NEW MINERAL NAMES*

MICHAEL FLEISCHER, LOUIS J. CABRI, ERNEST H. NICKEL AND ADOLF PABST

Argentocuproaurite


Microprobe analyses of two grains from Noril’sk and Talnakh, respectively, gave Au 67.7, 66.5; Cu 9.2, 11.2; Ag 12.8, 19.4; Pd 4.2, 2.2; Rh 4.3, –; Pb 1.6, –; Pt 0.9, –; Sn –, 0.5; totals 100.7, 99.8, with idealized formulae of Au,Cu,Ag,Rh,Pd and Au,Cu,Ag,Pd. The X-ray powder pattern (8 lines) was indexed as primitive cubic with a = 4.073(2)A. The mineral is light reddish-rose in reflected light, isotropic, with no observed birefringence. Reflectance at 580 mm : 64.3 percent. VHNuo = 214(211-216). Negative to standard etch agents, except for KCN and aqua regia.

Discussion

Compositionaly, the mineral is argentoo CuAu or cuproan argentoo gold. The mineral can be indexed as face-centered cubic (hence cuproan argentoo gold), except for the weakest peak in the pattern reported at 1.673A. Confirmation by single-crystal methods of this single weak extra reflection in the powder pattern is necessary to justify characterization as a new mineral species. The name is unnecessary. L.J.C.

Aurocuproite


Microprobe analyses of two grains gave Au 61.6, 64.5; Cu 28.4, 28.0; Ag 0.9, –; Pt 7.7, 6.9; Pt 2.3, –; Rh 1.9, –; Bi 0.6, –; totals 103.4, 99.4, with idealized formulae of Cu,Pd and Cu,Pd. The X-ray powder pattern (8 lines) was indexed as primitive cubic with a = 3.862(2)A. The mineral, found in ores of the Talnakh deposit, is light orange-yellow in reflected light, isotropic, with no observed birefringence. Reflectance at 580 nm = 63.1 percent. VHNuo = 199(189-206). Negative to standard etch reagents except for KCN and aqua regia.

Discussion

Compositionaly, the mineral is palladian AuCu or auroan palladian copper. The powder pattern may be indexed as face centered cubic (hence auroan palladian copper) except for the weakest reflection at 1.070A. Confirmation by single-crystal methods of this single extra weak reflection in the powder pattern is necessary to justify characterization as a new mineral species. The name is unnecessary. L.J.C.

* Minerals marked with an asterisk after the name were approved before publication by the Commission on New Minerals and Mineral Names, International Mineralogical Association.

Bracewellite,* grimaldiite,* guyanaite,* mcconnellite*


Merumite, supposedly CrO₃·H₂O [Am. Mineral., 34, 339 (1949)] is shown to consist of fine-grained intergrowths of eskolite (Cr₂O₃) (predominant) with 4 new minerals. It occurs as black rounded grains in alluvial gravels of the drainage basin of the Merum River, Guyana.

Guyanaite, CrO(OH) is orthorhombic, space group Pnmn, a 4.857, b 4.295, c 2.958A, Z = 2, G calc 4.53; synthetic material has closely agreeing unit cell dimensions. Analysis on 37 mg by B.L.L gave Cr₂O₃ 71.7, Al₂O₃ 4.0, Fe₂O₃ 4.4, MnO 0.9, TiO₂ 0.86, H₂O + 8.7, sum 90.7 percent. The strongest X-ray lines (21 given) are 3.224 (VS) (110), 2.432 (S) (200), 1.719 (MS) (211), 1.636 (S) (121), 1.609 (MS) (220), 1.516 (MS) (310). Color reddish-brown, golden-brown, greenish-brown, green (synthetic).

Bracewellite, also CrO(OH), is orthorhombic, space group Pbnm, a 4.492 ± 0.003, b 9.860 ± 0.005, c 2.974 ± 0.002A, Z = 4, G 4.45-4.48. It is isomorphous with goethite and diaspore. Analysis of a mixture containing 70 percent bracewellite, 30 percent eskolite gave Cr₂O₃ 70.6, Fe₂O₃ 15.1, Al₂O₃ 6.2, V₂O₅ 0.64, TiO₂ 0.17, H₂O 6.9, sum 99.6 percent. The strongest X-ray lines (14 given) are 4.065 (VS) (110), 2.648 (VS) (310), 2.404 (VS) (111). Color deep red to black, streak dark brown. The mineral has not been synthesized.

