

**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.

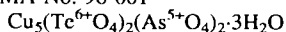
The names of these approved species are considered confidential information until the authors have published their descriptions or released information themselves.

NO OTHER INFORMATION WILL BE RELEASED BY THE COMMISSION

J. A. Mandarino, Chairman Emeritus and J. D. Grice, Chairman
Commission on New Minerals and Mineral Names
International Mineralogical Association

1996 PROPOSALS

IMA No. 96-001



Triclinic: P1 or P1̄

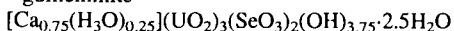
a 8.984, b 10.079, c 8.975 Å, α 102.68°, β 92.45°, γ 70.45°

Emerald green; vitreous to adamantine; transparent to translucent

Biaxial, indices of refraction calculated from reflectance measurements are 1.71–1.73

9.28 (70), 4.65 (70), 3.097 (100), 3.018 (60), 2.658 (50), 2.468 (50), 1.740 (50)

IMA No. 96-002 The calcium-dominant analogue of guilleminite



Orthorhombic: Pmn2₁ or Pmmn

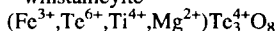
a 7.010, b 17.135, c 17.606 Å

Lemon-yellow; pearly; translucent

Biaxial (–), α 1.1.54 calc., β 1.73, γ 1.75, 2V(meas.) 33°

8.79 (80), 8.56 (40), 3.51 (100), 3.24 (40), 3.093 (50), 3.032 (100), 1.924 (40)

IMA No. 96-003 The Fe³⁺-dominant analogue of winstanleyite



Cubic: Ia3̄

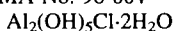
a 11.011 Å

Orange; adamantine; translucent

Isotropic, n(calc) = 2.17

4.486 (29), 3.175 (100), 2.943 (23), 2.749 (37), 2.592 (22), 1.944 (44), 1.658 (45)

IMA No. 96-004



Cubic: Im3m

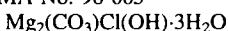
a 19.878 Å

Yellow-orange to yellow-brown; vitreous; transparent

Isotropic, n 1.53–1.55

8.11 (70), 7.03 (50), 4.47 (60), 3.23 (70), 2.706 (100), 2.446 (80), 1.957 (70)

IMA No. 96-005



Hexagonal (trigonal): R3c or R3̄c

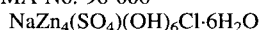
a 23.163, c 7.221 Å

White; lustre and diaphaneity unknown

Uniaxial, ω 1.510, ε 1.510

11.66 (100), 3.396 (17), 3.356 (17), 3.264 (21), 3.218 (21), 3.000 (41), 2.657 (22)

IMA No. 96-006

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

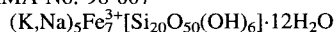
a 8.359, c 13.059 Å

Colourless to white; pearly; translucent

Uniaxial (-), ω 1.5607, ϵ 1.5382

14.244 (100), 6.501 (23), 4.339 (15), 3.258 (14), 2.967 (10)

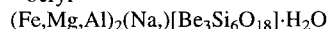
IMA No. 96-007

Triclinic: $P\bar{1}$ a 14.86, b 20.54, c 5.29 Å, α 95.6°, β 92.3°, γ 94.4°

Pink-brownish; silky to earthy; translucent

Biaxial (+), α 1.523, β 1.525, γ 1.550, 2V(meas.) 30°, 2V(calc.) 32°

12.36 (100), 11.60 (40), 10.21 (14), 3.411 (37), 3.281 (15), 2.896 (12)

IMA No. 96-008 The Fe^{3+} -dominant analogue of berylHexagonal: $P6/mcc$

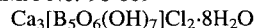
a 9.387, c 9.202 Å

Light-blue; vitreous; transparent

Uniaxial (-), ω 1.625, ϵ 1.619

8.12 (S), 4.00 (M), 3.278 (VS), 2.903 (S), 2.553 (MW), 1.752 (MW)

