

# 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. It is hoped that future lists will be published in the major mineralogical journals on a quarterly or semi-annual basis.

Each mineral is described in the following format:

IMA No.  
(any relationship to other minerals)  
Chemical Formula  
Crystal system, space group  
unit cell parameters  
Diaphaneity; lustre; colour  
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

**The following minerals were approved during 1990**

IMA No. 90-002  
(Ce,La)Al<sub>2</sub>B<sub>3</sub>O<sub>9</sub>  
Hexagonal, P6<sub>2</sub>m  
a 4.610, c 9.358 Å  
Transparent to translucent; vitreous; light yellow.  
Uniaxial (+),  $\omega$  1.703,  $\epsilon$  1.711  
3.67(100), 3.04(100), 2.458(75), 2.308(50),  
2.020(50), 1.953(50), 1.855(50), 1.835(50)

IMA No. 90-004  
the Mg-dominant analogue of allanite-(Ce)  
Ca(Ce,La)MgAl<sub>2</sub>Si<sub>3</sub>O<sub>12</sub>(OH)  
Monoclinic, P2<sub>1</sub>/m  
a 8.916, b 5.700, c 10.140 Å,  $\beta$  114.72°

Transparent; vitreous; pale yellow brown in thin-section.  
Biaxial (+),  $\alpha$  1.735,  $\beta$  1.741,  $\gamma$  1.758, 2V(meas.)  
64°, 2V(calc.) 62°.  
9.1(40), 3.50(50), 2.910(90), 2.842(50),  
2.698(100), 2.622(60), 2.177(40), 2.137(40).

IMA No. 90-005  
Ca<sub>5</sub>Si<sub>6</sub>(O,OH)<sub>18</sub> · 5 H<sub>2</sub>O  
Monoclinic, Cc or C2/c  
a 11.331, b 7.353, c 22.67 Å,  $\beta$  96.59°  
Transparent; vitreous; colourless to white.  
Biaxial (-),  $\alpha$  1.575,  $\beta$  1.580,  $\gamma$  1.585, 2V(calc.)  
89.8°.  
11.25(100), 3.745(36), 3.304(51), 3.068(45),  
3.034(60), 3.012(37), 2.811(41), 2.794(60).

## IMA No. 90-007

the Cu-dominant analogue of braunite and neltnerite  
 $\text{Cu}^{2+}\text{Mn}^{3+}(\text{O}_8/\text{SiO}_4)$   
 Tetragonal, I4<sub>1</sub>/acd  
 a 9.409, c 18.600 Å  
 Opaque; metallic; black.  
 In reflected light: grey, very weak anisotropism,  
 weak bireflectance, nonpleochroic. R-values:  
 (20.8, 21.2%) 470 nm, (19.6, 20.0%) 546 nm,  
 (19.2, 19.7%) 589 nm, (18.7, 19.2%) 650 nm.  
 2.703(100), 2.352(14), 2.135(16), 1.6516(30),  
 1.4167(10), 1.4023(12).

## IMA No. 90-008

$\text{Ca}(\text{Na},\text{K})_7(\text{Si}_6\text{Al}_6\text{O}_{24})(\text{S}^{-2})_{1.5} \cdot \text{H}_2\text{O}$   
 Hexagonal (trigonal), P31c  
 a 12.855, c 10.700 Å  
 Transparent; vitreous; yellow.  
 Uniaxial (-),  $\omega$  1.584,  $\epsilon$  1.660  
 4.824(70), 3.919(80), 3.720(100), 3.313(90),  
 2.694(35), 2.676(70), 2.471(35).

## IMA No. 90-009

$(\text{Na},\text{Ca},\text{K})_8(\text{Si}_6\text{Al}_6\text{O}_{24})(\text{SO}_4)_2\text{Cl} \cdot 0.5 \text{ H}_2\text{O}$   
 Hexagonal, P6<sub>2</sub>22  
 a 12.843, c 32.239 Å  
 Transparent; vitreous; green to greenish-yellow.  
 Uniaxial (+),  $\omega$  1.528,  $\epsilon$  1.543  
 4.84(40), 3.711(100), 3.314(80), 3.035(20),  
 2.988(16), 2.687(25), 2.470(16), 2.139(25).

