

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

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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 Emeritus
Commission on New Minerals and Mineral Names
International Mineralogical Association

1994 Proposals

IMA No. 94-001

The Fe³⁺-dominant analogue of warwickite.

Mg(Fe³⁺, Fe²⁺, Al, Ti, Mg)(BO₃)O

Orthorhombic: Pnam

a 9.258(6), b 9.351(4), c 3.081(2) Å

Black; adamantine to submetallic; subtranslucent to nearly opaque.

In reflected light: light grey, weak anisotropism, indistinct bireflectance, pleochroic from dark red to dark brown. R_{max.}: (9.99%) 470 nm, (9.66%) 540 nm, (9.29%) 589 nm, (8.79%) 650 nm.

6.563 (23), 4.176 (38), 2.957 (30), 2.570 (100), 2.088 (20), 1.591 (18), 1.550 (19).

IMA No. 94-002

Mn₂SiO₃(OH)₂ · H₂O

Orthorhombic: Pca2₁

a 12.682(4), b 7.214(2), c 5.337(1) Å

Brown-yellowish; vitreous; transparent.

Biaxial (-), α 1.681, β 1.688, γ 1.690,
2V(meas.) 54.4°, 2V(calc.) 56.1°.

7.220 (60), 4.083 (60), 3.011 (100), 2.547 (80),
2.456 (80), 2.440 (80), 1.552 (60).

IMA No. 94-004

A member of the amphibole group.

NaN₂Mn₂²⁺Mn₃³⁺Si₈O₂₄

Monoclinic: C2/m

a 9.89(2), b 18.04(3), c 5.29(1) Å,
β 104.6(1)°

Cherry red to very dark red; adamantine;
transparent.

Biaxial (-), α 1.717, β 1.780, γ 1.800,
2V(meas.) 51°, 2V(calc.) 57°.

3.400 (8), 3.146 (9), 2.544 (9), 2.176 (10),
1.656 (8), 1.447 (9).

IMA No. 94-005

(Zn,Cu)₆Zn₂(OH)₁₃[(Si,S)(O,OH)₄]₂

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

a 8.322(1), c 7.376(1) Å

Light green; vitreous; transparent.

Uniaxial (-), ω 1.705, ε 1.611.

7.37 (100), 3.623 (25), 3.282 (30), 2.724 (30),
2.556 (50), 2.191 (15), 1.572 (20).

IMA No. 94-006

(Mg_{1-x}□_x)₂Mg₁₂(PO₄)₆(PO₃OH)₂O₆H_{6+4x}
x = 0 to 0.3

Hexagonal: P6₃mc

a 12.47(1), c 5.036(6) Å

Azure blue; vitreous; transparent.

Uniaxial (-), n̄ ~ 1.61, Δ ~ 0.01.

3.66 (65), 3.15 (100), 3.109 (100), 2.692 (95),
2.213 (70), 1.803 (50), 1.552 (50).

IMA No. 94-007

Na₃(Fe²⁺,Fe³⁺)₆[Ti₂Si₁₂O₃₀(O,OH)₄]
(OH,O)₇ · 2 H₂O

Monoclinic: P2/c

a 5.353(4), b 16.18(1), c 21.95(2) Å,
β 94.6(2)°

Dark brown-green; vitreous to silky;
translucent.

Biaxial (-), α 1.627, β 1.667, γ 1.693,
2V(meas.) 75°, 2V(calc.) 76°.

13.00 (30), 10.94 (100), 4.44 (30), 2.728 (50),
2.641 (40), 2.547 (30), 2.480 (30).

IMA No. 94-008

AgFeS₂

Tetragonal: P4₂mc

a 5.64(1), c 10.34(3) Å

Megascopic colour not observed; metallic;
opaque.

In reflected light: cream with a greyish tint,
moderate anisotropism, no birefractance,
nonpleochroic. R_{min} & R_{max}: (27.2, 30.1%)
470 nm, (32.3, 36.4%) 546 nm, (33.0, 37.1%)
589 nm, (31.2, 35.3%) 650 nm.

3.15 (10), 2.445 (2), 2.340 (≤ 2), 1.910 (4),
1.692 (2).

IMA No. 94-010

A member of the milarite group.

K(K,Na,□)(Mn,Zr,Y)₂(Zn,Li)₃Si₁₂O₃₀

Hexagonal: P6/mcc

a 10.196(5), c 14.284(8) Å

Dark blue, violet blue, greyish brown-blue;
vitreous; transparent.