IMA No. 96-009



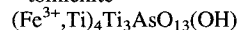
Monoclinic: Pn

a 17.42, b 8.077, c 17.33 Å, β 121.48°

Colourless to white; vitreous; transparent to translucent

Biaxial (-), α 1.506, β 1.527, γ 1.532, 2V(meas.) 56°, 2V(calc.) 51°

8.10 (10), 4.04 (4), 3.56 (2), 2.834 (2), 2.535 (2), 2.276 (2)

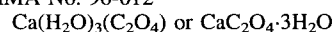
IMA No. 96-010 The Fe^{3+} -dominant analogue of tomichiteMonoclinic: $A2/m$ a 7.184, b 14.289, c 5.006 Å, β 105.17°

Black; metallic; opaque

In reflected light: greyish-white, no bireflectance, nonpleochroic. R_1 & R_2 : (20.1, 20.8 %)460nm, (18.7, 19.3 %)540nm, (18.2, 18.9 %)580nm, (17.5, 18.1 %)660nm

3.117 (30), 2.846 (80), 2.681 (100), 2.029 (30), 1.5825 (50)

IMA No. 96-012

Triclinic: $P\bar{1}$ a 6.097, b 7.145, c 8.434 Å, α 76.54°, β 70.30°, γ 70.75°

Colourless; vitreous; transparent

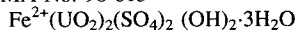
Biaxial (-), α 1.483, β 1.516(calc.), γ 1.533,

2V(meas.) 70°, 2V(calc.) 70°

7.92 (M), 5.52 (VS), 5.26 (M), 4.99 (M), 3.642 (M),

2.834 (S), 2.758 (M), 2.732 (M)

IMA No. 96-013



Orthorhombic: Pnm or Pnn2

a 15.908, b 16.274, c 6.903 Å

Pale yellow to white; vitreous; transparent

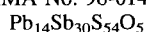
Biaxial (-), α 1.470, β 1.492, γ 1.504(calc.),

2V(meas.) 73°

7.95 (81), 5.91 (100), 3.941 (71), 3.451 (67), 3.166

(50), 2.894 (41), 2.596 (70)

IMA No. 96-014

Monoclinic: $C2/m$ a 52.00, b 8.148, c 24.311 Å, β 104.09°

Bluish-black; metallic; opaque

In reflected light: black with blue-red reflections, low

anisotropism, low bireflectance,

nonpleochroic. R_1 & R_2 : (40.03, 42.90 %)470nm,

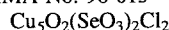
(36.46, 40.92 %)546nm, (35.65, 40.25 %)589nm,

(32.40, 36.00 %)650nm

4.04 (m), 3.47 (s), 3.44 (m), 3.04 (m), 2.96 (s), 2.296

(m)

IMA No. 96-015

Monoclinic: $P2_1/c$ a 6.045, b 13.778, c 5.579 Å, β 95.76°

Chestnut to dark brown; very strong vitreous to adamantine; translucent

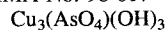
Biaxial (-), α 2.06, β 2.11, γ 2.15, 2V(meas.) large,

2V(calc.) 82°

6.88 (68), 5.511 (50), 2.990 (100), 2.963 (94), 2.566

(67), 2.296 (95)

IMA No. 96-017 A triclinic polymorph of clinoclase

Triclinic: $P\bar{1}$ a 5.445, b 5.873, c 5.104 Å, α 114.95°, β 93.05°, γ 91.92°

Green-blue; vitreous; transparent

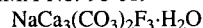
Biaxial (-), α 1.760, β 1.80, γ 1.83, 2V(meas.) 77°,

2V(calc.) 80°

4.613 (100), 4.580 (50), 3.390 (60), 2.713 (40), 2.543

(40), 2.445 (30)

IMA No. 96-019

Hexagonal (trigonal): $P\bar{3}_2$

a 6.718, c 15.050 Å

Colourless to white; vitreous; transparent to translucent

Uniaxial (+), ω 1.538, ϵ 1.563

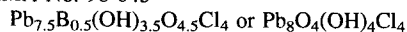
5.809 (30), 5.010 (30), 3.358 (30), 2.791 (50), 2.508

