NEW MINERAL NAMES*

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GEORGE Y. CHAO, AND LOUIS J. CABRI

Baumite*


Analysis by J. I. gave SiO2 33.5, Al2O3 6.60, Fe2O3 1.65, FeO 9.80, MgO 17.1, ZnO 6.65, CuO 0.03, MnO 12.3, CaO 0.07, Na2O 0.02, K2O 0.08, H2O-(140°) 0.2, H2O+(14°) 11.9, sum 99.90 percent, corresponding to the formula

(Mg8.6,Mn2.5,Fe1.7,Zn1.9,Al3.0)2+[Fe1.0,Al1.2]O6(OH)8.

X-ray powder data are given (Fe radiation). The strongest lines of 7 given are 7.23 10 001; 3.590 6 002; 2.510 3 201; hence the mineral is a member of the septime chlorite group. When heated at 500° for 1 hour, the mineral gave a weak, diffuse pattern, when heated at 600° gave no pattern.

Color dull black. Found in masses up to a foot in size on the dump of the Buckwheat open pit; it contains angular fragments of 

white pulverulent coating or as a cream-colored stain. Other, rarer.


The mineral occurs in granite pegmatite at the abandoned Evans-Lou feldspar mine, in the province of Quebec. The mine is about 22 miles north of Ottawa. Caysichite lines cavities as a dull white pulverulent coating or as a cream-colored stain. Other, rarer, occurrences are as thin incrustations with a parallel to slightly divergent columnar structure with a reniform surface; as radiating groups and terminated crystals; and as stalactites up to one cm long. Most of the following data apply to colorless crusts. The mineral is white with a yellow tint. Anisotropic. Reflectance Rg = 46.7(400nm) 50.9 (500nm), 56.5 (530nm), 57.7 (590nm), 55.8% (650nm). VHN = 92-205 kg/mm².

Both minerals occur in a Cu-Ni sulde deposit in fine-grained metagabbro and amphibolite in China (details on locality not given). The metallic minerals in the deposit are mainly pyrite, chalcopyrite, magnetite, and millerite. Other platinum group minerals present are michenerite, moncheite, and merenskyite.

The names are apparently derived from composition, according to the authors' proposed classification scheme based on P:Pt ratio: biteplatinite, >4:1; moncheite, 4:1-1:1; biteplapalladite, 1:1-1:4; and merenskyite, <1:4.

Discussion. Unnecessary names for intermediate members of the moncheite-merenskyite group. It is regrettable that the authors do not follow the generally accepted approach in dealing with a two-end-member solid solution series. GYC, LJC.

Biteplatinite and Biteplapalladite ( = Moncheite-Merenskyite Series)


Biteplatinite

Electron microprobe analyses gave: Pt 39.2, Pd 1.2, Te 58.1, Bi 6.0, sum 104.5 percent, corresponding to (Pt14.0,Pd6.6)(Te15.0,Bi23.0).

White with a strong metallic luster. Mineral grains are irregular to tabular (0.09×0.18-0.11×0.165 mm). Anisotropic, white under reflected light. Reflectance Rg = 56.1 (green), 57.8 (orange), 58.1% (red), VHN = 120-170 kg/mm², corresponding to 2.5-3.5 on Moh's scale.

Biteplapalladite

Electron microprobe analyses gave (range): Pt 7.0-18.2, Pd 10.9-18.6, Ni 1.1-2.1, Te 50.7-58.8, Bi 12.0-20.0, sum 95.2-102.7 percent, corresponding to (Pd6.41-2.07,Pt14.18-2.00)(Te0.38-0.24,Bi0.20-0.33) (Te1.02-1.18,Bi0.48-0.53).

The mineral is hexagonal with a = 4.005(5), c = 5.244(8)Å for (Pd6.41,Pt14.18)Ni0.005(Te1.02,Bi0.48) and a = 4.036, c = 5.259 Å for (Pd6.41,Pt14.18)Ni0.11(Te1.02,Bi0.33). The powder pattern is similar to that of merenskyite with strongest lines (22 given, including β-lines and s lines without indices): 5.22 6 001, 2.90 10 101, 2.09 6 102, 2.01 5 110, 1.560 5 103.

Under the binoculars, the mineral is white to bright white with strong metallic luster. Mineral grains are semi-rounded, prismatic, and hexagonal tabular (0.11×0.11 mm). Under reflected light, the mineral is white with a yellow tint. Anisotropic. Reflectance Rg = 46.7(400nm) 50.9 (500nm), 56.5 (530nm), 57.7 (590nm), 55.8% (650nm), VHN = 92-205 kg/mm².

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Bazirite


A preliminary report. Aegirine-riebeckite granite from Rockall Island (between Iceland and the British Isles) was reported by Sahine in 1960 to contain a colorless mineral containing Ba, Zr, and Si. Probe analysis (av. of 19) by Mrs. A. E. Tresham gave SiO, 28.32, 27.20; HfO, 69.78, 72.52; ZrO, 3.28, 1.21, sum 101.38, 100.93 percent, corresponding to ratios 100 Hf = 92.6, 97.2, calc 6.32, 6.48. Crystals were zoned, with highest Hf contents at the outer edges. Other samples gave ratios 33-78. Plots of the unit cell sizes show both a and c to decrease nearly linearly and d to increase with increasing ratio. End-members are calculated to have the following parameters.

$$\begin{align*}
\text{ZrSiO}_4 & \\
\text{HfSiO}_4 & \\
\text{a}_0 & = 6.63, \\
\text{c}_0 & = 6.02, \\
\text{d} & = 4.59,
\end{align*}$$

Crystal data associated with cookeite and cleavelandite. The name is for the composition.

Discussion

X-ray powder data and optical data would be helpful, M.F.

Jagowerite*


Analysis, recalculated after deducting admixed quartz, gave P,O, 31.41, Al,O, 25.87, Fe,O, 0.26, BaO 38.41, H,O* 4.09, S 0.15, sum 100.19 percent, corresponding to the formula Ba,Al_{12-15}Fe_{0.5-1_{10}}SiO_{30},al(OH), or BaAl_{12-15}{PO}_{30}(OH),. Spectroscopic analysis showed the presence of less than 0.1 percent of Cu, Cr, Ti, V, Ta, Nm, Sr, etc. Insol. in HCl.

X-ray study (precession) showed the mineral to be triclinic. The unit cell parameters, refined from X-ray powder data, are a = 6.690, b = 6.964, c = 4.971 Å, α = 116.51°, β = 86.06°, γ = 112.59°, Z = 1. G. 4.01, calc. The strongest X-ray lines (25 given) are 5.55 40 100; 3.26 60 101; 3.00 100 210; 2.94 35 710; 2.21 35 211, 1.90 35 030.

Color light green, luster vitreous, H. 4.5, Optically biaxial, negative, n(s) (Na) α = 1.672, β = 1.693, γ = 1.710 (all ± 0.003), V = 80 ± 5°. Fluoresces greenish-white under long-wave U. V. Cleavages (100) and (011) good, (001) fair.

The mineral is found in crystalline masses up to one inch across in quartz veins in tension fractures in a carbonaceous argillite, 16 miles north of the Hess River, Yukon Territory, Canada. Associated minerals are pyrite and hinsdaleite. The name is for the late J. A. Gower, formerly Professor of Mineralogy, University of British Columbia, where type material is preserved. M.F.

Kegelite*

Meixnerite*


Microprobe analysis gave MgO 36.5 (36.21), Al₂O₃ 15.0 (15.26), Fe₂O₃ 0.55, H₂O (by difference) 47.95 (48.53), sum 100.00 percent, the figures in brackets being the ideal composition corresponding to the formula.

Meixnerite occurs as a secondary mineral with talc and later aragonite in cracks of a serpentinite rock near Ybbs-Persenberg, Lower Austria. The crystals are tabular, colorless transparent, optically uniaxial with ω = 1.517, cleavage parallel to 0001 perfect. Meixnerite is trigonal rhombohedral, space group R₃m, a 3.0463 ± 0.0015, c 22.93 ± 0.02 Å, Z = 3/8; it is structurally related to hydrostalite.

The new mineral is named in honor of Professor H. Meixner, Salzburg. Type material is preserved in the mineral collections of the Universities of Göttingen and Salzburg. A.P.

Orpheite*


Chemical analyses by G. Eskenazi and L. Ivinova gave P₂O₅ 17.09, 17.38, 17.82; As₂O₃ 0.07, 0.05, 0.07; SO₃ 8.32, 8.12, 7.77; Al₂O₃ 20.20, 21.50, 19.45; PbO 40.63, 39.40, 37.71; CaO 1.27, 0.57, 2.02; CuO 0.52, 0.35, 0.41; SiO₂ n.d., 1.14, n.d., H₂O 0.01, -0.21; H₂O 12.30 (4.02 to 310°), 12.41 (4.04 to 310°), 11.70; loss on ign. 0.10, -2.27, sum 100.51, 100.92, 99.43 percent. Spectrographic analysis shows up to 0.03 percent Zn, and up to 0.01 percent Ba, Cr, Fe, Mg, Mn, and Ti. The mineral is insoluble in acids, dissolves in hot 20 percent KOH solution. The DTA curves show a small endothermic break at about 450°C, a large one at about 540°C, and a large exothermic break at about 680-720°C. Water is lost continuously to about 600°C (12.27%); a further loss in weight (10.06%) occurs between 800 and 1000°C. The analyses lead to the formulas:

H₄[PO₄(Pb₂₋₉Ca₉₋₀)₂₋₉(Cu₃₋₀)₉₋₀]Al₂₋₉(Cu₉₋₀)₈₋₉(Cu₁₋₀)₆₋₉(SO₄)₊₋₀(OH)₃₋₀·₉H₂O

or H₂[PO₄(Pb₂₋₉Ca₉₋₀)₂₋₉(Cu₃₋₀)₉₋₀]Al₂₋₉(Cu₉₋₀)₈₋₉(Cu₁₋₀)₆₋₉(SO₄)₊₋₀(OH)₃₋₀·₉H₂O.