## IMA No. 90-010

$\text{Fe}_{8-2x}[(\text{As}_{1-x}\text{S}_x)\text{O}_4]_6(\text{OH})_6 \cdot 5 \text{ H}_2\text{O}$ , x is about 0.2  
 Orthorhombic, Pbcm  
 a 6.412, b 19.45, c 8.941 Å  
 Transparent to translucent; greasy; cadmium orange.  
 Biaxial (-),  $\alpha$  1.94,  $\beta$  2.05,  $\gamma$  2.06, 2V(meas.) 5°,  
 2V(calc.) 32°.  
 9.75(10), 4.476(4), 3.208(9), 3.047(5), 2.680(4),  
 2.153(4), 1.604(4).

## IMA No. 90-011

$\text{HgAg}(\text{Cl},\text{Br},\text{I})\text{S}$   
 Orthorhombic, P2<sub>1</sub>2<sub>1</sub>2  
 a 6.803, b 12.87, c 4.528 Å  
 Translucent to opaque; subadamantine to  
 submetallic; black.  
 Biaxial (probably -),  $\alpha$  ~ 2.2,  $\gamma$  ~ 2.3.  
 6.43(40), 3.762(60), 3.637(60), 3.283(30),  
 2.664(100), 2.265(40), 2.047(20).

## IMA No. 90-012

$\text{Na}_6\text{K}_2(\text{Si}_6\text{Al}_6\text{O}_{24})(\text{SO}_4) \cdot 2 \text{ H}_2\text{O}$   
 Hexagonal, P6<sub>3</sub>  
 a 22.121, c 5.221 Å

Transparent; vitreous; colourless.

Uniaxial (-),  $\omega$  1.508,  $\epsilon$  1.506.  
 6.39(S), 4.77(vS), 3.69(m), 3.27(vS), 2.769(m),  
 2.650(m).

## IMA No. 90-013

$\text{Na}_7[\text{Al}_5\text{Si}_7\text{O}_{24}]\text{CO}_3 \cdot 3 \text{ H}_2\text{O}$   
 Hexagonal, P6<sub>3</sub>mc  
 a 12.575, c 5.105 Å  
 Transparent; vitreous; dark- to light-lilac.  
 Uniaxial (-),  $\omega$  1.509,  $\epsilon$  1.490.  
 6.30(70), 4.61(50), 3.65(90), 3.22(100),  
 2.722(50), 2.597(20), 2.402(20), 2.097(20).

## IMA No. 90-014

$\text{Na}_8[\text{Al}_6\text{Si}_6\text{O}_{24}](\text{OH})_2 \cdot 2 \text{ H}_2\text{O}$   
 Hexagonal, P6<sub>3</sub>  
 a 12.74, c 5.183 Å  
 Transparent; vitreous; light blue or colourless.  
 Uniaxial (+),  $\omega$  1.494,  $\epsilon$  1.501.  
 6.43(25), 4.70(60), 3.68(70), 3.26(100),  
 2.756(50), 2.433(30).

## IMA No. 90-015

$\text{Na}_3(\text{Y},\text{REE})(\text{CO}_3)_3 \cdot 3 \text{ H}_2\text{O}$   
 Orthorhombic, space group unknown, lattice is primitive  
 a 10.136, b 17.348, c 5.970 Å  
 Transparent; vitreous to dull; colourless.  
 Biaxial (+),  $\alpha$  1.528,  $\beta$  1.529,  $\gamma$  1.531, 2V(meas.) 45°,  
 2V(calc.) 71°.  
 6.53(55), 5.05(50), 4.85(65), 2.858(70),  
 2.597(50), 2.229(50), 2.076(100).

## IMA No. 90-016

an orthorhombic polymorph of natrolite  
 $\text{Na}_2\text{TiSiO}_5$   
 Orthorhombic, Pmma  
 a 9.827, b 9.167, c 4.799 Å  
 Translucent; adamantine; yellow, orange-yellow, orange-brown.  
 Biaxial (+),  $\alpha$  1.740,  $\beta$  1.741,  $\gamma$  1.765, 2V(meas.) 20°,  
 2V(calc.) 23°.  
 2.748(100), 2.257(25), 1.720(30), 1.680(30),  
 1.475(33), 1.443(35).