(40), 2.010 (100), 1.939 (40)

- IMA No. 96-020
 $\text{Pb}_{12}\text{O}_6\text{Mn}(\text{Mn},\text{Mg})_4(\text{Mg},\text{Mn})_2(\text{SO}_4)(\text{CO}_3)_4\text{Cl}_4(\text{OH})_{12}$
 Tetragonal: $\text{P4}_2/\text{nmn}$
 a 12.627, c 12.595 Å
 Apple green to emerald green; vitreous to adamantine; transparent
 Anomalous biaxial (+), α , β , and $\gamma > 1.92$
 8.95 (20), 7.30 (20), 3.99 (30), 2.975 (100), 2.752 (30), 2.473 (20), 1.716 (20)
- IMA No. 96-022 A polymorph of fluorapatite
 $(\text{Ca},\text{R})_5(\text{PO}_4)_3\text{FR} = \text{Sr}, \text{Na}, \text{REE}$
 Hexagonal: P6_3
 a 9.485, c 7.000 Å
 Pale yellow; vitreous; transparent
 Uniaxial (-), ω 1.649, ϵ 1.637
 3.498 (45), 3.104 (22), 2.838 (100), 2.814 (48), 2.740 (53), 1.963 (21), 1.865 (31)
- IMA No. 96-023 A manganese- and fluorine-rich member of the eudialyte group
 $(\text{Na},\text{RE})_{15}(\text{Ca},\text{RE})_6\text{Mn}_3\text{Zr}_3\text{NbSi}_{25}\text{O}_{76}\text{F}_2$
 Hexagonal (trigonal): R3m
 a 14.1686, c 30.0847 Å
 Yellow-brown; vitreous; transparent
 Uniaxial (-), ω 1.628, ϵ 1.623
 11.362 (43), 7.084 (41), 5.681 (30), 4.296 (34), 3.382 (37), 2.962 (91), 2.840 (100)
- IMA No. 96-024 The scandium-dominant analogue of xenotime-(Y)
 ScPO_4
 Tetragonal: $\text{I4}_1/\text{amd}$
 a 6.589, c 5.806 Å
 Pale-pink; vitreous; transparent
 Uniaxial (+), ω 1.790, ϵ 1.86
 3.293 (100), 2.464 (8), 2.178 (4), 2.055 (4), 1.693 (6), 1.647 (6)
- IMA No. 96-025 A member of the zeolite group
 $\text{Na}_3\text{Ca}_4\text{Al}_{11}\text{Si}_{85}\text{O}_{192}\cdot 60\text{H}_2\text{O}$
 Orthorhombic: Pnma
 a 20.223, b 20.052, c 13.491 Å
 Colourless to milky-white; silky to vitreous; opaque to transparent
 Biaxial (-), α 1.485, β 1.487, γ 1.488, $2\text{V}(\text{calc.}) 70^\circ$
 11.20 (84), 9.98 (35), 3.85 (100), 3.75 (98), 3.67 (27), 3.00 (32)
- IMA No. 96-026 An orthorhombic polymorph of corderoite
 $\gamma\text{-Hg}_3\text{S}_2\text{Cl}_2$
 Orthorhombic: $\text{Ammm}, \text{A222}$ or $\text{A2mm} (\text{Am}2\text{m}, \text{Amm}2)$
 a 9.332, b 16.82, c 9.108 Å
 Canary yellow; glassy; transparent
 Biaxial (+), mean index of refraction 2.25, $2\text{V}(\text{meas.}) > 70^\circ$