X-ray study shows strongest lines (62 given) 5.66 100, 3.50 67, 2.96 700, 1.901 33, 1.749 26. These are very close to X-ray data for hinsdalite (PbAlₐ₂(PO₄)(SO₄)(OH)₆); they can be indexed on a cell with a 7.00, c 16.72Å, but this gives Z = 0.32 with the formula above.

The mineral is colorless, gray, pale blue, or yellow-green. Luster vitreous. H 3.5, G 3.75 ± 0.01. Mp about 1200°C. No cleavage or an indistinct one on [0001]. Optically uniaxial, positive, zoned, ω ranges from 1.682 (center) to 1.704 (periphery), ε from 1.670 to 1.691, birefringence 0.012-0.013 (note: the data given correspond to uniaxial, neg. M.F.). The colorless varieties do not fluoresce in U.V.; the colored varieties fluoresce in turquoise blue. Infrared spectra are given.

The mineral occurs in the oxidation zone of the Madjarova polymetallic deposit, associated with hydroxides of Fe and Mn, kaolinite, anglesite, and with pyromorphite which it replaces. The name is for Orpheus, the mythical singer in the Rhodopes. Type material is at the Museum of Mineralogy, "Kliment Ochridski" University, Sofia.

Discussion

Needs further study. The mineral of the beudantite group commonly show departures from the 1:1 ratio of PO₄ (or AsO₄) to SO₄. I consider this mineral to be probably a variety of hinsdalite. M.F.

Pumpellyite and julgoldite nomenclature*


A system of nomenclature is proposed for the pumpellyite series based on the general formula WₓXₙZₙ₋ₓ(OH)₆ₖ₋ₓ(OH). In the formula, W = Ca, K, Na; X = Mn, Fe²⁺, Al; Y = Fe³⁺, Al, Ti; and Z = Si. In apportioning the constituents from an analysis, small amounts of Mn and Fe²⁺ can be shifted to the W position and some Al can be placed in the Z position. Two names are used for all the possible chemical compositions of the series: pumpellyite for those minerals with Al predominant in the Y position and julgoldite for minerals with Fe³⁺ in the Y position. Further distinctions are made by adding a suffix which denotes the predominant cation in the X position. From eighteen analyses studied by the authors, pumpellyite-(Al) was applied to eleven specimens, pumpellyite-(Fe⁰⁺) to one, pumpellyite-(Fe⁰⁺) to one, pumpellyite-(Mg) to four, and julgoldite-(Fe³⁺) to one. The authors point out two drawbacks of their scheme. First, a mineral rich in Fe³⁺ may receive a name which does not emphasize this aspect of its composition because Fe³⁺ being distributed in both X and Y sites, it may not be the most abundant cation in either X or Y. Their pumpellyite-(Fe³⁺) has Fe³⁺ > Al and Fe³⁺ > Fe⁰⁺. They suggest that this mineral could be called “ferrian pumpellyite-(Fe⁰⁺)”. The second drawback which they point out is that is possible to find a pumpellyite-(Al) which contains more Mg than is present in a pumpellyite-(Al). The abstractor feels that it is not a step in the right direction. The system is based on the predominant cations in two positions. That in Y determines the name and that in X determines the suffix. The question of the predominant cations in W and Z never arises. Granted, it may seem unlikely that Al will be greater than Si in the Z position in any subsequent study. Also, looking at the cation amounts in W for the eighteen analyses cited, it is clear that Ca is
much greater than K, Na, Mn, or Fe". However, can we be sure that this will always be the case? I prefer a system of nomenclature to be as flexible as possible so that the unexpected (which occurs more frequently than expected) can be accommodated. I am also opposed to all suffix-type systems of nomenclature with the exception that this will always be the case? I prefer a system of nomenclature much greater than K, Na, Mn, or Fe". However, can we be sure that this will always be the case?

Ruthenarsenite* and Iridarsenite*


Ruthenarsenite

Examination of more than 75 nuggets or fragments from the Territory of Papua and New Guinea resulted in the discovery of two new minerals, ruthenarsenite and iridarsenite. These new species were found in only two of the nuggets.

Ruthenarsenite occurs as irregular inclusions up to 100 microns long with irarsite and iridarsenite in a matrix of rutheniridosmine. In reflected light (oil immersion) it is pale orange-brown to brownish grey, shows distinct bireflectance, and has strong anisotropism varying from orange-brown to light steel-grey. Maximum and minimum reflectance values (averaged for four grains) are: 48.6 and 46.1 (470 nm), 49.5 and 47.5 (546 nm), 50.9 and 49.3 (589 nm), 52.4 and 51.1 (650 nm). Micro-indentation hardness (for two grains) is 743 and 933 kg/m² for a 100 g load.

Electron microprobe analyses for three grains are given. The average of the determinations from these analyses are: Ir 3.9, Ru 44.2, Os 0.7, Pt —, Rh 3.3, Pd 1.8, Cu —, Ni 4.0, Fe —, As 44.4, S —, total 98.3 wt percent. These data give an average formula of (Ru0.4, Ni0.1, Rh0.1, Pt0.1, Pd0.1)As2O2 or, ideally, RuAs2. Iridarsenite occurs with ruthenarsenite as inclusions up to 60 microns long with irarsite and ruthenarsenite in rutheniridosmine. In reflected light it is pale orange-brown to brownish grey, shows distinct bireflectance, and has strong anisotropism varying from orange-brown to light steel-grey. Maximum and minimum reflectance values (averaged for four grains) are: 48.6 and 46.1 (470 nm), 49.5 and 47.5 (546 nm), 50.9 and 49.3 (589 nm), 52.4 and 51.1 (650 nm). Micro-indentation hardness (for two grains) is 743 and 933 kg/m² for a 100 g load.

Electron microprobe analyses for three grains are given. The average of the determinations from these analyses are: Ir 52.2, Ru 1.7, Os 0.4, Pt 1.1, Rh 0.2, Pd 0.1, Cu —, Ni —, Fe —, As 44.0, S 0.2, total 99.9 wt percent. The average formula of all five grains is IrAs2.

Single crystal data could not be obtained. The X-ray powder pattern of the mineral is identical to that of synthetic IrAs2. Quenzel and Heyding (1962) state that IrAs2 is monoclinic with a 6.060, b 6.071, c 6.158Å, β 113° 16'. Least-squares refinement of the X-ray data for iridarsenite gave: a 6.05, b 6.06, c 6.18Å, β 113° 17'. For Z = 4, the calculated density of IrAs2 is 10.9 g/cm³. The strongest lines in the X-ray powder pattern are (in Å, radiation not given): 3.90 10 117; 2.84 7 002; 2.61 5 127; 2.069 6 022; and 1.910 5 317.

Type material is preserved in the National Mineral Collection, Ottawa. J.A.M.

Rutenium*


A microprobe analysis of a sample from the Horokanai placer, Hokkaido, gave Ru 64.43, Ir 14.62, Pt 9.14, Rh 7.05, Os 5.29, Pd 0.49, Fe 0.21, Ni, Cu trace, sum 101.23 percent, corresponding to Ru45.95, Ir4.43, Pt5.81, Rh0.95, Os0.46, Cu0.06. The mineral is probably hexagonal. It occurs as a tabular crystal 7 x 35 microns, in platy rutheniridoside. In reflected light white with creamy tint. Reflectivity 60.1 percent at 530 nm. Weakly anisotropic. Type material is at the University of Kagoshima, Japan. M.F.

Sobotkite


Analysis gave SiO2 39.68, Al2O3 20.98, Fe2O3 trace, MnO trace, MgO 16.72, NiO 0.04, CaO 1.58, K2O 0.15, Na2O trace, H2O ≥ 20.71, sum 99.83 percent, corresponding to the formula (Si13.5, K0.05)(Mg15.6, Al6.16, Si3.08, Al2.74)O14(OH)2·5.18H2O. A trigonal member of the montmorillonite group. The DTA curve shows endothermic peaks at 180°, 600°, 680° and 830°, and a large exothermic peak 780°. The mineral loses about 10 percent H2O to 300°, 15 percent to 600°, the remainder gradually to 800°–900°. The mineral swells with glycerol. The X-ray pattern is diffuse (11 lines) with strongest lines 14.50 7 001; 4.48 9 110 020; 2.61 6 130 200; 2.51 6 202; 2.41 5 007; 2.35 5 203; 1.527 6 060; b = 9.16–29.21 Å.

The mineral is pale green, soapy, G (pycnometer) 2.31, H. about 3. Three samples had ns 1.523, 1.525, 1.528 (each ±0.002).

The mineral occurs with nickelodian lizardite, chrysotile, and pimelite in weathered serpentinites of the Gogolow-Jordanow massif, Lower Silesia, Poland. The name is for Mt. Sobotka.

Discussion

It is a difficult problem to decide whether this name should be retained or whether it should be considered to be an aluminian saponite. M.F.
Sudburyite*

Sudburyite has been found in polished sections of ore from the Frood mine and the Copper Cliff South mine in the Sudbury area of Ontario. Most of the data are for the Copper Cliff South occurrence. The mineral occurs as small, often elongated, inclusions (18 × 100 microns or less) in cobaltite and maucherite. Other associated minerals are: chalcopyrite, galena, breithauptite, and nickel. Pentlandite, pyrrhotite, and michenerite also occurred in the samples.

