

# 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 (+), ω 1.703, ε 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)

Transparent; vitreous; pale yellow brown in thin-section.

Biaxial (+), α 1.735, β 1.741, γ 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. 90-004

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, β 114.72°

IMA No. 90-005

Ca<sub>3</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, β 96.59°

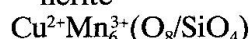
Transparent; vitreous; colourless to white.

Biaxial (-), α 1.575, β 1.580, γ 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



Tetragonal,  $I4_1/a$

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).

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. 90-008



Hexagonal (trigonal),  $P31c$

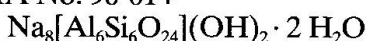
a 12.855, c 10.700 Å

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. 90-014



Hexagonal,  $P6_3$

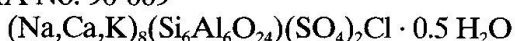
a 12.74, c 5.183 Å

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. 90-009



Hexagonal,  $P6_22$

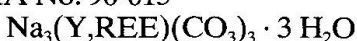
a 12.843, c 32.239 Å

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. 90-015



Orthorhombic, space group unknown, lattice is primitive

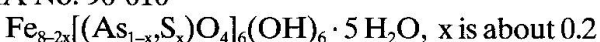
a 10.136, b 17.348, c 5.970 Å

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. 90-010



Orthorhombic,  $Pbcm$

a 6.412, b 19.45, c 8.941 Å

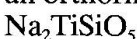
Transparent to translucent; greasy; cadmium orange.

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. 90-016

an orthorhombic polymorph of natisite



Orthorhombic,  $Pmma$

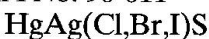
a 9.827, b 9.167, c 4.799 Å

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. 90-011



Orthorhombic,  $P2_12_12$

a 6.803, b 12.87, c 4.528 Å

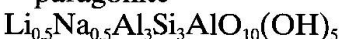
Translucent to opaque; subadamantine to submetallic; black.

Biaxial (probably -),  $\alpha \sim 2.2$ ,  $\gamma \sim 2.3$ .

6.43(40), 3.762(60), 3.637(60), 3.283(30), 2.664(100), 2.265(40), 2.047(20).

## IMA No. 90-018

a regular 1:1 interstratification of cookeite and paragonite



Monoclinic,  $C2/m$

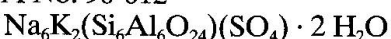
a 5.158, b 8.914, c 23.83 Å,  $\beta$  94.23°

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. 90-012

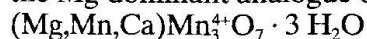


Hexagonal,  $P6_3$

a 22.121, c 5.221 Å

## IMA No. 90-019

the Mg-dominant analogue of chalcophanite



Triclinic, P1

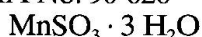
a 7.534, b 7.525, c 8.204 Å,  $\alpha$  89.753°,  
 $\beta$  117.375°,  $\gamma$  120.000°

Opaque; dull; coffee black.

In reflected light: grey, clear anisotropism,  
weak birefractance, 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



Orthorhombic, Pnma

a 9.762, b 5.639, c 9.558 Å

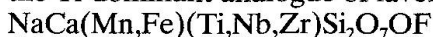
Transparent; vitreous; colourless.

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

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



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

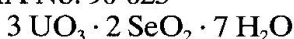
a 10.828, b 9.790, c 7.054 Å,  $\beta$  108.20°

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

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

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



Orthorhombic, Pnc2 or Pncm

a 8.025, b 17.43, c 6.935 Å

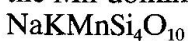
Translucent to transparent; vitreous; bright  
yellow.

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

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



Triclinic, P1

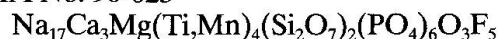
a 6.993, b 8.219, c 10.007 Å,  $\alpha$  105.11°,  
 $\beta$  100.76°,  $\gamma$  114.79°

Transparent; vitreous; colourless to light  
pinkish-cream.

Biaxial (-),  $\alpha$  1.540,  $\beta$  1.551,  $\gamma$  1.557, 2V(meas.)  
73°, 2V(calc.) 72°.

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



Triclinic, P1

a 5.412, b 7.079, c 26.56 Å,  $\alpha$  95.21°,  $\beta$  93.51°,  
 $\gamma$  90.10°

Translucent to transparent; vitreous to pearly;  
light brown.

