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**New minerals recently approved  
by the  
Commission on New Minerals and Mineral Names  
International Mineralogical Association**

The information given here is provided by the Commission on New Minerals and Mineral Names, I. M. A. for comparative purposes and as a service to mineralogists working on new species.

Each mineral is described in the following format:

IMA No.

(any relationship to other minerals)

Chemical Formula

Crystal system, space group

unit cell parameters

Colour; lustre; diaphaneity

Optical properties

Strongest lines in the X-ray powder diffraction pattern

The names of these approved species are considered confidential information until the authors have published their descriptions or released information themselves.

**No other information will be released by the commission.**

J. A. Mandarino, Chairman  
Commission on New Minerals and Mineral Names  
International Mineralogical Association

## 1993 Proposals

IMA No. 93-001

The calcium-analogue of burbankite and khanneshite.

$\text{Na}_3(\text{Ca,REE,Sr})_3(\text{CO}_3)_5$

Hexagonal:  $P6_3mc$ ,  $P6_2c$  or  $P6_3mmc$

$a$  10.447,  $c$  6.318 Å

Deep orange; vitreous; translucent.

Uniaxial (-),  $\omega$  1.636,  $\epsilon$  1.631.

5.20 (4), 3.68 (3), 3.01 (5), 2.601 (10),

2.130 (6), 1.649 (3).

Hexagonal (trigonal):  $R\bar{3}$  or  $R3$ .

$a$  7.514,  $c$  20.52 Å

Very dark brown to almost black; submetallic to vitreous; opaque, but translucent in thin plates.

Uniaxial (-),  $\omega > 2.00$ ,  $\epsilon$  1.97.

6.84 (10), 4.01 (2), 2.219 (3), 1.884 (2),

1.575 (2).

IMA No. 93-002

The nickel-analogue of chalcophanite.

$\text{NiMn}_3\text{O}_7 \cdot 3\text{H}_2\text{O}$

IMA No. 93-003

The arsenate-analogue of berlinite.

$\text{AlAsO}_4$

Hexagonal (trigonal):  $P3_121$  or  $P3_221$

$a$  5.031,  $c$  11.226 Å

Colourless, white, cream; vitreous; transparent.

Uniaxial (+),  $\omega$  1.596,  $\varepsilon$  1.608.

4.36 (20), 4.06 (31), 3.442 (100), 2.359 (15),  
1.873 (16), 1.4202 (11).

IMA No. 93-004

The aluminum-analogue of klyuchevskite.

$\text{K}_3\text{Cu}_3\text{AlO}_2(\text{SO}_4)_4$

Monoclinic: I2

a 18.423, b 5.139, c 18.690 Å,  $\beta$  101.72°

Dark green; vitreous; transparent.

Biaxial (+),  $\alpha$  1.542,  $\beta$  1.548,  $\gamma$  1.641,

2V(meas.) unknown, 2V(calc.) 30°.

9.15 (84), 9.04 (100), 7.20 (52), 3.781 (37),  
3.757 (33), 2.786 (21).

IMA No. 93-005

$\text{NaBa}_3(\text{Mn}^{2+}, \text{Mn}^{3+})_4[\text{Si}_4\text{O}_{10}(\text{OH})_2][\text{Si}_2\text{O}_7]\text{O}_2\text{F}$   
·  $\text{H}_2\text{O}$

Orthorhombic: Pnma

a 23.42, b 12.266, c 7.181 Å

Black with a green shade; vitreous to greasy;  
translucent.

Biaxial (+),  $\alpha$  1.767,  $\beta$  1.793,  $\gamma$  1.871,

2V(meas.) 60–65°, 2V(calc.) 62°.

4.580 (5), 3.303 (9), 2.999 (10), 2.715 (5),  
2.655 (10), 2.156 (4), 1.648 (5).

IMA No. 93-006

A tetragonal polymorph of rooseveltite.

$\text{BiAsO}_4$

Tetragonal:  $I4_1/a$

a 5.085, c 11.69 Å

White to yellowish white; earthy; opaque.

Uniaxial (+), mean  $n > 2.0$ .

4.660 (11), 3.066 (100), 2.546 (12), 1.797 (11),  
1.581 (10), 1.551 (17).