Uniaxial (-), ω 1.590, ε 1.586.

7.13 (30), 4.15 (45), 3.75 (50), 3.25 (100),
2.924 (39), 2.777 (32), 2.548 (520).

IMA No. 94-011

(NH₄,K)NO₃

Orthorhombic: Pbnm

a 7.075(5), b 7.647(5), c 5.779(5) Å

White; vitreous; transparent.

Biaxial (-), α 1.458, β 1.527, γ 1.599,
2V(meas.) ~ 90°, 2V(calc.) 87°.

3.863 (75), 3.364 (85), 3.212 (95), 3.194 (100),
2.805 (35), 2.595 (90), 2.400 (50).

IMA No. 94-012

(Na,Mn,Fe,Al,REE)₁₅(Y,REE,Ca,Na)₂
(CO₃)₉(SO₃F)Cl

Hexagonal: P $\bar{3}$

a 8.773(1), c 10.746(2) Å

Yellow to orange-brown; vitreous; trans-
parent.

Uniaxial (-), ω 1.548, ε 1.537.

6.20 (40), 4.39 (80), 2.774 (80), 2.532 (100),
2.240 (80), 2.067 (30), 1.657 (40).

IMA No. 94-013

Cu₂Zn[(As,Sb)O₄](OH)₃

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

a 8.201 (1), c 7.315 (1) Å

Emerald green; adamantine; transparent.

Uniaxial (-), ω 1.801, ε 1.796.

2.522 (100), 2.166 (88), 1.805 (92), 1.550 (100),
1.513 (85).

IMA No. 94-014

CuNiSb₂

Hexagonal (trigonal): P $\bar{3}$ m1

a 4.0489(2), c 5.1358(3) Å

Silver-white; metallic; opaque.

In reflected light: white with yellowish hue,
distinct anisotropism, weak birefractance,
nonpleochroic. R_O & R_E: (59.3, 52.4%)
470 nm, (63.0, 56.8%) 546 nm, (65.5, 60.9%)
589 nm, (68.6, 64.9%) 650 nm.

2.901 (100), 2.572 (10), 2.074 (65), 2.023 (51),
1.660 (11), 1.284 (10).

IMA No. 94-016

The Zn-dominant analogue of högbomite-8H.