Grimaldiite, CrO(OH), and mcconnellite, CrOOCu, occur as intergrowths of tabular deep-red rhombohedral crystals up to 1 mm in size. Analysis of such an intergrowth (containing 80-86% grimaldiite) gave on 9.35 mg Cr₂O₃ 77.3, Al₂O₃ 34.3, Fe₂O₃ 0.85, CuO 5.5, SiO₂ 0.42, ignition loss 99.9 percent. X-ray study shows that both minerals are rhombohedral, space group R3m. Grimaldiite has a 2.973 ± 0.002, c 13.392 ± 0.01A, mcconnellite has a 2.983 ± 0.004, c 17.160 ± 0.031A. The strongest lines for grimaldiite (14 given) are 4.47 (VS) (003), 2.401 (VS) (012), 1.857 (VS) (015), 1.486 (MS) (009); for mcconnellite, the strongest lines (14 given) are 2.860 (006), 2.474 (012), 2.213 (104), 1.650 (018), 1.492 (110). These both agree with data in the literature on synthetic CrO(OH) and CrOOCu.

Synthetic grimaldiite has been reported in the literature to have a 2.155, c 1.975, G 4.11, 4.12. Optical properties were not measured for mcconnellite; it has G meas (synthetic) 5.49, calc 5.61.

Guyanaite is named for the locality, bracewellite for Smith Bracewell, formerly director, British Guiana Geological Survey, who first described merumite, mcconnellite for Dr. R. B. McConnell, former director, British Guiana Geological Survey, grimaldiite for Dr. Frank S. Grimaldi, former chief chemist, U.S. Geological Survey. Type material is at the Smithsonian Institution, Washington, D.C. M.F.
Kankite* 
F. Cech, J. Jansa and F. Novak (1976) Kankite, Fe\textsubscript{2}As\textsubscript{5}O\textsubscript{12} \cdot 3\textsubscript{1/2}H\textsubscript{2}O, a new mineral. Neues Jahrb. Mineral. Monatsh., 426-436.

Analysis by M. Mrazek gave As\textsubscript{2}O\textsubscript{3} 43.92, SO\textsubscript{3} 0.44, Fe\textsubscript{2}O\textsubscript{3} 31.84, CuO 0.02, H\textsubscript{2}O + 13.91, H\textsubscript{2}O - 9.91, insol. 0.36, sum 100.40 percent (given as 100.46), corresponding to 2Fe\textsubscript{2}As\textsubscript{5}O\textsubscript{12} \cdot 6.74H\textsubscript{2}O. Spectrographic analysis showed traces of N, B, Cu, Mg, Mn, Ti, and Zn. The DTA curve shows 2 endothermic peaks at 190 and 290° and an exothermic peak at 605°. The loss in weight is 9.0 percent at 200°, 23.81 percent at 500°.

The infrared absorption spectrum is given. The mineral is insoluble in water, but dissolves readily in 10 percent HCl.

X-ray powder data (51 lines) are given; the strongest are 12.8 (100)(100), 7.56 (25)(001), 7.22 (21)(101), 6.97 (16)(011), 4.764 (34)(311), 4.258 (25)(140), 3.697 (228)(421), 2.630 (29)(631), 2.553 (22)(550, 631), 2.520 (21)(013). These are indexed on a monoclinic cell with a 18.803, b 17.490, c 7.633A, 0 92.71°, Z = 16.

The mineral forms yellowish-green botryoidal coatings and crusts several tenths mm to 7 mm thick. Luster dull. H 2-2 1/2, C calc 2.732, meas 2.70 (pycnometer).

The mineral is clear sky-blue. It occurs as aggregates of slender fibrous crystals less than 0.2 mm long, 0.006 mm wide. Optically biaxial, negative 2V 99°, elongation positive, pleochroic, X colorless to pale blue, Y very light greenish-blue, Z pale sky-blue to very light blue. The infrared absorption spectrum is given. Type I occurs as veins cutting massive serpentinite; it is associated with chrysotile and magnetite, rarely with brochantite and malachite. Type 2 occurs along fractures in sheared serpentine, associated with chrysotile, magnetite, arfite, and pyroaurite.

The name is for the locality. M.F.

Masutomilite* 

Analyses of masutomilite gave SiO\textsubscript{2} 46.85, 47.67, Al\textsubscript{2}O\textsubscript{3} 19.81, 22.17, TiO\textsubscript{2} 0.13, 0.09, Fe\textsubscript{2}O\textsubscript{3} 0.38, 0.35, FeO 1.53, 1.12, MnO 8.12, 4.27, MgO 0.00, 0.02, Li2O 4.45, 5.78, CaO 0.00, 0.08, Na\textsubscript{2}O 0.54, 0.61; K\textsubscript{2}O 9.88, 9.78; Rb\textsubscript{2}O 1.54, 1.20; F 7.04, 6.84; H\textsubscript{2}O + 1.27, 1.95; H\textsubscript{2}O - 1.36, 0.45; sum 102.90, 102.38 - (O : F) 296, 304.