IMA No. 93-008

$\text{NH}_4\text{BF}_4$

Orthorhombic: Pnma

a 9.0615, b 5.6727, c 7.2672 Å

Colourless to white and yellowish; vitreous;  
transparent to translucent.

Biaxial, mean  $n$  calculated from Gladstone-  
Dale is 1.308.

4.472 (75), 3.540 (90), 3.183 (100), 2.8982 (80),  
2.5362 (65), 2.2822 (65), 2.1631 (70).

IMA No. 93-009

A tetragonal polymorph of bismite.

$\text{Bi}_2\text{O}_3$

Tetragonal:  $P4_2/n$  or  $P4_2,2_1,2$

a 8.08, c 6.46 Å

Green, yellowish; adamantine; translucent.

Uniaxial (+),  $\omega$  2.13,  $\varepsilon$  2.18.

5.73 (7), 3.44 (5), 3.16 (10), 3.01 (4),  
2.56 (4dif.), 2.02 (5), 1.902 (6).

IMA No. 93-010

The magnesium analogue of fillowite and  
johnsomervilleite.

$\text{Na}_2\text{CaMg}_7(\text{PO}_4)_6$

Hexagonal (trigonal):  $R\bar{3}$

a 14.967, c 42.595 Å

Colourless; vitreous; transparent.

Uniaxial, indices of refraction calculated  
from reflectance values:  $n_1$  1.60,  $n_2$  1.62.

3.694 (S), 3.558 (M), 2.960 (S), 2.753 (S),  
2.500 (M), 2.126 (M), 1.851 (M).

IMA No. 93-011

$\text{Cu}_3\text{MoO}_4(\text{OH})_4$

Orthorhombic: Pnmm

a 8.499, b 12.527, c 6.067 Å

Dark green; adamantine; transparent.

Biaxial (+),  $\alpha$  slightly  $< 1.89$ ,  $\beta$  unknown,  
 $\gamma < 1.91$ , 2V(meas.) 74°.

5.471 (S), 3.754 (S), 3.043 (S), 2.591 (VS),  
1.519 (S).

IMA No. 93-013

$\text{CaSrAl}(\text{F}, \text{OH})_7$

Monoclinic:  $P2_1/c$

a 8.215, b 11.989, c 6.076 Å,  $\beta$  96.22°

Colourless; vitreous; transparent.

Biaxial (+),  $\alpha$  1.4240,  $\beta$  1.4320,  $\gamma$  1.4415,

2V(meas.) 85.5°, 2V(calc.) 85.6°.

6.758 (7), 4.250 (9), 3.643 (8), 3.148 (7),  
3.063 (8), 3.030 (7), 2.840 (7), 2.125 (8).

IMA No. 93-016

$\text{IrBiTe}$

Cubic: Pa3

a 6.502 Å

Steel black; metallic; opaque.

In reflected light: bright white with a  
yellowish tint, moderate anisotropism, no  
bireflectance, nonpleochroic. R: (51.0%)  
470 nm, (52.6%) 546 nm, (52.9%) 589 nm,  
(49.2%) 650 nm.

2.89 (70), 1.955 (100), 1.735 (80), 1.250 (80),  
1.207 (70), 1.148 (70), 1.054 (70).

IMA No. 93-017

$\text{Ir}_{1-x}\text{Te}_2$   $x = 0.24$

Cubic: Pa3

a 6.413 Å

Steel black; metallic; opaque.

In reflected light: bright white with bluish tint,  
no anisotropism, no bireflectance,  
nonpleochroic. R: (44.3%) 470 nm, (46.0%)  
546 nm, (46.9%) 589 nm, (45.5%) 650 nm.

2.86 (70), 1.93 (100), 1.235 (80), 1.132 (90),  
1.040 (80), 0.9780 (80).

## IMA No. 93-018

$IrTe_2$

Hexagonal:  $P\bar{3}m1$

a 3.933, c 5.390 Å

Steel black; metallic; opaque.

