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New minerals recently approved by the Commission on New Minerals and Mineral Names International Mineralogical Association

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Some time ago the Commission on New Minerals and Mineral Names decided that we could do a distinct service to the mineralogical community if we published very short descriptions of newly approved mineral species without, of course, their names. The purpose of this is to assist mineralogists who are working on new minerals which may be the same as those already approved, but as yet not published, species. The frequency of multiple proposals for the same species is increasing and it is hoped that this service will alert prospective proposers to the existence of these new species and thus save them some time and frustration in coming in second or third with the same mineral.

J.A. Mandarino, Chairman of C.N.M.M.N.

The information given here is provided by the Commission on New Minerals and Mineral Names, I. M. A. for comparative purposes.

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.

0935-1221/91/0003-1013 $ 1.25

THE FOLLOWING MINERALS WERE APPROVED DURING 1990

IMA No. 90-002
$(Ce,La)Al_2B_3O_9$
Hexagonal, $P\bar{6}2m$
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)

IMA No. 90-004
the Mg-dominant analogue of allanite-(Ce)
$Ca(Ce,La)MgAl_2Si_3O_{12}(OH)$
Monoclinic, $P2_1/m$
a 8.916, b 5.700, c 10.140 Å, β 114.72°
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. 90-005
$Ca_5Si_6(O,OH)_{18}\cdot 5H_2O$
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
$Cu^{2+}Mn_6^{3+}(O_8/SiO_4)$
Tetragonal, $I4_1/acd$
a 9.409, c 18.600 Å
Opaque; metallic; black.
In reflected light: grey, very weak anisotropism, weak bireflectance, nonpleochroic. R-values: (20.8, 21.2%) 470nm, (19.6, 20.0%) 546nm, (19.2, 19.7%) 589nm, (18.7, 19.2%) 650nm.
2.703(100), 2.352(14), 2.135(16), 1.6516(30), 1.4167(10), 1.4023(12).

IMA No. 90-008
$Ca(Na,K)_7(Si_6Al_6O_{24})(S^{-2})_{1.5}\cdot H_2O$
Hexagonal (trigonal), P31c
a 12.855, c 10.700 Å
Transparent; vitreous; yellow.
Uniaxial (-), ω 1.584, ϵ 1.660
4.824(70), 3.919(80), 3.720(100), 3.313(90), 2.694(35), 2.676(70), 2.471(35).

IMA No. 90-009
$(Na,Ca,K)_8(Si_6Al_6O_{24})(SO_4)_2Cl\cdot 0.5H_2O$
Hexagonal, $P6_222$
a 12.843, c 32.239 Å
Transparent; vitreous; green to greenish-yellow.
Uniaxial (+), ω 1.528, ϵ 1.543
4.84(40), 3.711(100), 3.314(80), 3.035(20), 2.988(16), 2.687(25), 2.470(16), 2.139(25).

IMA No. 90-010
$Fe_{8-2x}[(As_{1-x},S_x)O_4]_6(OH)_6\cdot 5H_2O$ x is about 0.2
Orthorhombic, Pbcm
a 6.412, b 19.45, c 8.941 Å
Transparent to translucent; greasy; cadmium orange.
Biaxial (-), α 1.94, β 2.05, γ 2.06, 2V(meas.) 5°, 2V(calc.) 32°.
9.75(10), 4.476(4), 3.208(9), 3.047(5), 2.680(4), 2.153(4), 1.604(4).

IMA No. 90-011
HgAg(Cl,Br,I)S
Orthorhombic, $P2_12_12$
a 6.803, b 12.87, c 4.528 Å
Translucent to opaque; subadamantine to submetallic; black.
Biaxial (probably -), α ~ 2.2, γ ~ 2.3.
6.43(40), 3.762(60), 3.637(60), 3.283(30), 2.664(100), 2.265(40), 2.047(20).

IMA No. 90-012
$Na_6K_2(Si_6Al_6O_{24})(SO_4)\cdot 2H_2O$
Hexagonal, $P6_3$
a 22.121, c 5.221 Å
Transparent; vitreous; colourless.
Uniaxial (-), ω 1508., ϵ 1506.
6.39(S), 4.77(vS), 3.69(m), 3.27(vS), 2.769(m), 2.650(m).

IMA No. 90-013
$Na_7[Al_5Si_7O_{24}]CO_3\cdot 3H_2O$
Hexagonal, $P6_3mc$
a 12.575, c 5.105 Å
Transparent; vitreous; dark- to light-lilac.
Uniaxial (-), ω 1.509, ϵ 1.490
6.30(70), 4.61(50), 3.65(90), 3.22(100), 2.722(50), 2.597(20), 2.402(20), 2.097(20).

IMA No. 90-014
$Na_8[Al_6Si_6O_{24}](OH)_2\cdot 2H_2O$
Hexagonal, $P6_3$
a 12.74, c 5.183 Å
Transparent; vitreous; light blue or colourless.
Uniaxial (+), ω 1.494, ϵ 1.501
6.43(25), 4.70(60), 3.68(70), 3.26(100), 2.756(50), 2.433(30).

IMA No. 90-015
$Na_3(Y,REE)(CO_3)_3\cdot 3H_2O$
Orthorhombic, space group unknown, lattice is primitive
a 10.136, b 17.348, c 5.970 Å
Transparent; vitreous to dull; colourless.
Biaxial (+), α 1.528, β 1.529, γ 1.531, 2V(meas.) 45°, 2V(calc.) 71°.
6.53(55), 5.05(50), 4.85(65), 2.858(70), 2.597(50), 2.229(50), 2.076(100).

IMA No. 90-016
an orthorhombic polymorph of natisite
Na_2TiSiO_5
Orthorhombic, Pmma
a 9.827, b 9.167, c 4.799 Å
Translucent; adamantine; yellow, orange-yellow, orange-brown.
Biaxial (+), α 1.740, β 1.741, γ 1.765, 2V(meas.) 20°, 2V(calc.) 23°.
2.748(100), 2.257(25), 1.720(30), 1.680(30), 1.475(33), 1.443(35).

IMA No. 90-018
a regular 1:1 interstratification of cookeite and paragonite
$Li_{0.5}Na_{0.5}Al_3Si_3AlO_{10}(OH)_5$
Monoclinic, C2/m
a 5.158, b 8.914, c 23.83 Å, β 94.23°
Transparent; pearly; white.
Biaxial (-), α 1.58 < < 1.59, β 1.58 < < 1.59, γ 1.59 < < 1.60, 2V(meas.) 30-50°.
11.89(70), 4.456(90), 4.325(90), 2.547(100), 2.476(70), 1.486(90).

IMA No. 90-019
the Mg-dominant analogue of chalcophanite
$(Mg,Mn,Ca)Mn_3^{4+}O_7 \cdot 3H_2O$
Triclinic, P$\bar{1}$
a 7.534, b 7.525, c 8.204 Å, α 89.753°, β 117.375°, γ 120.000°
Opaque; dull; coffee black.
In reflected light: grey, clear anisotropism, weak bireflectance, nonpleochroic. R-values: (23.0%)470nm, (193.9%)546nm, (19.1%)589nm, (18.6%)650nm.
6.965(100), 5.539(3), 4.086(4), 3.522(3), 3.483(11), 2.230(8).

IMA No. 90-020
$MnSO_3 \cdot 3H_2O$
Orthorhombic, Pnma
a 9.762, b 5.639, c 9.558 Å
Transparent; vitreous; colourless.
Biaxial (+), α 1.590, β 1.596, γ 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 No. 90-021
the Ti-dominant analogue of lavenite
$NaCa(Mn,Fe)(Ti,Nb,Zr)Si_2O_7OF$
Monoclinic, $P2_1/a$
a 10.828, b 9.790, c 7.054 Å, β 108.20°
Translucent to transparent; vitreous; orange-brown, yellow.
Biaxial (-), α 1.743, β 1.785, γ 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
$3UO_3 \cdot 2SeO_2 \cdot 7H_2O$
Orthorhombic, Pnc2 or Pncm
a 8.025, b 17.43, c 6.935 Å
Translucent to transparent; vitreous; bright yellow.
Biaxial (-), α 1.618, β 1.738, γ 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
$NaKMnSi_4O_{10}$
Triclinic, P$\bar{1}$
a 6.993, b 8.219, c 10.007 Å, α 105.11°, β 100.76°, γ 114.79°
Transparent; vitreous; colourless to light pinkish-cream.
Biaxial (-), α 1.540, β 1.551, γ 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
$Na_{17}Ca_3Mg(Ti,Mn)_4(Si_2O_7)_2(PO_4)_6O_3F_5$
Triclinic, P$\bar{1}$
a 5.412, b 7.079, c 26.56 Å, α 95.21°, β 93.51°, γ 90.10°
Translucent to transparent; vitreous to pearly; light brown.
Biaxial (-), α 1.600, β 1.658, γ 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
$Na_{14}CaMgTi_4(Si_2O_7)_2(PO_4)_4O_4F_2$
Triclinic, P$\bar{1}$
a 5.415, b 7.081, c 20.34 Å, α 86.85°, β 94.40°, γ 89.94°
Translucent to transparent; vitreous to pearly; light brown.
Biaxial (-), α 1.630, β 1.678, γ 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
$(Ca,Mn)_4Be_3Si_6O_{17}(OH)_4 \cdot 3H_2O$
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
$NaLiSi_2O_5 \cdot 2H_2O$
Monoclinic, A2/n
a 5.061, b 8.334, c 14.383 Å, β 96.67°
Transparent to opaque; vitreous to earthy; colourless to white.
Biaxial (+), α 1.515, β 1.516, γ 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
$NaLi_2PO_4$
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 (-), α 1.533, β 1.540, γ 1.541, 2V(meas.) 49°, 2V(calc.) 41°.
4.020(100), 3.507(100), 3.441(100), 2.833(40), 2.712(40), 2.493(90), 2.462(90), 1.721(40).

IMA No. 90-031
$Pb_3(Fe^{3+},Mn^{3+})_4Mn_3^{4+}O_{15}$
Hexagonal, $P6_3/mcm$

a 10.037, c 13.67 Å
Opaque; metallic; black.
In reflected light: bright white, strong anisotropism, moderate bireflectance, nonpleochroic. R_O & R_E: (31.0,26.1%)470nm, (29.5,25.1%)546nm, (28.5,24.4%)589nm, (27.2,23.4 %)650nm.
3.42(5), 3.18(8), 2.828(7), 2.663(10), 2.366(6), 1.687(8).

IMA No. 90-032
$Mg_5Ba(PO_4)_4 \cdot 8H_2O$
Orthorhombic, Pmma, $Pmc2_1$ or Pma2
a 12.829, b 8.335, c 18.312 Å
Transparent; vitreous with a silky sheen; yellow-brown to light pink.
Biaxial (+), α 1.552, β 1.552, γ 1.558, 2V(meas.) 23°, 2V(calc.) 0°.
10.51(100), 3.874(32), 3.520(34), 3.081(78), 3.054(41), 2.969(44), 2.839(34).

IMA No. 90-033
$Pb_4Cu_4Si_4O_{12}(HCO_3)_4ClH$
Tetragonal, I4/m
a 14.234, c 6.103 Å
Transparent; vitreous; bright blue.
Uniaxial (+), ω 1.786, ϵ 1.800
10.2(10), 5.644(7), 4.495(10), 3.333(10), 3.013(9), 2.611(5).

IMA No. 90-036
$Cu_4Al_2[HSbO_4,SO_4](OH)_{10}(CO_3) \cdot 2H_2O$
Monoclinic, $P2_1$
a 10.765, b 2.903, c 12.527 Å, β 95.61°
Transparent; silky; green-blue.
Biaxial (+), α 1.626, β 1.646, γ 1.682, 2V(meas.) 77°, 2V(calc.) 75°.
5.62(50), 5.160(90), 4.276(100), 3.565(40), 2.380(35), 2.326(35).

IMA No. 90-037
$Cu_4(UO_2)(MoO_4)_2(OH)_6$
Monoclinic, A121, A1m1 or A12/m1
a 5.529, b 6.112, c 19.83 Å, β 103.9°
Transparent; vitreous to greasy; dark green to black.
Biaxial (-), α 1.90, β 1.93, γ 1.96, 2V(meas.) 90°, 2V(calc.) 89°.
4.815(80), 4.425(40), 4.276(40), 4.100(100), 3.734(90), 3.254(40), 2.628(40), 2.482(60).

IMA No. 90-040
$Ca_3Cu_5Si_9O_{26}$
Monoclinic, C2/c
a 10.160, b 10.001, c 19.973 Å, β 91.56°
Transparent; vitreous; greenish blue.
Biaxial (+), α 1.722, β 1.723, γ 1.734, 2V(meas.) 73°, 2V(calc.) 34°.
7.13(60), 6.70(70), 3.12(90), 3.00(100), 2.45(60), 2.41(70).

IMA No. 90-041
$Ca_3(SO_3)_2SO_4 \cdot 12H_2O$
Hexagonal, $R\bar{3}m$
a 11.350, c 28.321 Å
Transparent; vitreous; colourless.
Uniaxial (+), ω 1.4941, ϵ 1.4960
8.11(80), 5.73(100), 3.63(60), 3.28(40), 2.69(80), 2.11(40).

IMA No. 90-042
$Mn(Mg,Mn)_2Zn_2(OH)_{10} \cdot 4H_2O$
Monoclinic, C2/m
a 15.47, b 6.369, c 5.576 Å, β 101.29°
Mostly opaque but also translucent; vitreous to dull to earthy; dark brown.
In reflected light: gray, weak anisotropism, very weak bireflectance, nonpleochroic. R(min., max.): (8.54,8.65%)470nm, (8.07,8.23%)546nm, (8.00,8.19%)589nm, (7.89,8.18%)650nm.
7.61(10), 3.96(5), 3.45(3), 2.997(4), 2.745(6), 2.673(3).