Electron microprobe analyses are given for ten different grains. These range as follows: Pd 29.2-45.5, Ni 0.48-11.6, Sb 45.3-59.3, Bi 0.53-5.4, Te 0.07-3.9, As 0.03-2.4, total 98.73-102.18. The following analysis (No. 1) is of a grain which gave the highest Pd content: Pd 45.2, Ni 1.06, Sb 52.8, Bi 0.53, Te 0.07, as 2.04, total 101.70. All of the analyses conform to a general formula of (Pd,Ni)(Sb,Bi,As,Te) or, ideally, PdSb. For example, analysis No. 1 (given above) yields the formula (Pd0.86Ni0.01)Sb0.86As0.01Bi0.01.

Under reflected light in air, sudburyite is white with a yellow tint, shows no birefringence, and is weakly to moderately anisotropic. Under oil immersion it is pale yellow, shows no birefringence, and is moderately anisotropic with colors light greyish yellow and dark greyish brown. Reflectance measurements gave: Rp’ 53.1-57.1 and Rg’ 56.1-60.5 (470 nm), Rp’ 54.6-59.9 and Rg’ 58.0-63.7 (546 nm), and Rp’ 56.2-62.3 and Rg’ 60.5-66.7 (589 nm). The value of Rg’ is larger for the more Ni-poor compositions.

Strongest lines are: 2.902 10, 2.931 10, 2.715 5, 2.746 4, 2.503 4, 2.566 4, 1.656 4, 1.675 5, 1.580 4, 1.596 4, 1.059 7, 1.062 5B, 1.051 7, 1.055 SB.

The crystals (0.075-0.03 mm) are commonly tabular, and less commonly prismatic; a few crystals are granular. Color pale yellow, orange yellow, and pale greenish yellow. Semi-transparent to translucent. Streak white to pale yellow. Luster pearly on crystal faces and resinous on fracture surfaces. Cleavages {100}, {010}, and {001} perfect. Fracture uneven. Hardness = 4.7, microhardness = 352.5 kg/sq mm. The mineral is brittle and moderately magnetic. Sp. gr. = 4.4.

Optically the mineral is biaxial positive, α = 2.194, β = 2.212 (calcd), γ = 2.248, 2V = 70°, non-pleochroic with parallel extinction and negative elongation.

The mineral occurs in an yttrium-rare-earth-rich muscovite granite, Southern China, associated with xenotime, monazite, zircon, fergusonite, thorite, doverite, gadolinite, chernovite, columbite, and cassiterite. The mineral is presumably a product of the autometasomatism from biotite granite to muscovite granite.

Discussion
The mineral is simply aescyhnite-(Y) (priorite), and no reason for the name is evident. It is apparently a common practice in the People’s Republic of China that compositional varieties are named in the same way as mineral species. See appears in the calculated formula but not in the chemical analysis. G.Y.C.

Tsvolite

The name tsvolite (for the Tsvao National Park), near where it was found, is suggested for a bright green to dark green variety of grossular that contains Cr, V, and Mn. It has n = 1.74 ± 0.03, G. 3.68 ± 0.02.

Discussion. An unnecessary name. M.F.

Taiyite (= Aeschyhnite-(Y))

Chemical analysis gave: TiO₂ 45.25, TR₂O₃ 32.41, (Zr,Hf)O₂ 0.26, V₂O₅ 0.03, UO₂ 0.61, ThO₂ 0.99, Nb₂O₅ 2.25, Ta₂O₅ 2.25, SiO₂ 5.26, Al₂O₃ 2.32, CaO 0.24, MgO 0.19, MnO 0.08, Fe₂O₃ 1.94, loss on ignition 3.22, 99.72 percent, corresponding to the empirical formula but not in the chemical analysis. G.Y.C.

The crystals (0.075-0.03 mm) are commonly tabular, and less commonly prismatic; a few crystals are granular. Color pale yellow, orange yellow, and pale greenish yellow. Semi-transparent to translucent. Streak white to pale yellow. Luster pearly on crystal faces and resinous on fracture surfaces. Cleavages {100}, {010}, and {001} perfect. Fracture uneven. Hardness = 4.7, microhardness = 352.5 kg/sq mm. The mineral is brittle and moderately magnetic. Sp. gr. = 4.4.

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birefringence, no other optical or physical data could be determined. Electron microprobe analysis (average of two analyses) gave: SiO₂ 40.3, FeO 0.3, MgO 0.1, CaO 18.0, Na₂O 0.4, K₂O 0.1, ZrO₂ 41.3, total 100.5. This gives a formula (based on seven oxygen atoms) of Ca₉₂Na₃ₓ₂Mg₈₉ₓ₈,FeO₁₇₊ₓ,Sn₉₋ₓTeₓ₉₋ₓSn₉₋ₓ. This abstractor gets essentially the same results except for Na₉₂ₓ and Kₓ≈₁. J.A.M.

Unamed Pt-Pd Minerals

Platinum-group minerals from a hydrothermal environment.
Econ. Geol. 69, 257-262.


The first paper describes three minerals from the Artonville mine, near Messina, South Africa, occurring with bornite, chalcocite, covellite, and digenite. Probe analyses and optical data are given. One mineral appears to be a bismuth-poor kotulskite. Another gave Pt 15.1, Pd 19.2, Ni 0.1, Sn 20.5, Cu 0.1, Fe 0.1, total 100.3 percent, corresponding to (Pt₁₋ₓPdₓ)Te,Sn, of Razin and Bykov (1971) (Am. Mineral. 1975, 60, 738), to (Pt₁₋ₓPdₓ)Sn, of Razin and Bykov (1971) (Am. Mineral. 1972, 57, 595-596). Unnamed S and with some of the minerals grouped under unnamed Z of Cabri (1972), Minerals. Sci. Eng., 4, No. 3, 3-29. Unnecessary descriptive name and formula. L.J.C.

Wroeweite*


Electron microprobe analysis by J. A. N. gave Cu 51.3 ± 0.8, S 56. ± 0.2 percent, which calculates to CuO 64.22, SO₃ 16.48, H₂O (by diff.) 19.30 percent, corresponding to Cu₃(SO₄)(OH)₂·2H₂O.

Precession photographs show the mineral to be monoclinic, space group P2₁/c, a 6.058, b 5.656, c 14.360 Å, β 93.3°±8°, Z = 2, G, calc 3.30, observed by flotation 3.72 ± 0.01. The strongest lines of 41 given are 7152 100 002, 3.581 70 004, 2.628 35 022, 2.004 30 222.215. The X-ray study shows twinning on (010).

Color deep greenish blue, streak light blue, luster vitreous, Cleavages (010), (100), (001), easy and perfect. H 2.5. Optically biaxial, negative, ns α 1.637, β 1.682, γ 1.694, 2V° ±53°, strongly pleochroic, X light blue, Y deep greenish-blue, Z medium greenish-blue, absorption Y > Z > X.

The mineral occurs in the oxidation zone of the old lead mine at Loudville, Massachusetts, as minute euhedral crystals up to 0.5 × 1.0 mm, associated with chalcocite, covellite, and digenite. The mineral alters to brochantite and malachite. It has also been found at two mines in England.

Type material is in the U.S. National Museum, no. 127339. The name is for C. Wroe Wolfe, American Crystallographer. M. F.

Fifteen New Minerals from the Talnakh Deposit


Fifteen minerals are described as “discovered for the first time.” Though no formal names have been presented, a nomenclature is employed, partly in the Tables and partly in the text, that uses the major elements from the quasi-cations and anions. An unfortunate aspect of this approach is that several minor elements, whose presence in any single structure may be non-essential and accidental, are sometimes used in deriving the nomenclature of these minerals. More serious, however, is the complete lack of single crystal data together with proposed non-ideal stoichiometries for all fifteen minerals, the latter being more easily explained by analytical errors. It is also not stated whether or where type material is preserved. (L.J.C.)

Solid Solution of Pd and Sn in Platinum (=rastenburgite)

Pt₁₋ₓPdx₁₉Sn₉₅

Probe analyses gave: Pt 58.3, Pd 19.8, Cu 1.3, Ni 0.9, Fe 0.1, Sn 19.6, Bi 2.5, Pb n.d., total 102.5 percent. Cubic, Fm3m, a = 3.984(2)Å, Z = 4, powder lines: 2.30 10 111, 1.997 7 200, 1.409 6 220, 1.273 2b 310, 1.203 6 311, 1.150 4 222. Reflected light (air?)—bright white with rose tint against chalcopyrite and silicates, isotropic. Reflectance values in air—460 nm 56.6, 550 nm 59.7, 580 nm 62.2, 640 nm 62.8 percent. VHN₉₀ = 304 (301-306) and VHN₉₀ = 384 (367-392). No reaction with any regular etch reagents. Grains average 30-70 microns in diameter and range from 5 to 1080 microns. Occurs as skeletal metacrystals with stepped facets and rectangular cross-sections; as anhedral elongated and isometric grains. Associated minerals: polarite, sperrylite, Au-Ag-Au alloys, plumbopalladinite, Pd and Pt stannides and arsenides, chalcopyrite, talnakhite, cubanite, magnetite, valleriite, and silicates.