In reflected light: bright yellowish white with bluish tint, moderate anisotropism with bluish or yellowish tint, no bireflectance, nonpleochroic.  $R_O$  &  $R_E$ : (41.4, 49.0%) 470 nm, (40.2, 48.2%) 546 nm, (41.1, 49.0%) 589 nm, (45.2, 51.2%) 650 nm.

2.85 (100), 2.10 (80), 1.95 (60), 1.580 (70),  
1.160 (60), 1.110 (70).

## IMA No. 93-019

$Bi_6Te_2O_{13}$

Orthorhombic: space group unknown

a 5.689, b 10.791, c 5.308 Å

Yellow green to light green; adamantine; transparent.

Biaxial n's > 2. In reflected light,

R: (14.8%) 470 nm, (13.0%) 546 nm,  
(13.2%) 589 nm, (13.6%) 650 nm.

3.146 (100), 2.841 (80), 2.694 (20), 1.956 (10),  
1.695 (20), 1.631 (10).

## IMA No. 93-020

The selenate-dominant analogue of 93-021.

$K_6(Na,K)_4Na_6Mg_{10}(IO_3)_{12}(SeO_4,SO_4,$   
 $CrO_4)_{12} \cdot 12 H_2O$

Hexagonal:  $P\bar{3}c1$

a 9.590, c 27.60 Å

Pale yellow; vitreous; transparent.

Uniaxial (-),  $\omega$  1.655,  $\epsilon$  1.642.

13.75 (30), 7.10 (20), 3.974 (16), 3.561 (100),  
3.082 (32), 3.058 (39), 2.715 (39).

## IMA No. 93-021

The sulfate-dominant analogue of 93-020.

$K_6(Na,K)_4Na_6Mg_{10}(IO_3)_{12}(SO_4)_{12} \cdot 12 H_2O$

Hexagonal:  $P\bar{3}c1$

a 9.4643, c 27.336 Å

Pale yellow; vitreous; transparent.

Uniaxial (-),  $\omega$  1.622,  $\epsilon$  1.615.

13.67 (50), 7.05 (40), 3.927 (100), 3.515 (24),  
3.023 (41), 2.681 (33), 2.3273 (21).

## IMA No. 93-022

$CaNaB_5O_8(OH)_2 \cdot 3 H_2O$

Monoclinic:  $P2_1/c$

a 6.50, b 13.280, c 11.462 Å,  $\beta$  92.97°

White; silky to pearly; translucent.

Biaxial (-),  $\alpha$  1.540,  $\beta$  1.554,  $\gamma$  1.558,  
 $2V$ (meas.) 60°,  $2V$ (calc.) 56°.

8.64 (100), 6.62 (30), 4.18 (17), 2.868 (26),  
2.845 (16), 2.795 (17), 2.587 (15).

## IMA No. 93-023

$AlCa_2(SO_4)_2F_2Cl \cdot 4 H_2O$

Tetragonal:  $I4/m$

a 6.859, c 13.310 Å

White; vitreous; transparent.

Uniaxial (+),  $\omega$  1.509,  $\epsilon$  1.526.

6.67 (60), 3.922 (50), 3.729 (40), 3.431 (100),  
3.335 (80), 3.052 (40), 2.483 (40).

## IMA No. 93-024

$NaAlZr(PO_4)_2(OH)_2 \cdot H_2O$

Monoclinic: space group unknown

a 20.840, b 9.871, c 11.195 Å,  $\beta$  104.41°

Pale pinkish orange; vitreous; translucent.

Biaxial, n's vary from 1.62 (parallel to fibres)  
to 1.64 (normal to fibres).

8.865 (40), 4.128 (80), 3.711 (65), 3.465 (60),  
3.243 (35), 2.603 (100).

## IMA No. 93-025

$TlPb(As,Sb)_3S_6$

Monoclinic:  $P2_1/a$

a 8.444, b 23.97, c 5.844 Å,  $\beta$  113.58°

Brilliant black, but dark red in thin fragments;  
metallic to submetallic; opaque, but trans-  
lucent in thin fragments.

In reflected light: greyish white, clearly visible  
anisotropism from bluish to very weak red-  
dish, visible bireflectance, nonpleochroic.

$R_{min}$  &  $R_{max}$ : (29.7, 35.4%) 470 nm, (28.8,  
33.1%) 546 nm, (26.7, 30.3%) 589 nm,  
(26.6, 29.9%) 650 nm.