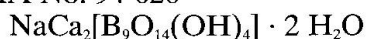
(Zn,Fe²⁺)_{1-2x}Ti_xAl₂O₄, x ~ 0.12

Hexagonal: most probably P6₃mc

a 5.708(4), c 18.31(2) Å

- Deep brown to black; adamantine; transparent in thin sections.
Uniaxial (-), ω 1.878, ε 1.832.
2.85 (50), 2.60 (80), 2.42 (100), 1.592 (60),
1.550 (50), 1.470 (70), 1.425 (80).
- IMA No. 94-017
 $\text{Na}_8(\text{Mn,Fe}^{3+},\text{Ti})_2\text{Si}_{10}\text{O}_{25}(\text{OH,Cl})_4 \cdot 10 \text{H}_2\text{O}$
Orthorhombic: C22₁
a 13.46(2), b 14.98(1), c 17.51(2) Å
Yellow to orange; vitreous; transparent.
Biaxial (+), α 1.532, β 1.540, γ 1.550,
2V(meas.) 89°, 2V(calc.) 84°.
10.049 (100), 8.823 (50), 5.025 (20), 3.806 (20),
2.718 (50).
- IMA No. 94-018
 $\text{PbCa}_2\text{Al}(\text{F,OH})_9$
Monoclinic: A2, A2/m or Am
a 23.905(5), b 7.516(2), c 7.699(2) Å,
 β 92.25(2)°
White to colourless; vitreous; transparent.
Biaxial (-), α 1.510, β 1.528, γ 1.531,
2V(meas.) 36°, 2V(calc.) 44°.
11.9 (100), 3.71 (70), 3.51 (85), 2.98 (60),
2.94 (60), 2.027 (60), 1.971 (60).
- IMA No. 94-019
The cobalt-dominant member of the
halotrichite group.
 $(\text{Co,Mg,Ni})\text{Al}_2(\text{SO}_4)_4 \cdot 22 \text{H}_2\text{O}$
Monoclinic: P2₁/c
a 6.189(4), b 24.23(1), c 21.20(1) Å,
 β 100.33(5)°
Empire rose; silky; transparent.
Biaxial (sign unknown), α 1.477, β unknown,
 γ 1.484, 2V unknown.
6.03 (22), 4.790 (100), 4.295 (27), 4.106 (22),
3.945 (26), 3.768 (33), 3.494 (92).
- IMA No. 94-020
A member of the magnetoplumbite group.
 $\text{Pb}(\text{Zn,Fe}^{3+})_3(\text{Fe}^{3+},\text{Mn}^{3+},\text{Mn}^{4+},\text{Al,Ti})_9\text{O}_{19}$
Hexagonal: P6₃/mmc
a 5.854(1), c 22.882(6) Å
Black; metallic; opaque.
In reflected light: black, isotropic, no bireflec-
tance, nonpleochroic.
 R_{mean} : (23.8%) 470 nm, (22.4%) 546 nm,
(21.7%) 589 nm, (20.7%) 650 nm.
11.39 (45), 3.811 (100), 2.858 (75), 2.745 (50),
2.605 (40), 2.407 (25), 1.6361 (30).
- IMA No. 94-021
The gallium-dominant analogue of
beudantite.
 $\text{Pb}(\text{Ga,Al,Fe})_3(\text{AsO}_4)(\text{SO}_4)(\text{OH})_6$
Hexagonal: R3m
a 7.225(4), c 17.03(2) Å
Pale yellow; vitreous; transparent.
Uniaxial (-), ω 1.763, ε 1.750.
5.85 (90), 3.59 (40), 3.038 (100), 2.851 (30),
2.513 (30), 2.271 (40), 1.948 (30).
- IMA No. 94-022
The F-analogue of thalenite-(Y).
 $\text{Y}_3\text{Si}_3\text{O}_{10}\text{F}$
Monoclinic: P2₁/n
a 7.321(2), b 11.133(4), c 10.375(6) Å,
 β 97.17(2)°
Colourless to white; adamantine; translucent.
Biaxial (-), α 1.719, β 1.739, γ 1.748,
2V(meas.) 73°, 2V(calc.) 67°.
5.60 (5), 3.81 (5), 3.12 (10), 2.828 (8), 2.253 (8),
2.187 (4), 2.131 (4).
- IMA No. 94-023
The Ir-dominant analogue of isoferro-
platinum.
 Ir_3Fe
Cubic: Pm3m
a 3.792(5) Å
Steel black; metallic; opaque.
In reflected light: bright white with yellowish
tint, isotropic, nonbireflectant, nonpleoch-
roic. R: (66.2%) 470 nm, (69.3%) 546 nm,
(71.1%) 589 nm, (72.5%) 650 nm.
2.18 (80), 1.89 (60), 1.34 (70), 1.26 (20),
1.200 (15), 1.142 (100), 1.094 (80).
- IMA No. 94-024
An orthorhombic polymorph of walpurgite.
 $(\text{UO}_2)\text{Bi}_4\text{O}_4(\text{AsO}_4)_2 \cdot 2 \text{H}_2\text{O}$
Orthorhombic: Pbcm
a 5.492(1), b 13.324(2), c 20.685(3) Å
Yellow; adamantine; transparent.
Biaxial (-), α 1.90, β 1.99, γ 2.00 (calc.),
2V(meas.) 36°.
10.354 (94), 5.610 (40), 3.277 (56), 3.208 (100),
3.088 (76), 2.999 (50), 2.852 (46).
- IMA No. 94-025
 $(\text{UO}_2)_8(\text{SO}_4)(\text{OH})_{14} \cdot 13 \text{H}_2\text{O}$
Monoclinic: P2₁/a
a 18.553(8), b 9.276(2), c 13.532(7) Å,
 β 125.56(2)°
Yellow; vitreous; translucent.
Biaxial (-), α 1.715, β 1.718, γ 1.720,
2V(calc.) 78°.
7.56 (100), 7.13 (48), 3.771 (34), 3.554 (20),
3.234 (10), 3.206 (13), 2.052 (8).

IMA No. 94-026

Monoclinic: $P2_1/c$

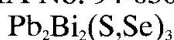
a 11.4994(8), b 12.5878(9), c 10.5297(1) Å,
 β 99.423(6)°

Colourless to light dirty-yellow and light grey;
 vitreous; transparent.

Biaxial (+), α 1.532, β 1.538, γ 1.564,
 2V(meas.) 54°, 2V(calc.) 52°.

5.41 (66), 5.20 (57), 4.20 (56), 3.35 (89),
 3.27 (59), 3.04 (100), 2.210 (59).

IMA No. 94-030

Hexagonal (trigonal): $P\bar{3}$ or $P\bar{3}m$

a 4.191(2), c 39.60(3) Å

Silver-grey; metallic; opaque.

