

**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, International Mineralogical Association (IMA), for comparative purposes and as a service to mineralogists working on new species. Each mineral is described in the following format:

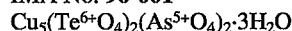
IMA Number	
Chemical formula	Any relationship to other minerals
Crystal system, space group unit-cell parameters	
Color, luster, diaphaneity	
Optical properties	
Strongest lines in the X-ray powder-diffraction pattern [<i>d</i> in Å(<i>l</i>)]	

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.

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

1996 PROPOSALS

IMA No. 96-001



Triclinic: $P1$ or $P\bar{1}$

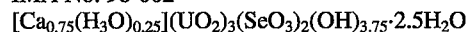
a 8.984, b 10.079, c 8.975 Å, α 102.68°, β 92.45°, γ 70.45°

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



Orthorhombic: $Pmn2_1$ or $Pmnm$

a 7.010, b 17.135, c 17.606 Å

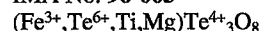
Lemon-yellow; pearly; translucent

Biaxial (–), α 1.54 calc., β 1.73, γ 1.75, $2V(\text{meas.})$ 33°

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

The calcium-dominant analogue of **guilleminite**

IMA No. 96-003



Cubic: $Ia\bar{3}$

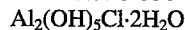
a 11.011 Å

Orange; adamantine; translucent

Isotropic, $n(\text{calc.}) = 2.17$

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

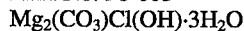
The Fe^{3+} -dominant analogue of **winstanleyite**

IMA No. 96-004Cubic: $Im\bar{3}m$ a 19.878 Å

Yellow-orange to yellow-brown; vitreous; transparent

Isotropic, n 1.53–1.55

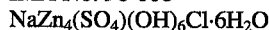
8.11(70), 7.03(50), 4.47(60), 3.23(70), 2.706(100), 2.446(80), 1.957(70)

IMA No. 96-005Hexagonal (trigonal): $R3c$ or $R\bar{3}c$ a 23.163, c 7.221 Å

White; luster and diaphaneity unknown

Uniaxial, ω 1.510, ϵ 1.510

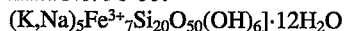
11.66(100), 3.396(17), 3.356(17), 3.264(21), 3.218(21), 3.000(41), 2.657(22)

IMA No. 96-006Hexagonal (trigonal): $P\bar{3}$ a 8.359, c 13.059 Å

Colorless to white; pearly; translucent

Uniaxial (–), ω 1.5607, ϵ 1.5382

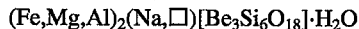
14.244(100), 6.501(23), 4.339(15), 3.258(14), 2.967(10)

IMA No. 96-007Triclinic: $P\bar{1}$ 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, $2V(\text{meas.})$ 30°, $2V(\text{calc.})$ 32°

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

IMA No. 96-008Hexagonal: $P6/mcc$ 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)

The Fe^{3+} -dominant analogue of beryl**IMA No. 96-009**Monoclinic: Pn a 17.42, b 8.077, c 17.33 Å, β 121.48°

Colorless to white; vitreous; transparent to translucent

Biaxial (–), α 1.506, β 1.527, γ 1.532, $2V(\text{meas.})$ 56°, $2V(\text{calc.})$ 51°

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

IMA No. 96-010Monoclinic: $A2/m$ a 7.184, b 14.289, c 5.006 Å, β 105.17°

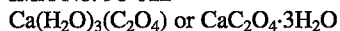
Black; metallic; opaque

In reflected light: greyish white, no birefractance, nonpleochroic. R_1 , R_2 : 20.1, 20.8% (460 nm), 18.7,

19.3% (540 nm), 18.2, 18.9% (580 nm), 17.5, 18.1% (660 nm)