## IMA No. 90-018

a regular 1:1 interstratification of cookeite and paragonite  
 $\text{Li}_{0.5}\text{Na}_{0.5}\text{Al}_3\text{Si}_3\text{AlO}_{10}(\text{OH})_5$   
 Monoclinic, C2/m  
 a 5.158, b 8.914, c 23.83 Å,  $\beta$  94.23°  
 Transparent; pearly; white.  
 Biaxial (-),  $\alpha$  1.58 << 1.59,  $\beta$  1.58 << 1.59,  $\gamma$  1.59  
 << 1.60, 2V(meas.) 30–50°.  
 11.89(70), 4.456(90), 4.325(90), 2.547(100),  
 2.476(70), 1.486(90).

## IMA No. 90-019

the Mg-dominant analogue of chalcophanite  
 $(\text{Mg}, \text{Mn}, \text{Ca})\text{Mn}_3^{4+}\text{O}_7 \cdot 3 \text{H}_2\text{O}$

Triclinic, P1

$a = 7.534$ ,  $b = 7.525$ ,  $c = 8.204 \text{ \AA}$ ,  $\alpha = 89.753^\circ$ ,  
 $\beta = 117.375^\circ$ ,  $\gamma = 120.000^\circ$

Opaque; dull; coffee black.

In reflected light: grey, clear anisotropism,  
weak bireflectance, nonpleochroic. R-values:  
(23.0%) 470 nm, (19.9%) 546 nm, (19.1%)  
589 nm, (18.6%) 650 nm.

6.965(100), 5.539(3), 4.086(4), 3.522(3),  
3.483(11), 2.230(8).

## IMA No. 90-020

$\text{MnSO}_3 \cdot 3 \text{H}_2\text{O}$

Orthorhombic, Pnma

$a = 9.762$ ,  $b = 5.639$ ,  $c = 9.558 \text{ \AA}$

Transparent; vitreous; colourless.

Biaxial (+),  $\alpha = 1.590$ ,  $\beta = 1.596$ ,  $\gamma = 1.636$ , 2V(meas.)  
 $41^\circ$ , 2V(calc.)  $43^\circ$ .

6.83(S), 4.33(VS), 3.43(VS), 2.704(M),  
2.666(M), 2.414(M), 1.726(M).IMA

## IMA No. 90-021

the Ti-dominant analogue of lavenite

$\text{NaCa}(\text{Mn}, \text{Fe})(\text{Ti}, \text{Nb}, \text{Zr})\text{Si}_2\text{O}_7\text{OF}$

Monoclinic,  $P2_1/a$

$a = 10.828$ ,  $b = 9.790$ ,  $c = 7.054 \text{ \AA}$ ,  $\beta = 108.20^\circ$

Translucent to transparent; vitreous; orange-brown, yellow.

Biaxial (-),  $\alpha = 1.743$ ,  $\beta = 1.785$ ,  $\gamma = 1.810$ , 2V(meas.)  
 $72-84^\circ$ , 2V(calc.)  $74^\circ$ .

3.942(20), 3.234(30), 2.859(100), 2.807(70),  
1.762(20), 1.741(20), 1.727(20), 1.688(20),  
1.627(20).

## IMA No. 90-023

$3 \text{UO}_3 \cdot 2 \text{SeO}_2 \cdot 7 \text{H}_2\text{O}$

Orthorhombic, Pnc2 or Pncm

$a = 8.025$ ,  $b = 17.43$ ,  $c = 6.935 \text{ \AA}$

Translucent to transparent; vitreous; bright yellow.

Biaxial (-),  $\alpha = 1.618$ ,  $\beta = 1.738$ ,  $\gamma = 1.765$ , 2V(meas.)  
 $43^\circ$ , 2V(calc.)  $48^\circ$ .

8.01(100), 4.01(70), 3.468(60), 3.186(50),  
3.119(70), 2.912(80), 2.471(40).