Solid Solution of Pt, Sn, and Pb in Palladium (=atokite)

Pd₁₋ₓSnₓ₁₉Pbx₁₉

Probe analysis: Pd 57.0, Pt 4.9, Au 3.3, Sn 14.6, Pb 20.5, Cu n.d., total 100.3 percent. Cubic, Fm3m, a = 3.976(3)Å, 2.29 10 111, 1.995 7b 200, 1.405 7b 311, 1.200 8b 311, 1.147 4b 222. Reflected light (air?)—pale creamy grey, isotropic, occasionally weakly anisotropic. R percent in air R₉₅ 460 nm 55.0, 550 nm 54.6, 580 nm 55.6, 640 nm 59.0. R₉₅ 460 nm 55.6, 550 nm 56.6, 580 nm 58.1, 640 nm 61.8. VHN₉₀ = 459(432-598), etches only with aqua regia (strongly). Occurs as rectangular and triangular cross-sections and as anhedral grains with stepped facets. Grains average 60-70 microns in diameter but range from 2 to 700 microns. Associated minerals: chalcopyrite, cubanite, magnetite, valleriite, polarsite, sperrylite, gold-silver alloys and other unnamed PGM.

Pd₁₋ₓSnₓ₁₉Pbx₁₉

Probe analysis: Pd 50.5, Pt 13.9, Ag 2.9, Au 2.5, Cu 0.1, Sn 21.0, Pb 10.0, total 100.9 percent. Cubic, Fm3m, a =
9.39(1) Å. Reflected light (air?) — greyish white, creamy tinge against Pt-Fe alloys, isotropic. R percent in air 460 nm 53.6, 550 nm 57.9, 580 nm 59.7, 640 nm 62.0, VHN_{90} = 465(523-519). Etched only with aqua regia. Occurs as oval or elongated grains. Grains average 30 microns in diameter but range from 10 to 80 microns. Associated minerals: talnakhite, cubanite, valleriite, Pt-Fe alloys, gold-silver alloys, and other unnamed PGM.

**Discussion.** Both (a) and (b) appear to be identical to atokite (disordered Pd_{2}Sn) of Mihalik et al (1975) Can. Mineral. 13, 146-150, to (Pd,Pt)_{2}(Sn,Pb)_{2} of Razin and Bykov (1971) (Am. Mineral. 1972, 57, 595-596) — unnamed mineral R and with some of the minerals grouped under unnamed Z of Cabrі (1972). Unnecessary names and formulae. L.J.C.

**Platinum-Palladium Stannide**

\[(Pt,Pd)_{2}Sn\]

Probe analyses gave: Pt 58.6, Pd 16.3, Au 4.6, Cu 1.2, Ni 0.5, Sn 19.2-100.4 percent (Pd n.d.). Cubic \(Pm\bar{3}m\), \(a = 3.984(1)\) Å and \(a = 3.980\) Å. Powder lines: 2.30 \(211\), 1.998 \(620\), 1.407 \(822\), 1.332 \(400\), 1.221 \(311\), 1.200 \(631\), 1.101 \(5320\), 0.914 \(631\), 0.891 \(742\), 0.814 \(642\). R percent in air: 460 nm 53.8, 550 nm 58.9, 580 nm 59.9, 640 nm 62.5, VHN_{90} = 288(269-321). VHN_{90} = 274 (245-318). VHN_{100} = 290(272-311). No reaction with standard etch reagents.

**Discussion.** This mineral is the ordered form of Pt_{2}Sn. The name is unfortunate as it implies that Pt is always a requirement. The ± in the formula may be due to analytical errors. L.J.C.

**Palladium-Palladium Stannide**

\[(Pd,Pt)_{2}Sn\]

Probe analyses of 3 samples gave Pd 37.6, 41.9, 44.9; Pt 36.2, 27.1, 25.9; Cu 1.6, 1.3, 1.3; Ag 1.7, 1.4; Au 1.5, ..., 1.5; Ni 0.7, 0.3, 0.3; Rh \(-\), \(-\), 0.5; Sn 22.1, 23.2, 21.8; Pb 0.3, n.d., 3.3; Sb 0.2, ..., 0.5; Bi \(-\), \(-\), 0.9; totals 101.9, 95.2, 101.0 percent. Cubic \(Pm\bar{3}m\), \(a = 3.984(2)\) Å. Strongest powder lines: 2.30 \(211\), 1.998 \(620\), 1.407 \(822\), 1.332 \(400\), 1.221 \(311\), 1.200 \(631\), 1.101 \(5320\), 0.914 \(631\), 0.891 \(742\), 0.814 \(642\). Reflected light (air?) — bright white with creamy tinge if next to sphal

**Discussion.** This mineral is indexed as tetragonal Pd_{2}Sn with reference to Schubert et al (1959). That reference does not discuss Pd_{2}Sn, however, and Pd_{2}Sn with tetragonal symmetry is unknown in the Pd-Sn system. Single crystal work is necessary. The ± in the formula may be due to analytical errors. This mineral may be the same as some of the minerals grouped under unnamed Z of Cabrі (1972). The name is unfortunate as the essential nature of all the elements is yet to be proved. L.J.C.

**Palladium-Platinum Arsenoplumbostannide**

\[(Pd,Pt)_{2}Sn(As,Pb)\]

Probe analysis of one grain gave Pd 67.0; Pt 5.2; Au 2.7; Cu 1.0; Sn 16.9; As 7.0; Bi 1.0; Pb not detected; total 100.8 percent. Indexed as tetragonal, \(Pd_{4}/mmm\), \(a = 3.99\) Å and \(c = 3.655\) Å from a six line powder pattern: 2.23 \(10\), 2.186 \(8400\), 1.906 \(1401\), 1.471 \(342\), 1.045 \(1440\), 1.190 \(3622\).

In reflected light (air?) the mineral is light grey with creamy, occasionally yellowish tints; very weakly birefringent in air; anisotropic with brownish grey colors. R percent in air 460 nm 50.6, 550 nm 55.5, 640 nm 57.5, VHN_{90} = 480(476-506).

**Discussion.** Not enough data to determine whether the formula derived from analysis represents a new species or whether this is a Pb-rich variety of ordered Pd_{2}Sn. Unnecessary name. L.J.C.
Discussion. Not enough data to determine whether the mineral is a unique species. The name is unjustified and single crystal work is necessary. L.J.C.

**Palladium-platinum Plumbostannaroarsenide**

(Pd,Pt)o-2x(Ass,Sn,Pb)

Probe analysis of one grain gave Pd 60.9, Pt 5.4, Ag 2.1, Rh 0.5, Sn 13.0, As 8.8, Pb 6.0, Sb 1.6; total 98.3 percent. Cu, Au not detected. Indexed as tetragonal, a = 3.99, c = 3.655 Å from an eleven line powder pattern, strongest lines 2.23 10 222, 1.992 5 400, 1.476 4 432.

Color in reflected light, bireflectance, and anisotropy same as for (Pd,Pt)o-xo(Ass,Sn,Pb) mineral. Also grain size, textures, and associated minerals. R percent in air 460 nm 56.8, 550 nm 56.4, 580 nm 57.4, 640 nm 59.9. VHNro = 423(396-449), VHNuo = 515(504-519).

Discussion. Appears to be the same mineral as (Pd,Pt)o-xo(Ass,Sn), which itself is not well enough characterized to determine if it is a unique species. The name is unjustified. L.J.C.

**Nickel-Palladium Arsenides**

(Ni,Pd),xAs and \( \beta - (Ni,Pd),xAs \)

(a) \( (Ni,Pd),xAs \). Probe analyses gave Pd 44.0, 45.9, Ni 29.0, 27.5; Cu 0.2; Pt 0.4; As 28.2, 26.6; totals 101.4, 100.4 percent. Indexed as hexagonal (second analysis) with \( a = 9.910, c = 6.601 \) Å from ten powder lines of which the strongest are 2.19 10 0003, 1.989 10 2242, 2.65 8 2022, 3031, and 2.29 6 2241,1232.

In reflected light (air?) the mineral is pale lilac grey with brownish or roseate tinge. Weakly bireflectant in air, weakly anisotropic with brownish-grey tones. R percent in air 460 nm 48.6, 550 nm 50.3, 580 nm 51.3, 640 nm 53.7. VHNro = 463(440-484) and VHNuo = 527(482-597) for first and second analysis, respectively. Occasional etching with 1:1 HCl, negative to other reagents.

Discuss. Not enough data to differentiate between (a) and (b). The powder pattern of (a) is very similar to synthetic NiAs, of (Ni,Pd),xAs, mineral.

(b) \( \beta - (Ni,Pd),xAs \). Probe analysis of one grain gave Ni 56.5; Pd 12.3; As 34.1; total 102.8 percent.

The color under reflected light, bireflectance, anisotropism, grain size, textures and mineral associations the same as for the (Ni,Pd),xAs mineral.

**Palladium Bismuthide**

PdAsx+Bi

Probe analysis of one grain gave Pd 31.6; Pb 1.6; Ag 1.5; Au 0.5; Cu 0.3; Bi 61.1; Te 0.6; total 97.2 percent. Indexed as hexagonal from eleven powder lines, a = 4.20, c = 5.64 Å, strongest lines 305 10 1011, 2.24 8 1072, 2.097 8 1120, 1.178 5 3031,1124.

In reflected light (air?) the mineral is pale yellowish cream with noticeable bireflectance, weakly to distinctly anisotropic with yellowish-grey tones. R percent in air 460 nm 47.9, 550 nm 57.0, 580 nm 59.2, 640 nm 63.0. VHNro = 281(272-286).

Discuss. May be elongated, or euhedral grains and as fringes which surround intergrowths of PGM. The grains average 15-20 microns in diameter and range in size from 5 to 100 microns. Associated minerals: pallorite, Ag-Au alloys, sperrylite, (Pd,Cu,Pt)o-xoSn, electrum, chalcopyrite, cubanite, silicates, galena.