IMA No. 90-043
the monoclinic dimorph of mimetite
$Pb_5(AsO_4)_3Cl$
Monoclinic, $P2_1/b$
a 10.189, b 20.372, c 7.46 Å, β 119.88°
Translucent; resinous; yellowish-white.
Biaxial (-), α, β and γ > 1.8, 2V(meas.) 8°.
3.342(50), 3.048(100), 3.008(70), 2.947(70), 2.106(60), 1.961(50), 1.903(50).

IMA No. 90-044
$NaVO_3$
Orthorhombic, Pnma
a 14.134, b 3.648, c 5.357 Å
Transparent; silky; colourless.
Biaxial (+), α 1.780, β 1.800, γ > 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
$Bi_2Cu_3(OH)_2O_2(PO_4)_2 \cdot 2H_2O$
Monoclinic, C2/m
a 12.358, b 6.331, c 9.060 Å, β 122.70°
Translucent; vitreous; sky blue to dark azure blue.
Biaxial (-), β 1.89, 2V(meas.) 68°.
7.623(8), 6.093(6), 5.405(6), 5.201(7), 3.039(10), 2.921(9), 2.197(6).

IMA No. 90-047
Pt_5Se_4
Monoclinic, $P2_1/c$
a 6.61, b 4.60, c 11.10 Å, β 101.4°
Opaque; metallic; dark bronze to black.
In reflected light: white with a brownish hue, very strong anisotropism, very strong bireflectance, weak pleochroism. R (max. & min.): (54.8,35.2%)470nm, (58.6,38.6%)546nm, (60.8,40.2%)589nm, (63.2,42.4%)650nm.
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
PdBiSe
Cubic, $P4_132$ or $P4_332$
a 6.448 Å
Opaque; metallic; light yellow.
In reflected light: pinkish-yellow, no anisotropism, no bireflectance, nonpleochroic. R: (47.5%)470nm, (48.3%)546nm, (46.8%)589nm, (45.6%)650nm.
2.89(10), 2.63(9), 1.943(9), 1.724(5), 1.376(4).

IMA No. 90-049
$CaBe_3(OH)_2(PO_4)_2 \cdot 4H_2O$
Monoclinic, Cc
a 11.897, b 9.707, c 9.633 Å, β 95.76°
Translucent; vitreous; colourless.
Biaxial (+), α 1.5203, β 1.5205, γ 1.5300, 2V(meas.) < 10°, 2V(calc.) 17°.
5.92(60), 4.33(50), 3.421(70), 2.959(60), 2.945(45), 2.5130(100).

IMA No. 90-050
the Mn-dominant analogue of stilpnomelane
$(K,Na)_4(Mn,Zn,Mg,Fe^{3+})_{48}(Si,Al)_{72}(O,OH0_{216} \cdot nH_2O$ (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 (-), α 1.545, β 1.583, γ 1.583, 2V(meas.) 10°, 2V(calc.) 0°.
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
$(Ca,Na)_2(Fe^{2+},Fe^{3+},Ti)_6(Si,Be,Al)_6O_{20}$
Triclinic, P1 or $P\bar{1}$
a 10.385, b 10.751, c 8.959 Å, α 104.76°, β 97.03°, γ 125.47°
Opaque to subtranslucent; vitreous; black.
Biaxial (-?), α 1.78, γ 1.82, 2V(meas.) large.
8.029(90), 3.122(46), 2.9243(59), 2.6756(48), 2.5291(100), 2.0993(63), 2.0758(47).

IMA No. 90-052
the indium-dominant analogue of scorodite and mansfieldite
$In(AsO_4) \cdot 2H_2O$
Orthorhombic, Pcab
a 10.45, b 10.32, c 9.09 Å
Transparent; vitreous; pale green to yellowish-green.
Biaxial (-), mean n about 1.65, 2V(meas.) 55-76°.
5.719(70), 4.537(100), 4.162(40), 3.2461(80), 3.1073(80), 2.6568(50), 2.5426(45).

IMA No. 90-054
$[(Na,K)_6Cl_2](Ca_2Cl_2)(Si_6Al_6O_{24}$
Hexagonal, $P6_3$ or $P6_3/m$
a 25.771, c 5.371 Å
Transparent; vitreous; colourless.
Uniaxial (+), ω 1.529, ϵ 1.532
4.85(S), 3.71(vS), 3.31(vS), 2.788(S), 2.677(m), 2.474(m), 2.147(m), 1.804(m), 1.380(m).

IMA No. 90-055
$(Pd,Cu,Fe)_9SnTe_2S_2$
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 bireflectance, pronounced pleochroism. $R_{min.}$,$R_{max.}$: (33.7,41.6%)470nm, (38.5,48.7%)546nm, (40.4,51.8%)589nm, (42.0,54.9%)650nm.
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 Fe^{3+}-analogue of surite
$(Pb,Ca)_{2-3}(CO_3)_{1.5-2}(OH,F)_{0.5-1}[(Fe,Al)_2Si_4O_{10}(OH)_2] \cdot nH_2O$
Monoclinic, $P2_1$ or $P2_1/m$
a 5.241, b 9.076, c 16.23 Å, β 90.03°
Transparent; silky; light yellow green to dark forest green.
Biaxial (+), α 1.757, β 1.763, γ 1.773, 2V(calc.) 76°.
16.1(40), 4.53(100), 3.727(35), 3.240(90), 2.612(80), 2.272(50).

IMA No. 90-057
$(Sr_{1.5}Ca_{1.2})Ca_2(Ca_{2.2}Na_{1.8})K_{1.4}Al_{17}Si_{19}O_{72} \cdot 34H_2O$
Hexagonal, $P6_3/mmc$
a 13.244, c 15.988 Å
Transparent; vitreous; colourless.
Uniaxial (-), ω 1.522, ϵ 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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Some time ago the Commission on New Minerals and Mineral Names decided that we could do a distinct service to the mineralogical community if we published very short descriptions of newly approved mineral species without, of course, their names. The purpose of this is to assist mineralogists who are working on new minerals which may be the same as these already approved, but as yet not published, species. The frequency of multiple proposals for the same species is increasing and it is hoped that this service will alert prospective proposers to the existence of these new species and thus save them some time and frustration in coming in second or third with the same mineral.

J.A. Mandarino, Chairman of C.N.M.M.N.

The information given here is provided by the Commission on New Minerals and Mineral Names, I. M. A. for comparative purposes.

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.

0935-1221/92/0004-1421 $ 2.00

1991 PROPOSALS

IMA No. 91-001
$Hg_2^{+1}Hg_3^{+2}Cr^{+6}O_5S_2^{-2}$
Triclinic: $P\bar{1}$
a 8.116, b 9.501, c 6.891 Å, α 100.43°, β 110.24°, γ 82.80°
Orange-red; adamantine; transparent.
Biaxial (sign unknown), all indices of refraction are greater than 2.
5.72 (90), 3.373 (60), 3.008 (100), 2.864 (50b), 2.774 (50), 2.536 (50), 2.486 (50), 2.425 (60).

IMA No. 91-003 The niobium analogue of bismutotantalite.
$Bi(Nb,Ta)O_4$
Orthorhombic: Pcmn
a 4.992, b 5.677, c 11.731 Å
Black; semi-metallic; transparent in small (<0.03 mm) fragments.
Biaxial (+), α 2.38, β 2.42, γ 2.47, 2V(calc.) 85°.
3.164 (100), 2.934 (90), 2.842 (45), 2.495 (45), 1.769 (45), 1.734 (80).

IMA No. 91-005
$(Zn,Co,Ni)_6(SO_4)(OH,Cl)_{10}\cdot 5H_2O$
Hexagonal: $P6_3$, $P6_3/m$ or $P6_322$
a 8.344, c 21.59 Å
Bright to deep pink; vitreous to pearly; transparent.
Uniaxial (-), ω 1.584, ϵ 1.544
10.8 (100), 3.300 (90), 2.725 (60), 2.563 (50), 2.351 (40), 1.575 (30).

IMA No. 91-007
$Mn_5(OH)_4(VO_4)_2$
Monoclinic: C2/m
a 9.604, b 9.558, c 5.393 Å, β 98.45°
Orange-red; vitreous; transparent.
Biaxial (-), α' 1.803, γ' 1.810, 2V(meas.) large.
4.76 (S), 3.00(M), 2.680 (VS), 2.656 (M), 2.155 (M), 1.565 (M), 1.510 (M).

IMA No. 91-008 The Ba-dominant end-member of the alunite group.
$Ba_{0.5}\square_{0.5}Al_3(SO_4)_2(OH)_6$
Hexagonal: $R\bar{3}m$
a 6.992, c 17.22 Å
White to light yellowish; vitreous; transparent.
Uniaxial (+), ω 1.588, ϵ 1.604.
5.73 (50), 3.49 (55), 2.98 (100), 2.283 (80), 1.909 (70), 1.747 (60).

IMA No. 91-009 The Ca-dominant end-member of the alunite group.
$Ca_{0.5}\square_{0.5}Al_3(SO_4)_2(OH)_6$
Hexagonal: $R\bar{3}m$
a 6.983, c 16.759 Å
White to light yellowish; vitreous; transparent.
Uniaxial (+), indices of refraction unknown.
4.91 (69), 2.97 (100), 2.231 (51), 1.899 (43), 1.745 (37), 1.375 (40).

IMA No. 91-010
$Ca(Fe,Mg)_6(SiO_4)_2(PO_4)_2$
Hexagonal: $R\bar{3}m$
a 6.240, c 26.784 Å
Yellow-brown; vitreous; transparent.
Uniaxial (-), ω 1.770, ϵ 1.759.
5.00 (60), 3.119 (100), 2.689 (80), 2.558 (100), 2.505 (80), 1.560 (80).

IMA No. 91-012
$Mn_5SnB_2Si_5O_{20}$
Monoclinic: P2/m
a 28.77, b 7.01, c 13.72(2) Å, β 96.6(2)°.
Orange-yellow; vitreous; transparent.
Biaxial (-), α 1.696, β 1.711, γ 1.715, 2V(meas.) 57°, 2V(calc.) 54°.
3.41 (8), 3.22 (8), 2.83 (10), 2.81 (10), 2.24 (7), 1.750 (6).

IMA No. 91-013
$(Na,K)_{17}Fe^{+3}TiSi_{16}O_{29}(OH)_{30}\cdot 2H_2O$
Orthorhombic: Cmcm, $Cmc2_1$ or C2cm
a 29.77, b 11.03, c 17.111(5) Å
Colourless (white or grey in aggregates); vitreous; transparent.
Biaxial (-), α 1.532, β 1.548, γ 1.559(2), 2V(meas.) 79°, 2V(calc.) 79°.
10.38 (100), 4.516 (75), 3.220 (65), 3.097 (80), 2.972 (65), 2.773 (90).

IMA No. 91-014
$Na_4K_3(Fe,Mn,Ti)_2Si_8O_{20}(OH)_4\cdot 4H_2O$
Triclinic: $P\bar{1}$
a 10.244, b 11.924, c 5.276 Å, α 103.491°, β 96.960°, γ 91.945°.
Olive-green with brownish or yellowish shades; vitreous; transparent.
Biaxial (+), α 1.569, β 1.574, γ 1.590, 2V(meas.) 58°, 2V(calc.) 59°.
11.57 (100), 3.386 (19), 3.006 (21), 2.992 (28), 2.716 (22), 2.598 (26).

IMA No. 91-015
$Na_8KSi_9O_{18}(OH)_9\cdot 19H_2O$
Monoclinic: $P2_1/c$
a 24.91, b 11.94, c 14.92 Å, β 94.47(9)°.
Colourless; vitreous; transparent.
Biaxial (-), α 1.460, β 1.478, γ 1.481, 2V(meas.) 43°, 2V(calc.) 44°.
4.26 (60), 3.08 (100), 2.938 (70B), 2.649 (60B), 2.400 (35), 2.289 (35).

IMA No. 91-016 A member of the adelite-descloizite group.
$CaMn(OH)SiO_4$
Orthorhombic: $P2_12_12_1$
a 5.838, b 7.224, c 8.690(1) Å
Deep red; vitreous; transparent.
Biaxial (+), α 1.840, β (calc.) 1.854, γ 1.920, 2V(meas.) 50°.
5.558 (S), 3.070 (S), 2.687 (S), 2.584 (VS), 1.565 (M).

IMA No. 91-017 The ferric-analogue of philipsbornite.
$PbFe^{+3}_3H(AsO_4)_2(OH)_6$
Hexagonal: $R\bar{3}m$
a 7.359, c 17.113(8) Å
Greenish-yellow; vitreous to adamantine; translucent to transparent.
Uniaxial (-), ω 1.975, ϵ 1.955.
5.966 (50), 3.678 (40), 3.092 (100), 2.283 (30), 1.992 (30), 1.840 (25).

IMA No. 91-018 The Mg-dominant analogue of congolite and the rhombohedral dimorph of boracite.
$(Mg,Fe)_3B_7O_{13}Cl$
Hexagonal: R3c
a 8.574, c 20.99 Å
Colourless; vitreous; transparent.
Uniaxial (-), ω 1.684, ϵ 1.668.
3.497 (34), 3.028 (100), 2.711 (66), 2.144 (37), 2.050 (73), 1.828 (25).

IMA No. 91-019
$Fe^{+2}_3(Fe^{+3},Ti)_3[O_2As_2O_5]_2$
Monoclinic: $P2_1/m$
a 10.625, b 3.264, c 8.990 Å, β 109.15°.
Dark brown to black; submetallic to metallic; opaque (translucent in thin fragments).
In reflected light: creamy white (in oil, white with a weak brown tint); no internal reflections; anisotropy visible along grain boundaries (in oil, clearly visible); bireflectance not visible (in oil, very weak along grain boundaries); nonpleochroic. R-values: (15.5-15.9 %)470nm, (15.0-15.5 %)546nm, (14.8-15.0 %)589nm, (14.2-14.5 %)650nm.
2.985 (67), 2.811 (94), 2.749 (100), 2.391 (85), 1.779 (48), 1.709 (35).