## IMA No. 90-024

the Mn-dominant analogue of fenaksite

$\text{NaKMnSi}_4\text{O}_{10}$

Triclinic, P1

$a = 6.993$ ,  $b = 8.219$ ,  $c = 10.007 \text{ \AA}$ ,  $\alpha = 105.11^\circ$ ,  
 $\beta = 100.76^\circ$ ,  $\gamma = 114.79^\circ$

Transparent; vitreous; colourless to light pinkish-cream.

Biaxial (-),  $\alpha = 1.540$ ,  $\beta = 1.551$ ,  $\gamma = 1.557$ , 2V(meas.)

$73^\circ$ , 2V(calc.)  $72^\circ$ .

6.89(70), 3.45(100), 3.26(90), 3.05(80),  
2.880(70), 2.715(70), 2.463(70).

## IMA No. 90-025

$\text{Na}_{17}\text{Ca}_3\text{Mg}(\text{Ti}, \text{Mn})_4(\text{Si}_2\text{O}_7)_2(\text{PO}_4)_6\text{O}_3\text{F}_5$

Triclinic, P1

$a = 5.412$ ,  $b = 7.079$ ,  $c = 26.56 \text{ \AA}$ ,  $\alpha = 95.21^\circ$ ,  $\beta = 93.51^\circ$ ,  
 $\gamma = 90.10^\circ$

Translucent to transparent; vitreous to pearly; light brown.

Biaxial (-),  $\alpha = 1.600$ ,  $\beta = 1.658$ ,  $\gamma = 1.676$ , 2V(meas.)  
 $56^\circ$ , 2V(calc.)  $57^\circ$ .

2.937(10), 2.702(9), 2.659(8), 2.048(8B),  
1.771(5B), 1.730(5).

## IMA No. 90-026

$\text{Na}_{14}\text{CaMgTi}_4(\text{Si}_2\text{O}_7)_2(\text{PO}_4)_4\text{O}_4\text{F}_2$

Triclinic, P1

$a = 5.415$ ,  $b = 7.081$ ,  $c = 20.34 \text{ \AA}$ ,  $\alpha = 86.85^\circ$ ,  $\beta = 94.40^\circ$ ,  
 $\gamma = 89.94^\circ$

Translucent to transparent; vitreous to pearly; light brown.

Biaxial (-),  $\alpha = 1.630$ ,  $\beta = 1.678$ ,  $\gamma = 1.697$ , 2V(meas.)  
 $62^\circ$ , 2V(calc.)  $63^\circ$ .

2.880(10), 2.702(8B), 2.636(7), 2.050(5),  
1.662(4B), 1.600(5).

## IMA No. 90-027

$(\text{Ca}, \text{Mn})_4\text{Be}_3\text{Si}_6\text{O}_{17}(\text{OH})_4 \cdot 3 \text{H}_2\text{O}$

Orthorhombic, space group unknown

$a = 8.724$ ,  $b = 23.14$ ,  $c = 4.923 \text{ \AA}$

Translucent; vitreous; white to pale grey or beige.

Biaxial, average index of refraction is 1.604.  
11.64(93), 5.80(68), 3.87(76), 3.16(74),  
2.889(75), 2.837(100), 2.494(58).

## IMA No. 90-028

$\text{NaLiSi}_2\text{O}_5 \cdot 2 \text{H}_2\text{O}$

Monoclinic, A2/n

$a = 5.061$ ,  $b = 8.334$ ,  $c = 14.383 \text{ \AA}$ ,  $\beta = 96.67^\circ$

Transparent to opaque; vitreous to earthy; colourless to white.

Biaxial (+),  $\alpha = 1.515$ ,  $\beta = 1.516$ ,  $\gamma = 1.518$ , 2V(meas.)  
 $64^\circ$ , 2V(calc.)  $71^\circ$ .

7.14(100), 4.24(80), 4.14(100), 4.02(80),  
2.847(100), 2.698(50), 1.610(40), 1.557(40).

## IMA No. 90-030

$\text{NaLi}_2\text{PO}_4$

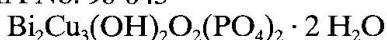
Orthorhombic, PmnB

$a = 6.884$ ,  $b = 9.976$ ,  $c = 4.927 \text{ \AA}$

Transparent to translucent; vitreous; colourless, white, very pale blue, very pale yellow.