**Palladium Stibiarosarnoarsenide**

PdAsxSn

Probe analysis of one grain gave Pd 78.2; As 12.3; Sn 6.8; Sb 6.3; total 103.6 percent, Pt,Pb not detected. Indexed as orthorhombic a = 8.107, b = 5.625, c = 4.360 Å from a 10 line powder pattern with strongest lines 2.30 10 121, 2.18 10 002, 1.124 5 133, 1.621 3 420.

In reflected light (air?) the mineral is brownish grey, weakly anisotropic, isotropic in certain sections. R percent in air 460 nm 41.2, 550 nm 49.4, 580 nm 51.4, 640 nm 54.5. VHNro = 423(396-449), VHNuo = 515(503-519).

Occurs as rounded, elongated grains and as hexagonal euhedral crystals ranging from 5 to 50 microns in diameter with an average size of 15 microns. Associated minerals: pallorite, Ag-Au alloys, sperrylite, electrum, other PGM, chalcopyrite, talnakhite, cubanite, spalterite, and galena.

**Discussion**. The mineral appears to be identical to paolovite, PdSn (Am. Mineral., 60, 162). The name is unjustified. L.J.C.

**Palladium Stannide**

PdAsxSn

Probe analysis of one grain gave Pd 60.6; Sn 35.5; total 96.4 percent; Pt, Cu, Pb not detected. Orthorhombic, a = 8.11, b = 5.65, c = 4.32 Å and strongest powder lines for the analyzed grain 2.30 10 121, 2.17 8 002, 1.278 6 403, 2.39 5 021. Another grain gave a better powder pattern with \( a = 8.104, b = 5.643, c = 4.312 \) Å.

In reflected light (air?) the mineral is light grey with a roseate to creamy bireflectance. Strongly anisotropic light grey, bluish to reddish tinge. Polysynthetically twinned. \( R'p \) and \( R'g \) percent in air 460 nm 42.2, 47.4, 550 nm 46.2, 51.5; 580 nm 48.8, 54.3; 640 nm 54.1, 59.2; VHNro = 291-449.

Discuss. Ocasional etching with 5% HCl and ranging from 2 to 200 microns. Associated minerals: sperrylite, (Pt,Pd)xoSn, Ag-Au alloys, chalcopyrite, pyrrhotite, magnetite, silicates.

**Discussion**. The mineral appears to be identical to paolovite, PdSn (Am. Mineral., 59, 1331). L.J.C.

**Palladium Plomboarsenide**

PdAsxSn

Probe analysis of two samples gave Pd 29.8, 31.8; Ag 1, 1; Pt 50.4, 50.2; As 21.4, 19.8; totals 101.6, 102.5 percent. 18-line powder pattern indexed as orthorhombic a = 7.180, b = 8.619, c = 10.662 Å. Strongest lines 2.65 10 004, 2.169 040, 124, 2.50 6 104, 2.23 6 311, 1.667 6 150, 044, 1.385 6 217.

In reflected light (air?) the mineral is greyish white next to chalcopyrite and pale grey next to Ag-Au alloy. It is anisotropic with yellowish grey tones. R percent in air for first analysis 460 nm 54.2, 550 nm 56.9, 580 nm 57.7, 640 nm 59.6. VHNro = 241 (228-250). Etched by 20 percent FeCl₃, conc. HNO₃; weakly etched.
by HgCl₂; negative to other reagents. Occurs as isometric, almost square, and oval crystals. Grains average 70 microns in diameter and range from 40 to 150 microns, Associated minerals: Ag-Au alloys, Pd-Pb, (Ni,Pd)₄As, (Pd,Pt)₃Sn, and chalcopyrite.

**Discussion.** Single crystal study required, especially to determine if approximate As:Pb of 1:1 is significant. The uncertain stoichiometry may be due to analytical errors. GYC, LJC.

**Newly Reported Minerals from China, I**


**Hexastibiopalladite, Pd₃Sb₄ ( = Sudburyite)**

Microprobe analysis gave: Pd 41, 40; Sb 60, 58; sum 101, 98 percent, corresponding to Pd₃Sb₂₋₈ and Pd₅Sb₂₋₈. The X-ray powder pattern is indexable on the basis of a hexagonal cell with a = 4.07, c = 5.57 Å. The strongest X-ray lines (19 given, including 3 β-lines) are: 2.970 8 101, 2.184 10 102, 2.030 6 110, 1.644 3 112, 1.490 3 202, 1.149 5 301.

Pale brownish gray, brittle, with metallic luster. Under reflected light it is yellowish white. Weakly anisotropic. Reflectance = 66.1 percent (590 nm). VHNₛ = 210 kg/mm², corresponding to 4.0 on Moh’s scale. The mineral was found as short prismatic grains in the heavy concentrates of crushed ores.

The mineral occurs in Cu-Ni-sulfide deposits in Y (see testibiopalladite) in Southwestern China.

**Discussion.** The name is unnecessary as the mineral is clearly identical to sudburyite (Pd₃Sb₂₋₈) in Southwestern China.

**Hexastibiopalladite, (Ni,Pd)₃Sb₂Te₂**

Microprobe analysis gave: Ni 20, Pd 16, Sb 31, Bi 0.1, Te 33, sum 100.1 percent, corresponding to (Ni₃₂Pd₈₆)₂(Sb₉₆Bi₁₂₀) Te₁₀₀. The X-ray powder pattern is indexable on the basis of a hexagonal cell with a = 3.98, c = 5.35 Å. Strongest X-ray lines (19 given, including 3 β-lines) are: 2.890 8 101, 2.109 8 102, 1.990 7 110, 1.635 4 201, 1.580 5 103, 1.108 6, diffuse 1/4.

The mineral is weakly anisotropic, pale yellow to yellowish white in reflected light. Reflectance = 58.2-62.3 percent (590 nm). VHNₛ = 75 kg/mm² and VHNₚ = 108 kg/mm², equivalent to 2.0-2.2 on Moh’s scale.

The mineral occurs in Cu-Ni-sulfide deposits in Y (see testibiopalladite) in Southwestern China. In heavy concentrates of crushed ores it is often found with testibiopalladite.

**Discussion.** The mineral appears to be a new species and may be structurally related to irigrite (NiTe₂, *Am. Mineral*, 49, 1151). The name is awkward. GYC, LJC.

**Testibiopalladite, Pd₅Sb₂Bi₂Te₂**

Microprobe analysis of two grains from Y, using pure metals as standards, gave: Pd 25, 26; Ni 1, 2; Sb 20, 21; Bi 19, 17; Te 35, 36; sum 100, 100 percent, corresponding to (Pd₅₋₁₋₁Ni₁₋₁₋₁Sb₂₋₂₋₂Bi₂₋₂₋₂Te₂₋₂₋₂) and Pd₅₋₁₋₁(Sb₂₋₂₋₂Bi₂₋₂₋₂Te₂₋₂₋₂). Six analyses of material from W gave (range): Pd 27-30.3, Ni 0-0.8, Sb 23-33.9, Bi 0-20, Te 31-39.7, sum 96.6-105.1 percent corresponding to (Pd₅₋₁₋₁Ni₁₋₁₋₁Sb₂₋₂₋₂Bi₂₋₂₋₂Te₂₋₂₋₂). The X-ray powder pattern is indexable on the basis of a cubic cell with a = 6.572 Å (also 6.557-6.581 Å, reflecting variations in Sb:Bi). The strongest X-ray lines (36 given, including β-lines) are: 2.940 10 210, 211 β; 2.680 8 211; 1.983 9 311; 1.755 7 321; 1.267 6 333, 511; 1.162 6 440; 1.066 7 532, 611.

The mineral was found in concentrates of crushed ores as irregular to short prismatic grains (0.07-0.10 mm). Bright steel gray with a light brown tint, metallic luster. Surfaces are often tarnished yellowish-brown. Brittle with two sets of imperfect cleavage. In reflected light it is bright white with a faint blue tint. Isotropic, reflectance = 57.3 percent (590 nm). The mineral from W is white and sometimes milky yellow. Reflectance 480 nm, 54.4; 500 nm, 54.2; 520 nm, 54.0; 540 nm, 53.9; 560 nm, 54.0; 580 nm, 54.9; 600 nm, 54.0; 620 nm, 54.0; 640 nm, 54.0; 660 nm, 54.7 percent. VHNₛ = 165 kg/mm² and VHNₚ = 267 kg/mm², equivalent to 3.5-4.0 on Moh’s scale.

The mineral occurs as inclusions in gersdorffite-cobatite, pyrrhotite, chalcopyrite, and pentlandite in Cu-Ni-sulfide deposits in Y, which is a serpentinite body intruded into a Permian formation of metamorphic rocks in Southwestern China. It is also found as a relatively common mineral in Cu-Ni-sulfide deposits in W, which is mainly a clinoxyroxenite intruding into sandy shales and volcanics of Permian age in Northeastern China.

**Discussion.** The mineral is the antimony analogue of michenereite (PdBi₂Te), with PdSb₂Te as an end-member. GYC, LJC.

**Unnamed Platinum Group Minerals**

1. (Pd,Ni)₄(Te,Sb,Bi,Bi)₂, reported as (Pd,Ni)(Sb,Bi,Bi)₂Te₂

Probe analysis gave Pd 41.2, Ni 1.1, Sb 23.0, Bi 4.3, Te 30.6, sum 100.2 percent, corresponding to (Pd₄₋₁₋₁Ni₁₋₁₋₁Sb₂₋₂₋₂Bi₂₋₂₋₂Te₂₋₂₋₂). Bright yellow under reflected light. Isotropic, reflectance = 66.4 percent (590 nm). VHNₛ = 225 kg/mm². Only one grain has been found in Y (see testibiopalladite) as a subhedral inclusion (43 micron) in gersdorffite.