 In reflected light: white, anisotropism and bireflectance not observed, $\text{R}(\text{est.}) 15\%$
 3.65 (90), 3.11 (51), 2.83 (36), 2.60 (49), 2.58 (100), 2.33 (41), 2.11 (31)
- IMA No. 96-027
 $\text{NaCu}_5\text{O}_2(\text{SeO}_3)_2\text{Cl}_3$
 Orthorhombic: Pbnm
 a 10.482, b 17.732, c 6.432 Å
 Emerald-green; vitreous; transparent
 Biaxial (-), α 1.845, β 1.968, γ 1.975, $2\text{V}(\text{meas.}) 20^\circ$, $2\text{V}(\text{calc.}) 31^\circ$
 9.01 (10), 8.84 (60), 5.24 (100), 3.251 (40), 2.955 (27), 2.626 (25), 2.513 (12)
- IMA No. 96-028
 $\text{NaFe}_4^{2+}(\text{PO}_4)_3$
 Hexagonal (trigonal): $\text{R}\bar{3}$
 a 14.97, c 41.66 Å
 Very pale amber; waxy; transparent
 Uniaxial (+), ω 1.72, ϵ 1.75
 4.13 (80), 3.47 (50), 3.21 (50), 3.01 (90), 2.93 (50), 2.85 (50), 2.71 (100), 2.57 (50)
- IMA No. 96-029
 $\text{Al}_{16}\text{B}_6\text{Si}_2\text{O}_{37}$
 Monoclinic: $\text{C2}/\text{m}, \text{Cm}$ or C2
 a 14.767, b 5.574, c 15.079 Å, β 91.959°
 White; vitreous; transparent
 Biaxial (+), α 1.629, β 1.640, γ 1.654, $2\text{V}(\text{meas.}) 82^\circ$, $2\text{V}(\text{calc.}) 84^\circ$
 5.41 (70), 5.19 (100), 4.95 (60), 4.31 (70), 3.378 (60), 2.162 (40)
- IMA No. 96-030
 $(\text{Rh},\text{Pd})_2\text{As}$
 Orthorhombic: Pnma or $\text{Pn}2_1\text{a}$
 a 5.866, b 3.893, c 7.302 Å
 Colour not observed, metallic, opaque
 In reflected light: brownish with a pale green tinge, anisotropism moderate-distinct from dark brown to pale greyish green, bireflectance weak, pleochroism brownish to greenish. $\text{R}_{\text{min.}}$ & $\text{R}_{\text{max.}}$: (45.5, 46.3 %)470nm, (47.6, 48.4 %)546nm, (48.2, 49.5%)589nm, (49.8, 51.2 %)650nm
 2.426 (7), 2.348 (4), 2.237 (10), 2.067 (8), 1.935 (6), 1.860 (5)
- IMA No. 96-032
 $\text{NaY}(\text{CO}_3)\text{F}_2$
 Orthorhombic: Pmnc
 a 6.964, b 9.173, c 6.302 Å
 Colourless to pale yellow; vitreous; transparent and translucent
 Biaxial (-), α 1.457, β 1.543, γ 1.622, $2\text{V}(\text{meas.}) 82^\circ$, $2\text{V}(\text{calc.}) 83^\circ$
 5.19 (90), 3.477 (100), 2.800 (50), 2.087 (50), 2.057 (50), 1.966 (50), 1.849 (50), 1.763 (50)
- IMA No. 96-033
 $\text{Na}_3\text{Ce}_2(\text{CO}_3)_4\text{F}$
 Hexagonal: $\text{P6}_3/\text{mmc}$