5.346 (32), 3.998 (74), 3.816 (54), 3.587 (86),  
2.823 (100), 2.778 (84), 2.670 (58).

## IMA No. 93-026

A member of the amphibole group.

$NaNa_2[(Fe^{2+},Mn^{2+},Mg)_2Fe_3^{2+}Li]Si_8O_{22}F_2$

Monoclinic:  $C2/m$

a 9.792, b 17.938, c 5.3133 Å,  $\beta$  103.87°

Bluish black to black; vitreous; opaque.

Biaxial (+),  $\alpha$  1.675,  $\beta$  1.683,  $\gamma$  1.694,  
 $2V$ (meas.) 87°,  $2V$ (calc.) 81°.

8.426 (45), 4.481 (54), 3.404 (57), 2.985 (38),  
2.710 (100), 2.585 (38), 2.536 (92).

## IMA No. 93-028

$AuSn$

Hexagonal:  $P6_3/mmc$

a 4.316, c 5.510 Å

White, greyish-black to black (when  
oxidized); metallic; opaque.

In reflected light: white with light yellow tint,  
clear anisotropism light yellow with a

brown tint, faint bireflectance, nonpleochroic.  $R_O$  &  $R_E$ : (65.4, 65.2 %) 470 nm, (76.7, 74.8%) 546 nm, (80.5, 77.9%) 589 nm, (82.8, 79.5%) 650 nm.

3.726 (34), 3.087 (38), 2.218 (100), 2.159 (57), 1.546 (31), 1.258 (25), 1.256 (26).

IMA No. 93-030

$Na_3Sr(PO_4)(CO_3)$

Monoclinic:  $P2_1$

a 9.187, b 6.707, c 5.279 Å,  $\beta$  89.98

Colourless to white; vitreous; transparent.

Biaxial (-),  $\alpha$  1.520,  $\beta$  1.564,  $\gamma$  1.565,  $2V$ (meas.) 20°,  $2V$ (calc.) 17°.

3.35 (50), 2.708 (100), 2.648 (90), 2.172 (100), 2.080 (50), 1.891 (80), 1.676 (50), 1.415 (70).

IMA No. 93-031

$PbAl(F,OH)_5$

Triclinic:  $P1$  or  $P\bar{1}$

a 6.259, b 6.791, c 5.053 Å,  $\alpha$  90.92,  $\beta$  107.45,  $\gamma$  104.45°

White to colourless; vitreous; transparent.

Biaxial (-),  $\alpha$  1.629,  $\beta$  1.682,  $\gamma$  1.691,  $2V$ (meas.) 41°,  $2V$ (calc.) 44°.

4.42 (100), 4.05 (35), 3.221 (40), 2.595 (70), 2.190 (65), 2.030 (50), 2.015 (40).

IMA No. 93-032

$CaVOSiO_4$

Monoclinic:  $C2/c$

a 6.526, b 8.691, c 7.032 Å,  $\beta$  113.88°

Deep red; adamantine; transparent.

Biaxial (sign unknown),  $\alpha \sim 1.95$ ,  $\beta$  unknown,  $\gamma$  2.105,  $2V$ (meas.) unknown.

4.90 (W), 3.22 (VS), 2.97 (M), 2.59 (S), 2.271 (W), 1.641 (W).

IMA No. 93-034

$(Y,Ca,NaREE)_4Si_5O_{15} \cdot n H_2O$   $n \sim 4$

Triclinic:  $P1$  or  $P\bar{1}$

a 9.245, b 9.684, c 5.510 Å,  $\alpha$  97.44°

$\beta$  100.40°,  $\gamma$  116.70°.

White; vitreous; translucent.

Biaxial (-),  $\alpha$  1.602,  $\beta$  1.607,  $\gamma$  1.611,  $2V$ (meas.) 73°,  $2V$ (calc.) 83°.

8.44 (80), 8.01 (50), 4.51 (50), 3.76 (70), 2.973 (100), 2.930 (60).

IMA No. 93-035

The chromium-dominant analogue of schreyerite.