X-ray powder data (34 lines) are given for Type I and Type II crystals. For Type I the strongest lines (those marked * may be in part chrysotile): 7.314*(100)(200); 7.081*(14)(102); 4.840(14)(300); 3.936(14)(222,023,312), 3.652*(20)(400); 3.552(13)(401), 2.397(14)(243); 2.367(16)(504); 2.332 (14)(602); 1.915 (16)(713); For type II, 7.823(12)(111); 7.308**(100)(200); 4.827(12)(121); 3.929(14)(301); 3.654**(26)(310,122); 2.365 (10)(026). These are indexed by A. Kato on an orthorhombic cell, with a 14.585, b 11.47, c 16.22A., Z = 2, G (calc) 2.35, (meas) (rotation in Cerlic solution) 2.39 ± 0.02.

The mineral is clear sky-blue. It occurs as aggregates of slender to fibrous crystals less than 0.2 mm long, 0.006 mm wide. Optically biaxial, negative 2V 65°(calc), α (Na) 1.585, β 1.604, γ 1.612, elongation positive, pleochroic, X colorless, Y very light greenish-blue, Z pale sky-blue to very light blue. The infrared absorption spectrum is given. Type I occurs as veins cutting massive serpentine; it is associated with chrysotile and magnetite, rarely with brochantite and malachite. Type 2 occurs along fractures in sheared serpentine, associated with chrysotile, magnetite, arfite, and pyroaurite.

The name is for the locality. M.F.

Petrovicite* 

Microprobe analyses by E. Joseph and R. Giraud, using Cu, HgS, PbS, Bi, and Se as standards, gave Cu 16.0, 15.3; Hg 17.4,
The color under crossed nics varies from bright to very weak, changes from yellowish to dark gray, and sometimes has reddish-brown tints. Reflectance measurements with a pyrite standard for sample No. 2 gave: 460 nm, 46.0, 49.6; 480 nm, 46.9; 500 nm, 46.2, 66.0; 540 nm, 50.0, 57.1; 580 nm, 50.2; 620 nm, 64.0, 68.5; 660 nm, 64.7, 71.6; 700 nm, 72.4, 76.4; 750 nm, 76.2, 80.5. Values are also given for sample No. 2: 460 nm, 46.0, 49.6; 480 nm, 46.9, 50.5; 500 nm, 46.2, 66.0; 540 nm, 50.0, 57.1; 580 nm, 50.2; 620 nm, 64.0, 68.5; 660 nm, 64.7, 71.6; 700 nm, 72.4, 76.4; 750 nm, 76.2, 80.5. The mineral tarnishes brown a few days after polishing. Microhardness 102 kg/sq.mm (-3 Mohs). Cleavage poor, parallel to flattening of crystals.

The mineral forms tabular crystals up to a few tenths mm in size in hydrothermal dolomite-calcare veins of the Petrovice deposit, western Moravia, Czechoslovakia. It is almost completely replaced by umangite and eskebornite; 12 other selenides occur in the deposit.

The name is for the deposit. Type material (2 polished sections) are in the Ecole Natl. Superieure des Mines, Paris. M.F.

**Rozhkovite = palladian cuproauride**


Microprobe analyses of five grains gave a range in composition (average) for Au 60.8-65.6(61.8); Cu 23.0-28.4(24.9); Pd 7.1-8.6(7.6); Rh 1.9-3.4(2.5); Pt 0.0-2.3(1.9); Ag 0.6-0.9(0.7); and Bi 0.6-0.8(0.6). Another sample (No.2) gave Au 65.6, Pd 7.1, Rh 3.4, Ag 0.6, Bi 0.6, Ni 0.15, Cu 23.0, total 100.45, which the authors calculated on 5 atoms to (Cu24.6Pd0.6Rh0.2Pt0.0Ag0.0Ni0.00.5Cu0.01Cu0.02Cu0.01). X-ray powder data (24 lines) were indexed as orthorhombic, with polarization colors dark green to violet. The mineral has a pale rose color with lilac or red tints. Reflectances are given at 15 wavelengths: 450 nm, 46.0, 49.6; 480 nm, 46.9, 50.5; 500 nm, 46.2, 66.0; 540 nm, 50.0, 57.1; 580 nm, 50.2; 620 nm, 64.0, 68.5; 660 nm, 64.7, 71.6; 700 nm, 72.4, 76.4; 750 nm, 76.2, 80.5. Values are also given up to 1100 nm. Microindentation hardness gave VHN60 = 204.6(195.4-213.8), VHN100 = 188.9(173.6-204.6), VHN1000 = 198.2(195.8-200.6), VHN200 = 183.4(180.5-186.3) for No. 35; and VHN1000 = 163.3(159.7-165.8), VHN200 = 178.7(161.0-199.2) for No. 27. The mineral is negative to standard etching reagents, except for KCN and sometimes with aqua regia (after 1 min).

