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
$Cu_5(Te^{6+}O_4)_2(As^{5+}O_4)_2 \cdot 3H_2O$
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 The calcium-dominant analogue of guilleminite
$[Ca_{0.75}(H_3O)_{0.25}](UO_2)_3(SeO_3)_2(OH)_{3.75} \cdot 2.5H_2O$
Orthorhombic: $Pmn2_1$ or Pmnm
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 Fe^{3+}-dominant analogue of winstanleyite
$(Fe^{3+},Te^{6+},Ti^{4+},Mg^{2+})Te_3^{4+}O_8$
Cubic: Ia3
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
$Al_2(OH)_5Cl \cdot 2H_2O$
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
$Mg_2(CO_3)Cl(OH) \cdot 3H_2O$
Hexagonal (trigonal): R3c or R$\bar{3}$c
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
$NaZn_4(SO_4)(OH)_6Cl{\cdot}6H_2O$
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
$(K,Na)_5Fe_7^{3+}[Si_{20}O_{50}(OH)_6]{\cdot}12H_2O$
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 beryl
$(Fe,Mg,Al)_2(Na,)[Be_3Si_6O_{18}]{\cdot}H_2O$
Hexagonal: 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
$Ca_3[B_5O_6(OH)_7]Cl_2{\cdot}8H_2O$
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 tomichite
$(Fe^{3+},Ti)_4Ti_3AsO_{13}(OH)$
Monoclinic: 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
$Ca(H_2O)_3(C_2O_4)$ or $CaC_2O_4{\cdot}3H_2O$
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
$Fe^{2+}(UO_2)_2(SO_4)_2\ (OH)_2{\cdot}3H_2O$
Orthorhombic: Pnnm 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
$Pb_{14}Sb_{30}S_{54}O_5$
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
$Cu_5O_2(SeO_3)_2Cl_2$
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
$Cu_3(AsO_4)(OH)_3$
Triclinic: 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(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
$NaCa_3(CO_3)_2F_3{\cdot}H_2O$
Hexagonal (trigonal): $P3_2$
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
$Pb_{12}O_6Mn(Mn,Mg)_4(Mg,Mn)_2(SO_4)(CO_3)_4Cl_4(OH)_{12}$
Tetragonal: $P4_2/nnm$
a 12.627, c 12.595 Å
Apple green to emerald green; vitreous to adamantine; transparent
Anomalously biaxial (+), α, β, and γ > 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
$(Ca,R)_5(PO_4)_3FR$ = Sr, Na, 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
$(Na,RE)_{15}(Ca,RE)_6Mn_3Zr_3NbSi_{25}O_{76}F_2$
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: $I4_1/amd$
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)

IMA No. 96-025 A member of the zeolite group
$Na_3Ca_4Al_{11}Si_{85}O_{192}{\cdot}60H_2O$
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, 2V(calc.) 70°
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
γ-$Hg_3S_2Cl_2$
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(meas.) > 70°
In reflected light: white, anisotropism and bireflectance not observed, R(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
$NaCu_5O_2(SeO_3)_2Cl_3$
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(meas.) 20°, 2V(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
$NaFe_4^{2+}(PO_4)_3$
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
$Al_{16}B_6Si_2O_{37}$
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(meas.) 82°, 2V(calc.) 84°
5.41 (70), 5.19 (100), 4.95 (60), 4.31 (70), 3.378 (60), 2.162 (40)

IMA No. 96-030
$(Rh,Pd)_2As$
Orthorhombic: Pnma or $Pn2_1a$
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. $R_{min.}$ & $R_{max.}$: (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
$NaY(CO_3)F_2$
Orthorhombic: Pmcn
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, 2V(meas.) 82°, 2V(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
$Na_3Ce_2(CO_3)_4F$
Hexagonal: $P6_3/mmc$

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
$Mg_7(PO_4)_2(OH)_8$
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
$PbCuFe^{3+}(PO_4)_2(OH,H_2O)_2$
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
$Th(Ca,Na)_2(K_{1-x})Si_8O_{20}{\cdot}nH_2O$
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
$(Ba,Ca,K,Na)_x[(V,Al)_2P(O,OH)_8]{\cdot}6H_2O$
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 carrboydite and glaucocerinite
$[Cu_{1-x}Al_x(OH)_2][(SO_4)_{x/2}(H_2O)_n]$ $0 < x < 0.67$ 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
$(Cr,Fe)_{23}C_6$
Cubic: Fm3m
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
$Ca_2(Zr,Ti)_5(Sb^{5+},Mn^{3+})_2O_{16}$
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
$KLi_3Ti_2Si_{12}O_{30}$
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)
$Pb_3Sb^{5+}(SO_4)(AsO_4)(OH)_6{\cdot}3H_2O$
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
$Ag_2Pd_3Se_4$
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; $^{im}R_1$, $^{im}R_2$: (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
$Pb_{7.5}B_{0.5}(OH)_{3.5}O_{4.5}Cl_4$ or $Pb_8O_4(OH)_4Cl_4$
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; $^{im}R_1$, $^{im}R_2$: (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
$(Fe,Cu)(Rh,Ir,Pt)_2S_4$
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
$Cu_9O_2(SeO_3)_4Cl_6$
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(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
$CaMgNa_6(IO_3)_6[(Cr_{0.84}S_{0.16})O_4]_2 \cdot 12H_2O$
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
Cu_2CdGeS_4
Tetragonal: $I\bar{4}2m$
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
$Ca_2B_2O_5 \cdot H_2O$
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(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
Cu_2HgSnS_4
Tetragonal: $I\bar{4}$
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 colour effects form violet-blue do 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
$Ca_4Al_2(OH)_{12}(SO_4) \cdot 6H_2O$
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)

IMA No. 96-054 The Fe^{2+}-dominant analogue of hawthorneite
$Ba[Fe^{2+}_6Ti_5Mg]O_{19}$
Hexagonal: $P6_3/mmc$
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
$(Ce,Nd,La)Al(SO_4)_2(C_2O_4) \cdot 12H_2O$
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(meas.) 85°, 2V(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
$(Ce,Nd,La)_2(SO_4)_2(C_2O_4)\cdot 12H_2O$
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(meas.) 65°, 2V(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
$(Y,Nd,Ce)Al(SO_4)_2(C_2O_4)\cdot 12H_2O$
Monoclinic: P2/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(meas.) 7°, 2V(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
$(Rb,K)AlSi_3O_8$
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
$Fe^{3+}Mo_2O_6(OH)_3\cdot H_2O$
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(meas.) ~ 90°, 2V(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
$CaMgSc(PO_4)_2(OH)\cdot 4H_2O$
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(meas.) ~ 50°, 2V(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
$(Ti,Cr,Fe)[O_{2-x}(OH)_x]$
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
$Na_4Zr_2Si_{10}O_{26}\cdot 9H_2O$
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(meas.) 63°, 2V(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)