$(Cr,V)_2Ti_3O_9$

Monoclinic:  $C2/c$ ,  $Cc$ ,  $P2_1/c$ ,  $P2/c$  or  $Pc$

a 7.03, b 5.02, c 18.83 Å,  $\beta$  119.60°

Black; metallic; opaque.

In reflected light: white, faint anisotropism,

faint bireflectance, faint pleochroism pale brown.  $R_{min}$  &  $R_{max}$ : (18.1, 20.1%) 470 nm, (18.5, 19.9%) 546 nm, (18.4, 19.8%) 589 nm, (18.6, 20.9 %) 650 nm.

2.88 (2), 2.75 (3), 2.43 (2), 1.635 (3), 1.386 (2).

IMA No. 93-036

$BaCuSi_4O_{10}$

Tetragonal:  $P4/ncc$

a 7.441, c 16.133 Å

Blue; vitreous; transparent.

Uniaxial (-),  $\omega$  1.633,  $\epsilon$  1.593.

8.055 (100), 4.031 (35), 3.544 (15), 3.200 (21), 2.688 (18), 2.395 (19), 2.016 (26).

IMA No. 93-037

The K-dominant analogue of gainesite.

$NaKZr_2(Be,Al,Ca,Mn)(PO_4)_4 \cdot 2 H_2O$

Tetragonal:  $I4_1/amd$

a 6.570, c 17.142 Å

Intense bluish purple or pale lilac; vitreous; transparent.

Uniaxial (+),  $\omega$  1.624,  $\epsilon$  1.636.

6.161 (100), 4.291 (25), 3.286 (50), 3.039 (30), 2.895 (20).

IMA No. 93-038

$Na(REE,Ca)_2F$

Hexagonal:  $P\bar{3}$

a 6.099, c 11.066 Å

Pale pink to colourless; vitreous; transparent.

Uniaxial (+),  $\omega$  1.483,  $\epsilon$  1.503.

5.29 (70), 3.036 (100), 2.146 (70), 1.757 (80), 1.152 (40), 0.9189 (40).

IMA No. 93-040

The  $PO_4$ -analogue of atelestite and a monoclinic polymorph of petitjeanite.

$Bi_2O(OH)(PO_4)$

Monoclinic:  $P2_1/c$

a 6.954, b 7.494, c 10.869 Å,  $\beta$  107.00°

White to yellow; adamantine; translucent.

Biaxial (+),  $\alpha$  2.05,  $\beta$  2.06,  $\gamma$  2.09,  $2V$ (meas.) 45°,  $2V$ (calc.) 61°.

4.268 (17), 3.271 (51), 3.254 (100), 3.145 (34), 2.727 (29), 1.885 (16).

IMA No. 93-041

$Hg_3^{1+}(CO_3)(OH) \cdot 2 H_2O$

Orthorhombic:  $Pcab$

a 11.130, b 11.139, c 10.725 Å

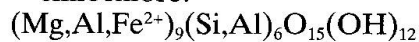
Black to very dark red-brown; sub-metallic to adamantine; opaque.

In reflected light: grey with slight bluish tinge, weak anisotropism (dull and dark greys and browns), weak to moderate bireflectance, nonpleochroic.  $R_{min}$  &  $R_{max}$ : (11.4, 12.15%)

470 nm, (10.95, 11.6%) 546 nm, (10.85, 11.5%) 589 nm, (10.7, 11.2%) 650 nm.  
4.84 (50), 2.969 (70), 2.786 (70), 2.648 (100),  
2.419 (60), 1.580 (50).

## IMA No. 93-042

A regular interstratification of amesite and clinochlore.



Monoclinic: Cm

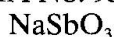
a 5.323, b 9.214, c 21.45 Å,  $\beta$  94.43°

Colourless to very pale green; nacreous; translucent.

Biaxial (+),  $\alpha$  1.575,  $\beta$  1.575,  $\gamma$  1.581,  
2V(meas.) 0°, 2V(calc.) 0°.

7.1 (100), 4.61 (60), 3.560 (80), 2.557 (40),  
2.427 (60), 1.536 (70).

