

**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 of the International Mineralogical Association, 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  
Color; luster; diaphaneity  
Optical properties  
Strongest lines in the X-ray powder-diffraction pattern:  $d$  in Å (relative intensity).

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

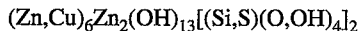
**1994 PROPOSALS**

IMA No. 94-001 The Fe<sup>3+</sup>-dominant analogue of warwickite  
Mg(Fe<sup>3+</sup>, Fe<sup>2+</sup>, Al, Ti, Mg)(BO<sub>3</sub>)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  
Mn<sub>2</sub>SiO<sub>3</sub>(OH)<sub>2</sub>·H<sub>2</sub>O  
Orthorhombic: *Pca2<sub>1</sub>*  
 $a$  12.682(4),  $b$  7.214(2),  $c$  5.337(1) Å  
Brown-yellowish; vitreous; transparent.  
Biaxial (-),  $\alpha$  1.681,  $\beta$  1.688,  $\gamma$  1.690,  $2V(\text{meas.})$  54.4°,  $2V(\text{calc.})$  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  
NaN<sub>2</sub>Mn<sub>2</sub><sup>2+</sup>Mn<sub>3</sub><sup>3+</sup>Si<sub>8</sub>O<sub>24</sub>  
Monoclinic: *C2/m*  
 $a$  9.89(2),  $b$  18.04(3),  $c$  5.29(1) Å,  $\beta$  104.6(1)°  
Cherry red to very dark red; adamantine; transparent.  
Biaxial (-),  $\alpha$  1.717,  $\beta$  1.780,  $\gamma$  1.800,  $2V(\text{meas.})$  51°,  $2V(\text{calc.})$  57°.  
3.400(8), 3.146(9), 2.544(9), 2.176(10), 1.656(8), 1.447(9).

## IMA No. 94-005

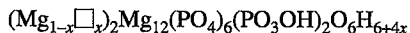
Hexagonal (trigonal):  $P\bar{3}$  $a$  8.322(1),  $c$  7.376(1) Å

Light green; vitreous; transparent.

Uniaxial (-),  $\omega$  1.705,  $\epsilon$  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

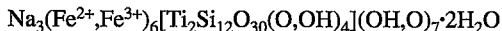
 $x = 0$  to 0.3Hexagonal:  $P6_3mc$  $a$  12.47(1),  $c$  5.036(6) Å

Azure blue; vitreous; transparent.

Uniaxial (-),  $\bar{n}$  ~ 1.61,  $\Delta$  ~ 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

Monoclinic:  $P2/c$  $a$  5.353(4),  $b$  16.18(1),  $c$  21.95(2) Å,  $\beta$  94.6(2)°

Dark brown-green; vitreous to silky; translucent.

Biaxial (-),  $\alpha$  1.627,  $\beta$  1.667,  $\gamma$  1.693,  $2V(\text{meas.})$  75°,  $2V(\text{calc.})$  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

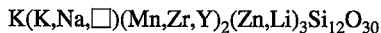
Tetragonal:  $P4_2mc$  $a$  5.64(1),  $c$  10.34(3) Å

Megascopic color not observed; metallic; opaque.

In reflected light: cream with a greyish tint, moderate anisotropism, no bireflectance, nonpleochroic.  $R_{\text{min.}}$  and  $R_{\text{max.}}$ : (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

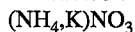
Hexagonal:  $P6/mcc$  $a$  10.196(5),  $c$  14.284(8) Å

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

Uniaxial (-),  $\omega$  1.590,  $\epsilon$  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

Orthorhombic:  $Pbnm$  $a$  7.075(5),  $b$  7.647(5),  $c$  5.779(5) Å

White; vitreous; transparent.

Biaxial (-),  $\alpha$  1.458,  $\beta$  1.527,  $\gamma$  1.599,  $2V(\text{meas.})$  ~ 90°,  $2V(\text{calc.})$  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

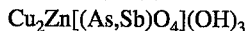
Hexagonal:  $P\bar{3}$  $a$  8.773(1),  $c$  10.746(2) Å

Yellow to orange-brown; vitreous; transparent.