- a 5.068, c 22.87 Å
 Colourless to slightly beige; vitreous to somewhat pearly; transparent to translucent
 Uniaxial (–), ω 1.728, ϵ 1.542
 4.31 (100), 3.169 (70), 2.877 (60), 2.534 (70), 2.192 (90B), 1.978 (70)
- IMA No. 96-034 The magnesium- and phosphate-dominant analogue of allactite
 $\text{Mg}_7(\text{PO}_4)_2(\text{OH})_8$
 Monoclinic: $P2_1/n$
 a 5.250, b 11.647, c 9.655 Å, β 95.93°
 Colourless; pearly; transparent
 Biaxial (–), α 1.5945, β 1.6069, γ 1.6088, 2V(meas.) 46°, 2V(calc.) 43°
 4.436 (75b), 3.521 (80), 3.145 (70), 3.087 (70), 2.905 (100), 2.794 (75), 2.199 (80)
- IMA No. 96-035 The phosphate-dominant analogue of gartrellite
 $\text{PbCuFe}^{3+}(\text{PO}_4)_2(\text{OH}_2\text{H}_2\text{O})_2$
 Triclinic: $P1$ or $P\bar{1}$
 a 5.320, b 5.528, c 7.434 Å, α 67.61°, β 69.68°, γ 70.65°
 Green; vitreous to adamantine; transparent to translucent
 Biaxial (+), α 1.90, β 1.93 (calc.), γ 2.00, 2V(meas.) 70°
 4.720 (67), 4.502 (61), 4.360 (100), 3.250 (70), 3.138 (57), 2.885 (89), 2.868 (69)
- IMA No. 96-036 The calcium-dominant analogue of steacyite
 $\text{Th}(\text{Ca},\text{Na})_2(\text{K}_{1-x})\text{Si}_8\text{O}_{20}\cdot n\text{H}_2\text{O}$
 Tetragonal: $P4/mcc$
 a 7.592, b 7.592, c 14.824 Å
 Apple-green to dark-green and brown; vitreous; transparent
 Uniaxial (–), ω 1.611, ϵ 1.606
 5.36 (40), 5.31 (70), 3.40 (100), 3.33 (65), 2.654 (59), 2.231 (50)
- IMA No. 96-037
 $(\text{Ba},\text{Ca},\text{K},\text{Na})_x[(\text{V},\text{Al})_2\text{P}(\text{O},\text{OH})_8]\cdot 6\text{H}_2\text{O}$
 Cubic: $I\bar{4}3m$
 a 15.470 Å
 Pale greenish blue; vitreous; transparent
 Isotropic, n 1.566
 10.8 (29), 7.73 (34), 3.164 (100), 2.827 (28), 2.738 (29), 2.582 (37), 2.445 (36)
- IMA No. 96-038 The copper-dominant analogue of carboydite and glaucocerinite
 $[\text{Cu}_{1-x}\text{Al}_x(\text{OH})_2][(\text{SO}_4)_{x/2}(\text{H}_2\text{O})_n]$ $0 < x < 0.67$ and $n > 3x/2$
 Hexagonal (trigonal): $R\bar{3}m$
 a 3.070, c 31.9 Å
 Blue to pale blue; vitreous; translucent
- Uniaxial (+), n_{min} 1.549, n_{max} 1.565
 10.5 (100), 5.26 (17), 3.50 (6), 2.60 (5), 2.46 (2), 2.23 (2), 1.524 (5b)
- IMA No. 96-039 The chromium-dominant analogue of haxonite
 $(\text{Cr},\text{Fe})_{23}\text{C}_6$
 Cubic: $Fm\bar{3}m$
 a 10.65 Å
 Iron-grey; metallic; opaque
 In reflected light: white. R: (46.5 %)470nm, (43.7 %)546nm, (43.2 %)589nm, (44.4 %)660nm
 2.38 (3), 2.17 (5), 2.05 (10)
- IMA No. 96-040 The antimony-dominant analogue of calzirtite
 $\text{Ca}_2(\text{Zr},\text{Ti})_5(\text{Sb}^{5+},\text{Mn}^{3+})_2\text{O}_{16}$
 Tetragonal: $I4_1/acd$
 a 15.199, c 10.181 Å
 Bright red; adamantine; translucent
 Uniaxial (+), ω 2.12, ϵ 2.16
 3.45 (40), 2.92 (100), 2.539 (60), 1.794 (90), 1.535 (80), 1.0353 (40)
- IMA No. 96-041 The titanium-dominant analogue of brannockite
 $\text{KLi}_3\text{Ti}_2\text{Si}_2\text{O}_{30}$
 Hexagonal: $P6/mcc$
 a 9.903, c 14.276 Å
 White; vitreous; transparent
 Uniaxial (–), ω 1.635, ϵ 1.630
 7.15 (40), 4.29 (50), 4.07 (85), 3.57 (80), 3.16 (100), 2.895 (95), 2.742 (30)
- IMA No. 96-043 The antimony-dominant analogue of fleischerite (with AsO_4 replacing one SO_4)
 $\text{Pb}_3\text{Sb}^{3+}(\text{SO}_4)(\text{AsO}_4)(\text{OH})_6\cdot 3\text{H}_2\text{O}$
 Hexagonal: $P6_322$
 a 8.939, c 11.102 Å
 Colourless; adamantine; transparent
 Uniaxial (+), ω 1.760, ϵ 1.801
 6.35 (44), 3.655 (100), 3.481 (80), 3.175 (31), 2.675 (62), 2.235 (35)
- IMA No. 96-044
 $\text{Ag}_2\text{Pd}_3\text{Se}_4$
 Monoclinic: $P2_1/m$ or $P2_1$
 a 6.350, b 10.387, c 5.683 Å, β 114.90°
 Colour unknown, only visible in polished section; metallic; opaque
 In reflected light: buff to slightly grey-green buff; moderate anisotropism, rotation tints rose-brown, grey-green, pale bluish grey and dark steel-blue; bireflectance weak (air), moderate (oil); very weak pleochroism. R_1 , R_2 : ${}^{\text{im}}R_1$, ${}^{\text{im}}R_2$: (39.7, 47.2; 26.2, 34.4 %)470nm, (43.1, 48.8; 29.3, 35.15 %)546nm, (44.3, 49.4; 30.4, 35.5 %)589nm, (44.4, 49.2; 31.0, 35.6 %)650nm
 2.868 (50b), 2.742 (100), 2.688 (80), 2.367 (50), 1.956 (100), 1.829 (30)

