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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; subtrans-
lucent to nearly opaque.

In reflected light: light grey, weak anisotrop-
ism, 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.

NaNa₂Mn₂²⁺Mn₃³⁺Si₈O₂₄

Monoclinic: C2/m

a 9.89(2), b 18.04(3), c 5.29(1) Å,
 β 104.6(1) $^\circ$
 Cherry red to very dark red; adamantine;
 transparent.
 Biaxial (-), α 1.717, β 1.780, γ 1.800,
 $2V$ (meas.) 51 $^\circ$, $2V$ (calc.) 57 $^\circ$.
 3.400 (8), 3.146 (9), 2.544 (9), 2.176 (10),
 1.656 (8), 1.447 (9).

IMA No. 94-005

$(Zn,Cu)_xZn_2(OH)_{13}[(Si,S)(O,OH)_{4}]_2$
 Hexagonal (trigonal): P3
 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

$(Mg_{1-x}\square_x)_2Mg_{12}(PO_4)_6(PO_3OH)_2O_6H_{6+4x}$
 $x = 0$ to 0.3
 Hexagonal: P6₃mc
 a 12.47(1), c 5.036(6) Å
 Azure blue; vitreous; transparent.
 Uniaxial (-), \bar{n} ~ 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

$Na_3(Fe^{2+},Fe^{3+})_6[Ti_2Si_{12}O_{30}(O,OH)_4]$
 $(OH,O)_7 \cdot 2 H_2O$
 Monoclinic: P2/c
 a 5.353(4), b 16.18(1), c 21.95(2) Å,
 β 94.6(2) $^\circ$
 Dark brown-green; vitreous to silky;
 translucent.
 Biaxial (-), α 1.627, β 1.667, γ 1.693,
 $2V$ (meas.) 75 $^\circ$, $2V$ (calc.) 76 $^\circ$.
 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

$AgFeS_2$
 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 bireflectance,
 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.

$K(K,Na,\square)(Mn,Zr,Y)_2(Zn,Li)_3Si_{12}O_{30}$

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

$(NH_4,K)NO_3$
 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 $^\circ$, $2V$ (calc.) 87 $^\circ$.
 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

$(Na,Mn,Fe,Al,REE)_{15}(Y,REE,Ca,Na)_2$
 $(CO_3)_9(SO_3F)Cl$
 Hexagonal: P3
 a 8.773(1), c 10.746(2) Å
 Yellow to orange-brown; vitreous; transparent.
 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

$Cu_2Zn[(As,Sb)O_4](OH)_3$
 Hexagonal (trigonal): P3
 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

$CuNiSb_2$
 Hexagonal (trigonal): P3m1
 a 4.0489(2), c 5.1358(3) Å
 Silver-white; metallic; opaque.
 In reflected light: white with yellowish hue,
 distinct anisotropism, weak bireflectance,
 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).

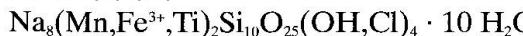
IMA No. 94-016

The Zn-dominant analogue of högbomite-8H.
 $(Zn,Fe^{2+})_{1-2x}Ti_xAl_2O_4$, $x \sim 0.12$
 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

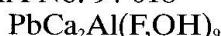


Orthorhombic: C222₁
a 13.46(2), b 14.98(1), c 17.51(2) Å

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

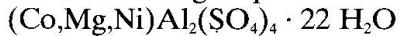


Monoclinic: A2, A2/m or Am
a 23.905(5), b 7.516(2), c 7.699(2) Å,
 β 92.25(2)°

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.



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.



Hexagonal: P6₃/mmc
a 5.854(1), c 22.882(6) Å

Black; metallic; opaque.

In reflected light: black, isotropic, no bireflectance, 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.



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).



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.



Cubic: Pm3m

a 3.792(5) Å

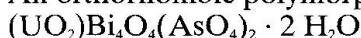
Steel black; metallic; opaque.

In reflected light: bright white with yellowish tint, isotropic, nonbireflectant, nonpleochroic. 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.



Orthorhombic: Pbcm

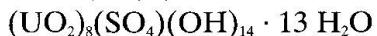
a 5.492(1), b 13.324(2), c 20.685(3) Å

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



Monoclinic: P2₁/a

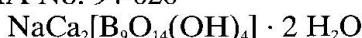
a 18.553(8), b 9.276(2), c 13.532(7) Å,
 β 125.56(2)°

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: P2₁/c

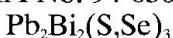
a 11.4994(8), b 12.5878(9), c 10.5297(1) Å,
 β 99.423(6) $^\circ$

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

Biaxial (+), α 1.532, β 1.538, γ 1.564,
 2V(meas.) 54 $^\circ$, 2V(calc.) 52 $^\circ$.

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



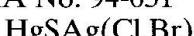
Hexagonal (trigonal): P $\bar{3}$ or P $\bar{3}m$
 a 4.191(2), c 39.60(3) Å

Silver-grey; metallic; opaque.

In reflected light: yellowish-white, distinct
 anisotropism, practically absent bireflectance, 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: P6₂, P6₄, P6₂22 or P6₄22
 a 8.234(4), c 19.38(1) Å

Red to brownish red; adamantine; translucent.