Uniaxial (-),  $\omega$  1.548,  $\epsilon$  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

Hexagonal (trigonal):  $P\bar{3}$  $a$  8.201(1),  $c$  7.315(1) Å

Emerald green; adamantine; transparent.

Uniaxial (-),  $\omega$  1.801,  $\epsilon$  1.796.

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

IMA No. 94-014

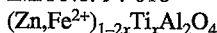
Hexagonal (trigonal):  $P\bar{3}m1$  $a$  4.0489(2),  $c$  5.1358(3) Å

Silver-white; metallic; opaque.

In reflected light: white with yellowish hue, distinct anisotropism, weak bireflectance, nonpleochroic.  $R_O$  and $R_E$ : (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 hōgbomite-8H

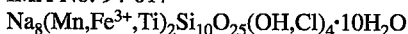
 $x \approx 0.12$ Hexagonal: most probably  $P6_3mc$  $a$  5.708(4),  $c$  18.31(2) Å

Deep brown to black; adamantine; transparent in thin sections.

Uniaxial (-),  $\omega$  1.878,  $\epsilon$  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

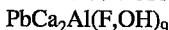
Orthorhombic:  $C222_1$  $a$  13.46(2),  $b$  14.98(1),  $c$  17.51(2) Å

Yellow to orange; vitreous; transparent.

Biaxial (+),  $\alpha$  1.532,  $\beta$  1.540,  $\gamma$  1.550,  $2V(\text{meas.})$  89°,  $2V(\text{calc.})$  84°.

10.049(100), 8.823(50), 5.025(20), 3.806(20), 2.718(50).

IMA No. 94-018

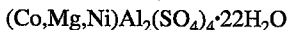
Monoclinic:  $A2, A2/m$  or  $Am$  $a$  23.905(5),  $b$  7.516(2),  $c$  7.699(2) Å,  $\beta$  92.25(2)°

White to colorless; vitreous; transparent.

Biaxial (-),  $\alpha$  1.510,  $\beta$  1.528,  $\gamma$  1.531,  $2V(\text{meas.})$  36°,  $2V(\text{calc.})$  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:  $P2_1/c$  $a$  6.189(4),  $b$  24.23(1),  $c$  21.20(1) Å,  $\beta$  100.33(5)°

Empire rose; silky; transparent.

Biaxial (sign unknown),  $\alpha$  1.477,  $\beta$  unknown,  $\gamma$  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:  $P6_3/mmc$  $a$  5.854(1),  $c$  22.882(6) Å

Black; metallic; opaque.

In reflected light: black, isotropic, no bireflectance, nonpleochroic.  $R_{\text{mean}}$ : (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  
 $\text{Pb}(\text{Ga}, \text{Al}, \text{Fe})_3(\text{AsO}_4)(\text{SO}_4)(\text{OH})_6$   
 Hexagonal:  $R\bar{3}m$   
 $a$  7.225(4),  $c$  17.03(2) Å  
 Pale yellow; vitreous; transparent.  
 Uniaxial (-),  $\omega$  1.763,  $\epsilon$  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:  $P2_1/n$   
 $a$  7.321(2),  $b$  11.133(4),  $c$  10.375(6) Å,  $\beta$  97.17(2)°  
 Colorless to white; adamantine; translucent.  
 Biaxial (-),  $\alpha$  1.719,  $\beta$  1.739,  $\gamma$  1.748,  $2V(\text{meas.})$  73°,  $2V(\text{calc.})$  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 isoferroplatinum  
 $\text{Ir}_3\text{Fe}$   
 Cubic:  $Pm\bar{3}m$   
 $a$  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  
 $(\text{UO}_2)\text{Bi}_4\text{O}_4(\text{AsO}_4)_2 \cdot 2\text{H}_2\text{O}$   
 Orthorhombic:  $Pbcm$   
 $a$  5.492(1),  $b$  13.324(2),  $c$  20.685(3) Å  
 Yellow; adamantine; transparent.  
 Biaxial (-),  $\alpha$  1.90,  $\beta$  1.99,  $\gamma$  2.00 (calc.),  $2V(\text{meas.})$  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:  $P2_1/a$   
 $a$  18.553(8),  $b$  9.276(2),  $c$  13.532(7) Å,  $\beta$  125.56(2)°  
 Yellow; vitreous; translucent.  
 Biaxial (-),  $\alpha$  1.715,  $\beta$  1.718,  $\gamma$  1.720,  $2V(\text{calc.})$  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  
 $\text{NaCa}_2[\text{B}_9\text{O}_{14}(\text{OH})_4] \cdot 2\text{H}_2\text{O}$   
 Monoclinic:  $P2_1/c$   
 $a$  11.4994(8),  $b$  12.5878(9),  $c$  10.5297(10) Å,  $\beta$  99.423(6)°  
 Colorless to light dirty-yellow and light grey; vitreous; transparent.  
 Biaxial (+),  $\alpha$  1.532,  $\beta$  1.538,  $\gamma$  1.564,  $2V(\text{meas.})$  54°,  $2V(\text{calc.})$  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  
 $\text{Pb}_2\text{Bi}_2(\text{S}, \text{Se})_3$   
 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.  $R_1$  &  $R_2$ : (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