IMA No. 91-020
$Ba(Al,Mg)(PO_4,CO_3)(OH)_2 \cdot H_2O$
Orthorhombic: Pnna or Pnnn
a 8.939, b 5.669, c 11.073(3) Å
Pale blue; silky; translucent.
Biaxial (-), α 1.616, β 1.629, γ 1.640, 2V(meas.) 70°-90°, 2V(calc.) 85°.
5.54 (79), 3.479 (82), 3.345 (59), 2.768 (100), 2.543 (61), 2.072 (41).

IMA No. 91-021 A polymorph of mundrabillaite.
$Ca(NH_4)_2(HPO_4)_2 \cdot H_2O$
Orthorhombic: space group unknown
a 20.959, b 7.403, c 6.478(5) Å
White; vitreous; transparent.
Biaxial (-), α 1.506, β 1.510, γ 1.512, 2V(meas.) 65°, 2V(calc.) 70°.
10.5 (57), 6.99 (100), 4.739 (36), 3.705 (89), 3.651 (39), 3.177 (55).

IMA No. 91-022
$KZr_2(PO_4)_3$
Hexagonal: R$\bar{3}$c
a 8.687, c 23.877(7) Å
Pale blue to blue-green to nearly colourless; vitreous; transparent.
Uniaxial (+), ω 1.656, ϵ 1.682.
6.41 (50), 4.679 (50), 4.329 (100), 3.806 (90), 2.928 (90), 2.502 (50).

IMA No. 91-023 The Cs-analogue of gainesite
$NaCs(Be,Li)Zr_2(PO_4)_4$
Tetragonal: $I4_1/amd$
a 6.573, c 17.28 Å
White to colourless; vitreous; translucent to transparent.
Uniaxial (+), ω 1.634, ϵ 1.645.
6.159 (90), 4.326 (80), 4.099 (40), 3.281 (80), 3.060 (100), 2.896 (30), 1.849 (30).

IMA No. 91-024
$Sb_6(SO_4)O_8 \cdot H_2O$
Triclinic: P$\bar{1}$
a 11.434, b 29.77, c 11.314(4) Å, α 91.07°, β 119.24°, γ 92.82°.
Colourless to white; adamantine; transparent to translucent.
Biaxial (+), mean n 2.08, birefringence low, 2V(meas.) $>>$ 60°.
14.835 (50), 9.270 (41), 6.810 (67), 3.304 (93), 3.200 (39), 3.092 (100).

IMA No. 91-025
$Cu_4(As,Sb)_2S_5$
Orthorhombic: space group unknown
a 14.51, b 13.30, c 17.96(1) Å
Silvery lead grey; metallic; opaque.
In reflected light: grey, weak anisotropism, weak bireflectance, nonpleochroic. $R_{min.}$ & $R_{max.}$: (31.5, 32.5 %)470nm, (31.1, 32.0 %)546nm, (30.3, 31.15 %)589nm, (27.2,23.4 %)650nm.
3.36(7), 2.999(100), 2.594(20), 2.238(6), 1.833(40), 1.564(15b).

IMA No. 91-026
$(Co,Zn,Ni)_6(SO_4)(OH,Cl)_{10} \cdot 8H_2O$
Hexagonal: space group unknown
a 8.363, c 26.18(7) Å
Pink to light pink; pearly; transparent.
Uniaxial (-), ω 1.568, ϵ 1.542.
13.1 (100), 3.523 (30), 2.985 (30), 2.681 (40), 2.527 (90).

IMA No. 91-027 The fluorine-analogue of britholite-(Ce) of the apatite group.
$(REE,Ca)_5(Si,P)_3O_{12}F$, where Ce is the dominant REE
Hexagonal: $P6_3/m$
a 9.517, c 6.983(4) Å
Tan, reddish-brown; adamantine; opaque to translucent.
Uniaxial (-), ω 1.792, ϵ 1.786.
2.845 (100), 2.822 (40), 2.747 (30), 1.970 (30), 1.870 (40).

IMA No. 91-028 A member of the amphibole group.
$(Na,K)Na_2[Mg_2(Fe^{3+},Mn^{3+})_2Li]Si_8O_{22}(OH,F)_2$
Monoclinic: C2/m
a 9.808, b 17.850, c 5.289(1) Å, β 104.22(2)°.
Dark red; vitreous; translucent.
Biaxial (+), α 1.667, β 1.675, γ 1.691, 2V(meas.) 59-71°, 2V(calc.) 71°.
8.399 (56), 3.383 (18), 3.254 (20), 3.122 (100), 2.798 (48), 2.696 (15).

IMA No. 91-029
$NiSb_2(OH)_{12} \cdot 6H_2O$
Hexagonal: $P\bar{3}1m$, P31m or P312
a 16.016, c 9.789(2) Å
Light-blue; vitreous; transparent.
Uniaxial (+), ω 1.600, ϵ 1.605.
4.6195 (100), 3.3537 (100), 2.3431 (80), 2.0909 (60), 1.8050 (70), 1.7496 (60).

IMA No. 91-030
$(Pb,Mo,\square)_8O_8Cl_2$
Tetragonal: I4/mmm, $I\bar{4}2m$, $I\bar{4}m2$, $I\bar{4}mm$ or $I\bar{4}22$
a 3.9922, c 22.514(2) Å
Carmine; adamantine; translucent.
In reflected light: grey, weak to moderate anisotropy, moderate bireflectance, weak pleochroism, internal reflections abundant, R_1 & R_2 (19.6, 22.0 %)470nm, (18.0, 20.5 %)546nm, (17.4, 19.6 %)589nm, (16.95, 18.8 %)650nm.
3.507 (32), 2.983 (100), 2.816 (78), 1.989 (75), 1.658 (51), 1.586 (33).

IMA No. 91-031
$Ca_6Cu_3(SO_4)_3(OH)_{12} \cdot 2H_2O$
Monoclinic: $P2_1/c$ (pseudo C2/c)
a 15.122, b 14.358, c 22.063 Å, β 108.68°.
Dark blue; vitreous; transparent.
Biaxial (-), α 1.590, β 1.610, γ 1.619, 2V(meas.) 65°, 2V(calc.) 67°.
3.393 (100), 3.368 (55), 3.200 (53), 3.188 (65), 3.120 (85), 3.098 (57).

IMA No. 91-032
$Fe(OH)_3$
Orthorhombic Immm (pseudocubic)
a 7.544, b 7.558, c 7.560(4) Å
Dark bottle green; vitreous to adamantine; transparent.
Biaxial (-), the indices of refraction are between 1.92 and 1.94.
3.774 (100), 2.671 (35), 2.395 (30), 1.904 (15), 1.697 (60), 1.548 (40).

IMA No. 91-033
Au_2Pb
Cubic: Fd3m
a 7.933(5) Å
Colour unknown because of the small grain size; metallic; opaque.
In reflected light: silvery grey, dark grey when highly oxidized; no anisotropy, bireflectance, pleochroism or internal reflections; R (56.0%)470nm, (59.5%)546nm, (60.0%)589nm, (62.0%)650nm.
4.595 (21), 2.810 (30), 2.391 (100), 2.301 (25), 1.526 (23), 1.196 (26).

IMA No. 91-034
$Ca(UO_2)_3(CO_3)_4 \cdot 3H_2O$
Orthorhombic: Pmnm, $Pmn2_1$ or $P2_1nm$
a 15.337, b 17.051, c 6.931 Å
Canary yellow; vitreous; transparent.
Biaxial (-), α 1.603(calc.), β 1.690, γ 1.710, 2V(meas.) 49°.
8.55 (100), 6.94 (50), 4.11 (60), 3.723 (60), 3.460 (50), 2.772 (70).

IMA No. 91-037
$[Ag_5(Pb,Fe)Bi_7]_{13}(Sb,Bi)_2S_{17}$
Monoclinic: C2/m or Cm
a 13.515, b 4.098, c 26.000 Å, β 93.00°.
Grey; metallic; opaque.
In reflected light: white, distinct anisotropy, very weak bireflectance, no pleochroism, no internal reflections, $R_{max.}$ & $R_{min.}$ (42.2, 39.7 %)470nm, (41.4, 38.8 %)546nm, (40.8, 37.9 %)589nm, (39.8, 36.9 %)650nm.
3.49 (8), 3.37 (9), 3.24 (9), 2.82 (10), 2.01 (7), 1.992 (8), 1.967 (6).

IMA No. 91-038
$Pb_2(Mn,Fe,Mg)_3Fe^{3+}_{14}O_{26}$
Hexagonal: $P6_3/mmc$, $P6_3mc$ or $P\bar{6}2c$
a 5.951, c 33.358 Å
Black; submetallic; opaque.
In reflected light: grey with pale brownish tint, moderate anisotropy, weak bireflectance, no pleochroism, no internal reflections, R_O & R_E (23.6, 22.3%) 470nm, (22.8, 21.9%) 546nm, (22.2, 21.5%)589nm, (21.3, 21.0%)650nm.
4.168 (55), 3.011 (60), 2.9750 (70), 2.8017 (95), 2.6236 (100), 2.6125 (90).

IMA No. 91-042
$N(CH_3)_4[Si_2(Si_{0.5}Al_{0.5})O_6]_2$
Orthorhombic: I222
a 8.984, b 8.937, c 8.927 Å
White, colourless, light yellow; vitreous; transparent.
Biaxial (-), α 1.529, β(calc.) 1.530, γ 1.531, 2V(meas.) 76°.
6.33 (8), 4.46 (8), 3.66 (10), 2.60 (8), 1.760 (8), 1.351 (8).

IMA No. 91-043 The Sb-dominant member of the colusite group.
$Cu_{26}V_2(Sb,Sn,As)_6S_{32}$
Cubic: $P\bar{4}3n$
a 10.705 Å
Colour not observed because of the small size; metallic; opaque.
In reflected light: grey with a light-brown tint; no anisotropy, bireflectance, pleochroism or internal reflections; R (25.2 %) 470nm, (28.3 %) 546nm, (29.9 %) 589nm, (31.0 %) 650nm.
3.10 (10), 1.892 (9), 1.614 (7), 1.226 (4), 1.094 (6), 1.030 (4).

IMA No. 91-044 The Ge-dominant member of the colusite group.
$Cu_{26}V_2(Ge,As)_6S_{32}$
Cubic: $P\bar{4}3n$
a 10.568 Å
Grey-black; metallic; opaque.

In reflected light: greenish-yellow, olive-yellowish-cream; no internal reflections, anisotropy, bireflectance or pleochroism; R (23.8%) 470nm, (27.3%) 546nm, (27.9%)589nm, (27.9%)650nm.
3.05 (10), 2.64 (4), 1.870 (5), 1.595 (3), 1.320 (3), 1.212 (3), 1.079 (3), 1.017 (5).

IMA No. 91-045
$(Ca,Mg)_{14}Mn_3Zn_3Be_6Si_{14}O_{50}(OH,F)_8$
Monoclinic: $P2_1/c$
a 9.08, b 18.03, c 14.59(4) Å, β 104.8°.
Colourless; vitreous; transparent.
Biaxial (-), α 1.674, β 1.680, γ 1.681, 2V(meas.) 29.0°, 2V(calc.) 44°.
2.863 (100), 2.771 (40), 2.653 (50), 2.388 (50), 2.272 (30), 1.832 (30).

IMA No. 91-046 The Cu-dominant analogue of geigerite and chudobaite.
$(Cu,Co)_5(AsO_4)_2(AsO_3OH)_2 \cdot 10H_2O$
Triclinic: P1 or $P\bar{1}$
a 8.033, b 10.374, c 6.446(5) Å, α 79.62°, β 84.95°, γ 86.21°.
Green; vitreous; transparent.
Biaxial (+), α 1.634, β 1.662, γ 1.720, 2V(meas.) 75°, 2V(calc.) 72°.
10.2 (100), 8.01 (60), 4.001 (50), 3.667 (60), 3.151 (50), 3.063 (50).

IMA No. 91-047
Tl_3AsS_4
Orthorhombic: Pnma
a 8.894, b 10.855, c 9.079 Å.
Dark red; adamantine to submetallic; opaque to translucent.
In reflected light: red, red internal reflections, strong anisotropy, strong bireflectance, no pleochroism. $R_{max.}$ and $R_{min.}$ are: (4.78, 3.93 %) 481nm, (4.64, 3.86 %) 547nm, (8.64, 7.81 %) 591nm, (13.72, 11.78 %) 644nm.
4.14 (M), 3.99 (S), 3.80 (M), 3.47 (MSb), 3.35 (M), 2.813 (VS), 2.537 (M), 2.264 (MSb).

IMA No. 91-048
$Na_{25}Ba(Y,Gd,Dy)_2(CO_3)_{11}(HCO_3)_4(SO_4)_2F_2Cl$
Hexagonal: $P6_3/m$
a 8.811, c 37.03(3) Å
Light green to yellowish-green; vitreous; transparent.
Uniaxial (-), ω 1.536, ϵ 1.510.
4.79 (42), 3.32 (40), 2.829 (100), 2.659 (51b), 2.531 (71b), 2.270 (90).

IMA No. 91-050
$(Ca,REE,Th)_{15}As^{+5}(As^{+3}_{0.5}Na_{0.5})Fe^{+3}Si_6B_4O_{40}F_7$
Hexagonal: R3m
a 10.795, c 27.336(4) Å
Yellowish-green; vitreous; transparent.
Uniaxial (-), ω 1.757, ϵ 1.722.
2.993 (S), 2.950 (S), 1.839 (MS), 1.802 (MS), 1.686 (MS), 1.572 (MS).