## IMA No. 93-044



Isostructural with ilmenite and geikielite

Hexagonal: R $\bar{3}$

a 5.301, c 15.932 Å

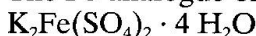
Colourless; pearly; transparent.

Uniaxial (-),  $\omega$  1.1.84,  $\epsilon$  1.631.

5.30 (53), 3.00 (55), 2.650 (67), 2.365 (69),  
1.874 (100), 1.471 (69).

## IMA No. 93-045

The Fe-analogue of leonite.



Monoclinic: C2/m

a 11.843, b 9.552, c 9.945 Å,  $\beta$  94.89°

Colourless to light yellow; vitreous; transparent.

Biaxial (+),  $\alpha$  1.497,  $\beta$  1.501,  $\gamma$  1.509,  
2V(meas.) 73°, 2V(calc.) 71°.

4.776 (30), 3.504 (52), 3.439 (100), 3.330 (48),  
3.051 (29), 2.405 (30), 2.389 (49).

## IMA No. 93-046



Monoclinic: F2/m

a 13.44, b 10.749, c 10.448 Å,  $\beta$  118.32°

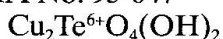
Megascopic colour not observed; metallic; opaque.

In reflected light: pale slightly brownish grey,  
weak anisotropism in greys and browns,  
weak bireflectance, pleochroism weak.

R<sub>1</sub> & R<sub>2</sub>: (47.2, 48.9%) 470 nm, (48.4,  
50.3%) 546 nm, (49.1, 50.7%) 589 nm, (49.8,  
51.0%) 650 nm.

3.156 (100), 3.081 (100), 2.957 (90), 2.234 (60),  
1.871 (80), 1.791 (90), 1.532 (70).

## IMA No. 93-047



Monoclinic: P2<sub>1</sub>/n

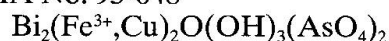
a 9.095, b, 5.206, c 4.604 Å,  $\beta$  98.69°

Medium leaf green; adamantine; transparent.

In reflected light: pale grey, weak anisotropism with brown rotation tints, weak bireflectance, nonpleochroic. The mean index of refraction calculated from the reflectances at 589 nm is 2.00.

4.506 (40), 4.337 (60), 3.838 (50), 2.891 (70),  
2.598 (100), 1.834 (40), 1.713 (40),  
1.500 (40).

## IMA No. 93-048



Triclinic: P1 or P $\bar{1}$

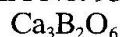
a 4.569, b 6.162, c 8.993 Å,  $\alpha$  94.56,  $\beta$  99.68,  
 $\gamma$  94.31°

Brown-yellow; adamantine; transparent to translucent.

Biaxial (-),  $\alpha$  2.04,  $\beta$  2.10 (calc.),  $\gamma$  2.11,  
2V(meas.) 45°.

8.822 (62), 3.749 (100), 3.596 (77), 3.468 (58),  
2.903 (69), 2.810 (51), 2.685 (48).

## IMA No. 93-049



Hexagonal: R $\bar{3}c$  or R3c

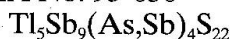
a 8.638, c 11.850 Å

Greyish white; vitreous; transparent.

Uniaxial (-),  $\omega$  1.726,  $\epsilon$  1.630.

2.915 (100), 2.756 (61), 2.493 (44), 2.160 (19),  
2.044 (21), 1.976 (18), 1.895 (75).

## IMA No. 93-050



Triclinic: P $\bar{1}$

a 7.393, b 8.707, c 17.58 Å,  $\alpha$  103.81°,  
 $\beta$  91.79°,  $\gamma$  109.50°

Black; metallic; opaque.

In reflected light: white, distinct to strong anisotropism with blue or blue-green colours, weak to medium bireflectance, pleochroism white to white with grey-blue tints. R<sub>min.</sub> & R<sub>max.</sub>: (34.0, 36.7%) 470 nm, (32.0, 34.9%) 546 nm, (30.5, 33.0%) 589 nm, (28.1, 29.7%) 650 nm.

3.459 (100), 3.388 (64), 3.177 (54), 3.076 (65),  
2.802 (44), 2.287 (57), 1.736 (38).