In reflected light: yellowish-white, distinct

anisotropism, practically absent bire-

flectance, bluish-grey to brownish

pleochroism. R1 & R2: (49.7, 48.5%)

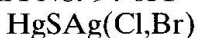
470 nm, (48.4, 47.4%) 546 nm, (47.9, 46.8%)

589 nm, (47.9, 46.2%) 650 nm.

3.42 (5), 3.04 (10), 2.096 (8), 1.806 (6),

1.725 (5), 1.298 (7), 1.233 (6).

IMA No. 94-031

Hexagonal: $P6_2$, $P6_4$, $P6_22$ or $P6_422$

a 8.234(4), c 19.38(1) Å

Red to brownish red; adamantine; trans-
 lucent.

Uniaxial (-), ω 2.3 (from polished section),
 ε could not be measured).

6.47 (20), 4.124 (30), 3.357 (60), 3.237 (30),

3.127 (50), 2.879 (100), 2.009 (50).

IMA No. 94-032

Hexagonal (trigonal): $P31c$

a 7.758(5), c 5.623(5) Å

Brownish red to colourless; probably adaman-
 tine; transparent.

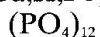
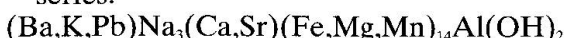
Uniaxial (-), ω 2.03, ε 2.02.

2.893 (85), 2.599 (75), 2.547 (100), 2.320 (60),

1.486 (70), 1.418 (60), 1.351 (75).

IMA No. 94-033

Isostructural with the arrojadite-dickonsonite
 series.

Monoclinic: $C2/c$

a 16.406(5), b 9.945(3), c 24.470(5) Å,

β 105.73(2)°

Greenish-grey; greasy; translucent.

Biaxial (sign unknown), n_{average} 1.65.

3.186 (45), 3.018 (100), 2.824 (39), 2.813 (36),
 2.685 (50), 2.530 (35).

IMA No. 94-034

The magnesium-analogue of coulsonite.

Cubic: $Fd\bar{3}m$

a 8.385(3) Å

Black; metallic; opaque.

In reflected light: light grey, isotropic, no

bireflectance, nonpleochroic. R: (14.0%)

470 nm, (13.7%) 546 nm, (13.7%) 589 nm,

(13.7%) 650 nm.

4.84 (9), 2.52 (10), 2.093 (8), 1.612 (8),

1.482 (9), 1.092 (7), 1.048 (5).

IMA No. 94-035

Tetragonal: $P4_22_2$ or $P4_222$

a 10.085(2), c 23.836(8) Å

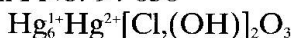
Intense blue to emerald green; vitreous;
 translucent.

Uniaxial (-), ω 1.686, ε 1.635.

11.90 (100), 9.29 (60), 7.132 (50), 5.043 (60),

4.641 (40), 3.098 (80), 3.061 (70).

IMA No. 94-036

Orthorhombic: $Pbma$

a 11.790(3), b 13.881(4), c 6.450(2) Å

Black to very dark brown; metallic; opaque.

In reflected light: white, strong anisotropism,

moderate bireflectance, pleochroic from

white to a higher reflecting blue-white.

R1 & R2: (22.8, 29.6%) 470 nm,

(20.7, 25.7%) 546 nm, (20.3, 24.6%) 589 nm,

(20.2, 23.2%) 650 nm.

5.25 (80), 3.164 (60), 3.053 (100), 2.954 (70),

2.681 (50), 2.411 (50).

IMA No. 94-038

Tetragonal: $I4/amd$

a 5.499(5), c 33.91(4) Å

Grey; metallic; opaque.

In reflected light: greyish white with bluish

tint; anisotropism, bireflectance and

pleochroism not observed. R₀: (31.3%)

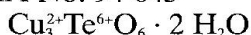
470 nm, (30.4%) 543 nm, (29.3%) 587 nm,

(27.1%) 657 nm.

3.19 (50), 2.77 (100), 1.960 (80), 1.679 (70),

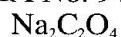
1.598 (70), 1.274 (60).