Samples of the mineral are preserved in the Mineralogical Museum, Academy of Sciences, Moscow, USSR.

**Discussion**

The authors refer to the work of Johansson and Linde (1936, Ann. Physik., 25, 1-48) for comparison with a presumed CuAu2 synthetic phase. Hansen and Anderk (1958, Constitution of Binary Alloys, p. 199), however, state that Johansson and Linde were unable to find any clear indication of CuAu2 as a distinct phase by X-ray investigations. Hansen and Anderk further state that recent investigations by several other authors, using either X-rays, resistivity, emf, or combinations, found no support for the existence of CuAu2 as a separate phase. In view of the lack of single-crystal data for this mineral, its indexing must be considered tentative, but if any likeness to synthetic phases is to be made, it must rather be to CuAu2. It can be also demonstrated that the one complete analysis given may be recalculated on the basis of 2 atoms to give (Cu,Rh,Ni,Bi,Ag),447 (Au,Pd),495 or, simply CuAu.


The mineral described as palladian cuproauride by Razin et al. (1971) is now referred to as rozhkovite with a footnote that the name rozhkovite was considered and recommended by the Commission on New Minerals and Mineral Names, I.M.A., in May 1970.

**Discussion**

The uncertainties regarding the ideal composition of palladian cuproauride and the indexing of its powder pattern apply equally to rozhkovite. The unexplained appearance of this second name four years later has created an unfortunate and confusing precedent. Though the text and Table 2 show the mineral to be orthorhombic, tetragonal cell parameters are given in Table 3. Both names are unnecessary pending reexamination and better data for characterization as a unique mineral species. L.J.C.

**Senegalite**


Microprobe analysis by E. Joseph gave P2O5 31.83, Al2O3 46.23, Fe2O3 0.28, H2O 21.00, sum 99.93 percent, (H2O by thermal analysis), corresponding closely to the formula above. The DTA curve shows small endothermic breaks at 250° and 370° and a very large one at 440°. The final product of dehydration gave the X-ray pattern of AIPO4 (tridymite type). The infrared spectrum shows small endothermic breaks at 1120° and 2.91: 1.08: 1.01: 4.99.

**NEW MINERAL NAMES**


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X-ray study (Weissenberg and rotation) showed the mineral to be orthorhombic, Pnal21, a 9.678, b 7.597, c 7.668 (all ± 0.002 A). Z = 4, G(calc) 2.551, (meas) 2.552 ± 0.007. Goniometric data are in close agreement. Forms present a [100], c [001], b [010], m [110], l [210], h [011], e [302], p [111]. The strongest x-ray lines (42 given)
are 5.41 (7)(011), 4.089 (9)(201), 3.834(10)(002), 3.610(8)(211), 2.990 (9)(220), 2.348 (8)(113, 312), 2.070 (7)(1)(123), 1.505 (7)(143, 342, 404). Crystals are colorless to pale yellow, luster vitreous. H.5.5. Cleavage (100) imperfect, observed only under the microscope. Not fluorescent. Optically biaxial, positive, \( \alpha = 1.562, \beta = 1.566, \gamma = 1.587 \) (all \( \pm 0.002 \)), 2\( V \) 53 ± 4° (meas), 48° (calc), dispersion \( r > v \), weak. \( \omega = a, \gamma = c. \)

The mineral occurs in the zone of oxidation, Kourondicko iron ore deposit, Senegal, associated with turquoise, augelite, wavellite, rescent. Optically biaxial, positive, \( r_s (Na) a 1.562,0 1.566, t \) weak..Z=a.Y:c.

Nobuhide Murakami, Toshio Kato, Yasunori Miura and Fumi-}

<table>
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<th>Unnamed (Cu,Ni,Fe,Co)(_2)S(_4)</th>
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A pale gray-white, optically isotropic mineral enclosed in and scattered along the margins of granoblastic secondary pyrite-marcasite masses occurs in disseminated sulfide ore. Electron probe analyses of a homogeneous grain showed that Cu > Ni > Fe > Co with a stoichiometry very near \( \text{(Cu, Ni, Fe, Co)}_2\text{S}_4\). 

Discussion
May be a new mineral. X-ray data and quantitative probe data are required. L.J.C.