IMA No. 91-051
$Ag_9SbTe_3(S,Se)_3$
Monoclinic: P2, P2/m or Pm
a 8.900, b 8.302, c 19.49 Å, β 82.98°.
Colour unknown because of the small grain size; metallic; opaque.
In reflected light: grey with faint green-blue hue, anisotropy present with brownish-grey tone, weak bireflectance, no pleochroism, no internal reflections, $R_{max.}$ and $R_{min.}$ (38.0,34.2%)470nm, (36.6,32.2%)546nm, (35.7,31.8%)589nm, (34.0,30.2%)650nm.
3.82 (6), 2.89 (4), 2.83 (4), 2.22 (10), 2.14 (3), 2.13 (4).

IMA No. 91-052 The Sb-analogue of skutterudite.
$CoSb_3$
Cubic: Im3
a 9.0411 Å
Tin-white; metallic; opaque.
In reflected light: tin-white, isotropic, no bireflectance, nonpleochroic, no internal reflections, R (59.0 %)470nm, (58.7 %)546nm, (58.7 %)589nm, (58.7 %)650nm.
2.85 (100), 2.01 (80), 1.92 (80), 1.84 (80), 1.50 (80), 1.185 (80), 1.147 (80), 0.780 (100).

IMA No. 91-053
$Zn_{12}(CO_3)_3(SO_4)(OH)_{16}$
Orthorhombic: $P22_12$
a 15.724, b 6.256, c 5.427(5) Å
White; vitreous; translucent.
Biaxial (probably +), α 1.635(3), β 1.650(3), γ could not be measured, 2V about 60°.
15.44 (100), 7.88 (100), 5.25 (20), 2.714 (40), 2.577 (20), 2.397 (20), 1.565 (30b).

IMA No. 91-054
$Na_{26}Ce_6(SiO_3)_6(PO_4)_6(CO_3)_6(SO_2)O$
Hexagonal: $R\bar{3}$
a 16.025, c 19.773 Å
Colourless to pale brown; vitreous; transparent.
Uniaxial (-), ω 1.589, ϵ 1.586.
8.076 (80), 6.544 (90), 4.659 (75), 3.776 (90), 3.159 (85), 2.683 (100).

IMA No. 91-055 A member of the epidote group, related to dollaseite-(Ce).
$(Ca,REE)REE(Mg,Fe)MnAlSi_3O_{11}(OH)(F,O)$
Monoclinic: $P2_1/m$
a 8.903, b 5.748, c 10.107 Å, β 113.41°.
Dark greyish-brown; vitreous; transparent.
Biaxial (-), α 1.773, β 1.790, γ 1.803, 2V(meas.) 83°, 2V(calc.) 82°.
9.32 (2), 5.23 (2), 4.67 (2), 3.52 (4), 2.91 (10), 2.73 (7), 2.63 (8), 1.437 (2).

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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.

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IMA No. (any relationship to other minerals)
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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
Commission on New Minerals and Mineral Names
International Mineralogical Association

1992 PROPOSALS

IMA No. 92-001
$FeZr(PO_4)_2{\cdot}4H_2O$
Monoclinic: $P2_1/c$
a 9.12 b 5.42 c 19.17 Å β 94.8°
Pale yellowish white; vitreous to dull; transparent.
Biaxial (+), α 1.644, β 1.652, γ 1.652, 2V(meas.) 0°, 2V(calc.) 0°.
9.58 (75), 4.572 (65), 4.382 (80), 4.092 (60), 3.160 (100), 2.640 (70).

IMA No. 92-002
$Bi_2O(OH)_2SO_4$
Monoclinic: $P2_1/c$
a 7.700 b 13.839 c 5.686 Å β 109.11°
Colourless; adamantine; transparent.
Biaxial, indices of refraction calculated from reflectance data at 589nm: R_1 1.91, R_2 1.99.
3.644 (60), 3.466 (60), 3.206 (100), 2.924 (70), 2.782 (50), 1.984 (90).

IMA No. 92-003 The selenium analogue of stibnite.
Sb_2Se_3
Orthorhombic: Pbnm
a 11.593 b 11.747 c 3.984 Å
Black; metallic; opaque.
In reflected light: white, distinct anisotropism, distinct bireflectance, pleochroic white to greyish white. $R_{max.}$ & $R_{min.}$: (42.62, 40.55 %)470nm, (41.95, 39.02 %)546nm, (41.23, 39.42 %)589nm, (44.39, 41.56 %)650nm.
3.70 (70), 3.17 (50), 2.870 (100), 2.625 (60), 1.930 (30), 1.764 (35).

IMA No. 92-005
$Mg[UO_2(AsO_3)_x(AsO_4)_{1-x}]_2{\cdot}7H_2O$ x about ⅔
Monoclinic: C2/m
a 18.194 b 7.071 c 6.670 Å β 99.70°
Bright yellow to straw yellow; vitreous; transparent.
Biaxial (-), α 1.610, β 1.730, γ 1.740, 2V(meas.) 34°, 2V(calc.) 30°.
9.02 (100), 4.90 (40), 4.48 (80), 4.00 (40), 3.53 (40), 3.28 (50), 3.01 (60), 2.849 (60).

IMA No. 92-006 The nickel-analogue of hydromagnesite.
$Ni_5(CO_3)_4(OH)_2{\cdot}4\text{-}5H_2O$
Monoclinic: $P2_1/c$
a 10.06 b 8.75 c 8.32 Å β 114.3°
Bluish-green; silky; transparent.
Biaxial (sign unknown), α' 1.630, γ' 1.640, 2V unknown.
6.30 (5), 5.75 (10), 4.36 (4), 4.14 (3), 2.871 (4b), 2.458 (2b), 2.120 (3).

IMA No. 92-008
$NaH(CO_3)H_3(BO_3){\cdot}2H_2O$
Monoclinic: C2
a 16.119 b 6.928 c 6.730 Å β 100.46°
Colourless; vitreous; transparent.
Biaxial (-), α 1.351 (calc.), β 1.459, γ 1.486, 2V(meas.) 50°.
6.36 (25), 4.203 (6), 3.464 (100), 3.173 (59), 2.608 (5), 1.731 (19).

IMA No. 92-010 A triclinic polymorph of 92-011.
$Ca_9B_{26}O_{34}(OH)_{24}Cl_4{\cdot}13H_2O$
Triclinic: P1
a 12.759 b 13.060 c 9.733 Å α 102.14° β 102.03° γ 85.68°
Colourless to very pale yellow; vitreous; translucent to transparent.
Biaxial (+), α 1.537, β 1.548, γ 1.570, 2V(meas.) 77°, 2V(calc.) 71°.
9.21 (70), 7.69 (100), 5.74 (60), 4.63 (40), 3.845 (35), 2.199 (30b).

IMA No. 92-011 A monoclinic polymorph of 92-010.
$Ca_9B_{26}O_{34}(OH)_{24}Cl_4{\cdot}13H_2O$
Monoclinic: $P2_1$
a 19.88 b 9.715 c 17.551 Å β 114.85°
Colourless to very pale yellow; vitreous; translucent to transparent.
Biaxial (+), α 1.542, β 1.545, γ 1.565, 2V(meas.) 47°, 2V(calc.) 43°.
9.03 (60), 8.56 (100), 6.62 (70), 6.14 (30b), 5.12 (30), 4.09 (30), 3.768 (30), 3.493 (30).

IMA No. 92-012
$Ca_2(CaMn)(SiO_3OH)_2(OH)_2$
Orthorhombic: Pbca
a 9.398 b 9.139 c 10.535 Å
Colourless; vitreous; transparent.
Biaxial (+), α 1.634, β 1.640, γ 1.656, 2V(meas.) 65°, 2V(calc.) 63°.
4.18 (45), 3.231 (100), 2.846 (42), 2.789 (35), 2.391 (42), 2.042 (28).

IMA No. 92-013 The phosphate analogue of preisingerite and schumacherite.
$Bi_3O(OH)(PO_4)_2$
Triclinic: P$\bar{1}$
a 9.798 b 7.250 c 6.866 Å α 88.28° β 115.27° γ 110.70°
White to pale pink, sometimes brown; vitreous; transparent to translucent.
Mean index of refraction estimated from reflectance data: 2.01 at 589nm.
4.437 (46), 3.247 (87), 3.188 (100), 3.135 (95), 3.026 (75), 2.953 (47), 2.165 (41).

IMA No. 92-014
$Na_xCa_yCu_z(Mg,Fe^{3+},Al)_3(AsO_4)_3$ x ~ 0.76, y ~ 0.42, z ~ 0.39
Monoclinic: C2/c
a 11.882 b 12.760 c 6.647 Å β 112.81°
Light blue; vitreous; translucent.
Biaxial (+), α 1.714, β 1.744, γ 1.783, 2V(meas.) 60°, 2V(calc.) 84°.
4.35 (40), 4.06 (50), 3.56 (40), 3053 (40), 3.495 (60), 3.066 (40), 2.744 (140), 2.605 (40).

IMA No. 92-015 The ferric analogue of millosevichite.
$(Fe,Al)_2(SO_4)_3$
Hexagonal: R$\bar{3}$
a 8.14 c 21.99 Å
White to light brown; dull; transparent.
Uniaxial (sign unknown), n is between 1.555 and 1.625.
5.99 (28), 4.35 (23), 3.56 (100), 2.97 (20), 2.72 (20), 2.64 (11).

IMA No. 92-016 The phosphate analogue of arsenoclasite.
$Mn_5(PO_4)_2(OH)_4$
Orthorhombic: $P2_12_12_1$
a 9.097 b 5.693 c 18.00 Å
Pale yellow, yellow, pale burnt orange; adamantine; transparent.
Biaxial (sign unknown), α' 1.74, γ' 1.76, 2V unknown.
2.900 (100), 2.853 (70), 2.802 (50), 2.702 (80), 2.022 (15), 1.608 (15).

IMA No. 92-017 A member of the garnet group.
$Ca_3(Ti,Fe^{2+}Fe^{3+})_2(Si,Fe^{3+})_3O_{12}$
Cubic: Ia3d
a 12.162 Å
Black; adamantine; opaque.
Isotropic, ω 1.955.
3.039 (72), 2.720 (100), 2.483 (51), 2.385 (21), 1.973 (24), 1.687 (26), 1.626 (56).

IMA No. 92-018
$Ca_2Y(AsO_4)(WO_4)_2$
Tetragonal: $I4_1/a$
a 5.135 c 33.882 Å
Creamy yellow; vitreous to adamantine; translucent.
Uniaxial (+), ω 1.874, ε 1.918.
4.674 (18), 3.059 (100), 2.571 (19), 1.901 (32), 1.818 (16), 1.674 (17), 1.562 (32).

IMA No. 92-019
$C_{14}H_{10}$
Monoclinic: $P2_1$
a 8.392 b 6.181 c 9.558 Å β 98.48°
Colourless to greyish-white; vitreous to waxy; transparent.
Biaxial (+), $n_{min.}$ ~ 1.75, $n_{max.}$ ~ 1.95, 2V(meas.) ~ 90°.
9.434 (100), 4.941 (11), 4.724 (11), 4.546 (5), 4.028 (13), 3.371 (10).

IMA No. 92-020 A member of the amphibole group.
$(Na,K)(Ca,Na)_2(Mg,Fe^{3+},Fe^{2+})_5Si_8O_{22}(F,OH,O)_2$
Monoclinic: C2/m
a 9.762 b 17.888 c 5.122 Å β 102.25°
Blue green and green; vitreous; transparent.
Biaxial (-), α 1.618, β 1.624, γ 1.627, 2V(meas.) 71°, 2V(calc.) 70°.
9.9 (70), 3.69 (60), 3.34 (100), 3.18 (60), 3.13 (90), 2.82 (70), 1.98 (90), 1.439 (60).

IMA No. 92-024
$CuBi_2O_4$
Tetragonal: P4/ncc
a 8.511 c 5.823 Å
Black; metallic; opaque.
In reflected light: grey, weak anisotropism, weak but distinct bireflectance, pleochroic grey with a faint bluish tint and brownish grey. $R_{max.}$ & $R_{min.}$: (21.1, 19.0 %)482nm, (20.2, 18.0 %)545nm, (19.7, 17.6 %)589nm, (19.5, 17.3 %)659nm.
4.26 (17), 3.191 (100), 2.913 (16), 2.695 (18), 1.947 (18).

IMA No. 92-025
$Cu_3TeO_6{\cdot}H_2O$
Cubic: P-lattice, space group unknown
a 9.555 Å
Emerald green; adamantine; transparent to translucent.
Isotropic, ω 2.01 calculated from reflectance values at 589nm.
4.26 (40), 2.763 (100), 2.384 (70), 1.873 (40), 1.689 (80), 1.440 (60).

IMA No. 92-026 The *-2H* polytype of 92-027.
$Mn_6Al_2(OH)_{12}CO_3{\cdot}3H_2O$
Hexagonal: $P6_522$
a 10.985 c 15.10 Å
Orange-brown, pale brown, pale blue, colourless; vitreous; transparent.
Uniaxial (-), ω 1.587, ε 1.547.
7.53 (100), 3.768 (60), 2.578 (50), 2.221 (40), 1.856 (40), 1.552 (40).

IMA No. 92-027 The *-3T* polytype of 92-026.
$Mn_6Al_2(OH)_{12}CO_3{\cdot}3H_2O$
Hexagonal (trigonal): $P3_112$ or $P3_212$
a 10.985 c 22.63 Å
Orange-brown, pale brown; vitreous; transparent.
Uniaxial (-), ω 1.587, ε could not be measured.
7.55 (100), 3.770 (90), 2.670 (70), 2.346 (70), 1.973 (60), 1.586 (30), 1.662 (30).

IMA No. 92-028 The *-2H* polytype of 92-029.
$Mg_6Al_2(OH)_{12}CO_3{\cdot}3H_2O$
Hexagonal: $P6_522$
a 10.571 c 15.139 Å
Orange-brown, pale brown; vitreous; transparent.
Uniaxial (+), ω 1.533, ε 1.533.
7.63 (100), 3.785 (100), 2.603 (15), 2.496 (15), 2.341 (15), 2.166 (15), 1.991 (15), 1.825 (20), 1.495 (15).