IMA No. 94-043

Monoclinic: $P2_1/n$

- a 9.204(2), b 9.170(2), c 7.584(1) Å,
β 102.32(3)°
Emerald green; adamantine; transparent.
Biaxial (sign unknown), n 1.91–1.92.
6.428 (100), 3.217 (70), 2.601 (40), 2.530 (50),
2.144 (35), 1.750 (35).
- IMA No. 94-045
Fe³⁺(Mn,Fe²⁺,Mg)(PO₄)O
Monoclinic: I2/a
a 9.977(2), b 6.339(2), c 11.836(3) Å,
β 105.77(3)°
Black; weakly submetallic; opaque.
Optical properties could not be measured due
to the opaque nature of the mineral.
3.256 (23), 2.970 (100), 2.861 (35), 2.810 (98),
2.064 (25), 1.778 (22).
- IMA No. 94-046
A member of the amphibole group.
(K,Na)Ca₂(Mg,Fe²⁺,Al,Fe³⁺,Ti)₅(Si,Al)₈
O₂₂[(OH),F,O]₂
Monoclinic: C2/m
a 9.9199(4), b 18.0591(8), c 5.3180(3) Å,
β 105.36(1)°
Black; vitreous; opaque, but translucent in
thin splinters.
Biaxial (-), α 1.654, β 1.664, γ 1.670,
2V(meas.) = 79°, 2V(calc.) = 75°.
8.45 (95), 3.283 (45), 3.140 (100), 2.707 (35),
2.344 (70), 2.018 (35), 1.652 (40).
- IMA No. 94-047
(Cu,Fe)(Sn,Sb)
Tetragonal: space group unknown
a 4.22(1), c 5.10(3) Å
Megascopic colour was not observed; metal-
lic; opaque.
In reflected light: pinkish-white, distinct an-
isotropism, distinct birefractance, pleochro-
ic from light pink to pinkish-white.
R_{max} & R_{min}: (72.6, 64.8%) 470 nm, (77.4,
68.2%) 546 nm, (78.5, 68.9%) 589 nm,
(79.0, 69.0%) 650 nm.
2.96 (9), 2.10 (10), 1.72 (3), 1.488 (3), 1.214 (4),
1.092 (4).
- IMA No. 94-048
A member of the epidote group.
(Mn²⁺,Ca)(La,Ce,Ca)(Al,Mn³⁺,Mn²⁺)₃(Si₃O₁₁)
O(OH)
Monoclinic: P2₁/m
a 8.891(3), b 5.704(3), c 10.107(8) Å,
β 113.99(2)°
Brown-red; vitreous; transparent.
Because of the small grain size, most of the
optical properties could not be determined.
- 2.897 (100), 2.857 (45), 2.707 (60), 2.615 (60),
2.178 (60), 2.145 (60).
- IMA No. 94-049
Mn₃(Nb,Ta)₃(Nb,Mn)₂W₂O₂₀
Monoclinic: P2₁
a 24.73(2), b 5.056(3), c 5.760(3) Å,
β 103.50(7)°
Red to brown-red; metallic; opaque.
In reflected light: light grey, weak anisotro-
pism, weak birefractance, nonpleochroic.
R_{max} & R_{min}: (19.2, 18.0%) 470 nm, (18.5,
17.5%) 546 nm, (19.3, 18.5%) 589 nm,
(16.5, 16.0%) 650 nm.
6.0 (5), 3.74 (8), 3.69 (8), 2.98 (10), 1.783 (5),
1.744 (6), 1.732 (7), 1.456 (5).
- IMA No. 94-050
An F-dominant, triclinic polymorph of
canasite, with additional H₂O.
K₃Na₃Ca₃(Si₁₂O₃₀)(F₃OH) · H₂O
Triclinic: P1
a 10.0941(3), b 12.6913(2), c 7.2405(1) Å
α 90.00(2)°, β 111.02(2)°, γ 110.20(2)°
Lilac-grey, blue-grey, rarely greenish;
vitreous; translucent.
Biaxial (-), α 1.536, β 1.539, γ 1.542,
2V(meas.) = 70°, 2V(calc.) = 89.8°.
5.88 (37), 4.70 (54), 4.21 (40), 3.01 (25),
2.915 (100), 2.354 (30), 2.307 (21).
- IMA No. 94-051
Pb₂Bi₂Te₂S₃
Hexagonal: space group unknown
a 4.230(4), c 33.43(2) Å
Dark grey to black; metallic; opaque.
In reflected light: greyish-white with a slight
pinkish tint, very faint anisotropism, very
weak birefractance, nonpleochroic.
R_o & R_E: (40.4, 39.3%) 470 nm (42.1,
40.8%) 546 nm, (41.3, 40.8%) 589 nm,
(41.9, 40.9%) 650 nm.
3.35 (40), 3.06 (100), 2.22 (25), 2.115 (50),
1.311 (25), 1.213 (25).
- IMA No. 94-052
K₂Na₄Ca₃Ti₂Be₄Si₁₂O₃₈
Orthorhombic: Fddd
a 12.778(4), b 14.343(3), c 33.69(1) Å
Pink, dark red, seldom white; vitreous;
transparent.
Biaxial (+), α 1.630, β 1.644(calc.), γ 1.675,
2V(meas.) = 70°.
9.23 (9), 4.15 (10), 3.30 (10), 3.16 (10),
2.53 (10), 2.42 (10), 1.582 (9).