2. Pd₅Sb₂Bi₂Te₂, reported as Pd₅Sb₂Bi₂Te₇

Probe analysis gave: Pd 37, Sb 41, Bi 5, Te 17, sum 100 percent, corresponding to Pd₅₋₁₋₁Sb₂₋₂₋₂Bi₂₋₂₋₂Te₂₋₂₋₂. Bright white with a rose tint. Strongly anisotropic, Pleochroic: grayish blue-orange yellow. Distinct bireflectance: white with a rose tint-white with a gray tint. R'g and R'p = 520 nm, 56.1, 52.4; 580 nm, 60.7, 57.4; 660 nm, 64.2, 61.2 percent. Hardness less than that of chalcopyrite. The mineral occurs in W (see testibiopalladite), as inclusions (18 microns) in chalcopyrite.

3. Ni₃Sb₂Te₇, reported as (Ni,Pd)₃(Sb,Bi,Bi)₂Te₇

Probe analysis gave: Ni 22, Pd 3, Sb 26, Bi 1, Te 46, sum 98 percent, corresponding to (Ni₃₋₁₋₁Pd₁₋₁₋₁Sb₂₋₂₋₂Bi₂₋₂₋₂Te₂₋₂₋₂). The mineral is yellow under reflected light, isotropic. Reflectance = 59.8 percent (590 nm). VHNₛ = 280 kg/mm². Only one grain has been found in Y as an inclusion intergrown with pyrrhotite and pentlandite in gersdorffite.

4. Pd₅Sb₂Bi₂Te₂

Probe analyses gave: Pd 63.1, 60.3, 61; Sb 37.4, 37.3, 36; sum 100.8, 97.6, 97 percent, corresponding to Pd₅₋₁₋₁Sb₂₋₂₋₂Bi₂₋₂₋₂Te₂₋₂₋₂. The mineral is gray to pinkish gray with distinct bireflectance. Strongly anisotropic, pleochroic: dull purple-grayish
red. Reflectance = 48.4 (520 nm), 52.8 (580 nm), 56.1 percent (660 nm). Hardness similar to that of chalcopyrite. The mineral occurs in both W (intergrown with native gold) and Y.

5. PdSb

Probe analyses gave: Pd 49.9, 50.4, 46.9, 43; Ni -, -, 0.5; Sb 49.3, 50.9, 45.4, 54; Bi -, -, 4.1; Te -, -, 1.5; sums 99.2, 101.3, 98.4, 101 percent, corresponding to Pd$_{3+}$Sb$_{0.8}$Pd$_{1.3}$Sb$_{0.9}$, (Pd$_{0.9}$Sb$_{0.7}$) (Sb$_{1.0}$Bi$_{0.7}$Te$_{0.1}$), and (Pd$_{0.8}$Sb$_{0.9}$) (Sb$_{0.8}$Bi$_{0.2}$Te$_{0.0}$). The mineral from W is rose yellow with strong bireflectance: orange-yellow-bright yellowish brown. Strongly anisotropic. Pleochroic: grayish yellow-dull purple. Reflectance = 50.0 (520 nm), 52.2 (580 nm), 53.4 percent (650 nm). Hardness moderate. The mineral occurs in both W and Y as short prismatic crystals (20-50 microns) in interstices of pentlandite and silicates or as rims around pyrrhotite. The mineral was also reported to occur in X (no details given) in Northern China, associated with chalcopyrite and electrum.

6. Pd$_3$Te

Probe analysis gave: Pd 71.9, Te 26.7, sum 98.6 percent, corresponding to Pd$_3$Te$_{1.0}$. White with a yellow tint under reflected light. Weakly anisotropic. Reflectance greater than that of pyrite. Medium hardness. The mineral occurs in W as small grayish yellow grains intergrown with other tellurides of platinum and palladium.

7. (Pd, Pt)$_2$Te

Probe analysis gave: Pd 62.1, Pt 12.4, Te 28.6, sum 103.1 percent, corresponding to (Pd$_{0.8}$Pt$_{0.2}$)Te$_{0.8}$. White with a pink tint. Weak bireflectance. Strongly anisotropic. Pleochroic: reddish brown-grayish blue. Reflectance similar to that of pyrite. Moderate hardness. Found in W with other tellurides, often intergrown with moncheite.

8. PdTe

Probe analysis gave: Pd 40.2 Hg 1.1, Bi 8.5, Te 48.8, sum 98.6 percent, corresponding to (Pd$_{0.8}$Hg$_{0.1}$) (Bi$_{0.8}$Te$_{0.8}$). Pale pink under reflected light. Weakly anisotropic. Pleochroic: yellow-gray. Reflectance = 56.3 (520 nm), 58.3 (580 nm), 58.0 percent (650 nm). Hardness similar to that of chalcopyrite. Found in W with other tellurides.

9. (Pd, Ni)(Bi, Te)

Probe analysis gave: Pd 24.4, Ni 7.7, Bi 10.9, Te 51.4, sum 94.4 percent, corresponding to (Pd$_{0.2}$Ni$_{0.8}$) (Bi$_{0.2}$Te$_{0.8}$). Isotropic, white in reflected light. Reflectance = 57.8 (520 nm), 57.9 (580 nm), 59.2 percent (660 nm). Harder than pyrrhotite. Found in W as cubic grains (5 × 7 microns) in pyrrhotite.

10. PdTe$_5$

Probe analysis gave: Pd 26.8, Sb 6.5, Bi 10, Te 58, sum 101.3 percent, corresponding to Pd$_{0.8}$Sb$_{0.2}$Bi$_{0.2}$Te$_{0.8}$. Isotropic, pure white under reflected light. Reflectance = 63.8 (520 nm), 62.3 (580 nm), 66.3 percent (650 nm). Harder than chalcopyrite. Only one grain has been found in W as an euhedral tabular crystal (14 × 23 microns) in the interstices between chalcopyrite and silicates.

11. PdTe$_7$

Probe analysis gave: Pd 21.0, Te 78.0, sum 99.0 percent, corresponding to Pd$_{0.8}$Te$_{0.8}$. Weakly anisotropic, white with a rose tint under reflected light. Pleochroic: pale blue-yellowish gray. Reflectance larger than that of pyrite. Hardness similar to that of pyrrhotite. Found in W as irregular grains (5 × 32 microns) in the interstices between pyrrhotite and silicates.

12. Pd$_4$(Te, As)

Probe analysis gave: Pd 61.5, Hg 6.1, Te 20.4, As 11.1, sum 99.1 percent, corresponding to (Pd$_{0.8}$Hg$_{0.1}$) (Te$_{0.2}$As$_{0.1}$). Pale pink under reflected light. Strong bireflectance: pale pink–bright brownish yellow. Strongly anisotropic. Pleochroic: yellowish pink–bluish pink. Reflectance approaches that of sperrylite. Found in a Cu-sulfide deposit in W, often intergrown with sperrylite.

13. Pd$_2$(As, Sb), reported as Pd$_4$(Sb, As)

Probe analysis gave: Pd 73.2, Sb 9.1, Te 4.5, As 15.5, sum 102.3 percent, corresponding to Pd$_{1.1}$ (Sb$_{0.8}$Te$_{0.1}$, As$_{0.1}$). Distinctly anisotropic, gray to pale gray with a pinkish brown tint under reflected light. Pleochroic: purplish gray–pinkish gray, Reflectance = 53.6 (520 nm), 52.3 (580 nm), 51.3 percent (660 nm). Hardness approaches that of chalcopyrite. Found in W, often intergrown with native gold. Reported as a subspecies, intermediate between palladoarsenide (Pd$_4$As, Am. Mineral. 60, 162, 1975) and the mineral Pd$_4$Sb found in W and Y.

Discussion. Data for all the above minerals are insufficient for full characterization. Nos. 2, 3, 6, 12 may be compositionally unique. No. 4 may be a Pt-free variety of the unnamed mineral (Pd, Pt, Ni)$_2$(Sb, Sn) (Am. Mineral. 60, 73; 1975). No. 5 could be sudburyite (Can. Mineral., 12, 275–279, 1974). No. 7 is probably a Pt-bearing variety of No. 6. No. 8 is probably identical to kotulskite (Am. Mineral. 48, 1181). Analysis of No. 9 is too poor to establish stoichiometry. No. 10 is compositionally similar to merenskyite. No. 11 appears to be unique but the composition is not known in the synthetic Pd-Te system. No. 13 appears to be antimonnian palladoarsenide (Am. Mineral. 60, 162, 1975). GYC, L.J.C.

Newly Reported Minerals from China, II

Comments

It is not stated whether or where type materials are preserved. The minerals are named after type localities about which there is no information given. The mineral names are derived from Chinese characters according to the P'in-Yin Romanization System which is widely used in the People's Republic of China. However, the Wade-Giles Romanization System is more widely used in the western scientific community, and to facilitate proper pronunciation, a list of the Wade-Giles equivalents is given below:

- Yixunite: Yi-hsun-ite
- Dayingite: Ta-ying-ite
- Xingzhongite: Hsing-chung-ite
- Malanite: Ma-lan-ite
- Daomanite: Tao-ma-ite
- Hongshiite: Hung-Shih-ite
- Guanglinite: Kuang-lin-ite
- Fengluanite: Feng-luan-ite
- Yanzhongite: Yen-chung-ite
- Hongshiite: Hung-chi-ite

(GYC)
NEW MINERAL NAMES


Daomanite, (Cu,Pt)₅AsS₄

Electron microprobe analysis gave: Pt 45.2, Cu 20.1, As 18.8, S 15.3, sum 99.4 percent, corresponding to Cu₉Pt₅As₄S₁₆, or ideally (Cu,Pt)₅AsS₄. Other analyses gave: Pt 45.0, 42.2; Cu 21.0, 19.2; As 27.4, 17.3; S 13.2, 14.1; sums 106.6, 92.8 percent. The mineral is not attacked by HCl, HNO₃, or H₂PO₄.