IMA No. 92-029 The *-3T* polytype of 92-028.
$Mg_6Al_2(OH)_{12}CO_3{\cdot}3H_2O$
Hexagonal (trigonal): $P3_112$ or $P3_212$
a 10.558 c 22.71 Å
Yellow to pale yellow; vitreous; transparent.
Uniaxial (+ or -), ω 1.533, ε 1.533.
7.57 (100), 3.778 (90), 2.570 (40), 2.281 (40), 1.932 (40), 1.524 (20), 1.493 (20).

IMA No. 92-030
$Fe_6Al_2(OH)_{12}CO_3{\cdot}3H_2O$
Hexagonal (trigonal): $P3_112$ or $P3_212$
a 10.805 c 22.48 Å
Green-brown with black coating; vitreous; transparent.
Uniaxial (-), ω 1.599, ε 1.570.
7.49 (100), 3.746 (50), 2.625 (40), 2.314 (50), 1.948 (40), 1.558 (15), 1.526 (20).

IMA No. 92-031
$Na_2YZrSi_6O_{18}{\cdot}6H_2O$
Hexagonal (trigonal): R32
a 10.825 c 15.809 Å
Light green to yellow green; vitreous; transparent to translucent.
Uniaxial (-), ω 1.585, ε 1.578.
6.03 (32), 5.40 (63), 3.236 (84), 3.127 (88), 3.030 (100), 1.805 (21).

IMA No. 92-032 A member of the amphibole group.
$(K,Na)(Na,Li)_2(Mg,Mn^{3+},Fe^{3+}Li)_5Si_8O_{22}(OH)_2$
Monoclinic: $P2_1/m$
a 9.94 b 17.80 c 5.302 Å β 105.5°
Dark red to brownish lilac; vitreous; transparent.
Biaxial (-), α 1.654, β 1.675 (calculated), γ 1.696, 2V(meas.) 88-92°.
8.890 (M), 8.427 (M), 5.077 (M), 4.442 (M), 3.357 (M), 3.257 (S), 3.132 (S), 2.812 (S), 2.553 (S) plus seven other lines of intensity (M).

IMA No. 92-033
$SrMn_2^{3+}[Si_2O_7](OH)_2{\cdot}H_2O$
Orthorhombic: Cmcm
a 6.245 b 9.031 c 13.404 Å
Orange-brown; vitreous; translucent.
Biaxial (+), n's > 1.82, 2V(meas.) 63°.
4.804 (86), 3.373 (66), 2.833 (100), 2.807 (82), 2.695 (98), 2.401 (68).

IMA No. 92-034 A member of the tourmaline group.
$\square(Fe_3^{2+}Al)Al_6Si_6O_{18}(BO_3)_3(OH)_4$
Hexagonal (trigonal): R3m
a 15.967 c 7.126 Å
Bluish black; vitreous; transparent.
Uniaxial (-), ω 1.664, ε 1.642.
6.338 (84), 4.212 (48), 3.989 (38), 3.452 (91), 2.944 (71), 2.573 (100).

IMA No. 92-035 The magnesium-analogue of staurolite.
$(Mg,Li,Fe,\square)_4Al_{18}Si_9O_{44}(OH)_4$
Monoclinic: C2/m
a 7.872 b 16.55 c 5.634 Å β 90.00°
Colourless in thin section; vitreous to resinous; transparent.
Biaxial (sign unknown), mean n 1.709, 2V unknown.
4.139 (24), 2.678 (38), 2.390 (50), 2.370 (33), 2.356 (24), 1.968 (100).

IMA No. 92-036 The zinc-analogue of staurolite.
$(Zn,Li,Fe,Mg,\square)_4Al_{18}Si_9O_{44}(OH)_4$
Monoclinic: C2/m
a 7.853 b 16.54 c 5.639 Å β 90.00°
Colourless in thin section; vitreous to resinous; transparent.
Biaxial (sign unknown), α ~ 1.722, β unknown, γ 1.734, 2V unknown.
3.001 (61), 2.678 (70), 2.390 (87), 2.363 (46), 2.349 (45), 1.968 (61), 1.964 (48), 1.391 (100).

IMA No. 92-037 The tetragonal, lead-analogue of lavendulan.
$NaPbCu_5(AsO_4)_4Cl{\cdot}5H_2O$
Tetragonal: P4$_1$22 or P4$_3$22
a 10.066 c 39.39 Å
Intense blue; vitreous; translucent.
Uniaxial (-), ω 1.770, ε 1.710.
9.83 (100), 4.925 (60), 4.482 (50), 3.132 (90), 2.772 (40), 2.515 (50), 1.778 (40).

IMA No. 92-038
$Cu_{20}(Fe,Cu,Zn)_6Mo_2Ge_6S_{32}$
Cubic: space group unknown
a 10.64 Å
Megascopic colour unknown; metallic; opaque.
In reflected light: pale yellow to greyish yellow, no anisotropism, no bireflectance, nonpleochroic. R: (23.7 %)470nm, (25.5 %)546nm, (25.7 %)589nm, (25.6 %)650nm.
3.07 (10), 2.66 (2), 1.884 (8), 1.603 (4), 1.536 (½), 1.331 (1), 1.220 (2), 1.190 (1).

IMA No. 92-039
$Cu_{20}(Fe,Zn,Cu)_6W_2Ge_6S_{32}$
Cubic: space group unknown
a 10.675 Å
Megascopic colour unknown; metallic; opaque.
In reflected light: pale yellowish pink, no anisotropism, no bireflectance, nonpleochroic.
R: (23.2 %)470nm, (23.7 %)546nm, (24.0 %)589nm, (23.8 %)650nm.
4.36 (1), 3.38 (1), 3.08 (10), 2.67 (2), 1.887 (7), 1.612 (5), 1.543 (1), 1.333 (1), 1.225 (1½), 1.192 (½).

IMA No. 92-040
$Na_4Zn_2Si_7O_{18}\cdot 5H_2O$
Orthorhombic: F2dd
a 10.211 b 39.88 c 10.304 Å
Colourless to light mauve; vitreous; transparent.
Biaxial (+), α 1.520, β 1.521, γ 1.524, 2V(meas.) 61°, 2V(calc.) 60°.
6.346 (10), 4.959 (3), 3.240 (6), 3.167 (4), 3.140 (4), 2.821 (3).

IMA No. 92-041 The thallium-analogue of jarosite.
$(Tl,K)Fe_3(SO_4)_2(OH)_6$
Hexagonal (trigonal): $R\bar{3}m$
a 7.3301 c 17.6631 Å
Gold yellow; adamantine; transparent.
Uniaxial (-), ω 1.822, ε 1.768.
5.974 (87), 3.666 (34), 3.112 (100), 2.9877 (22), 2.5773 (21), 1.9912 (29), 1.8329 (23).

IMA No. 92-043
$Ca(UO_2)_4(SO_4)_2(OH)_6\cdot 6H_2O$
Orthorhombic: P-lattice, space group unknown
a 8.73 b 17.09 c 15.72 Å
Sulphur yellow; vitreous; translucent.
Biaxial (-), α 1.617 (calculated), β 1.710, γ 1.758, 2V(meas.) 68°.
7.90 (100), 4.17 (30), 3.98 (40), 3.49 (80), 3.38 (70), 2.844 (30b).

IMA No. 92-045 The phosphate-analogue of segnitite.
$PbFe_3^{3+}(PO_4)_2(OH,H_2O)_6$
Hexagonal (trigonal): $R\bar{3}m$
a 7.325 c 16.900 Å
Cream to brownish yellow to yellowish green; adamantine; translucent.
Uniaxial (-), ω 1.955, ε 1.935.
5.96 (90), 3.67 (60), 3.07 (100), 2.538 (50), 2.257 (50), 1.979 (50).

IMA No. 92-046
$AlF_3\cdot 3H_2O$
Tetragonal: P4/n
a 7.715 c 3.648 Å
Colourless; vitreous; transparent.
Uniaxial (-), ω 1.427, ε 1.403.
5.47 (100), 2.439 (72), 2.027 (70), 1.775 (78), 1.725 (85), 1.306 (70).

IMA No. 92-048
$Na_xREE_y(CO_3)_z$ with Ce the dominant REE
Monoclinic: $P2_1$
a 20.84 b 6.374 c 10.578 Å β 120.45°
Grey with slight pinkish tint; vitreous; translucent.
Biaxial (+ or -), α 1.623, β 1.636, γ 1.649, 2V(meas.) 90°, 2V(calc.) 89°.
9.13 (3), 5.22 (5), 4.13 (3), 3.70 (4), 2.607 (10), 2.148 (3), 1.921 (3).

IMA No. 92-050 The magnesium-analogue of dumortierite.
$(Mg,Ti,\square)(Al,Mg)_2Al_4Si_3O_{18-x}(OH)_xB$ $x \approx 3$
Orthorhombic: Pmcn
a 12.02 b 20.22 c 4.732 Å
Pink to red; vitreous; transparent.
Biaxial (-), α 1.678, β 1.700, γ 1.701, 2V(meas.) 38°, 2V(calc.) 24°.
6.01 (59), 5.88 (100), 3.489 (60), 3.255 (82), 3.074 (53), 2.927 (74), 2.131 (50), 2.090 (48).

NOTE:
The following three minerals from previous years also have been approved.

IMA No. 90-006
$Fe_{16}O_{16}(OH)_y(SO_4)_z$ where $16 - y = 2z$ and $2.0 \le z \le 3.5$
Tetragonal: probably P4/m
a 10.66 c 6.04 Å
Brownish yellow; dull; translucent.
Optical properties unknown.
4.86 (37), 3.38 (46), 2.55 (100), 2.28 (23), 1.66 (21), 1.51 (24), 1.46 (18).

IMA No. 90-046 The uranium-analogue of polycrase-(Y).
$(U,Y)(Ti,Nb,Ta)_2O_8$
Orthorhombic: Pbcn
a 14.48 b 5.559 c 5.223 Å
Brown-red; adamantine; opaque.
In reflected light: pale grey with bluish tones; no anisotropism, bireflectance, or pleochroism. R: (23.6 %)470nm, (21.5 %)546nm, (22.3 %)589nm, (25.1 %)650nm.
3.73 (W), 3.21 (W), 2.99 (S), 2.78 (W), 1.90 (MS), 1.86 (W), 1.77 (MW), 1.48 (M).

IMA No. 91-036
$Fe_2(OH)_3Cl$
Orthorhombic: Pnam
a 6.31 b 9.20 c 7.10 Å
Megascopic colour unknown; lustre probably dull; transparent.
Index of refraction: 1.6 to 1.7.
Electron diffraction pattern: 5.68, 5.07, 2.93, 2.37, 2.14, 1.65.

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New minerals recently approved by the Commission on New Minerals and Mineral Names International Mineralogical Association

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Some time ago the Commission on New Minerals and Mineral Names decided that we could do a distinct service to the mineralogical community if we published very short descriptions of newly approved mineral species without, of course, their names. The purpose of this is to assist mineralogists who are working on new minerals which may be the same as these approved species, which have not been published yet. The frequency of multiple proposals for the same species is increasing and it is hoped that this service will alert prospective proposers to the existence of these new species and thus save them some time and frustration in coming in second or third with the same mineral.

J.A. Mandarino, Chairman of C.N.M.M.N.

The information given here is provided by the Commission on New Minerals and Mineral Names, I.M.A. for comparative purposes .

Each mineral is described in the following format:

I.M.A. 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.

0935-1221/95/0007-0447 $ 2.50

1993 PROPOSALS

IMA No. 93-001 The calcium-analogue of burbankite and khanneshite.
$Na_3(Ca,REE,Sr)_3(CO_3)_5$
Hexagonal: $P6_3mc$, $P6_2c$ or $P6_3mmc$
a 10.447 c 6.318 Å
Deep orange; vitreous; translucent.
Uniaxial (-), ω 1.636, ϵ 1.631.
5.20 (4), 3.68 (3), 3.01 (5), 2.601 (10), 2.130 (6), 1.649 (3).

IMA No. 93-002 The nickel-analogue of chalcophanite.
$NiMn_3O_7 \cdot 3H_2O$
Hexagonal (trigonal): $R\bar{3}$ or R3
a 7.514 c 20.52 Å
Very dark brown to almost black; submetallic to vitreous; opaque, but translucent in thin plates.
Uniaxial (-), $\omega > 2.00$, ϵ 1.97.
6.84 (10), 4.01 (2), 2.219 (3), 1.884 (2), 1.575 (2).

IMA No. 93-003 The arsenate-analogue of berlinite.
$AlAsO_4$
Hexagonal (trigonal): $P3_121$ or $P3_221$
a 5.031 c 11.226 Å
Colourless, white, cream; vitreous; transparent.
Uniaxial (+), ω 1.596, ϵ 1.608.
4.36 (20), 4.06 (31), 3.442 (100), 2.359 (15), 1.873 (16), 1.4202 (11).

IMA No. 93-004 The aluminum-analogue of klyuchevskite.
$K_3Cu_3AlO_2(SO_4)_4$
Monoclinic: I2
a 18.423 b 5.139 c 18.690 Å β 101.72°
Dark green; vitreous; transparent.
Biaxial (+), α 1.542, β 1.548, γ 1.641, 2V(meas.) unknown, 2V(calc.) 30°.
9.15 (84), 9.04 (100), 7.20 (52), 3.781 (37), 3.757 (33), 2.786 (21).