IMA No. 96-045



Monoclinic: C2/c

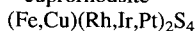
a 5.673, b 5.580, c 13.152 Å, β 90.47°

Pale yellow to reddish orange; vitreous, resinous; translucent

In reflected light: grey; internal reflections ubiquitous, amber to light yellow; anisotropism masked (if present) by the internal reflections; bireflectance weak, nonpleochroic. R₁, R₂; ^{im}R₁, ^{im}R₂: (15.2, 16.3; 4.07, 4.67 %)470nm, (14.2, 15.3; 3.59, 4.17 %)546nm, (13.9, 15.0; 3.44, 4.02 %)589nm, (13.7, 14.7; 3.37, 3.91 %)650nm

6.581 (37), 3.785 (48), 3.267 (35), 2.930 (100), 2.825 (43), 2.780 (36), 2.182 (37), 1.980 (33)

IMA No. 96-047 The iron-dominant analogue of cuprorhodsite



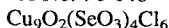
Cubic: Fd3m

a 9.89 Å

Black; metallic; opaque

In reflected light: white, isotropic. R: (41.4 %)470nm, (41.8 %)546nm, (41.8 %)589nm, (41.7 %)650nm
5.72 (7), 2.99 (10), 2.471 (8), 1.903 (7), 1.750 (9), 1.674 (3), 1.009 (3)

IMA No. 96-048



Monoclinic: I2

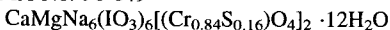
a 14.110, b 6.27, c 12.997 Å, β = 113.0°

Tobacco-green; strong vitreous; transparent

Biaxial (-), α 1.87, β 1.92, γ 1.94, 2V(meas.) 66°, 2V(calc.) 63°

11.29 (63), 5.56 (83), 3.450 (100), 3.239 (39), 2.714 (33), 2.486 (61)

IMA No. 96-049



Monoclinic: C2/c

a 23.645, b 10.918, c 15.768 Å, β 114.42°

Pale yellow to bright lemon yellow; vitreous; transparent to translucent

Biaxial (+), α 1.647, β 1.674, γ 1.704, 2V(calc.) 88°
10.69 (100), 6.36 (50), 5.65 (50), 3.590 (70), 3.121 (80), 3.051 (80)

IMA No. 96-050 The cadmium-dominant analogue of briartite



Tetragonal: I42m

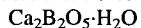
a 5.45, c 10.6 Å

Colour unknown, only visible in polished section; metallic; opaque

In reflected light: grey with pale violet tint, very weak anisotropism, very weak bireflectance and very weak pleochroism. R and ^{im}R: (24.42, 10.79 %)460nm, (23.29, 9.85 %)540nm, (23.04, 9.59 %)580nm, (23.46, 9.91 %)660nm