## IMA No. 93-051



Monoclinic: space group unknown

a 9.717, b 7.280, c 6.559 Å,  $\beta$  95.00°

Yellow; metallic; opaque.

In reflected light: yellow, strong anisotropism with orange, yellow-orange and greenish grey colours, distinct bireflectance, pleoch-

roism greyish brown, orange, yellow orange.  $R_{\min.}$  &  $R_{\max.}$ : (19.5, 32.1%) 470 nm, (23.8, 36.8%) 546 nm, (24.6, 37.4%) 589 nm, (25.1, 37.3%) 650 nm.

2.709 (10), 2.419 (8), 2.323 (7), 1.92 (6), 1.758 (8), 0.9605 (6), 0.9576 (7).

IMA No. 93-052



Monoclinic: C2/c

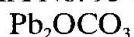
a 12.94, b 8.910, c 5.446 Å,  $\beta$  107.0°

Colourless to white; vitreous; transparent.

Biaxial (+),  $\alpha$  1.6178,  $\beta$  1.6184,  $\gamma$  1.6516, 2V(meas.) 12°, 2V(calc.) 15.5° (synthetic material).

4.460 (43), 3.609 (13), 3.515 (100), 2.882 (13), 2.605 (36), 2.440 (21), 1.764 (20).

IMA No. 93-053



Orthorhombic: P2<sub>1</sub>22<sub>1</sub> or P2<sub>1</sub>2<sub>1</sub>2<sub>1</sub>

a 9.294, b 9.000, c 5.133 Å

White; waxy; transparent to opaque.

The mean index of refraction calculated from the reflectance value at 589 nm is 2.09.

6.49 (30), 4.02 (40), 3.215 (100), 3.181 (90), 2.858 (40), 2.564 (35).

IMA No. 93-054

The Se-analogue of pyrite.



Cubic: Pa $\bar{3}$

a 5.783 Å

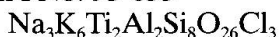
Black; metallic; opaque.

In reflected light: pink-yellow, no anisotropism, no bireflectance, nonpleochroic.

R: (42.4%) 470 nm, (42.7%) 546 nm, (45.7%) 589 nm, (49.8%) 650 nm.

2.888 (50), 2.588 (100), 2.364 (80), 2.045 (40), 1.743 (50), 1.546 (60), 1.1131 (40).

IMA No. 93-055



Monoclinic: C2/m

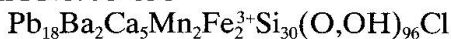
a 10.37, b 16.32, c 9.16 Å,  $\beta$  105.6°

Colourless; vitreous; transparent.

Biaxial (+),  $\alpha$  1.601,  $\beta$  1.625,  $\gamma$  1.654, 2V(meas.) 85°, 2V(calc.) 86°.

8.22 (71), 3.50 (42), 3.157 (35), 3.049 (100), 2.900 (71), 2.835 (84).

IMA No. 93-056



Hexagonal: R $\bar{3}$

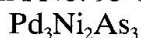
a 9.863, c 79.45 Å

Colourless; adamantine; transparent.

Uniaxial (-),  $\omega$  1.845,  $\epsilon$  1.815.

13.4 (50), 4.43 (30), 3.98 (30), 3.32 (100), 3.11 (40), 2.969 (40), 2.671 (80).

IMA No. 93-057



Hexagonal: P6<sub>3</sub>/m, P6<sub>3</sub> or P6<sub>3</sub>22

a 8.406, c 6.740 Å

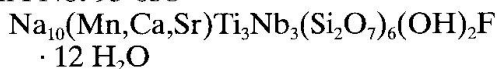
Megascopic colour not observed; metallic; opaque.

In reflected light: rose, distinct anisotropism from light grey to greyish-brown, no bireflectance, nonpleochroic.  $R_{\min.}$  &  $R_{\max.}$ :

(48.4, 50.2%) 470 nm, (51.2, 53.2%) 546 nm, (53.2, 55.3%) 589 nm, (56.6, 58.7%) 650 nm.

2.626 (10), 2.477 (10), 2.429 (8), 2.283 (7), 1.978 (7), 1.818 (7), 1.781 (7).