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

The Fe^{3+} -dominant analogue of tomichite

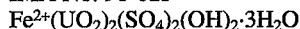
IMA No. 96-012Triclinic: *P*

a 6.097, b 7.145, c 8.434 Å, α 76.54°, β 70.30°, γ 70.75°

Colorless; vitreous; transparent

Biaxial (-), α' 1.483, β 1.516(calc.), γ' 1.533, $2V(\text{meas.})$ 70°, $2V(\text{calc.})$ 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)

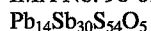
IMA No. 96-013Orthorhombic: *Pnmm* or *Pnn2*

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.), $2V(\text{meas.})$ 73°

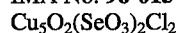
7.95(81), 5.91(100), 3.941(71), 3.451(67), 3.166(50), 2.894(41), 2.596(70)

IMA No. 96-014Monoclinic: *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.

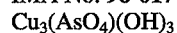
 R_1, R_2 : 40.03, 42.90% (470 nm), 36.46, 40.92% (546 nm), 35.65, 40.25% (589 nm), 32.40, 36.00% (650 nm)
4.04(m), 3.47(s), 3.44(m), 3.04(m), 2.96(s), 2.296(m)**IMA No. 96-015**Monoclinic: *P2₁/c*

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, $2V(\text{meas.})$ large, $2V(\text{calc.})$ 82°

6.88(68), 5.511(50), 2.990(100), 2.963(94), 2.566(67), 2.296(95)

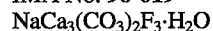
IMA No. 96-017Triclinic: *P1*

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, $2V(\text{meas.})$ 77°, $2V(\text{calc.})$ 80°

4.613(100), 4.580(50), 3.390(60), 2.713(40), 2.543(40), 2.445(30)

A triclinic polymorph of **clinoclase****IMA No. 96-019**Hexagonal (trigonal): *P3₂*

a 6.718, c 15.050 Å

Colorless 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. 96-020Tetragonal: *P4₂/nmm*

a 12.627, c 12.595 Å

Apple green to emerald green; vitreous to adamantine; transparent

Anomalously 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 $(\text{Ca}, R)_5(\text{PO}_4)_3\text{F}$ $R = \text{Sr}, \text{Na}, \text{REE}$ 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)

A polymorph of **fluorapatite****IMA No. 96-023** $(\text{Na}, \text{REE})_{15}(\text{Ca}, \text{REE})_6\text{Mn}_3\text{Zr}_3\text{NbSi}_{25}\text{O}_{76}\text{F}_2$ 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)

A manganese- and fluorine-rich member of the eudialyte group

IMA No. 96-024 ScPO_4 Tetragonal: $I4_1/amd$ 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)

The scandium-dominant analogue of **xenotime-(Y)****IMA No. 96-025** $\text{Na}_3\text{Ca}_4\text{Al}_{11}\text{Si}_{85}\text{O}_{192}\cdot 60\text{H}_2\text{O}$ Orthorhombic: $Pnma$ a 20.223, b 20.052, c 13.491 Å

Colorless to milky-white; silky to vitreous; opaque to transparent

Biaxial (-), α 1.485, β 1.487, γ 1.488, $2V(\text{calc.})$ 70°

11.20(84), 9.98(35), 3.85(100), 3.75(98), 3.67(27), 3.00(32)

A member of the zeolite group

IMA No. 96-026 $\gamma\text{-Hg}_3\text{S}_2\text{Cl}_2$ Orthorhombic: $Ammm$, $A222$ or $A2mm$ ($Am2m$, $Amm2$) a 9.332, b 16.82, c 9.108 Å

Canary yellow; glassy; transparent

Biaxial (+), mean index of refraction 2.25, $2V(\text{meas.}) > 70^\circ$ In reflected light: white, anisotropism and bireflectance not observed, $R(\text{est.}) \approx 15\%$

3.65(90), 3.11(51), 2.83(36), 2.60(49), 2.58(100), 2.33(41), 2.11(31)

An orthorhombic polymorph of **corderoite****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, $2V(\text{meas.})$ 20°, $2V(\text{calc.})$ 31°

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 $\text{NaFe}^{2+}_4(\text{PO}_4)_3$ Hexagonal (trigonal): $R\bar{3}$ a 14.97, c 41.66 Å