The mineral is orthorhombic with a = 8.085, b = 5.905, and c = 7.314 Å. Strongest X-ray lines (41 given) are: 7.32 70 001, 3.20 60 012, 3.01 100 211, 209 60 203, 1.835 100 123, 1.281 60 341, 1.079 80 443, 1.003 60 052, 152, 0.9982 60 444, 0.9906 70 605, 643.

Color steel gray with a yellow tint, silver grayish white on fresh surfaces, luster metallic, habit tabular. Grain size 0.2-0.3 mm. Four sets of cleavages, from most to least perfect, are (100), (001) [110]. Non-magnetic, brittle. Fracture step-like or uneven.

Under reflected light pale greenish yellow, strongly anisotropic, pleochroic: gold yellow and grayish green. Parallel extinction. Rg and Rp are: 466 nm, 40.5; 544 nm, 44.1; 656 nm, 47.2; 589 nm, 49.4; 392, 57.4, sum 99.4 percent. Corresponding to Cu₉Pt₅As₄S₁₆ = 169-175 kg/sq mm.

The mineral was found in the Tao and Ma (apparently code names-GYC) districts in a certain region in China. In the Tao district the occurrence and mineral associations are the same as for yixunite and dayingite. In the Ma district, the mineral occurs in the olivine pyroxenite type of platinum ores related to Cu-sulfide mineralization, associated with olivine, diopside, serpentine, chlorite, bornite, chalcopyrite, magnetite, pyrite, gold, and Pt are: 466 nm, 40.5, 34.6; 544 nm, 43.1, 37.2; 589 nm, 44.1, 39.2; 656 nm 45.2, 37.2 percent. Isotropic. VHN₁₀⁻²₀ = 657-660 kg/sq mm.

Fengluanite and guanglinite are relatively common minerals in various types of platinum ores in the basic-ultrabasic rocks, particularly in the Hung district, in a certain region in China. Occurrence and mineral associations are the same as given for hongshiite in the Hung district, and as given for yixunite, dayingite, and daomanite in the Tao district. In the Hung district the mineral is often found to replace diopside and biotite and as pseudomorphs after biotite.

Discussion. Unnecessary name for antimonial guanglinite (Pd₃As). See discussion on guanglinite. The d value (2.18 Å) of reflection 110 is apparently in error. GYC,LJC.

Guanglinite, Pd₃As

Electron microprobe analysis gave: Pd 80.3, Pt-, As 14.0, Sb-, sum 100.4 percent, corresponding to Pd₃As₁₆ or ideally Pd₃As₄.

The mineral is orthorhombic with a = 10.83, b = 3.33, and c = 6.07 Å. The strongest X-ray lines (26 given) are: 2.36 70 302, 2.18 100 500, 1.242 50 504, 0.8595 40, 0.8265 50, 0.8050 40, 0.7936 40, 0.7846 40.

Physical properties of guanglinite were reported to be very similar to those of fengluanite, except that guanglinite is usually massive.

Yellow under reflected light. Weakly anisotropic. Parallel extinction. Polishes well. Reflectances are: 466 nm, 45.0; 544 nm, 47.1; 656 nm, 49.4; 589 nm, 48.6 percent. VHN₁₀⁻²₀ = 635-660 kg/sq mm.

Guanglinite occurs as a relatively common mineral in various types of platinum ores in the basic-ultrabasic rocks, particularly in the Hung district, in a certain region in China, associated with the same suite of minerals as given for hongshiite.

Discussion. The mineral appears to be unique. The powder data bear strong similarity to those of synthetic Pd₃As which is trigonal with a = 9.974(2) Å and c = 4.822(2) Å (Saini et al, 1974, Can. J. Chem. 42, 620-629). Further single crystal work is necessary. GYC,LJC.

Hongshiite, TiO

Electron microprobe analysis gave: Ti 74.0, Fe 0.5, O 25 (theoretical), sum 99.5 percent, corresponding to Ti₄FeO₇(Fe₅O₄)O (calculated by GYC) or ideally TiO. The presence of O was confirmed by probe analysis.

The mineral is cubic, Fm₃m with a = 4.293(5) Å, which is significantly larger than that of synthetic TiO (a = 4.177, ASTM 8-117) but is comparable to that of wustite (a = 4.284). The powder pattern contains seven lines: 2.479 50 111, 2.144 100 200, 1.529 70 220, 1.297 50 311, 1.081 80 400, 0.9850 10 331, 0.9600 20 420.

The mineral is bright white with metallic luster and occurs as perfect cube-octahedral crystals (0.2-3.0 mm). Non-magnetic.
brite. White with a pink tint under reflected light. Isotropic, with distinct red internal reflection. Reflectances are: 466 nm, 28.6; 544 nm, 27.5; 589 nm, 35.8; 656 nm, 32.6 percent. VHN$_{\text{np}} = 710$ kg/sq mm.

The mineral occurs in platinum ores of the garnet hornblende pyroxenite type in the Tao district in a certain region in China, associated with minerals similar to those given for yixunite and daomanite.

**Discussion.** The mineral appears to be unique. GYC,LJC.

**Hongshihite, PtCuAs**

Electron microprobe analysis gave: Pt 61.0, Cu 15.7, As 23.0, sum 99.7 percent, corresponding to Pt$_{1.5}$Cu$_{2.0}$As$_{0.5}$ or ideally PtCuAs.

The mineral is hexagonal with $a = 10.51$ and $c = 4.59$ Å. The strongest X-ray lines (34 given) are: 4.52 100 200, 2.211 100 311, 1.910 100 212, 1.361 40 303, 1.344 40 512, 1.156 80 422, 0.8822 70 405, 0.859 80 661.

Color bronze, luster metallic, habit irregular to massive. Grain size 0.1-0.5 mm. Cleavage not observed. Non-magnetic, relatively brittle. Polishes well. White with a yellow tint under reflected light. Reflectances are: 466 nm, 48.1; 544 nm, 45.6; 589 nm, 62.1; 656 nm, 65.3 percent. VHN$_{\text{np}} = 483-482$ kg/sq mm.

The mineral occurs in the actinolitized diopside type of platinum deposits in the Hung (apparently a code name—GYC) district in a certain region in China, associated with diopside, actinolite, epidote, magnetite, bornite, pyrrhotite, cooperite, sperrylite, vysotskite, and two new minerals, fengluanite and guanglinite. The mineral is often found replacing cooperite and replaced by fengluanite.

**Discussion.** The mineral appears to be a new species. The ideal formula, based on data reported, may also be written as (Pt,Cu)$_2$As or (Pt,Cu)$_3$As. GYC,LJC.

**Malanite, (Cu,Pt,Ir)$_2$S$_2$**

Electron microprobe analysis gave: Cu 14.1, Ni 0.5, Fe 1.5, Pt 31.2, Ir 19.1, Pd 0.66, S 32.7, sum 99.76 percent, corresponding to Cu$_{0.29}$Pt$_{0.70}$Ir$_{0.01}$Cu$_{0.00}$S$_{0.22}$ or ideally (Cu,Pt,Ir)$_2$S$_2$.

The mineral is cubic with $a = 6.030(9)$ Å. The strongest X-ray lines (17 given) are: 5.86 80 100, 3.00 70 200, 2.833 60 210, 2.501 100 211, 1.921 70 310, 1.761 100 222, 1.014 50 531, 0.785 80 731.


The mineral occurs in the peridotite type of platinum ores related to Cu-Ni sulfides in a certain region in China, associated with olivine, orthopyroxenes, pyroxenes, serpentine, chlorites, pentlandite, pyrrhotite, bornite, magnetite, cooperite, sperrylite, cuproplatinum, and platinum.

**Discussion.** The mineral appears to be a new species. It may be related to synthetic Cu$_3$S$_2$, Pa$_3$ with $a = 5.79$ Å (Munson, 1966, Inorg. Chem. 5, 1296) and $a = 5.789$ Å (Taylor and Kullerud, 1972, Neues Jährb. Mineral. Monatsh., 458-463); and to fukuchilitte, (Cu,Fe)$_2$O$_3$ (Am. Mineral. 55, 1811). GYC,LJC.

**Xingzhongite, (Ir,Cu,Rh)$_2$S**

Electron microprobe analysis gave: Ir 47.0, Os 3.0, Pt 4.0, Rh 7.6, Cu 10.0, Fe 2.5, Pb 8.0, S 17.1, sum 99.2 percent, corresponding to Ir$_2$Cu$_{17}$Pt$_{15}$Pb$_{22}$As$_{10}$ or ideally (Ir,Cu,Rh)$_2$S.

The mineral is cubic or pseudocubic with $a = 8.72(1)$ Å. The strongest X-ray lines (29 given) are: 5.99 60 110, 3.02 80 220, 1.769 70 422, 1.506 60 530, 1.340 60 541, 1.208 100 640, 1.034 80 822, 1.020 80 830.

The mineral is steel gray with metallic luster. It often occurs as a rim (0.1 mm wide) around iridosmine. Under reflected light the mineral is bluish gray. Reflectances are: 466 nm, 40.5; 544 nm, 38.9; 589 nm, 41.1; 656 nm, 41.0 percent. Isotropic. VHN$_{\text{np}} = 753$ kg/sq mm.