IMA No. 93-058



Monoclinic: Pm, P2 or P2/m

a 5.468, b 7.18, c 31.1 Å,  $\beta$  94.0°

Colourless, white, silvery, pale pink or cream; greasy to pearly; transparent to translucent.

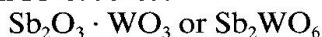
Biaxial (+),  $\alpha$  1.608,  $\beta$  1.630,  $\gamma$  1.660,

2V(meas.) 82°, 2V(calc.) 83°

15.56 (9), 5.16 (6), 3.11 (10), 2.850 (7),

2.665 (7), 2.627 (7), 2.217 (6), 1.795 (6).

IMA No. 93-059



Orthorhombic: probably P22<sub>1</sub>2<sub>1</sub>

a 8.59, b 9.58, c 6.12 Å

Green to dark green; pearly to dull; translucent to opaque.

Biaxial (+),  $\alpha$  2.285,  $\beta$  2.40,  $\gamma$  2.58,

2V(meas.) large, 2V(calc.) 82°.

3.32 (10), 3.06 (10), 2.98 (4), 2.73 (6), 2.46 (5),

1.919 (4).

IMA No. 93-060

A monoclinic polymorph of atacamite, botallackite and paratacamite.



Monoclinic: P2<sub>1</sub>/n

a 6.157, b 6.814, c 9.104 Å,  $\beta$  99.65°

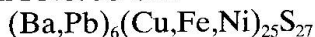
Green to dark greenish black; adamantine; translucent to transparent.

Biaxial (-), indices of refraction could not be measured because mineral reacts with immersion liquids, 2V(meas.) 75°.

5.44 (100), 2.887 (40), 2.767 (60), 2.742 (70),

2.266 (60), 2.243 (50), 1.704 (50).

IMA No. 93-061



Cubic: Pm $\bar{3}m$

a 10.373 Å

Megascopic colour unknown; metallic;  
opaque.

In reflected light: pale brownish grey, no  
anisotropism, no bireflectance, nonpleo-  
chroic. R: (22.0%) 470 nm, (24.85%)  
546 nm, (26.2%) 589 nm, (27.55%) 650 nm.  
3.460 (40), 3.281 (40), 2.996 (90), 2.378 (90),  
1.835 (100), 1.779 (40).

IMA No. 93-062

(Pd,Ag)<sub>2</sub>Te

Tetragonal:  $P4_22$ ,  $P4_2/m$  or  $P4_2$

a 8.913, c 6.098 Å

Megascopic colour unknown; metallic;  
opaque.

In reflected light: brownish-rose, distinct to  
strong anisotropism from white to rose-  
brown, distinct bireflectance, pleochroic  
from brownish-grey to violet-rose.

$R_{min.}$  &  $R_{max.}$ : (38.7, 48.7%) 470 nm, (44.0,  
55.5%) 546 nm, (47.3, 58.2%) 589 nm,  
(50.7, 60.7%) 650 nm.  
3.051 (6), 2.825 (10), 2.553 (4), 2.231 (6),  
2.042 (5), 1.326 (3).

### Notice

Dr. J. A. Mandarino retires as Chairman of  
the Commission on New Minerals and Mineral  
Names (CNMMN) of the International Mineral-  
ogical Association on 31 December 1994. After  
that date, all proposals for new minerals should  
be sent to the new Chairman:

Dr. J. D. Grice  
Mineral Sciences Division  
Canadian Museum of Nature  
P.O. Box 3443  
Station 'D'  
Ottawa, Ontario  
K1P 6P4 CANADA

Dr. E. H. Nickel remains the Vice-chairman of  
the CNMMN and will continue to handle re-  
definitions, discreditations and revalidations.  
Proposals of these kinds should be sent to:

Dr. E. H. Nickel  
Division of Mineral Products  
CSIRO  
Private Bag  
P. O. Wembley  
Western Australia 6014  
AUSTRALIA

Dr. C. E. S. Arps retires as Secretary of the  
CNMMN on 31 December 1994. The new Secre-  
tary is:

Dr. W. D. Birch  
Department of Mineralogy and Petrology  
Museum of Victoria  
285 Russell Street  
Melbourne  
Victoria 3000  
AUSTRALIA