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

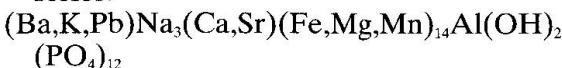
Brownish red to colourless; probably adamantine; transparent.

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-dicksononite series.



Monoclinic: C2/c

a 16.406(5), b 9.945(3), c 24.470(5) Å,
 β 105.73(2) $^\circ$

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: Fd3m

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: P4₂2₁ or P4₂2

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

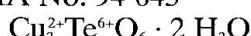
Grey; metallic; opaque.

In reflected light: greyish white with bluish
 tint; anisotropism, bireflectance and
 pleochroism not observed. R_o: (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: P2₁/n

a 9.204(2), b 9.170(2), c 7.584(1) Å,
 β 102.32(3) $^\circ$

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

$\text{Fe}^{3+}(\text{Mn},\text{Fe}^{2+},\text{Mg})(\text{PO}_4)\text{O}$

Monoclinic: I2/a

a 9.977(2), b 6.339(2), c 11.836(3) Å,
 β 105.77(3) $^\circ$

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.

$(\text{K},\text{Na})\text{Ca}_2(\text{Mg},\text{Fe}^{2+},\text{Al},\text{Fe}^{3+},\text{Ti})_5(\text{Si},\text{Al})_8$
 $\text{O}_{22}[(\text{OH}),\text{F},\text{O}]_2$

Monoclinic: C2/m

a 9.9199(4), b 18.0591(8), c 5.3180(3) Å,
 β 105.36(1) $^\circ$

Black; vitreous; opaque, but translucent in
 thin splinters.

Biaxial (–), α 1.654, β 1.664, γ 1.670,
 $2V(\text{meas.}) = 79^\circ$, $2V(\text{calc.}) = 75^\circ$.

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

$(\text{Cu},\text{Fe})(\text{Sn},\text{Sb})$

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 bireflectance, pleochroic
 from light pink to pinkish-white.

$R_{\text{max.}}$ & $R_{\text{min.}}$: (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.

$(\text{Mn}^{2+},\text{Ca})(\text{La},\text{Ce},\text{Ca})(\text{Al},\text{Mn}^{3+},\text{Mn}^{2+})_3(\text{Si}_3\text{O}_{11})$
 $\text{O}(\text{OH})$

Monoclinic: P2₁/m

a 8.891(3), b 5.704(3), c 10.107(8) Å,
 β 113.99(2) $^\circ$

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

$\text{Mn}_3(\text{Nb},\text{Ta})_3(\text{Nb},\text{Mn})_2\text{W}_2\text{O}_{20}$

Monoclinic: P2₁

a 24.73(2), b 5.056(3), c 5.760(3) Å,
 β 103.50(7) $^\circ$

Red to brown-red; metallic; opaque.

In reflected light: light grey, weak anisotropism,
 weak bireflectance, nonpleochroic.

$R_{\text{max.}}$ & $R_{\text{min.}}$: (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.

$\text{K}_3\text{Na}_3\text{Ca}_5(\text{Si}_{12}\text{O}_{30})(\text{F}_3\text{OH}) \cdot \text{H}_2\text{O}$

Triclinic: P1

a 10.0941(3), b 12.6913(2), c 7.2405(1) Å
 α 90.00(2) $^\circ$, β 111.02(2) $^\circ$, γ 110.20(2) $^\circ$

Lilac-grey, blue-grey, rarely greenish;
 vitreous; translucent.

Biaxial (–), α 1.536, β 1.539, γ 1.542,
 $2V(\text{meas.}) = 70^\circ$, $2V(\text{calc.}) = 89.8^\circ$.

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

$\text{Pb}_2\text{Bi}_2\text{Te}_2\text{S}_3$

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 bireflectance, 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

$\text{K}_2\text{Na}_4\text{Ca}_3\text{Ti}_2\text{Be}_4\text{Si}_{12}\text{O}_{38}$

Orthorhombic: Fddd

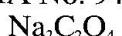
a 12.778(4), b 14.343(3), c 33.69(1) Å

Pink, dark red, seldom white; vitreous;
 transparent.

Biaxial (+), α 1.630, β 1.644(calc.), γ 1.675,
 $2V(\text{meas.}) = 70^\circ$.

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: P2₁/aa 10.426(9), b 5.255(5), c 3.479(3) Å,
β 93.14(8)°

Pale yellow; vitreous; transparent.

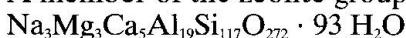
Biaxial (-), α 1.415, β 1.524, γ 1.592,

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.

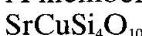
Biaxial (-), α 1.480, β 1.485, γ 1.486,

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): R̄3

a 9.197(1), α 68.75(2)°

Black; metallic; opaque.

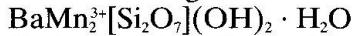
In reflected light: ash-grey with pale bluish
tones, weak anisotropism, low bireflec-
tance, very weak pleochroism. R₁ & R₂:

(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.



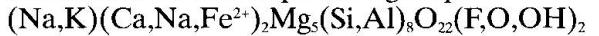
Orthorhombic: Cmcm (?)

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).