<table>
<thead>
<tr>
<th>Unnamed hydrous magnesium carbonate</th>
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<tr>
<td>Jujin Suzuki and Mashahiro Ito (1973) A new magnesium carbonate hydrate mineral, ( \text{Mg}_6(\text{CO}_3\text{O})_3(\text{OH})_8\cdot 8\text{H}_2\text{O} ), from Yoshikawa, Aichi Prefecture, Japan. J. Japan Assoc. Mineral. Petrol. Econ. Geol., 68, 353–361.</td>
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</table>

Analysis of material containing chrysotile gave \( \text{SiO}_2 5.01, \text{MgO} 38.38, \text{CaO} 0.12, \text{FeO} 0.21, \text{CO}_2 28.93, \text{H}_2\text{O} + 20.90 \text{H}_2\text{O} = 6.39, \) sum 99.94 percent. After subtracting \( \text{SiO}_2 \) as chrysotile, the analysis gives \( \text{MgO} : \text{CO}_2 : \text{H}_2\text{O} = 5.09 : 4.04 : 8.81 \), corresponding to the formula above (a hydromagnesite + 4H\(_2\)O). The mineral is slightly soluble in water. The DTA curve gives endothermic breaks at 40°, 114°, 270°, 410°, and 515° and exothermic breaks at 495°, 637° (chrysotile), and 808° (chrysotile). The DTA pattern above 150° is like that of hydromagnesite. The infrared absorption spectrum is similar to that of hydromagnesite. The X-ray powder pattern of the mineral has strongest lines (44 given) 33.2 (62), 16.36 (33), 10.82 (55), 6.454 (55) (plus nesquehonite), 5.887 (100), 4.206 (38), 2.933 (57). After being heated to 150°, the mineral gives an X-ray pattern close to that of hydromagnesite. The mineral occurs as snow-white to gray oolithic, botryoidal, or reniform aggregates. Scanning electron microscope photographs show that it consists of aggregates of flaky crystals.

Under the microscope, very fine-grained, colorless, \( \alpha 1.515, \beta 1.521, \gamma 1.522, 2V^\prime = 44.5^\circ \), extinction nearly parallel, elongation positive.

Discussion.
Not certainly distinct from dypingite [55, 1457–1465 (1970)]; the latter is however optically biaxial positive. It occurs on the weathered surface of a brucite-bearing serpentinite mass. Associated minerals are chrysotile, nesquehonite, brugnatellite, pyroaurite, artinite, and hydromagnesite. M.F.

<table>
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<tr>
<th>Unnamed dimorph of lazurite</th>
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A sample from the lazurite deposits of Cis-Baikal has \( \alpha 1.503, \beta 1.510, \gamma 1.514, \) biaxial positive, 2\( V \) 62° (Note—the \( \alpha \) correspond to a negative mineral, M.F.). Color, pale green to dark blue; deeply
Unnamed lead-bismuth tellurides


Quartz veins in Archean granitic rocks contain pyrrhotite and other sulfides, with small amounts of gold, hessite, altaite, tellurobismuthite, and tetradymite, and 4 minerals:

Electron microprobe analyses gave:

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<tr>
<th></th>
<th>Ag</th>
<th>Pb</th>
<th>Bi</th>
<th>Te</th>
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<th>Sum</th>
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<tbody>
<tr>
<td>A</td>
<td>1.2</td>
<td>13.0</td>
<td>40.2</td>
<td>44.9</td>
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<td>99.3</td>
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<tr>
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<td>1.3</td>
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<td>43.0</td>
<td>-</td>
<td>97.9</td>
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<tr>
<td>C</td>
<td>-</td>
<td>10.7</td>
<td>52.2</td>
<td>30.9</td>
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<td>99.3</td>
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<tr>
<td>D</td>
<td>-</td>
<td>20.3</td>
<td>46.0</td>
<td>27.3</td>
<td>6.3</td>
<td>99.9</td>
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</table>

These correspond respectively to the formulas: \((\text{Ag}_{0.85}\text{Pb}_{0.15}\text{Bi}_{0.85})\text{Te}_{1.26}\) (\((\text{Ag}_{0.85}\text{Pb}_{0.15}\text{Bi}_{0.85})\text{Te}_{1.26}\)), \((\text{Pb}_{0.85}\text{Bi}_{0.15})\text{Te}_{1.26}\text{S}_{1.75}\)), and \((\text{Pb}_{0.85}\text{Bi}_{0.15})\text{Te}_{1.26}\text{S}_{1.75}\)). Reflectances are given for Minerals A, B, and D.

X-ray powder data for Minerals A and D.

Mineral A is similar in optical properties to tellurobismuthite, but the reflectance is lower (57-65%). It has a pale cream tint. Cleavage \(\{001\}\) perfect, microhardness 65-80, av. 75 kg/sq mm. The strongest lines of the pattern (22 given) are 3.21 (10), 2.35 (5), 2.21 (3); the data resemble those published for synthetic PbBiTe. Mineral B was found as a grain 0.1 mm., bordering mineral A. It resembles mineral A in appearance and optics, but has a slightly lower reflectance. Mineral C occurs as veinlets 0.05 mm wide, associated with gold and tellurobismuthite. It has a light gray color, with a slightly greenish tint. Mineral D is light gray with small amounts of gold, hessite, altaite, tellurobismuthite, and tetradymite, and 4 minerals:

Discussion

Data insufficient as to composition and symmetry; X-ray powder data are not given. M.F.