IMA No. 93-005
$NaBa_3(Mn^{2+},Mn^{3+})_4[Si_4O_{10}(OH)_2][Si_2O_7]O_2F \cdot H_2O$
Orthorhombic: Pnma
a 23.42 b 12.266 c 7.181 Å
Black with a green shade; vitreous to greasy; translucent.
Biaxial (+), α 1.767, β 1.793, γ 1.871, 2V(meas.) 60-65°, 2V(calc.) 62°.
4.580 (5), 3.303 (9), 2.999 (10), 2.715 (5), 2.655 (10), 2.156 (4), 1.648 (5).

IMA No. 93-006 A tetragonal polymorph of rooseveltite.
$BiAsO_4$
Tetragonal: $I4_1/a$
a 5.085 c 11.69 Å
White to yellowish white; earthy; opaque.
Uniaxial (+), mean n > 2.0.
4.660 (11), 3.066 (100), 2.546 (12), 1.797 (11), 1.581 (10), 1.551 (17).

IMA No. 93-008
NH_4BF_4
Orthorhombic: Pnma
a 9.0615 b 5.6727 c 7.2672 Å
Colourless to white and yellowish; vitreous; transparent to translucent.
Biaxial, mean n calculated from Gladstone-Dale is 1.308.
4.472 (75), 3.540 (90), 3.183 (100), 2.8982 (80), 2.5362 (65), 2.2822 (65), 2.1631 (70).

IMA No. 93-009 A tetragonal polymorph of bismite.
Bi_2O_3
Tetragonal: $P4_2/n$ or $P4_22_12$
a 8.08 c 6.46 Å
Green, yellowish; adamantine; translucent.
Uniaxial (+), ω 2.13, ϵ 2.18.
5.73 (7), 3.44 (5), 3.16 (10), 3.01 (4), 2.56 (4dif.), 2.02 (5), 1.902 (6).

IMA No. 93-010 The magnesium analogue of fillowite and johnsomervilleite.
$Na_2CaMg_7(PO_4)_6$
Hexagonal (trigonal): $R\bar{3}$
a 14.967 c 42.595 Å
Colourless; vitreous; transparent.
Uniaxial, indices of refraction calculated from reflectance values: n_1 1.60, n_2 1.62.
3.694 (S), 3.558 (M), 2.960 (S), 2.753 (S), 2.500 (M), 2.126 (M), 1.851 (M).

IMA No. 93-011
$Cu_3MoO_4(OH)_4$
Orthorhombic: Pnnm
a 8.499 b 12.527 c 6.067 Å
Dark green; adamantine; transparent.
Biaxial (+), α slightly < 1.89, β unknown, γ slightly < 1.91, 2V(meas.) 74°.
5.471 (S), 3.754 (S), 3.043 (S), 2.591 (VS), 1.519 (S).

IMA No. 93-013
$CaSrAl(F,OH)_7$
Monoclinic: $P2_1/c$
a 8.215 b 11.989 c 6.076 Å β 96.22°
Colourless; vitreous; transparent.
Biaxial (+), α 1.4240, β 1.4320, γ 1.4415, 2V(meas.) 85.5°, 2V(calc.) 85.6°.
6.758 (7), 4.250 (9), 3.643 (8), 3.148 (7), 3.063 (8), 3.030 (7), 2.840 (7), 2.125 (8).

IMA No. 93-016
IrBiTe
Cubic: Pa3
a 6.502 Å
Steel black; metallic; opaque.
In reflected light: bright white with a yellowish tint, moderate anisotropism, no bireflectance, nonpleochroic. R: (51.0%)470nm, (52.6%)546nm, (52.9%)589nm, (49.2%)650nm.
2.89 (70), 1.955 (100), 1.735 (80), 1.250 (80), 1.207 (70), 1.148 (70), 1.054 (70).

IMA No. 93-017
$Ir_{1-x}Te_2$ x = 0.24
Cubic: Pa3
a 6.413 Å
Stel black; metallic; opaque.
In reflected light: bright white with bluish tint, no anisotropism, no bireflectance, nonpleochroic. R: (44.3%)470nm, (46.0%)546nm, (46.9%)589nm, (45.5%)650nm.
2.86 (70), 1.93 (100), 1.235 (80), 1.132 (90), 1.040 (80), 0.9780 (80).

IMA No. 93-018
$IrTe_2$
Hexagonal: $P\bar{3}m1$
a 3.933 c 5.390 Å
Steel black; metallic; opaque.
In reflected light: bright yellowish white with bluish tint, moderate anisotropism with bluish or yellowish tint, no bireflectance, nonpleochroic. R_O & R_E: (41.4, 49.0%)470nm, (40.2, 48.2%)546nm, (41.1, 49.0%)589nm, (45.2, 51.2%)650nm.
2.85 (100), 2.10 (80), 1.95 (60), 1.580 (70), 1.160 (60), 1.110 (70).

IMA No. 93-019
$Bi_6Te_2O_{13}$
Orthorhombic: space group unknown
a 5.689 b 10.791 c 5.308 Å
Yellow green to light green; adamantine; transparent.
Biaxial n's > 2. In reflected light, R: (14.8%)470nm, (13.0%)546nm, (13.2%)589nm, (13.6%)650nm.
3.146 (100), 2.841 (80), 2.694 (20), 1.956 (10), 1.695 (20), 1.631 (10).

IMA No. 93-020 The selenate-dominant analogue of 93-021
$K_6(Na,K)_4Na_6Mg_{10}(IO_3)_{12}(SeO_4,SO_4,CrO_4)_{12}\cdot 12H_2O$
Hexagonal: $P\bar{3}c1$
a 9.590 c 27.60 Å
Pale yellow; vitreous; transparent.
Uniaxial (-), ω 1.655, ϵ 1.642.
13.75 (30), 7.10 (20), 3.974 (16), 3.561 (100), 3.082 (32), 3.058 (39), 2.715 (39).

IMA No. 93-021 The sulfate-dominant analogue of 93-020
$K_6(Na,K)_4Na_6Mg_{10}(IO_3)_{12}(SO_4)_{12}\cdot 12H_2O$
Hexagonal: $P\bar{3}c1$
a 9.4643 c 27.336 Å
Pale yellow; vitreous; transparent.
Uniaxial (-), ω 1.622, ϵ 1.615.
13.67 (50), 7.05 (40), 3.927 (100), 3.515 (24), 3.023 (41), 2.681 (33), 2.3273 (21).

IMA No. 93-022
$CaNaB_5O_8(OH)_2\cdot 3H_2O$
Monoclinic: $P2_1/c$
a 6.506 b 13.280 c 11.462 Å β 92.97°
White; silky to pearly; translucent.
Biaxial (-), α 1.540, β 1.554, γ 1.558, 2V(meas.) 60°, 2V(calc.) 56°.
8.64 (100), 6.62 (30), 4.18 (17), 2.868 (26), 2.845 (16), 2.795 (17), 2.587 (15).

IMA No. 93-023
$AlCa_2(SO_4)_2F_2Cl\cdot 4H_2O$
Tetragonal: I4/m
a 6.859 c 13.310 Å
White; vitreous; transparent.
Uniaxial (+), ω 1.509, ϵ 1.526.
6.67 (60), 3.922 (50), 3.729 (40), 3.431 (100), 3.335 (80), 3.052 (40), 2.483 (40).

IMA No. 93-024
$NaAlZr(PO_4)_2(OH)_2\cdot H_2O$
Monoclinic: space group unknown
a 20.840 b 9.871 c 11.195 Å β 104.41°
Pale pinkish orange; vitreous; translucent.
Biaxial, n's vary from 1.62 (parallel to fibres) to 1.64 (normal to fibres)
8.865 (40), 4.128 (80), 3.711 (65), 3.465 (60), 3.243 (35), 2.603 (100).

IMA No. 93-025
$TlPb(As,Sb)_3S_6$
Monoclinic: $P2_1/a$
a 8.444 b 23.97 c 5.844 Å β 113.58°
Brilliant black, but dark red in thin fragments; metallic to submetallic; opaque, but translucent in thin fragments.
In reflected light: greyish white, clearly visible anisotropism from bluish to very weak reddish, visible bireflectance, nonpleochroic. $R_{min.}$ & $R_{max.}$: (29.7, 35.4%)470nm, (28.8, 33.1%)546nm, (26.7, 30.3%)589nm, (26.6, 29.9%)650nm.
5.346 (32), 3.998 (74), 3.816 (54), 3.587 (86), 2.823 (100), 2.778 (84), 2.670 (58).

IMA No. 93-026 A member of the amphibole group
$NaNa_2[(Fe^{2+},Mn^{2+},Mg)_2Fe_2^{3+}Li]Si_8O_{22}F_2$
Monoclinic: C2/m
a 9.792 b 17.938 c 5.3133 Å β 103.87°
Bluish black to black; vitreous; opaque.
Biaxial (+), α 1.675, β 1.683, γ 1.694, 2V(meas.) 87°, 2V(calc.) 81°.
8.426 (45), 4.481 (54), 3.404 (57), 2.985 (38), 2.710 (100), 2.585 (38), 2.536 (92).

IMA No. 93-028
AuSn
Hexagonal: $P6_3/mmc$
a 4.316 c 5.510 Å
White, greyish-black to black (when oxidized); metallic; opaque.
In reflected light: white with liht yellow tint, clear anisotropism light yellow with a brown tint, faint bireflectance, nonpleochroic. R_O & R_E: (65.4, 65.2 %)470nm, (76.7, 74.8 %)546nm, (80.5, 77.9 %)589nm, (82.8, 79.5 %)650nm.
3.726 (34), 3.087 (38), 2.218 (100), 2.159 (57), 1.546 (31), 1.258 (25), 1.256 (26).

IMA No. 93-030
$Na_3Sr(PO_4)(CO_3)$
Monoclinic: $P2_1$
a 9.187 b 6.707 c 5.279 Å β 89.98°
Colourless to white; vitreous; transparent.
Biaxial (-), α 1.520, β 1.564, γ 1.565, 2V(meas.) 20°, 2V(calc.) 17°.
3.35 (50), 2.708 (100), 2.648 (90), 2.172 (100), 2.080 (50), 1.891 (80), 1.676 (50), 1.415 (70).

IMA No. 93-031
$PbAl(F,OH)_5$
Triclinic: P1 or $P\bar{1}$
a 6.259 b 6.791 c 5.053 Å α 90.92° β 107.45° γ 104.45°
White to colourless; vitreous; transparent.
Biaxial (-), α 1.629, β 1.682, γ 1.691, 2V(meas.) 41°, 2V(calc.) 44°.
4.42 (100), 4.05 (35), 3.221 (40), 2.595 (70), 2.190 (65), 2.030 (50), 2.015 (40).

IMA No. 93-032
$CaVOSiO_4$
Monoclinic: C2/c
a 6.526 b 8.691 c 7.032 Å β 113.88°
Deep red; adamantine; transparent.
Biaxial (sign unknown), $\alpha \sim 1.95$, β unknown, γ 2.105, 2V(meas.) unknown.
4.90 (W), 3.22 (VS), 2.97 (M), 2.59 (S), 2.271 (W), 1.641 (W).

IMA No. 93-034
$(Y,Ca,Na,REE)_4Si_5O_{15}\cdot nH_2O$ $n \sim 4$
Triclinic: P1 or $P\bar{1}$
a 9.245 b 9.684 c 5.510 Å α 97.44° β 100.40° γ 116.70°
White; vitreous; translucent.
Biaxial (-), α 1.602, β 1.607, γ 1.611, 2V(meas.) 73°, 2V(calc.) 83°.
8.44 (80), 8.01 (50), 4.51 (50), 3.76 (70), 2.973 (100), 2.930 (60).

IMA No. 93-035 The chromium-dominant analogue of schreyerite
$(Cr,V)_2Ti_3O_9$
Monoclinic: C2/c, Cc, $P2_1/c$, P2/c or Pc
a 7.03 b 5.02 c 18.83 Å β 119.60°
Black; metallic; opaque.
In reflected light: white, faint anisotropism, faint bireflectance, faint pleochroism pale brown. $R_{min.}$ & $R_{max.}$: (18.1, 20.1 %)470nm, (18.5, 19.9 %)546nm, (18.4, 19.8 %)589nm, (18.6, 20.9 %)650nm.
2.88 (2), 2.75 (3), 2.43 (2), 1.635 (3), 1.386 (2).

IMA No. 93-036
$BaCuSi_4O_{10}$
Tetragonal: P4/ncc
a 7.441 c 16.133 Å
Blue; vitreous; transparent.
Uniaxial (-), ω 1.633, ϵ 1.593.
8.055 (100), 4.031 (35), 3.544 (15), 3.200 (21), 2.688 (18), 2.395 (19), 2.016 (26).

IMA No. 93-037 The K-dominant analogue of gainesite
$NaKZr_2(Be,Al,Ca,Mn)(PO_4)_4 \cdot 2H_2O$
Tetragonal: $I4_1/amd$
a 6.570 c 17.142 Å
Intense bluish purple or pale lilac; vitreous; transparent.
Uniaxial (+), ω 1.624, ϵ 1.636.
6.161 (100), 4.291 (25), 3.286 (50), 3.039 (30), 2.895 (20).

IMA No. 93-038
$Na(REE,Ca)_2F_6$
Hexagonal: $P\bar{3}$
a 6.099 c 11.066 Å
Pale pink to colourless; vitreous; transparent.
Uniaxial (+), ω 1.483, ϵ 1.503.
5.29 (70), 3.036 (100), 2.146 (70), 1.757 (80), 1.152 (40), 0.9189 (40).

IMA No. 93-040 The PO_4-analogue of atelestite and a monoclinic polymorph of petitjeanite
$Bi_2O(OH)(PO_4)$
Monoclinic: $P2_1/c$
a 6.954 b 7.494 c 10.869 Å β 107.00°
White to yellow; adamantine; translucent.
Biaxial (+), α 2.05, β 2.06, γ 2.09, 2V(meas.) 45°, 2V(calc.) 61°.
4.268 (17), 3.271 (51), 3.254 (100), 3.145 (34), 2.727 (29), 1.885 (16).