- Biaxial (-),  $\alpha$  1.533,  $\beta$  1.540,  $\gamma$  1.541, 2V(meas.) 49°, 2V(calc.) 41°.  
 4.020(100), 3.507(100), 3.441(100), 2.833(40),  
 2.712(40), 2.493(90), 2.462(90), 1.721(40).
- IMA No. 90-031**  
 $Pb_3(Fe^{3+}, Mn^{3+})_4Mn^{4+}O_{15}$   
 Hexagonal, P6<sub>3</sub>/mcm  
 a 10.037, c 13.67 Å  
 Opaque; metallic; black.  
 In reflected light: bright white, strong anisotropism, moderate bireflectance, nonpleochroic.  
 $R_O$  and  $R_E$ : (31.0, 26.1%) 470 nm,  
 (29.5, 25.1%) 546 nm, (28.5, 24.4%) 589 nm,  
 (27.2, 23.4 %) 650 nm.  
 3.42(5), 3.18(8), 2.828(7), 2.663(10), 2.366(6),  
 1.687(8).
- IMA No. 90-032**  
 $Mg_5Ba(PO_4)_4 \cdot 8 H_2O$   
 Orthorhombic, Pmma, Pmc2<sub>1</sub> or Pma2  
 a 12.829, b 8.335, c 18.312 Å  
 Transparent; vitreous with a silky sheen; yellow-brown to light pink.  
 Biaxial (+),  $\alpha$  1.552,  $\beta$  1.552,  $\gamma$  1.558, 2V(meas.) 23°, 2V(calc.) 0°.  
 10.51(100), 3.874(32), 3.520(34), 3.081(78),  
 3.054(41), 2.969(44), 2.839(34).
- IMA No. 90-033**  
 $Pb_4Cu_4Si_4O_{12}(HCO_3)_4ClH$   
 Tetragonal, I4/m  
 a 14.234, c 6.103 Å  
 Transparent; vitreous; bright blue.  
 Uniaxial (+),  $\omega$  1.786,  $\epsilon$  1.800  
 10.2(10), 5.644(7), 4.495(10), 3.333(10),  
 3.013(9), 2.611(5).
- IMA No. 90-036-**  
 $Cu_4Al_2[HSbO_4, SO_4](OH)_{10}(CO_3) \cdot 2 H_2O$   
 Monoclinic, P2<sub>1</sub>  
 a 10.765, b 2.903, c 12.527 Å,  $\beta$  95.61°  
 Transparent; silky; green-blue.  
 Biaxial (+),  $\alpha$  1.626,  $\beta$  1.646,  $\gamma$  1.682, 2V(meas.) 77°, 2V(calc.) 75°.  
 5.62(50), 5.160(90), 4.276(100), 3.565(40),  
 2.380(35), 2.326(35).
- IMA No. 90-037**  
 $Cu_4(UO_2)(MoO_4)_2(OH)_6$   
 Monoclinic, A121, A1m1 or A12/m1  
 a 5.529, b 6.112, c 19.83 Å,  $\beta$  103.9°  
 Transparent; vitreous to greasy; dark green to black.  
 Biaxial (-),  $\alpha$  1.90,  $\beta$  1.93,  $\gamma$  1.96, 2V(meas.) 90°, 2V(calc.) 89°.
- 4.815(80), 4.425(40), 4.276(40), 4.100(100),  
 3.734(90), 3.254(40), 2.628(40), 2.482(60).
- IMA No. 90-040**  
 $Ca_3Cu_5Si_9O_{26}$   
 Monoclinic, C2/c  
 a 10.160, b 10.001, c 19.973 Å,  $\beta$  91.56°  
 Transparent; vitreous; greenish blue.  
 Biaxial (+),  $\alpha$  1.722,  $\beta$  1.723,  $\gamma$  1.734, 2V(meas.) 73°, 2V(calc.) 34°.  
 7.13(60), 6.70(70), 3.12(90), 3.00(100), 2.45(60),  
 2.41(70).
- IMA No. 90-041**  
 $Ca_3(SO_3)_2SO_4 \cdot 12 H_2O$   
 Hexagonal, R3m  
 a 11.350, c 28.321 Å  
 Transparent; vitreous; colourless.  
 Uniaxial (+),  $\omega$  1.4941,  $\epsilon$  1.4960.  
 8.11(80), 5.73(100), 3.63(60), 3.28(40), 2.69(80),  
 2.11(40).
- IMA No. 90-042**  
 $Mn(Mg, Mn)_2Zn_2(OH)_{10} \cdot 4 H_2O$   
 Monoclinic, C2/m  
 a 15.47, b 6.369, c 5.576 Å,  $\beta$  101.29°  
 Mostly opaque but also translucent; vitreous to dull to earthy; dark brown.  
 In reflected light: gray, weak anisotropism, very weak bireflectance, nonpleochroic.  $R$ (min., max.): (8.54, 8.65%) 470 nm, (8.07, 8.23%) 546 nm, (8.00, 8.19%) 589 nm, (7.89, 8.18%) 650 nm.  
 7.61(10), 3.96(5), 3.45(3), 2.997(4), 2.745(6),  
 2.673(3).
- IMA No. 90-043**  
 the monoclinic dimorph of mimetite  
 $Pb_5(AsO_4)_3Cl$   
 Monoclinic, P2<sub>1</sub>/b  
 a 10.189, b 20.372, c 7.46 Å,  $\beta$  119.88°  
 Translucent; resinous; yellowish-white.  
 Biaxial (-),  $\alpha$ ,  $\beta$  and  $\gamma$  > 1.8, 2V(meas.) 8°.  
 3.342(50), 3.048(100), 3.008(70), 2.947(70),  
 2.106(60), 1.961(50), 1.903(50).
- IMA No. 90-044**  
 $NaVO_3$   
 Orthorhombic, Pnma  
 a 14.134, b 3.648, c 5.357 Å  
 Transparent; silky; colourless.  
 Biaxial (+),  $\alpha$  1.780,  $\beta$  1.800,  $\gamma$  > 1.85, 2V(meas.) 30–40°.  
 7.07(11), 5.05(100), 3.530(25), 3.241(18),  
 3.016(13), 2.957(35), 2.685(12).

## IMA No. 90-045



Monoclinic, C2/m

a 12.358, b 6.331, c 9.060 Å, β 122.70°

Translucent; vitreous; sky blue to dark azure blue.

Biaxial (−), β 1.89, 2V(meas.) 68°.

7.623(8), 6.093(6), 5.405(6), 5.201(7), 3.039(10), 2.921(9), 2.197(6).

12.3(100), 2.737(30), 2.583(40), 2.362(30), 1.594(30), 1.580(30).

## IMA No. 90-047



Monoclinic, P2<sub>1</sub>/c

a 6.61, b 4.60, c 11.10 Å, β 101.4°

Opaque; metallic; dark bronze to black.

In reflected light: white with a brownish hue, very strong anisotropism, very strong bireflectance, weak pleochroism. R (max. and min.): (54.8, 35.2%) 470 nm, (58.6, 38.6%) 546 nm, (60.8, 40.2%) 589 nm, (63.2, 42.4%) 650 nm.

5.45(60), 3.27(60), 2.93(80), 2.78(60), 2.648(60B), 2.465(60), 1.875(100B), 1.812(70).

## IMA No. 90-048



Cubic, P4<sub>1</sub>32 or P4<sub>3</sub>2

a 6.448 Å

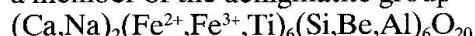
Opaque; metallic; light yellow.

In reflected light: pinkish-yellow, no anisotropism, no bireflectance, nonpleochroic. R: (47.5%) 470 nm, (48.3%) 546 nm, (46.8%) 589 nm, (45.6%) 650 nm.

2.89(10), 2.63(9), 1.943(9), 1.724(5), 1.376(4).

## IMA No. 90-051

a member of the aenigmatite group



Triclinic, P1 or P̄1

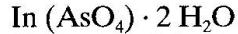
a 10.385, b 10.751, c 8.959 Å, α 104.76°, β 97.03°, γ 125.47°

Opaque to subtranslucent; vitreous; black.

Biaxial (−?), α 1.78, γ 1.82, 2V(meas.) large. 8.029(90), 3.122(46), 2.9243(59), 2.6756(48), 2.5291(100), 2.0993(63), 2.0758(47).

## IMA No. 90-052

the indium-dominant analogue of scorodite and mansfieldite



Orthorhombic, Pcab

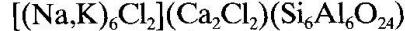
a 10.45, b 10.32, c 9.09 Å

Transparent; vitreous; pale green to yellowish-green.

Biaxial (−), mean n about 1.65, 2V(meas.) 55–76°.

5.719(70), 4.537(100), 4.162(40), 3.2461(80), 3.1073(80), 2.6568(50), 2.5426(45).

## IMA No. 90-054



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

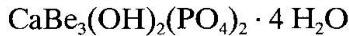
a 25.771, c 5.371 Å

Transparent; vitreous; colourless.

Uniaxial (+), ω 1.529, ε 1.532

4.85(S), 3.71(vS), 3.31(vS), 2.788(S), 2.677(m), 2.474(m), 2.147(m), 1.804(m), 1.380(m).

## IMA No. 90-049



Monoclinic, Cc

a 11.897, b 9.707, c 9.633 Å, β 95.76°

Translucent; vitreous; colourless.

Biaxial (+), α 1.5203, β 1.5205, γ 1.5300, 2V(meas.) < 10°, 2V(calc.) 17°.

5.92(60), 4.33(50), 3.421(70), 2.959(60), 2.945(45), 2.5130(100).

## IMA No. 90-055



Tetragonal, space group unknown

a 9.044, c 4.937 Å

Opaque; metallic; megascopic colour unknown.

In reflected light: yellowish-rose, strong anisotropism, distinct to strong bireflectance, pronounced pleochroism. R<sub>min.</sub>, R<sub>max.</sub>: (33.7, 41.6%) 470 nm, (38.5, 48.7%) 546 nm, (40.4, 51.8%) 589 nm, (42.0, 54.9%) 650 nm.

2.472(10), 2.260(9), 2.022(6), 1.361(4), 1.213(5), 1.205(5), 1.129(5).

## IMA No. 90-050

the Mn-dominant analogue of stilpnomelane  
 $(\text{K},\text{Na})_4(\text{Mn},\text{Zn},\text{Mg},\text{Fe}^{3+})_{48}(\text{Si},\text{Al})_{72}(\text{O},\text{OH})_{216} \cdot n \text{H}_2\text{O}$  (n about 6)

Triclinic, P1 or P̄1

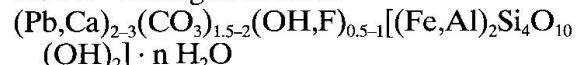
a 5.521, b 9.560, c 36.57 Å (orthohexagonal cell)

Transparent to translucent; vitreous; dark brown.

Biaxial (−), α 1.545, β 1.583, γ 1.583, 2V(meas.) 10°, 2V(calc.) 0°.

## IMA No. 90-056

the Fe<sup>3+</sup>-analogue of surite



Monoclinic, P2<sub>1</sub> or P2<sub>1</sub>/m

a 5.241, b 9.076, c 16.23 Å, β 90.03°

Transparent; silky; light yellow green to dark forest green.

Biaxial (+),  $\alpha$  1.757,  $\beta$  1.763,  $\gamma$  1.773, 2V(calc.)  
 $76^\circ$ .  
16.1(40), 4.53(100), 3.727(35), 3.240(90),  
2.612(80), 2.272(50).

IMA No. 90-057  
 $(\text{Sr}_{1.5}\text{Ca}_{1.2})\text{Ca}_2(\text{Ca}_{2.2}\text{Na}_{1.8})\text{K}_{1.4}\text{Al}_{17}\text{Si}_{19}\text{O}_{72} \cdot 34 \text{ H}_2\text{O}$   
Hexagonal, P6<sub>3</sub>/mmc  
a 13.244, c 15.988 Å  
Transparent; vitreous; colourless.  
Uniaxial (-),  $\omega$  1.522,  $e$  1.507  
6.58(80), 3.80(100), 2.95(70), 2.70(50), 2.50(50),  
2.21(70), 1.83(50).

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