3.10 (100), 2.79 (10), 1.92 (80), 1.89 (70), 1.64 (60), 1.60 (20)

IMA No. 96-051 A polymorph of sibirskite

Monoclinic: P2₁/m

a 6.722, b 5.437, c 3.555 Å, β 93.00°

White; weak pearly; translucent

Biaxial (+), α 1.556, β 1.593, γ 1.663, 2V(calc.) 75°
6.73 (70), 3.354 (30), 2.975 (60), 2.855 (20), 2.237 (100), 1.776 (20)

IMA No. 96-052 The mercury-dominant analogue of ernite and stannite



Tetragonal: I4̄

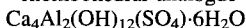
a 5.555, c 10.911 Å

Dark grey; metallic; opaque

In reflected light: greenish-grey to light grey with greenish-brownish tint, moderate anisotropism with faded colour effects form violet-blue to dark-greenish blue, insignificant bireflectance, weakly pleochroic from yellowish-olive-green to brownish-olive. R_{max}: (26.0 %)470nm, (26.3 %)546nm, (25.6 %)589nm, (24.8 %)650nm
3.17 (10), 1.958 (2.5), 1.941 (8), 1.671 (4), 1.646 (3.5), 1.264 (2.5)

IMA No. 96-053 The sulphate-dominant

rhombohedral analogue of hydrocalumite



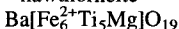
Hexagonal (trigonal): R3̄ or R3

a 5.76, c 53.66 Å

White; vitreous; transparent

Uniaxial (-), ω 1.504, ε 1.485

8.972 (100), 4.476 (70), 2.362 (40), 2.190 (40), 2.071 (35)

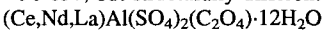
IMA No. 96-054 The Fe²⁺-dominant analogue of hawthorneiteHexagonal: P6₃/mmc

a 5.926, c 23.32 Å

Colour unknown, only visible in polished section; metallic; opaque

In reflected light: light grey; very weak anisotropism, nearly isotropic; bireflectance very weak, but measurable; nonpleochroic. R_E, R_O; ^{im}R_E, ^{im}R_O, R_{min}: (16.9, 17.3; 5.13, 5.37 %)470nm, (16.35, 16.8; 4.90, 5.19 %)546nm, (16.3, 16.9; 4.92, 5.29 %)589nm, (16.4, 17.1; 5.00, 5.42 %)650nm
2.963 (44), 2.795 (90), 2.641 (100), 2.437 (46), 1.676 (37), 1.634 (47), 1.481 (47)

IMA No. 96-055 The cerium-dominant analogue of 96-057, but structurally different