Unnamed palladium telluride


An unnamed cream-colored, weakly anisotropic mineral of composition \(\text{PdTe}_{1.26}\) occurs as discrete grains intergrown with bismuthian merenskyite.

Discussion

Insufficient data on the unnamed mineral and the bismuthian merenskyite. L.J.C.

Unnamed nickel-bismuth telluride


A mineral that optically resembles melonite in the Hitura deposit, Finland, was analyzed with the electron probe: Ni 20.1, Pd 1.1, Te 61.6, Bi 16.1, Sb 0.5; total 99.4 percent, corresponding to \((\text{Ni}_{30.6}\text{Pd}_{0.5})\text{Te}_{1.26}\text{Bi}_{1.26}\text{Sb}_{0.5})\). Reflectance 48.5-53 percent, and it differs in color, with a slight greenish tint. Mineral D is light gray with small amounts of gold, hessite, altaite, tellurobismuthite, and tetradymite, and 4 minerals:

Electron microprobe analyses gave:

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<tr>
<th></th>
<th>Ag</th>
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<tbody>
<tr>
<td>A</td>
<td>1.3</td>
<td>20.5</td>
<td>33.1</td>
<td>43.0</td>
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<td>97.9</td>
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<tr>
<td>B</td>
<td>1.7</td>
<td>52.2</td>
<td>30.9</td>
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<td>-</td>
<td>99.9</td>
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These correspond respectively to the formulas: \((\text{Ag}_{0.33}\text{Pb}_{0.67}\text{Bi}_{0.85})\text{Te}_{1.26}\) (\((\text{Ag}_{0.33}\text{Pb}_{0.67}\text{Bi}_{0.85})\text{Te}_{1.26}\)), \((\text{Pb}_{0.67}\text{Bi}_{0.33})\text{Te}_{1.26}\text{S}_{1.75}\)), and \((\text{Pb}_{0.67}\text{Bi}_{0.33})\text{Te}_{1.26}\text{S}_{1.75}\)). Reflectances are given for Minerals A, B, and D.

X-ray powder data for Minerals A and D.

Mineral A is similar in optical properties to tellurobismuthite, but the reflectance is lower (57-65%). It has a pale cream tint. Cleavage \(\{001\}\) perfect, microhardness 65-80, av. 75 kg/sq mm. The strongest lines of the pattern (22 given) are 3.21 (10), 2.35 (5), 2.21 (3); the data resemble those published for synthetic PbBiTe. Mineral B was found as a grain 0.1 mm., bordering mineral A. It resembles mineral A in appearance and optics, but has a slightly lower reflectance. Mineral C occurs as veinlets 0.05 mm wide, associated with gold and tellurobismuthite. It has a light gray color, with a slight greenish tint. Mineral D is light gray with small amounts of gold, hessite, altaite, tellurobismuthite, and tetradymite, and 4 minerals:

Discussion

Data insufficient as to composition and symmetry; X-ray powder data are not given. M.F.

Unnamed Pd-Bi-Te mineral


A light coffee-brown, extremely anisotropic Pd-Bi-Te mineral with stoichiometry has not been determined occurs as thin rims replacing michenerite in weakly oxidized ore. L.J.C.

Unnamed Pd\(_4\) (Te,Bi,Sb)\(_2\)


The unnamed Pd\(_4\)(Te,Bi,Sb)\(_2\) mineral contains tiny inclusions of a slightly darker, peach-buff-colored mineral with a composition reported to conform exactly to Pd\(_4\)(Te,Bi,Sb)\(_2\) stoichiometry.

Discussion

No X-ray or analytical data are given. L.J.C.

Unnamed Pd(Te,Bi,Sb)


Three grains found as small inclusions in samples from the old Vermilion and the Creighton mine, Sudbury, Ontario. The mineral is pinkish cream in reflected light (air). No reflection pleochroism, but weakly anisotropic. Reflectance $R'_{\text{g}}$ and $R'_{\text{p}} = 53.1$, $52.7$ (470 nm), $58.1$, $57.0$ (546 nm), $61.3$, $60.4$ (589 nm), $64.8$, $64.7$ (650 nm). Electron-probe analyses of these grains gave: Pd 40.3, 42.3, 37.4; Bi 3.8, 4.0, 5.0; totals 99.4 percent corresponding to Pd$_{1.0}$(Bi$_{0.5}$Te$_{0.4}$Sb$_{0.3}$)$_{1.0}$, the combination of sulfoantimonites of lead and silver. No reflection pleochroism, which is pinkish cream in reflected light (air). No reflection pleochroism, Verrilion and the Creighton mine, Sudbury, Ontario. The mineral is white, estimated to have 60 percent reflectance and strongly anisotropic. Probe analysis gave: Pd 31.6, Te 19.0, Bi 39.0, Sb 3.8, Cu 10.3, 2.8; $R_{\text{g}} = 53.1$, $52.7$ (470 nm), $63.1$, $62.0$ (546 nm), $66.8$, $66.7$ (589 nm), $70.3$, $70.2$ (650 nm).