The mineral occurs in the dunite type of platinum ores related to chromium mineralization in a certain region in China, associated with olivine, serpentine, tcalc, chromatite, and minor pyrite. Other platinum group minerals present are polyxene, osmiridium, iridosmine, osmium, iridium, elrichmanite, cooperite, irarsite, osarsite, unnamed Ir-Ni sulfide, unnamed Os-Ni disulfide, unnamed Rh-Ir disulfide.

**Discussion.** The mineral appears to be a new species. The ideal formula, based on data reported, may also be written as Ir$_4$Rh$_7$Pt$_2$S$_{11}$. GYC,LJC.

**Yanzhongite, PdTe-PdTe$'_2$ ( = Kotulskite)**

Electron microprobe analysis of five grains gave (range): Pd 45.0-48.6, Te 49.1-52.0, Bi 5.5, sum 99.3-103.3 percent, corresponding to Pd$_{0.86}$Te$_{0.46}$-$_{0.52}$Bi$_{0.20}$-$_{0.25}$ or ideally PdTe-PdTe$_2$.

Two other analyses gave low sums (88.7 and 90.5 percent). Analysis of argentian varieties gave: Pd 42.0, 41.4; Te 52.6, 52.6; Bi 2.2, $\sim$ Ag 3.7, 5.3; sums 100.5, 99.3 percent, corresponding to Pd$_{0.86}$Ag$_{0.07}$Te$_{0.46}$Bi$_{0.20}$ and Pd$_{0.86}$Ag$_{0.04}$Bi$_{0.11}$Te$_{0.44}$. Analysis of an Hg-bearing variety gave: Pd 40.3, Te 52.7, Hg 7.7, sum 100.7 percent, corresponding to Pd$_{0.90}$Hg$_{0.02}$Te$_{0.46}$Bi$_{0.20}$.

The mineral is hexagonal with $a = 4.12$ and $c = 5.62$ Å. The strongest X-ray lines (15 given) are: 3.037 100 101, 2.848 80 002, 2.222 70 102, 2.094 80 110, 2.014 60 201, 1.530 60 202.

The mineral was only found in polished sections, as droplets near the margin of bornite or in vein minerals such as hornblende. A few grains show hexagonal cross-sections. Grain size several tens of microns up to 0.1 mm.

Pale yellow under reflected light. Bireflectance not observed. Strongly anisotropic, pleochroic: pale bluish, grayish white to dark grayish yellow. Hardness less than that of bornite. Polishes well. Reflectances are: 466 nm, 40.5; 544 nm, 45.6; 656 nm, 65.3 percent. VHN$_{\text{np}} = 15.8$ kg/sq mm. Reflectances and VHN's near Hg-, Ag-, and Bi-bearing varieties are somewhat different.

The mineral occurs in the garnet hornblende pyroxenite type of platinum ores in the Tao district, and in the olivine pyroxenite type of platinum ores in the Ma district, associated with minerals similar to those given for daomanite. In the Tao district the mineral is closely associated with bornite and is often found to replace bornite.

**Discussion.** Unnecessary name for kotulskite (Am. Mineral. 48, 1181). The d value (2.014) of reflection 201 is apparently in error. GYC,LJC.

**Yixunite, PtIn**

Electron microprobe analysis gave: Pt 66.0, In 33.5, sum 99.5 percent, corresponding to Pt$_{0.86}$In$_{0.09}$ or ideally PtIn. The mineral is not attacked by HCl, HNO$_3$, or H$_2$PO$_4$.

The mineral is cubic, Fm3m with $a = 3.948(5)$ Å. The powder pattern contains nine lines: 2.294 50 111, 1.991 70 200, 1.395 50 220, 1.187 100 311, 1.140 30 222, 0.9873 20 400, 0.9048 40 331, 0.8820 50 420, 0.8057 60 422.

Color bright white with a blue tint, luster metallic, cleavage ab-
sent, non-magnetic. Mineral grains are rounded (size not given). Under reflected light the mineral is bright white with a slight yellow tint, isotropic. Reflectances are: 466 nm, 67.0; 544 nm, 63.9; 589 nm, 78.5; 656 nm, 75.8 percent. VHN₉₀ = 159.4 kg/sq mm.

The mineral occurs in the garnet hornblende pyroxenite type of platinum ores related to Cu-sulfides in the Tao (GYC: apparently a code name) district in a certain region in China, associated with almandine, hornblende, diopside, augite, plagioclase, sphene, apatite, clathropyrite, bornite, magnetite, covellite, carrollite, goethite, columbite, cooperite, sperrylite, moncheite, and other new minerals fengluanite, dayingite, yanzhongite, daomanite, and hongquite.

Discussion. The mineral appears to be a new species but the synthetic compound PtIn has not been reported for the Pt-In system. GYC, LJC.

Unnamed Sulfides of Ir, Os, Rh, Ni

(1) (Ni₀·₈₁Ir₀·₁₉)S

Electron microprobe analysis gave: Ir 41.0, 39.0; Os 2.0, 2.5; Ni 14.3, 11.5; Fe 11.0, 10.1; Cu 5.7, 4.5; Co 2.8, 0.7; S 24.5, 21.5; sum 101.4, 89.9 percent, the former corresponding to Ir₉₀Ni₈₀Fe₀₈₀Cu₀₁₆₁Co₀₆₀S₁₀₀, or ideally (Ni₀·₈₁Ir₀·₁₉)S or (Ni,Fe,Cu)₀·₈₁Ir₀·₁₉S. The strongest X-ray lines (45 given, unindexed) are: 3.33 100, 2.982 80, 2.894 75, 2.798 60, 2.046 60, 1.917 80, 1.748 100, 1.022 50.

Reddish brown in reflected light. Strongly anisotropic, pleochroic: pale blue-fire red. Reflectances are: 466 nm, 46.9; 544 nm, 43.7; 589 nm, 43.4; 656 nm, 43.1 percent, VHN₉₀ = 642 kg/sq mm. Cleavage not observed. Polishes well.

The mineral occurs as rims around osmiridium, associated with pyoxene, erlichmanite, irarsite and other minerals in chromium ores in dunite.

Discussion. The mineral is probably the Cu analog of the Cu analog of hemihedrite, with a series probably existing. Khuniite (Am. Mineral. 55, 1813, 58, 562; 59, 633) is iranite, not hemihedrite. M.F.

(2) (Ir,Rh,Ni)S

Electron microprobe analysis gave: Ir 59.0, Rh 14.2, Pt 3.5, Ni 4.9, S 17.5, sum 99.1 percent, corresponding to Ir₉₀Rh₆₀Pt₄₀Ni₄₀S₁₀₀ or ideally (Ir,Rh,Ni)S.

Bluish gray under reflected light. Strongly anisotropic, pleochroic: dull red-bluish green. Reflectances are: 466 nm, 40.8; 544 nm, 39.5; 589 nm, 37.8; 656 nm, 41.5 percent. VHN₉₀ = 1650 kg/sq mm.

The mineral occurs in chromium ores of the dunite type, as an exsolution product in osmiridium.

(3) (Os,Ni)S₂

Electron microprobe analysis gave: Os 48.5, Ni 15.0, Ru 5.0, S 31.7, sum 100.2 percent, corresponding to Os₀·₅₄Ru₀·₂₅₁Ni₀·₄₂₁S₂₀₀. Color bluish gray under reflected light. Isotropic with high relief. Reflectances are: 466 nm, 42.0; 544 nm, 44.5; 589 nm, 43.7; 656 nm, 43.7 percent. VHN₉₀ = 2575 kg/sq mm.

The mineral occurs as worm-like exsolution product (0.09 x 0.02 mm) in osmiridium in the chromium ores of the dunite type.

(4) (Ir,Rh)S₂

Electron microprobe analysis gave: Ir 58.0, Rh 14.5, S 29.5, sum 102.0 percent, corresponding to Ir₉₀Rh₆₀Pt₄₀Ni₄₀S₁₀₀ or ideally (Ir,Rh)S₂. Bluish gray under reflected light. Isotropic with high relief. Reflectances are: 466 nm, 45.1; 544 nm, 48.1; 589 nm, 51.3; 656 nm, 47.1 percent. VHN₉₀ = 2300 kg/sq mm.

The mineral occurs as euhedral rhombohedral crystals (10 microns) in a matrix of pyroxene in the chromium ores of the dunite type.

Discussion. (Ni₀·₈₁Ir₀·₁₉)S may be structurally unique if X-ray data reported were from pure material. (Ir,Rh,Ni)S and (Ir,Rh)S₂ are compositionally unique. (Os,Ni)S₂ may be a nickelloan erlichmanite. On the other hand, the near 1:1 ratio of Os:Ni may be structurally significant. We agree with the authors' statement that further studies are necessary for full characterization. GYC, LJC.

NEW DATA

(Khuniite = Iranite)


Iranite was described as PbCrO₄ · H₂O (Am. Mineral. 48, 1417), but new analyses of type material show CuO 4.59, ZnO 0.20 percent (Sebarz, Iran); CuO 2.29, ZnO 0.43 percent (Seh-Changi, Iran). The X-ray data for these match closely those for hemihedrite (Am. Mineral. 55, 1088–1102), and iranite is probably the Cu analog of hemihedrite, with a series probably existing. Khuniite (Am. Mineral. 55, 1813, 58, 562; 59, 633) is iranite, not hemihedrite. M.F.

Errata

Am. Mineral. 60, 488. In the discussion of natrofairchildite, “one percent cleavage” should read “one perfect cleavage.”