IMA No. 93-041
$Hg_3^{1+}(CO_3)(OH) \cdot 2H_2O$
Orthorhombic: Pcab
a 11.130 b 11.139 c 10.725 Å
Black to very dark red-brown; sub-metallic to adamantine; opaque.
In reflected light: grey with slight bluish tinge, weak anisotropism (dull and dark greys and browns), weak to moderate bireflectance, nonpleochroic. $R_{min.}$ & $R_{max.}$: (11.4, 12.15 %)470nm, (10.95, 11.6 %)546nm, (10.85, 11.5 %)589nm, (10.7, 11.2 %)650nm.
4.84 (50), 2.969 (70), 2.786 (70), 2.648 (100), 2.419 (60), 1.580 (50).

IMA No. 93-042 A regular interstratification of amesite and clinochlore
$(Mg,Al,Fe^{2+})_9(Si,Al)_6O_{15}(OH)_{12}$
Monoclinic: Cm
a 5.323 b 9.214 c 21.45 Å β 94.43°
Colourless to very pale green; nacreous; translucent.
Biaxial (+), α 1.575, β 1.575, γ 1.581, 2V(meas.) 0°, 2V(calc.) 0°.
7.1 (100), 4.61 (60), 3.560 (80), 2.557 (40), 2.427 (60), 1.536 (70).

IMA No. 93-044
$NaSbO_3$ Isostructural wuth ilmenite and geikielite
Hexagonal: $R\bar{3}$
a 5.301 c 15.932 Å
Colourless; pearly; transparent.
Uniaxial (-), ω 1.1.84, ϵ 1.631.
5.30 (53), 3.00 (55), 2.650 (67), 2.365 (69), 1.874 (100), 1.471 (69).

IMA No. 93-045 The Fe-analogue of leonite

$K_2Fe(SO_4)_2 \cdot 4H_2O$
Monoclinic: C2/m
a 11.843 b 9.552 c 9.945 Å β 94.89°
Colourless to light yellow; vitreous; transparent.
Biaxial (+), α 1.497, β 1.501, γ 1.509, 2V(meas.) 73°, 2V(calc.) 71°.
4.776 (30), 3.504 (52), 3.439 (100), 3.330 (48), 3.051 (29), 2.405 (30), 2.389 (49).

IMA No. 93-046
$(Rh,Ir,Pt)_3S_4$
Monoclinic: F2/m
a 13.44 b 10.749 c 10.448 Å β 118.32°
Megascopic colour not observed; metallic; opaque.
In reflected light: pale slightly brownish grey, weak anisotropism in greys and browns, weak bireflectance, pleochroism weak. R_1 & R_2: (47.2, 48.9 %)470nm, (48.4, 50.3 %)546nm, (49.1, 50.7 %)589nm, (49.8, 51.0 %)650nm.
3.156 (100), 3.081 (100), 2.957 (90), 2.234 (60), 1.871 (80), 1.791 (90), 1.532 (70).

IMA No. 93-047
$Cu_2Te^{6+}O_4(OH)_2$
Monoclinic: $P2_1/n$
a 9.095 b 5.206 c 4.604 Å β 98.69°
Medium leaf green; adamantine; transparent.
In reflected light: pale grey, weak anisotropism with brown rotation tints, weak bireflectance, nonpleochroic. The mean index of refraction calculated from the reflectances at 589nm is 2.00.
4.506 (40), 4.337 (60), 3.838 (50), 2.891 (70), 2.598 (100), 1.834 (40), 1.713 (40), 1.500 (40).

IMA No. 93-048
$Bi_2(Fe^{3+},Cu)_2O(OH)_3(AsO_4)_2$
Triclinic: P1 or $P\bar{1}$
a 4.569 b 6.162 c 8.993 Å α 94.56° β 99.68° γ 94.31°
Brown-yellow; adamantine; transparent to translucent.
Biaxial (-), α 2.04, β 2.10 (calc.), γ 2.11, 2V(meas.) 45°.
8.822 (62), 3.749 (100), 3.596 (77), 3.468 (58), 2.903 (69), 2.810 (51), 2.685 (48).

IMA No. 93-049
$Ca_3B_2O_6$
Hexagonal: $R\bar{3}c$ or R3c
a 8.638 c 11.850 Å
Greyish white; vitreous; transparent.
Uniaxial (-), ω 1.726, ϵ 1.630.
2.915 (100), 2.756 (61), 2.493 (44), 2.160 (19), 2.044 (21), 1.976 (18), 1.895 (75).

IMA No. 93-050
$Tl_5Sb_9(As,Sb)_4S_{22}$
Triclinic: $P\bar{1}$
a 7.393 b 8.707 c 17.58 Å α 103.81° β 91.79° γ 109.50°
Black; metallic; opaque.
In reflected light: white, distinct to strong anisotropism with blue or blue-green colours, weak to medium bireflectance, pleochroism white to white with grey-blue tints. $R_{min.}$ & $R_{max.}$: (34.0, 36.7 %)470nm, (32.0, 34.9 %)546nm, (30.5, 33.0 %)589nm, (28.1, 29.7 %)650nm.
3.459 (100), 3.388 (64), 3.177 (54), 3.076 (65), 2.802 (44), 2.287 (57), 1.736 (38).

IMA No. 93-051
Fe_4S_8O
Monoclinic: space group unknown
a 9.717 b 7.280 c 6.559 Å β 95.00°
Yellow; metallic; opaque.
In reflected light: yellow, strong anisotropism with orange, yellow-orange and greenish grey colours, distinct bireflectance, pleochroism greyish brown, orange, yellow orange. $R_{min.}$ & $R_{max.}$:

(19.5, 32.1 %)470nm, (23.8, 36.8 %)546nm, (24.6, 37.4 %)589nm, (25.1, 37.3 %)650nm.
2.709 (10), 2.419 (8), 2.323 (7), 1.92 (6), 1.758 (8), 0.9605 (6), 0.9576 (7).

IMA No. 93-052
$CaAl_4O_7$
Monoclinic: C2/c
a 12.94 b 8.910 c 5.446 Å β 107.0°
Colourless to white; vitreous; transparent.
Biaxial (+), α 1.6178, β 1.6184, γ 1.6516, 2V(meas.) 12°, 2V(calc.) 15.5° (synthetic material).
4.460 (43), 3.609 (13), 3.515 (100), 2.882 (13), 2.605 (36), 2.440 (21), 1.764 (20).

IMA No. 93-053
Pb_2OCO_3
Orthorhombic: $P2_122_1$ or $P2_12_12_1$
a 9.294 b 9.000 c 5.133 Å
White; waxy; transparent to opaque.
The mean index of refraction calculated from the reflectance value at 589nm is 2.09.
6.49 (30), 4.02 (40), 3.215 (100), 3.181 (90), 2.858 (40), 2.564 (35).

IMA No. 93-054 The Se-analogue of pyrite
$FeSe_2$
Cubic: Pa3
a 5.783 Å
Black; metallic; opaque.
In reflected light: pink-yellow, no anisotropism, no bireflectance, nonpleochroic.
R: (42.4 %)470nm, (42.7 %)546nm, (45.7 %)589nm, (49.8 %)650nm.
2.888 (50), 2.588 (100), 2.364 (80), 2.045 (40), 1.743 (50), 1.546 (60), 1.1131 (40).

IMA No. 93-055
$Na_3K_6Ti_2Al_2Si_8O_{26}Cl_3$
Monoclinic: C2/m
a 10.37 b 16.32 c 9.16 Å β 105.6°
Colourless; vitreous; transparent.
Biaxial (+), α 1.601, β 1.625, γ 1.654, 2V(meas.) 85°, 2V(calc.) 86°.
8.22 (71), 3.50 (42), 3.157 (35), 3.049 (100), 2.900 (71), 2.835 (84).

IMA No. 93-056
$Pb_{18}Ba_2Ca_5Mn_2Fe_2^{3+}Si_{30}(O,OH)_{96}Cl$
Hexagonal: $R\bar{3}$
a 9.863 c 79.45 Å
Colourless; adamantine; transparent.
Uniaxial (-), ω 1.845, ϵ 1.815.
13.4 (50), 4.43 (30), 3.98 (30), 3.32 (100), 3.11 (40), 2.969 (40), 2.671 (80).

IMA No. 93-057
$Pd_3Ni_2As_3$
Hexagonal: $P6_3/m$, $P6_3$ or $P6_322$
a 8.406 c 6.740 Å
Megascopic colour not observed; metallic; opaque.
In reflected light: rose, distinct anisotropism from light grey to greyish-brown, no bireflectance, nonpleochroic. $R_{min.}$ & $R_{max.}$: (48.4, 50.2 %)470nm, (51.2, 53.2 %)546nm, (53.2, 55.3 %)589nm, (56.6, 58.7 %)650nm.
2.626 (10), 2.477 (10), 2.429 (8), 2.283 (7), 1.978 (7), 1.818 (7), 1.781 (7).

IMA No. 93-058
$Na_{10}(Mn,Ca,Sr)Ti_3Nb_3(Si_2O_7)_6(OH)_2F\cdot 12H_2O$
Monoclinic: Pm, P2 or P2/m
a 5.468 b 7.18 c 31.1 Å β 94.0°
Colourless, white, silvery, pale pink or cream; greasy to pearly; transparent to translucent.

Biaxial (+), α 1.608, β 1.630, γ 1.660, 2V(meas.) 82°, 2V(calc.) 83°.
15.56 (9), 5.16 (6), 3.11 (10), 2.850 (7), 2.665 (7), 2.627 (7), 2.217 (6), 1.795 (6).

IMA No. 93-059
$Sb_2O_3 \cdot WO_3$ or Sb_2WO_6
Orthorhombic: probably $P22_12_1$
a 8.59 b 9.58 c 6.12 Å
Green to dark green; pearly to dull; translucent to opaque.
Biaxial (+), α 2.285, β 2.40, γ 2.58, 2V(meas.) large, 2V(calc.) 82°.
3.32 (10), 3.06 (10), 2.98 (4), 2.73 (6), 2.46 (5), 1.919 (4).

IMA No. 93-060 A monoclinic polymorph of atacamite, botallackite and paratacamite
$Cu_2(OH)_3Cl$
Monoclinic: $P2_1/n$
a 6.157 b 6.814 c 9.104 Å β 99.65°
Green to dark greenish black; adamantine; translucent to transparent.
Biaxial (-), indices of refraction could not be measured because mineral reacts with immersion liquids, 2V(meas.) 75°.
5.44 (100), 2.887 (40), 2.767 (60), 2.742 (70), 2.266 (60), 2.243 (50), 1.704 (50).

IMA No. 93-061
$(Ba,Pb)_6(Cu,Fe,Ni)_{25}S_{27}$
Cubic: Pm3m
a 10.373 Å
Megascopic colour unknown; metallic; opaque.
In reflected light: pale brownish grey, no anisotropism, no bireflectance, nonpleochroic.
R: (22.0 %)470nm, (24.85 %)546nm, (26.2 %)589nm, (27.55 %)650nm.
3.460 (40), 3.281 (40), 2.996 (90), 2.378 (90), 1.835 (100), 1.779 (40).

IMA No. 93-062
$(Pd,Ag)_2Te$
Tetragonal: $P4_222$, $P4_2/m$ or $P4_2$
a 8.913 c 6.098 Å
Megascopic colour unknown; metallic; opaque.
In reflected light: brownish-rose, distinct to strong anisotropism from white to rose-brown, distinct bireflectance, pleochroic from brownish-grey to violet-rose. $R_{min.}$ & $R_{max.}$: (38.7, 48.7%)470nm, (44.0, 55.5 %)546nm, (47.3, 58.2 %)589nm, (50.7, 60.7 %)650nm.
3.051 (6), 2.825 (10), 2.553 (4), 2.231 (6), 2.042 (5), 1.326 (3).

I.M.A. NEWS

NOTICE

Dr. J. A. Mandarino retires as Chairman of the Commission on New Minerals and Mineral Names (CNMMN) of the International Mineralogical Association on 31 December 1994. After that date, all proposals for new minerals should be sent to the new Chairman:

Dr. J. D. Grice
Mineral Sciences Division
Canadian Museum of Nature
P.O. Box 3443
Station 'D'
Ottawa, Ontario
K1P 6P4 CANADA

Dr. E. H. Nickel remains the Vice-chairman of the CNMMN and will continue to handle redefinitions, discreditations and revalidations. Proposals of these kinds should be sent to:

Dr. E. H. Nickel
Division of Mineral Products
CSIRO
Private Bag
P. O. Wembley
Western Australia 6014
AUSTRALIA

Dr. C. E. S. Arps retires as Secretary of the CNMMN on 31 December 1994. The new Secretary is:

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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 of the International Mineralogical Association, 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
Color; luster; diaphaneity
Optical properties
Strongest lines in the X-ray powder-diffraction pattern: *d* in Å (relative intensity).

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
Commission on New Minerals and Mineral Names
International Mineralogical Association

1994 PROPOSALS

IMA No. 94-001 The Fe^{3+}-dominant analogue of warwickite
$Mg(Fe^{3+},Fe^{2+},Al,Ti,Mg)(BO_3)O$
Orthorhombic: *Pnam*
a 9.258(6), *b* 9.351(4), *c* 3.081(2) Å
Black; adamantine to submetallic; subtranslucent to nearly opaque.
In reflected light: light grey, weak anisotropism, indistinct bireflectance, pleochroic from dark red to dark brown.
$R_{max.}$: (9.99%) 470 nm, (9.66%) 540 nm, (9.29%) 589 nm, (8.79%) 650 nm.
6.563(23), 4.176(38), 2.957(30), 2.570(100), 2.088(20), 1.591(18), 1.550(19).