Discussion

These four analyses plot within the PdSb (sudburyite, hexagonal)—PdTe (kotulskite, hexagonal)—PdBi (polarine, orthorhombic) composition triangle. Synthesis experiments reported by Cabri and Lafllamme indicate a wide solid-solution field (hexagonal NiAs-type) and a restricted field of orthorhombic symmetry. Any proposed nomenclature for minerals with compositions in the hexagonal solid-solution field, other than at the PdSb and PdTe corners, will have to take account of the phase relations in the PdSb–PdBi–PdTe system. L.J.C.

Unnamed rhodium sulfide


Small (<20 µm) inclusions occur in platinum-group element alloy grains, especially in isoferronplatinum. Electron probe analyses gave: Rh 65.7, 54.9, 71.7, 33.7, 53.2, 35.2; Pt 3.0, 13.3, 2.5, 10.0, 11.2, 19.3; Ru 8.5, 4.5, 3.8, 27.0, 5.6, 3.2; Ir <0.1, <0.1, <0.1, <0.1, <0.1, 11.1, 11.1; Os <0.1, <0.1, <0.1, <0.1, <0.1, 11.1, 11.1; Fe <0.1, 1.8, <0.1, 1.1, 3.1, 1.8; Sb 19.3, 18.7, 18.5, 27.5, 19.5, 22.0; As <0.1, <0.1, <0.1, 2.9; totals 101.2, 93.7, 96.7, 99.5, 93.0, 98.9 percent. These correspond to approximately $\text{RhS}$ near to the formula $\text{RhS}$. In the absence of X-ray data, the proposals are not acceptable, especially for the "brongniardite," for which material from the type locality was not examined. M.F.

Ceruleite


Ceruleite (coeruleite) was described by Dufet (1900) (Dana's System, 7th Ed., vol. 2, p. 927). The present study was made on samples from southern Bolivia (exact locality unknown); their identity with type material (British Museum of Natural History) was proved by X-ray study.

Chemical analysis of 7 samples (range and average) CuO 10.74–12.31, 11.79; Al$_2$O$_3$ 26.12–27.52, 26.85; Fe$_2$O$_3$ 0.11 in 1, not determined in others; As$_2$O$_3$ 36.61–40.63, 38.01; P$_2$O$_5$ traces; $\text{H}_2\text{O}$ 22.18–23.75, 23.24; sum 99.51–100.35 percent, the average corresponding to the ratio CuO:Al$_2$O$_3$:As$_2$O$_3$:H$_2$O = 1.79:3.18:2::15:6. The formula proposed is $\text{Cu}_2\text{Al}_2(\text{OH})_6(\text{AsO}_4)_2$.11$\text{H}_2\text{O}$. X-ray patterns of heated ceruleite show no change up to 230°, at 250° (14.7% loss in weight) a new phase is formed, as also shown by the infrared spectrum. At 290° the material turns green and becomes amorphous, The DTA curve shows a sharp endothermic effect at 365°. The mineral is insoluble in water, but soluble in HCl, HNO$_3$, or KOH.

X-ray powder data are given; the strongest lines (40 given) are 7.696(5402), 7.926(57011), 7.650(100111), 8.487(50211), 6.632(100211), 6.545(30321), 6.375(30231), 2.894(50332), 2.650(60402). These are indexed on a triclinic unit cell, a 14.359

New Data

Brongniardite, ramdohrite


New microprobe analyses are given of "brongniardite," ramdohrite, andorite, and fizejite, mostly on samples from various museum collections. Analysis of material from the Ust-Teremlov deposit. Transbaikal, gave Pb 25.2, Ag 26.8, Sb 31.8, I$\text{S}$. 18.0, sum 101.8 percent, corresponding to Ag$_2$Pb$_2$Sb$_2$, near to the formula of the discredited mineral brongniardite, which is therefore considered to be reestablished.

Material labelled ramdohrite from the type locality, Potosi, Bolivia, was found to be a mixture of two phases, one with the composition of andorite, the other containing Ag$_9$9.6, Pb 35.7, Sb 36.1, I$_S$. 19.4, sum 100.8 percent, corresponding to Ag$_2$Pb$_2$Sb$_2$, or Ag$_2$Pb$_2$Sb$_2$. It is suggested that the name ramdohrite be transferred to this compound.

Discussion

This is probably a new sulfarsenide of the platinum group with RuAsS as end member. X-ray data are required. L.J.C.

Unnamed ruthenium sulfarsenide


Electron probe analyses of hollingworthite from Witwatersrand gold mines revealed two grains with Ru > Rh. Analyses are: Pt 10.3, 2.8; Ir 7.5, 0.4; Rh 15.1, 20.3; Ru 20.4, 27.4; As 38.1, 29.6; Cu <0.1, <0.1; Ni <0.1, 6.4; Fe 0.8, 1.7; S 7.8, 13.7; totals 100.0, 102.3 corresponding to (PGE + Cu, Ni, Fe)$_{15}$As$_{34}$Sb$_{42}$S$_{69}$, and (PGE + Cu, Ni, Fe)$_{15}$As$_{34}$Sb$_{42}$S$_{69}$. Grains are too small for X-ray diffraction but are considered to represent varieties of a mineral with ideal RuAsS composition for the end member.
A. M. Portnov and G. A. Sidorenko (1975) New data on ortho-
lavette (Nickel et al., 1958), a mineral belonging to the same group as
little new data Using the chemical analysis reported by Port-
crystal” X-ray diffraction pattern, as had been reported for nioca-
try of lavenite, was not established beyond doubt. The mineral was
probe analysis is reported for material from Auchinstarry pre-
are now recorded in the powder pattern of julgoldite in the interval
A. Livingstone (1976) Julgoldite, new data and occurrences; a
mineral, as opposed to the monoclinic symmetry of lavenite, was not established beyond doubt. The mineral was
reported to be polysynthetically twinned, and such a twinned crys-
tal, if monoclinic, could give an apparently orthorhombic “single-
crystal” X-ray diffraction pattern, as had been reported for niocalite (Nickel et al., 1958), a mineral belonging to the same group as lavenite.

In their new submission, Portnov and Sidorenko provide little new data. Using the chemical analysis reported by Port-
nov et al. (1966), they propose the generalized formula
\[ \text{Na}_3\text{Ca}_2\text{Zr}_4(\text{Si}_3\text{O}_9)(\text{F},\text{OH})_6 \]
for their mineral, as contrasted with the
lavenite formula, \((\text{Na},\text{Ca},\text{Mn})_3\text{Zr}_4(\text{Si}_3\text{O}_9)(\text{O},\text{F},\text{OH})_6\). However, their proposed formula is not electrostatically balanced, and their detailed empirical formula departs even further from electrostatic neutrality.

The x-ray powder diffraction data have been re-done, giving a pattern with the following strongest lines: 2.960 (10X402), 2.881 (7X710), 1.791 (7X832), 1.680 (7X224, 060), 2.242 (6X622), and 1.820 (6X840), which are substantially different from those reported in the earlier publication. The pattern has been indexed on an orthorhombic unit cell with \(a = 20.97, b = 10.10, c = 7.21 \AA\). An IR spectrum shows an absence of the splitting of the main bands exhibited by lavenite and titanio-lavenite.

Discussion
For some inexplicable reason, Portnov and Simonov do not give the space group of their orthorhombic cell. Also, they do not indicate how they overcame the problem (if, indeed, they did) of the polysynthetic twinning. They stress that the \(d\) values calculated from their orthorhombic cell give better agreement with the measured values than do the \(d\) values calculated from the monoclinic lavenite cell. However, equally good agreement is obtained if one employs a monoclinic unit-cell transformed directly from their orthorhombic parameters according to \(a = 1/2[011], b = [010], c = [001]\), giving \(a = 11.09, b = 10.10, c = 7.21 \AA, \beta = 108.97^\circ\). The IR spectrum, itself, is not conclusive in distinguishing between an orthorhombic and monoclinic unit cell, since the absorption peaks are a function of site symmetry rather than cell symmetry. In conclusion, this reviewer feels that the evidence favoring the existence of an orthorhombic polymorph of lavenite has not been appreciably strengthened by this latest report. E.H.N.
Many samples were studied of dripstones from Zlata Hory (formerly Zuckmantel), Czechoslovakia, the type locality (Dana's System, 7th Ed., vol. 2, p. 587-588). Five complete analyses are given; they show Fe₂O₃ 61.2-66.7, SO₃ 8.15-11.45, H₂O—8.43-12.79, H₂O+12.42-16.96 percent. DTA curves show a small endothermic peak at 260-280° (loss of H₂O), a sharp exothermic maximum at 550° (recrystallization), and a large endothermic peak at 700° (loss of SO₃). Some samples are isotropic with n(Na) 1.730-1.736; some are partly anisotropic. G 2.47-2.51. Infrared data are given. X-ray study showed no measurable lines. After being heated at 250°, samples gave lines at 6.3, 3.28, 2.467A., indicating lepidocrocite. Samples heated at 350° gave the pattern of maghemite, those heated above 500° the pattern of hematite.

Glockerite is therefore, a cryptocrystalline variety of lepidocrocite with SO₃ and H₂O. M.F.