HgSAg(Cl,Br)

Hexagonal:  $P6_2, P6_4, P6_22$  or  $P6_422$  $a$  8.234(4),  $c$  19.38(1) Å

Red to brownish red; adamantine; translucent.

Uniaxial (-),  $\omega$  2.3 (from polished section),  $\epsilon$  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

 $Si_3N_4$ Hexagonal (trigonal):  $P31c$  $a$  7.758(5),  $c$  5.623(5) Å

Brownish red to colorless; probably adamantine; transparent.

Uniaxial (-),  $\omega$  2.03,  $\epsilon$  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–dickinsonite series

 $(Ba,K,Pb)Na_3(Ca,Sr)(Fe,Mg,Mn)_{14}Al(OH)_2(PO_4)_{12}$ Monoclinic:  $C2/c$  $a$  16.406(5),  $b$  9.945(3),  $c$  24.470(5) Å,  $\beta$  105.73(2)°

Greenish grey; greasy; translucent.

Biaxial (sign unknown),  $n_{\text{average}}$  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

 $Mg(V,Cr)_2O_4$ 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

 $(Na,Ca,K)Cu_3(AsO_4)_2Cl \cdot 5H_2O$ Tetragonal:  $P4_22_1$  or  $P4_22$  $a$  10.085(2),  $c$  23.836(8) Å

Intense blue to emerald green; vitreous; translucent.

Uniaxial (-),  $\omega$  1.686,  $\epsilon$  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

 $Hg_6^{1+}Hg^{2+}[Cl,(OH)]_2O_3$ 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.  $R_1$  &  $R_2$ : (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

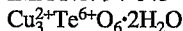
 $Ag(Cd,Pb)AsS_3$ Tetragonal:  $I4/amd$  $a$  5.499(5),  $c$  33.91(4) Å

Grey; metallic; opaque.

In reflected light: greyish white with bluish tint; anisotropism, bireflectance and pleochroism not observed.  $R_G$ : (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

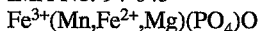
Monoclinic:  $P2_1/n$  $a$  9.204(2),  $b$  9.170(2),  $c$  7.584(1) Å,  $\beta$  102.32(3)°

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

Monoclinic:  $I2/a$  $a$  9.977(2),  $b$  6.339(2),  $c$  11.836(3) Å,  $\beta$  105.77(3)°

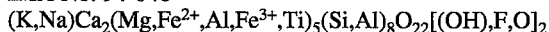
Black; weakly submetallic; opaque.

Optical properties could not be measured owing 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

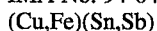
Monoclinic:  $C2/m$  $a$  9.9199(4),  $b$  18.0591(8),  $c$  5.3180(3) Å,  $\beta$  105.36(1)°

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

Biaxial (-),  $\alpha$  1.654,  $\beta$  1.664,  $\gamma$  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



Tetragonal: space group unknown

 $a$  4.22(1),  $c$  5.10(3) Å

Megascopic color was not observed; metallic; opaque.