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

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

## IMA No. 90-026



Triclinic, P1

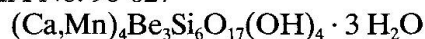
a 5.415, b 7.081, c 20.34 Å,  $\alpha$  86.85°,  $\beta$  94.40°,  
 $\gamma$  89.94°

Translucent to transparent; vitreous to pearly;  
light brown.

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

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

## IMA No. 90-027



Orthorhombic, space group unknown

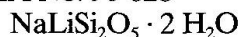
a 8.724, b 23.14, c 4.923 Å

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



Monoclinic, A2/n

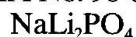
a 5.061, b 8.334, c 14.383 Å,  $\beta$  96.67°

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

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

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



Orthorhombic, Pmnb

a 6.884, b 9.976, c 4.927 Å

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

$\text{Pb}_3(\text{Fe}^{3+}, \text{Mn}^{3+})_4\text{Mn}_3^{4+}\text{O}_{15}$   
Hexagonal,  $\text{P6}_3/\text{mcm}$   
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

$\text{Mg}_3\text{Ba}(\text{PO}_4)_4 \cdot 8 \text{H}_2\text{O}$   
Orthorhombic,  $\text{Pmma}$ ,  $\text{Pmc}2_1$  or  $\text{Pma}2$   
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

$\text{Pb}_4\text{Cu}_4\text{Si}_4\text{O}_{12}(\text{HCO}_3)_4\text{ClH}$   
Tetragonal,  $\text{I4}/\text{m}$   
a 14.234, c 6.103 Å  
Transparent; vitreous; bright blue.  
Uniaxial (+),  $\omega$  1.786,  $\varepsilon$  1.800  
10.2(10), 5.644(7), 4.495(10), 3.333(10), 3.013(9), 2.611(5).

## IMA No. 90-036

$\text{Cu}_4\text{Al}_2[\text{HSbO}_4, \text{SO}_4](\text{OH})_{10}(\text{CO}_3) \cdot 2 \text{H}_2\text{O}$   
Monoclinic,  $\text{P}2_1$   
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

$\text{Cu}_4(\text{UO}_2)(\text{MoO}_4)_2(\text{OH})_6$   
Monoclinic,  $\text{A}121$ ,  $\text{A}1\text{m}1$  or  $\text{A}12/\text{m}1$   
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

$\text{Ca}_3\text{Cu}_5\text{Si}_9\text{O}_{26}$   
Monoclinic,  $\text{C}2/\text{c}$   
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

$\text{Ca}_3(\text{SO}_3)_2\text{SO}_4 \cdot 12 \text{H}_2\text{O}$   
Hexagonal,  $\text{R}\bar{3}\text{m}$   
a 11.350, c 28.321 Å  
Transparent; vitreous; colourless.  
Uniaxial (+),  $\omega$  1.4941,  $\varepsilon$  1.4960.  
8.11(80), 5.73(100), 3.63(60), 3.28(40), 2.69(80), 2.11(40).

## IMA No. 90-042

$\text{Mn}(\text{Mg}, \text{Mn})_2\text{Zn}_2(\text{OH})_{10} \cdot 4 \text{H}_2\text{O}$   
Monoclinic,  $\text{C}2/\text{m}$   
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.  $R(\text{min.}, \text{max.})$ : (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  
 $\text{Pb}_5(\text{AsO}_4)_3\text{Cl}$   
Monoclinic,  $\text{P}2_1/\text{b}$   
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

$\text{NaVO}_3$   
Orthorhombic,  $\text{Pnma}$   
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  
 $\text{Bi}_2\text{Cu}_3(\text{OH})_2\text{O}_2(\text{PO}_4)_2 \cdot 2 \text{H}_2\text{O}$   
 Monoclinic,  $C2/m$   
 $a$  12.358,  $b$  6.331,  $c$  9.060 Å,  $\beta$  122.70°  
 Translucent; vitreous; sky blue to dark azure blue.  
 Biaxial (-),  $\beta$  1.89,  $2V(\text{meas.})$  68°.  
 7.623(8), 6.093(6), 5.405(6), 5.201(7), 3.039(10), 2.921(9), 2.197(6).
- IMA No. 90-047  
 $\text{Pt}_5\text{Se}_4$   
 Monoclinic,  $P2_1/c$   
 $a$  6.61,  $b$  4.60,  $c$  11.10 Å,  $\beta$  101.4°  
 Opaque; metallic; dark bronze to black.  
 In reflected light: white with a brownish hue, very strong anisotropism, very strong birefractance, 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  
 $\text{PdBiSe}$   
 Cubic,  $P4_132$  or  $P4_32$   
 $a$  6.448 Å  
 Opaque; metallic; light yellow.  
 In reflected light: pinkish-yellow, no anisotropism, no birefractance, 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. 90-049  
 $\text{CaBe}_3(\text{OH})_2(\text{PO}_4)_2 \cdot 4 \text{H}_2\text{O}$   
 Monoclinic,  $Cc$   
 $a$  11.897,  $b$  9.707,  $c$  9.633 Å,  $\beta$  95.76°  
 Translucent; vitreous; colourless.  
 Biaxial (+),  $\alpha$  1.5203,  $\beta$  1.5205,  $\gamma$  1.5300,  $2V(\text{meas.}) < 10^\circ$ ,  $2V(\text{calc.}) 17^\circ$ .  
 5.92(60), 4.33(50), 3.421(70), 2.959(60), 2.945(45), 2.5130(100).
- 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  $P\bar{1}$   
 $a$  5.521,  $b$  9.560,  $c$  36.57 Å (orthohexagonal cell)  
 Transparent to translucent; vitreous; dark brown.  
 Biaxial (-),  $\alpha$  1.545,  $\beta$  1.583,  $\gamma$  1.583,  $2V(\text{meas.}) 10^\circ$ ,  $2V(\text{calc.}) 0^\circ$ .
- 12.3(100), 2.737(30), 2.583(40), 2.362(30), 1.594(30), 1.580(30).
- IMA No. 90-051  
 a member of the aenigmatite group  
 $(\text{Ca}, \text{Na})_2(\text{Fe}^{2+}, \text{Fe}^{3+}, \text{Ti})_6(\text{Si}, \text{Be}, \text{Al})_6\text{O}_{20}$   
 Triclinic,  $P1$  or  $P\bar{1}$   
 $a$  10.385,  $b$  10.751,  $c$  8.959 Å,  $\alpha$  104.76°,  $\beta$  97.03°,  $\gamma$  125.47°  
 Opaque to subtranslucent; vitreous; black.  
 Biaxial (-?),  $\alpha$  1.78,  $\gamma$  1.82,  $2V(\text{meas.})$  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  
 $\text{In}(\text{AsO}_4) \cdot 2 \text{H}_2\text{O}$   
 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,  $2V(\text{meas.}) 55-76^\circ$ .  
 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  
 $[(\text{Na}, \text{K})_6\text{Cl}_2](\text{Ca}_2\text{Cl}_2)(\text{Si}_6\text{Al}_6\text{O}_{24})$   
 Hexagonal,  $P6_3$  or  $P6_3/m$   
 $a$  25.771,  $c$  5.371 Å  
 Transparent; vitreous; colourless.  
 Uniaxial (+),  $\omega$  1.529,  $\epsilon$  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. 90-055  
 $(\text{Pd}, \text{Cu}, \text{Fe})_9\text{SnTe}_2\text{S}_2$   
 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 birefractance, pronounced pleochroism.  $R_{\text{min.}}$ ,  $R_{\text{max.}}$ : (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. 90-056  
 the  $\text{Fe}^{3+}$ -analogue of surite  
 $(\text{Pb}, \text{Ca})_{2.3}(\text{CO}_3)_{1.5-2}(\text{OH}, \text{F})_{0.5-1}[(\text{Fe}, \text{Al})_2\text{Si}_4\text{O}_{10}(\text{OH})_2] \cdot n \text{H}_2\text{O}$   
 Monoclinic,  $P2_1$  or  $P2_1/m$   
 $a$  5.241,  $b$  9.076,  $c$  16.23 Å,  $\beta$  90.03°  
 Transparent; silky; light yellow green to dark forest green.

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

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$(\text{Sr}_{1.5}\text{Ca}_{1.2})\text{Ca}_2(\text{Ca}_{2.2}\text{Na}_{1.8})\text{K}_{1.4}\text{Al}_{17}\text{Si}_{19}\text{O}_{72} \cdot 34 \text{H}_2\text{O}$   
Hexagonal,  $P6_3/mmc$   
 $a$  13.244,  $c$  15.988 Å  
Transparent; vitreous; colourless.  
Uniaxial (-),  $\omega$  1.522,  $\varepsilon$  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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