Very pale amber; waxy; transparent

Uniaxial (+), ω 1.72, ϵ 1.75

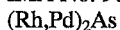
4.13(80), 3.47(50), 3.21(50), 3.01(90), 2.93(50), 2.85(50), 2.71(100), 2.57(50)

IMA No. **96-029**Monoclinic: $C2/m$, 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, $2V(\text{meas.})$ 82°, $2V(\text{calc.})$ 84°

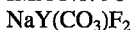
5.41(70), 5.19(100), 4.95(60), 4.31(70), 3.378(60), 2.162(40)

IMA No. **96-030**Orthorhombic: $Pnma$ or $Pn2_1a$ a 5.866, b 3.893, c 7.302 Å

Color 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. $R_{\text{min.}}$, $R_{\text{max.}}$: 45.5, 46.3% (470 nm), 47.6, 48.4% (546 nm), 48.2, 49.5% (589 nm), 49.8, 51.2% (650 nm)

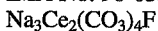
2.426(7), 2.348(4), 2.237(10), 2.067(8), 1.935(6), 1.860(5)

IMA No. **96-032**Orthorhombic: $Pmcn$ a 6.964, b 9.173, c 6.302 Å

Colorless to pale yellow; vitreous; transparent and translucent

Biaxial (-), α 1.457, β 1.543, γ 1.622, $2V(\text{meas.})$ 82°, $2V(\text{calc.})$ 83°

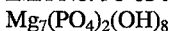
5.19(90), 3.477(100), 2.800(50), 2.087(50), 2.057(50), 1.966(50), 1.849(50), 1.763(50)

IMA No. **96-033**Hexagonal: $P6_3/mmc$ a 5.068, c 22.87 Å

Colorless to slightly beige; vitreous to somewhat pearly; transparent to translucent

Uniaxial (-), ω 1.728, ϵ 1.542

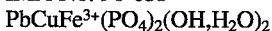
4.31(100), 3.169(70), 2.877(60), 2.534(70), 2.192(90B), 1.978(70)

IMA No. **96-034**The magnesium- and phosphate-dominant analogue of **allactite**Monoclinic: $P2_1/n$ a 5.250, b 11.647, c 9.655 Å, β 95.93°

Colorless; pearly; transparent

Biaxial (-), α 1.5945, β 1.6069, γ 1.6088, $2V(\text{meas.})$ 46°, $2V(\text{calc.})$ 43°

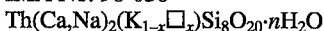
4.436(75b), 3.521(80), 3.145(70), 3.087(70), 2.905(100), 2.794(75), 2.199(80)

IMA No. **96-035**The phosphate-dominant analogue of **gartrellite**Triclinic: $P1$ or $P1$ 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, $2V(\text{meas.})$ 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**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

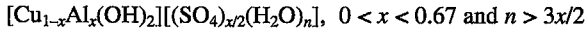
5.36(40), 5.31(70), 3.40(100), 3.33(65), 2.654(59), 2.231(50)

IMA No. 96-037Cubic: $I\bar{4}3m$ a 15.470 Å

Pale greenish blue; vitreous; transparent

Isotropic, n 1.566

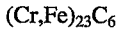
10.8(29), 7.73(34), 3.164(100), 2.827(28), 2.738(29), 2.582(37), 2.445(36)

IMA No. 96-038The copper-dominant analogue of **carrboydite** and **glaucozerinite**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

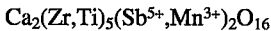
10.5(100), 5.26(17), 3.50(6), 2.60(5), 2.46(2), 2.23(2), 1.524(5b)

IMA No. 96-039The chromium-dominant analogue of **haxonite**Cubic: $Fm\bar{3}m$ a 10.65 Å

Iron-grey; metallic; opaque

In reflected light: white. R : 46.5% (470 nm), 43.7% (546 nm), 43.2% (589 nm), 44.4% (660 nm)

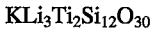
2.38(3), 2.17(5), 2.05(10)

IMA No. 96-040The antimony-dominant analogue of **calzirtite**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. 96-041The titanium-dominant analogue of **brannockite**Hexagonal: $P6/mcc$ a 9.903, c 14.276 Å

White; vitreous; transparent

Uniaxial (-), ω 1.635, ϵ 1.630

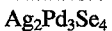
7.15(40), 4.29(50), 4.07(85), 3.57(80), 3.16(100), 2.895(95), 2.742(30)

IMA No. 96-043The antimony-dominant analogue of **fleischerite**Hexagonal: $P6_322$ (with AsO_4 replacing one SO_4) a 8.939, c 11.102 Å

Colorless; 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. 96-044Monoclinic: $P2_1/m$ or $P2_1$ a 6.350, b 10.387, c 5.683 Å, β 114.90°

Color 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 ; mR_1 , mR_2 : 39.7, 47.2; 26.2, 34.4% (470 nm), 43.1, 48.8; 29.3, 35.15% (546 nm), 44.3, 49.4; 30.4,

35.5% (589 nm), 44.4, 49.2; 31.0, 35.6% (650 nm)
2.868(50b), 2.742(100), 2.688(80), 2.367(50), 1.956(100), 1.829(30)

IMA No. 96-045

$\text{Pb}_{7.5}\text{B}_{0.5}(\text{OH})_{3.5}\text{O}_{4.5}\text{Cl}_4$ or $\text{Pb}_8\text{O}_4(\text{OH})_4\text{Cl}_4$

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. $R_1, R_2; {}^{\text{im}}R_1, {}^{\text{im}}R_2$: 15.2, 16.3; 4.07, 4.67% (470 nm), 14.2, 15.3; 3.59, 4.17% (546 nm), 13.9, 15.0; 3.44, 4.02% (589 nm), 13.7, 14.7; 3.37, 3.91% (650 nm)

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

$(\text{Fe,Cu})(\text{Rh,Ir,Pt})_2\text{S}_4$

The iron-dominant analogue of **cuprorhodsit**

Cubic: $Fd\bar{3}m$

a 9.89 Å

Black; metallic; opaque

In reflected light: white, isotropic. R : 41.4% (470 nm), 41.8% (546 nm), 41.8% (589 nm), 41.7% (650 nm)
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

$\text{Cu}_9\text{O}_2(\text{SeO}_3)_4\text{Cl}_6$

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, $2V(\text{meas.})$ 66°, $2V(\text{calc.})$ 63°
11.29(63), 5.56(83), 3.450(100), 3.239(39), 2.714(33), 2.486(61)

IMA No. 96-049

$\text{CaMgNa}_6(\text{IO}_3)_6[(\text{Cr}_{0.84}\text{S}_{0.16})\text{O}_4]_2 \cdot 12\text{H}_2\text{O}$

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, $2V(\text{calc.})$ 88°
10.69(100), 6.36(50), 5.65(50), 3.590(70), 3.121(80), 3.051(80)

IMA No. 96-050

$\text{Cu}_2\text{CdGeS}_4$

The cadmium-dominant analogue of **briartite**

Tetragonal: $\bar{I}42m$

a 5.45, c 10.6 Å

Color 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 ${}^{\text{im}}R$: 24.42, 10.79% (460 nm), 23.29, 9.85% (540 nm), 23.04, 9.59% (580 nm), 23.46, 9.91% (660 nm)
3.10(100), 2.79(10), 1.92(80), 1.89(70), 1.64(60), 1.60(20)

IMA No. 96-051

$\text{Ca}_2\text{B}_2\text{O}_5 \cdot \text{H}_2\text{O}$

A polymorph of **sibirskite**

Monoclinic: $P2_1/m$

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, $2V(\text{calc.})$ 75°
6.73(70), 3.354(30), 2.975(60), 2.855(20), 2.237(100), 1.776(20)

IMA No. 96-052 $\text{Cu}_2\text{HgSnS}_4$ Tetragonal: $\bar{I}4$ 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 color effects form violet-blue to dark greenish blue, insignificant bireflectance, weakly pleochroic from yellowish olive-green to brownish olive. R_{max} : 26.0% (470 nm), 26.3% (546 nm), 25.6% (589 nm), 24.8% (650 nm)