IMA No. 94-053

Monoclinic: $P2_1/a$ a 10.426(9), b 5.255(5), c 3.479(3) Å,
 β 93.14(8)°

Pale yellow; vitreous; transparent.

Biaxial (-), α 1.415, β 1.524, γ 1.592,

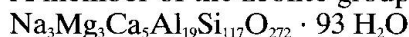
2V(meas.) = 72°, 2V(calc.) = 72°.

5.203 (13), 2.898 (27), 2.826 (100), 2.602 (56),

2.334 (33), 2.177 (13), 2.041 (14).

IMA No. 94-054

A member of the zeolite group.

Orthorhombic: $Cmca$

a 13.698(2), b 25.213(3), c 22.660(2) Å

Colourless to light straw; vitreous;
transparent.Biaxial (-), α 1.480, β 1.485, γ 1.486,

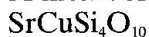
2V(meas.) < 60°, 2V(calc.) 48°.

11.34 (100), 10.64 (31), 4.64 (35), 4.37 (79),

4.01 (57), 3.938 (36), 3.282 (68).

IMA No. 94-055

A member of the cuprorivaite group.

Tetragonal: $P4/ncc$

a 7.366(1), c 15.574(3) Å

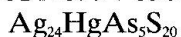
Colour; vitreous; transparent.

Uniaxial (-), γ 1.630, ε 1.590.

7.79 (35), 3.444 (40), 3.330 (100), 3.119 (55),

3.033 (50), 2.605 (30), 2.322 (30).

IMA No. 94-056



Hexagonal: space group unknown

a 15.00(1), c 15.46(3) Å

Wine-red to violet; metallic; opaque.

In reflected light: grey, weak to moderate

anisotropism, very low bireflectance, weak

pleochroism. $R_{\max.}$ & $R_{\min.}$: (31.0, 30.3%)

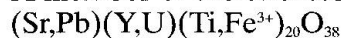
470 nm, (29.2, 27.6%) 546 nm, (27.6, 26.0%)

589 nm, (24.6, 23.9%) 650 nm.

3.17 (6), 3.091 (10), 2.998 (4), 2.755 (3),
1.878 (8).

IMA No. 94-057

A member of the crichtonite group.

Hexagonal (rhombohedral): $R\bar{3}$ a 9.197(1), α 68.75(2)°

Black; metallic; opaque.

In reflected light: ash-grey with pale bluish

tones, weak anisotropism, low bireflec-

tance, very weak pleochroism. R_1 & R_2 :

(17.73, 17.22%) 470 nm, (17.14, 16.50%)

546 nm, (16.54, 16.11%) 589 nm, (16.48,

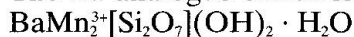
16.00%) 650 nm.

3.412 (m), 2.902 (m), 2.846 (mw), 2.499 (mw),

1.916 (mw), 1.603 (m), 1.441 (m).

IMA No. 94-058

The Ba-analogue of hennomartinite.

Orthorhombic: $Cmcm$ (?)

a 6.325(1), b 9.120(1), c 13.618(1) Å

Dark brown; earthy to brilliant; translucent to
transparent.Biaxial (-), α 1.82, β 1.845 (calc.), γ 1.85,

2V(meas.) 46°.

4.85 (100), 4.557 (50), 4.322 (59), 3.416 (77),

2.869 (80), 2.729 (82).

IMA No. 94-059

A member of the amphibole group.

Monoclinic: $C2/m$

a 9.893(4), b 18.015(5), c 5.279(3) Å,

 β 104.61(4)°Grey to black; vitreous; opaque, but thin
fragments are transparent.Biaxial (-), α 1.603, β 1.613, γ 1.623,

2V(meas.) 90°, 2V(calc.) 89°.

9.06 (6), 8.46 (8), 3.282 (9), 3.140 (10),

2.703 (6), 1.443 (7).