IMA No. 94-002
$Mn_2SiO_3(OH)_2 \cdot H_2O$
Orthorhombic: $Pca2_1$
a 12.682(4), *b* 7.214(2), *c* 5.337(1) Å
Brown-yellowish; vitreous; transparent.
Biaxial (-), α 1.681, β 1.688, γ 1.690, 2*V*(meas.) 54.4°, 2*V*(calc.) 56.1°.
7.220(60), 4.083(60), 3.011(100), 2.547(80), 2.456(80), 2.440(80), 1.552(60).

IMA No. 94-004 A member of the amphibole group
$NaNa_2Mn^{2+}_2Mn^{3+}_3Si_8O_{24}$
Monoclinic: *C2/m*
a 9.89(2), *b* 18.04(3), *c* 5.29(1) Å, β 104.6(1)°
Cherry red to very dark red; adamantine; transparent.
Biaxial (-), α 1.717, β 1.780, γ 1.800, 2*V*(meas.) 51°, 2*V*(calc.) 57°.
3.400(8), 3.146(9), 2.544(9), 2.176(10), 1.656(8), 1.447(9).

IMA No. 94-005
$(Zn,Cu)_6Zn_2(OH)_{13}[(Si,S)(O,OH)_4]_2$
Hexagonal (trigonal): $P\bar{3}$
a 8.322(1), *c* 7.376(1) Å
Light green; vitreous; transparent.
Uniaxial (–), ω 1.705, ε 1.611.
7.37(100), 3.623(25), 3.282(30), 2.724(30), 2.556(50), 2.191(15), 1.572(20).

IMA No. 94-006
$(Mg_{1-x}\square_x)_2Mg_{12}(PO_4)_6(PO_3OH)_2O_6H_{6+4x}$ $x = 0$ to 0.3
Hexagonal: $P6_3mc$
a 12.47(1), *c* 5.036(6) Å
Azure blue; vitreous; transparent.
Uniaxial (–), $\bar{n} \sim 1.61$, $\Delta \sim 0.01$.
3.66(65), 3.15(100), 3.109(100), 2.692(95), 2.213(70), 1.803(50), 1.552(50).

IMA No. 94-007
$Na_3(Fe^{2+},Fe^{3+})_6[Ti_2Si_{12}O_{30}(O,OH)_4](OH,O)_7{\cdot}2H_2O$
Monoclinic: *P*2/*c*
a 5.353(4), *b* 16.18(1), *c* 21.95(2) Å, β 94.6(2)°
Dark brown-green; vitreous to silky; translucent.
Biaxial (-), α 1.627, β 1.667, γ 1.693, 2*V*(meas.) 75°, 2*V*(calc.) 76°.
13.00(30), 10.94(100), 4.44(30), 2.728(50), 2.641(40), 2.547(30), 2.480(30).

IMA No. 94-008
$AgFeS_2$
Tetragonal: $P4_2mc$
a 5.64(1), *c* 10.34(3) Å
Megascopic color not observed; metallic; opaque.
In reflected light: cream with a greyish tint, moderate anisotropism, no bireflectance, nonpleochroic. $R_{min.}$ and $R_{max.}$: (27.2, 30.1%) 470 nm, (32.3, 36.4%) 546 nm, (33.0, 37.1%) 589 nm, (31.2, 35.3%) 650 nm.
3.15(10), 2.445(2), 2.340(≤2), 1.910(4), 1.692(2).

IMA No. 94-010 A member of the milarite group
$K(K,Na,\square)(Mn,Zr,Y)_2(Zn,Li)_3Si_{12}O_{30}$
Hexagonal: *P*6/*mcc*
a 10.196(5), c 14.284(8) Å
Dark blue, violet blue, greyish brown-blue; vitreous; transparent.
Uniaxial (–), ω 1.590, ε 1.586.
7.13(30), 4.15(45), 3.75(50), 3.25(100), 2.924(39), 2.777(32), 2.548(520).

IMA No. 94-011
$(NH_4,K)NO_3$
Orthorhombic: *Pbnm*
a 7.075(5), *b* 7.647(5), *c* 5.779(5) Å
White; vitreous; transparent.
Biaxial (-), α 1.458, β 1.527, γ 1.599, 2*V*(meas.) ~ 90°, 2*V*(calc.) 87°.
3.863(75), 3.364(85), 3.212(95), 3.194(100), 2.805(35), 2.595(90), 2.400(50).

IMA No. 94-012
$(Na,Mn,Fe,Al,REE)_{15}(Y,REE,Ca,Na)_2(CO_3)_9(SO_3F)Cl$
Hexagonal: *P*3
a 8.773(1), *c* 10.746(2) Å
Yellow to orange-brown; vitreous; transparent.
Uniaxial (–), ω 1.548, ε 1.537.
6.20(40), 4.39(80), 2.774(80), 2.532(100), 2.240(80), 2.067(30), 1.657(40).

IMA No. 94-013
$Cu_2Zn[(As,Sb)O_4](OH)_3$
Hexagonal (trigonal): $P\bar{3}$
a 8.201(1), *c* 7.315(1) Å
Emerald green; adamantine; transparent.
Uniaxial (–), ω 1.801, ε 1.796.
2.522(100), 2.166(88), 1.805(92), 1.550(100), 1.513(85).

IMA No. 94-014
$CuNiSb_2$
Hexagonal (trigonal): $P\bar{3}m1$
a 4.0489(2), *c* 5.1358(3) Å
Silver-white; metallic; opaque.
In reflected light: white with yellowish hue, distinct anisotropism, weak bireflectance, nonpleochroic. R_O and R_E: (59.3, 52.4%) 470 nm, (63.0, 56.8%) 546 nm, (65.5, 60.9%) 589 nm, (68.6, 64.9%) 650 nm.
2.901(100), 2.572(10), 2.074(65), 2.023(51), 1.660(11), 1.284(10).

IMA No. 94-016 The Zn-dominant analogue of högbomite–8*H*
$(Zn,Fe^{2+})_{1-2x}Ti_xAl_2O_4$ $x \approx 0.12$
Hexagonal: most probably $P6_3mc$
a 5.708(4), *c* 18.31(2) Å
Deep brown to black; adamantine; transparent in thin sections.
Uniaxial (–), ω 1.878, ε 1.832.
2.85(50), 2.60(80), 2.42(100), 1.592(60), 1.550(50), 1.470(70), 1.425 (80).

IMA No. 94-017
$Na_8(Mn,Fe^{3+},Ti)_2Si_{10}O_{25}(OH,Cl)_4 \cdot 10H_2O$
Orthorhombic: $C222_1$
a 13.46(2), *b* 14.98(1), *c* 17.51(2) Å
Yellow to orange; vitreous; transparent.
Biaxial (+), α 1.532, β 1.540, γ 1.550, 2*V*(meas.) 89°, 2*V*(calc.) 84°.
10.049(100), 8.823(50), 5.025(20), 3.806(20), 2.718(50).

IMA No. 94-018
$PbCa_2Al(F,OH)_9$
Monoclinic: *A*2, *A*2/*m* or *Am*
a 23.905(5), *b* 7.516(2), *c* 7.699(2) Å, β 92.25(2)°
White to colorless; vitreous; transparent.
Biaxial (-), α 1.510, β 1.528, γ 1.531, 2*V*(meas.) 36°, 2*V*(calc.) 44°.
11.9(100), 3.71(70), 3.51(85), 2.98(60), 2.94(60), 2.027(60), 1.971(60).

IMA No. 94-019 The cobalt-dominant member of the halotrichite group
$(Co,Mg,Ni)Al_2(SO_4)_4 \cdot 22H_2O$
Monoclinic: $P2_1/c$
a 6.189(4), *b* 24.23(1), *c* 21.20(1) Å, β 100.33(5)°
Empire rose; silky; transparent.
Biaxial (sign unknown), α 1.477, β unknown, γ 1.484, 2*V* unknown.
6.03(22), 4.790(100), 4.295(27), 4.106(22), 3.945(26), 3.768(33), 3.494(92).

IMA No. 94-020 A member of the magnetoplumbite group
$Pb(Zn,Fe^{3+})_3(Fe^{3+},Mn^{3+},Mn^{4+},Al,Ti)_9O_{19}$
Hexagonal: $P6_3/mmc$
a 5.854(1), *c* 22.882(6) Å
Black; metallic; opaque.
In reflected light: black, isotropic, no bireflectance, nonpleochroic. R_{mean}: (23.8%) 470 nm, (22.4%) 546 nm, (21.7%) 589 nm, (20.7%) 650 nm.
11.39(45), 3.811(100), 2.858(75), 2.745(50), 2.605(40), 2.407(25), 1.6361(30).

IMA No. 94-021 The gallium-dominant analogue of beudantite
$Pb(Ga,Al,Fe)_3(AsO_4)(SO_4)(OH)_6$
Hexagonal: *R*3*m*
a 7.225(4), *c* 17.03(2) Å
Pale yellow; vitreous; transparent.
Uniaxial (–), ω 1.763, ε 1.750.
5.85(90), 3.59(40), 3.038(100), 2.851(30), 2.513(30), 2.271(40), 1.948(30).

IMA No. 94-022 The F-analogue of thalenite-(Y)
$Y_3Si_3O_{10}F$
Monoclinic: $P2_1/n$
a 7.321(2), *b* 11.133(4), *c* 10.375(6) Å, β 97.17(2)°
Colorless to white; adamantine; translucent.
Biaxial (-), α 1.719, β 1.739, γ 1.748, 2*V*(meas.) 73°, 2*V*(calc.) 67°.
5.60(5), 3.81(5), 3.12(10), 2.828(8), 2.253(8), 2.187(4), 2.131(4).

IMA No. 94-023 The Ir-dominant analogue of isoferroplatinum
Ir_3Fe
Cubic: *Pm*3*m*
a 3.792(5) Å
Steel black; metallic; opaque.
In reflected light: bright white with yellowish tint, isotropic, nonbireflectant, nonpleochroic. *R*: (66.2%) 470 nm, (69.3%) 546 nm, (71.1%) 589 nm, (72.5%) 650 nm.
2.18(80), 1.89(60), 1.34(70), 1.26(20), 1.200(15), 1.142(100), 1.094(80).

IMA No. 94-024 An orthorhombic polymorph of walpurgite
$(UO_2)Bi_4O_4(AsO_4)_2{\cdot}2H_2O$
Orthorhombic: *Pbcm*
a 5.492(1), *b* 13.324(2), *c* 20.685(3) Å
Yellow; adamantine; transparent.
Biaxial (-), α 1.90, β 1.99, γ 2.00 (calc.), 2*V*(meas.) 36°.
10.354(94), 5.610(40), 3.277(56), 3.208(100), 3.088(76), 2.999(50), 2.852(46).

IMA No. 94-025
$(UO_2)_8(SO_4)(OH)_{14}{\cdot}13H_2O$
Monoclinic: $P2_1/a$
a 18.553(8), *b* 9.276(2), *c* 13.532(7) Å, β 125.56(2)°
Yellow; vitreous; translucent.
Biaxial (-), α 1.715, β 1.718, γ 1.720, 2*V*(calc.) 78°.
7.56(100), 7.13(48), 3.771(34), 3.554(20), 3.234(10), 3.206(13), 2.052(8).

IMA No. 94-026
$NaCa_2[B_9O_{14}(OH)_4]{\cdot}2H_2O$
Monoclinic: $P2_1/c$
a 11.4994(8), *b* 12.5878(9), c 10.5297(10) Å, β 99.423(6)°
Colorless to light dirty-yellow and light grey; vitreous; transparent.
Biaxial (+), α 1.532, β 1.538, γ 1.564, 2V(meas.) 54°, 2V(calc.) 52°.
5.41(66), 5.20(57), 4.20(56), 3.35(89), 3.27(59), 3.04(100), 2.210(59).

IMA No. 94-030
$Pb_2Bi_2(S,Se)_3$
Hexagonal (trigonal): $P\bar{3}$ or $P\bar{3}m$
a 4.191(2), c 39.60(3) Å
Silver-grey; metallic; opaque.
In reflected light: yellowish white, distinct anisotropism, practically absent bireflectance, bluish grey to brownish pleochroism. R_1 & R_2: (49.7, 48.5%) 470 nm, (48.4, 47.4%) 546 nm, (47.9, 46.8%) 589 nm, (47.9, 46.2%) 650 nm.
3.42(5), 3.04(10), 2.096(8), 1.806(6), 1.725(5), 1.298(7), 1.233(6).

IMA No. 94-031
HgSAg(Cl,Br)
Hexagonal: $P6_2$, $P6_4$, $P6_222$ or $P6_422$
a 8.234(4), *c* 19.38(1) Å
Red to brownish red; adamantine; translucent.
Uniaxial (–), ω 2.3 (from polished section), ε could not be measured.
6.47(20), 4.124(30), 3.357(60), 3.237(30), 3.127(50), 2.879(100), 2.009(50).

IMA No. 94-032
Si_3N_4
Hexagonal (trigonal): *P*31*c*
a 7.758(5), *c* 5.623(5) Å
Brownish red to colorless; probably adamantine; transparent.
Uniaxial (–), ω 2.03, ε 2.02.
2.893(85), 2.599(75), 2.547(100), 2.320(60), 1.486(70), 1.418(60), 1.351(75).

IMA No. 94-033 Isostructural with the arrojadite–dickinsonite series
$(Ba,K,Pb)Na_3(Ca,Sr)(Fe,Mg,Mn)_{14}Al(OH)_2(PO_4)_{12}$
Monoclinic: *C*2/*c*
a 16.406(5), *b* 9.945(3), *c* 24.470(5) Å, β 105.73(2)°
Greenish grey; greasy; translucent.
Biaxial (sign unknown), $n_{average}$ 1.65.
3.186(45), 3.018(100), 2.824(39), 2.813(36), 2.685(50), 2.530(35).

IMA No. 94-034 The magnesium-analogue of coulsonite
$Mg(V,Cr)_2O_4$
Cubic: *Fd*$\bar{3}$*m*
a 8.385(3) