the Carr Boyd mine and the Britannia mine, Wales, showed them to be identical. The results indicate that georgeite is the amorphous analogue of malachite, Cu$_2$CO$_3$(OH)$_2$. Revision of the formula was approved by the CNMMN. J.L.J.

Kamchatkite


Single-crystal X-ray structural study ($R = 0.055$) of kamchatkite [abs., Am. Mineral. 75, p. 1210, 1990], gave orthorhombic symmetry, space group $Pna2_1$. The space group is new. J.L.J.

Loddarite


Single-crystal X-ray structural study of loddarite gave orthorhombic symmetry, space group $Pna2_1$, a = 39.576(1), b = 6.9308(2), c = 7.1526(3) Å, formula K$_4$Na$_{12}$(Be$_2$Si$_2$O$_7$)$_2$.18H$_2$O. Distinct domains and various degrees of structural disorder are present. The mineral is the first example of a framework silicate containing three-membered rings. The formula and space group are new. J.L.J.

Osmium, iridium, rutheniodosmine, ruthenium


Within the ternary system Os-Ir-Ru, only four names apply: osmium for hexagonal alloys with atomic % Os the major element; iridium for cubic alloys and rutheniodosmine for hexagonal alloys in which atomic % Ir is the
major element; *ruthenium* for hexagonal alloys with Ru the major element. The new system (see also *Discredited Minerals*) was approved by the CNMMN. J.L.J.

**Phurcalite**


Single-crystal X-ray structural study \((R = 0.038)\) of phurcalite gave orthorhombic symmetry, space group \(Pbca\), \(a = 17.415(2)\), \(b = 16.035(3)\), \(c = 13.598(3)\) \(\text{Å}\), \(D_{\text{meas}} = 4.22\), \(D_{\text{calc}} = 4.220\, \text{g/cm}^3\) with \(Z = 8\). Electron-microprobe analyses and the structural study indicate that the formula is \(\text{Ca}_2(\text{UO}_2)_3(\text{PO}_4)_2\cdot 7\text{H}_2\text{O}\). The formula is new. J.L.J.

**Silicon**


Electron-microprobe analysis of the Yakutian silicon gave nearly pure Si: 99.73 wt%. The mineral forms 6-sided crystals up to nearly 0.1 mm long in moissanite. Isotropic, transparent, transmits a reddish brown color. The X-ray powder pattern includes lines (12 given) from both the silicon and the host moissanite-6\(H\); the following lines probably belong to Si: 3.134(100), 1.917(50), 1.644(10) \(\text{Å}\). The Fuxian silicon occurs as a thin iridescent film on crystal faces of moissanite; the silicon formed at oxygen fugacities lower than that of the Si-SiO\(_2\) buffer, and coevally with moissanite and diamond in the mantle.

**Discussion**. See the Discussion for moissanite and \(\beta\)-SiC. Silicon was reported in a fulgurite (Essene and Fisher, Science, 234, 189–193, 1986), and data for silicon from other localities were abstracted in *Am. Mineral.*, 76, p. 668, 1991. E.S.G.

**Discredited Minerals**

**Iridosmine, *osmiridium, *ruthenosmiridium, *platiniridium**


The consequence of the redefinition of the mineral names applicable to the Ru-Os-Ir ternary system (see osmium, etc.) is that *iridosmine, osmiridium*, and *ruthenosmiridium* are no longer valid. As well, *platiniridium* is merely platinian iridium. J.L.J.

**Erratum**

In the abstract for *kazakhstanite* (V. 76, p. 662), the formula should read \(\text{Fe}_4^+\cdot \text{V}_5^+\cdot \text{V}_1^2\cdot \text{O}_{30}^{2-}\cdot \text{OH}_8\cdot 8.55\text{H}_2\text{O}\).