In reflected light: pinkish white, distinct anisotropism, 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

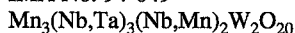
Monoclinic:  $P2_1/m$  $a$  8.891(3),  $b$  5.704(3),  $c$  10.107(8) Å,  $\beta$  113.99(2)°

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

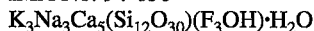
Monoclinic:  $P2_1$  $a$  24.73(2),  $b$  5.056(3),  $c$  5.760(3) Å,  $\beta$  103.50(7)°

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

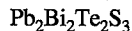
An F-dominant, triclinic polymorph of canasite with additional  $\text{H}_2\text{O}$ Triclinic:  $P1$  $a$  10.0941(3),  $b$  12.6913(2),  $c$  7.2405(1) Å,  $\alpha$  90.00(2)°,  $\beta$  111.02(2)°,  $\gamma$  110.20(2)°

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

Biaxial (-),  $\alpha$  1.536,  $\beta$  1.539,  $\gamma$  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



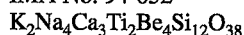
Hexagonal: space group unknown

 $a$  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

Orthorhombic:  $Fdd$  $a$  12.778(4),  $b$  14.343(3),  $c$  33.69(1) Å

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

Biaxial (+),  $\alpha$  1.630,  $\beta$  1.644(calc.),  $\gamma$  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

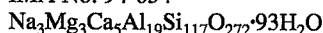
Monoclinic:  $P2_1/a$  $a$  10.426(9),  $b$  5.255(5),  $c$  3.479(3) Å,  $\beta$  93.14(8)°

Pale yellow; vitreous; transparent.

Biaxial (-),  $\alpha$  1.415,  $\beta$  1.524,  $\gamma$  1.592,  $2V(\text{meas.}) = 72^\circ$ ,  $2V(\text{calc.}) = 72^\circ$ .

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

Orthorhombic:  $Cmca$  $a$  13.698(2),  $b$  25.213(3),  $c$  22.660(2) Å

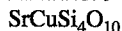
Colorless to light straw; vitreous; transparent.

Biaxial (-),  $\alpha$  1.480,  $\beta$  1.485,  $\gamma$  1.486,  $2V(\text{meas.}) < 60^\circ$ ,  $2V(\text{calc.}) 48^\circ$ .

11.34(100), 10.64(31), 4.64(35), 4.37(79), 4.01(57), 3.938(36), 3.282(68).

A member of the zeolite group

IMA No. 94-055

Tetragonal:  $P4/ncc$  $a$  7.366(1),  $c$  15.574(3) Å

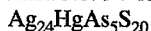
Colorless; vitreous; transparent.

Uniaxial (-),  $\omega$  1.630,  $\epsilon$  1.590.

7.79(35), 3.444(40), 3.330(100), 3.119(55), 3.033(50), 2.605(30), 2.322(30).

A member of the cuprorivaite group

IMA No. 94-056



Hexagonal: space group unknown

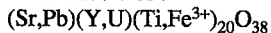
 $a$  15.00(1),  $c$  15.46(3) Å

Wine-red to violet; metallic; opaque.

In reflected light: grey, weak to moderate anisotropism, very low bireflectance, weak pleochroism.  $R_{\text{max.}}$  &  $R_{\text{min.}}$ : (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

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

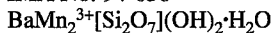
Black; metallic; opaque.

In reflected light: ash-grey with pale bluish tones, weak anisotropism, low bireflectance, 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).

A member of the crichtonite group

IMA No. 94-058

Orthorhombic: *Cmcm* (?)*a* 6.325(1), *b* 9.120(1), *c* 13.618(1) Å

Dark brown; earthy to brilliant; translucent to transparent.

Biaxial (-),  $\alpha$  1.82,  $\beta$  1.845 (calc.),  $\gamma$  1.85,  $2V(\text{meas.})$  46°.

4.85(100), 4.557(50), 4.322(59), 3.416(77), 2.869(80), 2.729(82).

The Ba-analogue of hennomartinite

IMA No. 94-059

Monoclinic: *C2/m**a* 9.893(4), *b* 18.015(5), *c* 5.279(3) Å,  $\beta$  104.61(4)°

Grey to black; vitreous; opaque, but thin fragments are transparent.

Biaxial (-),  $\alpha$  1.603,  $\beta$  1.613,  $\gamma$  1.623,  $2V(\text{meas.})$  90°,  $2V(\text{calc.})$  89°.

9.06(6), 8.46(8), 3.282(9), 3.140(10), 2.703(6), 1.443(7).

A member of the amphibole group