3.17(10), 1.958(2.5), 1.941(8), 1.671(4), 1.646(3.5), 1.264(2.5)

The mercury-dominant analogue of **černýite** and **stannite****IMA No. 96-053** $\text{Ca}_4\text{Al}_2(\text{OH})_{12}(\text{SO}_4)\cdot 6\text{H}_2\text{O}$ Hexagonal (trigonal): $R\bar{3}$ 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)

The sulfate-dominant rhombohedral analogue of **hydrocalumite****IMA No. 96-054** $\text{Ba}[\text{Fe}^{2+}_6\text{Ti}_5\text{Mg}]\text{O}_{19}$ Hexagonal: $P6_3/mmc$ a 5.926, c 23.32 Å

Color 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 ; ${}^{\text{im}}R_E$, ${}^{\text{im}}R_O$, R_{min} : 16.9, 17.3; 5.13, 5.37% (470 nm), 16.35, 16.8; 4.90, 5.19% (546 nm), 16.3, 16.9; 4.92, 5.29% (589 nm), 16.4, 17.1; 5.00, 5.42% (650 nm)

2.963(44), 2.795(90), 2.641(100), 2.437(46), 1.676(37), 1.634(47), 1.481(47)

The Fe^{2+} -dominant analogue of **hawthorneite****IMA No. 96-055** $(\text{Ce}, \text{Nd}, \text{La})\text{Al}(\text{SO}_4)_2(\text{C}_2\text{O}_4)\cdot 12\text{H}_2\text{O}$ 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)

The cerium-dominant analogue of 96-057, but structurally different

IMA No. 96-056 $(\text{Ce}, \text{Nd}, \text{La})_2(\text{SO}_4)_2(\text{C}_2\text{O}_4)\cdot 12\text{H}_2\text{O}$ 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-colored; 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 $(\text{Y}, \text{Nd}, \text{Ce})\text{Al}(\text{SO}_4)_2(\text{C}_2\text{O}_4)\cdot 12\text{H}_2\text{O}$ Monoclinic: $P2/n$ a 10.289, b 19.234, c 11.015 Å, β 108.50°

Colorless; 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)

The yttrium-dominant analogue of 96-055, but structurally different

IMA No. 96-058 $(\text{Rb}, \text{K})\text{AlSi}_3\text{O}_8$ Triclinic: $P\bar{1}$ a 8.81, b 13.01, c 7.18 Å, α 90.3°, β 115.7°, γ 88.2°The rubidium-dominant analogue of **microcline**

Colorless; 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 data, 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, $2V(\text{meas.}) \sim 90^\circ$, $2V(\text{calc.}) 74^\circ$

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**

$\text{CaMgSc}(\text{PO}_4)_2(\text{OH}) \cdot 4\text{H}_2\text{O}$

The scandium-dominant analogue of **overite** and **segelerite**

Orthorhombic: $Pbca$

a 15.03, b 18.95, c 7.59 Å

Colorless, light yellow to yellowish brown; vitreous; transparent

Biaxial (-), α 1.574, β 1.579, γ 1.582, $2V(\text{meas.}) \sim 50^\circ$, $2V(\text{calc.}) 75^\circ$

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**

$\text{Na}_4\text{Zr}_2\text{Si}_{10}\text{O}_{26} \cdot 9\text{H}_2\text{O}$

The sodium-dominant analogue of **lemoynite** with additional H_2O

Monoclinic: $C2/m$

a 10.5150, b 16.2534, c 9.1029 Å, β 105.46°

Colorless to white; vitreous; transparent to translucent

Biaxial (-), α 1.533, β 1.559, γ 1.567, $2V(\text{meas.}) 63^\circ$, $2V(\text{calc.}) 57^\circ$

8.832(30), 8.135(100), 5.975(40), 3.974(35), 3.693(30), 3.564(40), 3.490(35), 2.804(30)