Monoclinic: C2/c

a 8.718, b 18.313, c 13.128 Å, β 93.90°

Very pale pink (incandescent light) and very pale blue

- (fluorescent light); vitreous; transparent
 Biaxial (+), α 1.455, β 1.485, γ 1.528, $2V(\text{meas.})$ 85° ,
 $2V(\text{calc.})$ 82°
 7.9 (100), 5.36 (50), 5.01 (40), 3.93 (70), 3.74 (20),
 3.29 (20), 3.07 (20)
- IMA No. 96-056
 $(\text{Ce,Nd,Ld})_2(\text{SO}_4)_2(\text{C}_2\text{O}_4)\cdot 12\text{H}_2\text{O}$
 Triclinic: $P\bar{1}$
 a 6.007, b 8.368, c 9.189 Å, α 99.90° , β 105.55° , γ 107.71°
 Pale pink (incandescent light), pale blue (fluorescent light), some cream-coloured; vitreous; transparent
 Biaxial (–), α 1.544, β 1.578, γ 1.602, $2V(\text{meas.})$ 65° ,
 $2V(\text{calc.})$ 78°
 8.52 (70), 6.72 (60), 5.48 (100), 4.26 (50), 3.84 (60),
 3.35 (40), 2.744 (40)
- IMA No. 96-057 The yttrium-dominant analogue of 96-055, but structurally different
 $(\text{Y,Nd,Ce})\text{Al}(\text{SO}_4)_2(\text{C}_2\text{O}_4)\cdot 12\text{H}_2\text{O}$
 Monoclinic: $P2_1/n$
 a 10.289, b 19.234, c 11.015 Å, β 108.50°
 Colourless; vitreous; transparent
 Biaxial (+), α 1.48, β 1.49, γ 1.55, $2V(\text{meas.})$ 7° ,
 $2V(\text{calc.})$ 46°
 9.3 (100), 6.28 (90), 5.20 (40), 4.89 (60), 4.63 (30),
 4.09 (50), 3.700 (30)
- IMA No. 96-058 The rubidium-dominant analogue of microcline
 $(\text{Rb,K})\text{AlSi}_3\text{O}_8$
 Triclinic: $P\bar{1}$
 a 8.81, b 13.01, c 7.18 Å, α 90.3° , β 115.7° , γ 88.2°
 Colourless; vitreous; transparent
 Biaxial, indices of refraction slightly higher than host microcline
 5.82, 5.77, 4.62, 3.88, 3.61, 3.60, 3.59, 2.94, 2.65,
 2.63, 2.61, 2.56 (electron diffraction, no intensities)
- IMA No. 96-059
 $\text{Fe}^{3+}\text{Mo}_2\text{O}_6(\text{OH})_3 \cdot \text{H}_2\text{O}$
 Triclinic: $P\bar{1}$
 a 5.878, b 7.536, c 9.436 Å, α 71.66° , β 83.43° , γ 72.85°
 Green with a yellowish tinge; vitreous to earthy; transparent to opaque
 Biaxial (–), α 1.91, β 2.03, γ 2.11, $2V(\text{meas.})$ $\sim 90^\circ$,
 $2V(\text{calc.})$ 74°
 5.620 (70), 4.711 (50), 4.095 (70), 3.319 (100), 3.232 (90), 2.614 (50), 1.956 (50)
- IMA No. 96-060 The scandium-dominant analogue of overite and segelerite
 $\text{CaMgSc}(\text{PO}_4)_2(\text{OH})\cdot 4\text{H}_2\text{O}$
 Orthorhombic: $Pbca$
 a 15.03, b 18.95, c 7.59 Å
 Colourless, light yellow to yellowish brown; vitreous; transparent
 Biaxial (–), α 1.574, β 1.579, γ 1.582, $2V(\text{meas.})$ $\sim 50^\circ$, $2V(\text{calc.})$ 75°
 9.49 (100), 4.75 (17), 3.440 (31), 2.942 (27), 2.912 (44), 2.890 (35), 2.018 (15)
- IMA No. 96-062
 $(\text{Ti,Cr,Fe})[\text{O}_{2-x}(\text{OH})_x]$
 Monoclinic: $P2_1/c$
 a 7.688, b 4.5495, c 20.147 Å, β 92.27°
 Black; metallic; translucent to opaque
 Biaxial, mean n 2.47 (calc.). In reflected light: grey, with R lower than that of rutile, crichtonite, and srilankite and higher than that of pyrope
 3.766 (66), 2.835 (100), 2.660 (73), 1.6842 (94), 1.6760 (73), 1.6574 (71)
- IMA No. 96-063 The sodium-dominant analogue of lemoynite with additional H_2O
 $\text{Na}_4\text{Zr}_2\text{Si}_{10}\text{O}_{26}\cdot 9\text{H}_2\text{O}$
 Monoclinic: $C2/m$
 a 10.5150, b 16.2534, c 9.1029 Å, β 105.46°
 Colourless to white; vitreous; transparent to translucent
 Biaxial (–), α 1.533, β 1.559, γ 1.567, $2V(\text{meas.})$ 63° ,
 $2V(\text{calc.})$ 57°
 8.832 (30), 8.135 (100), 5.975 (40), 3.974 (35), 3.693 (30), 3.564 (40), 3.490 (35), 2.804 (30)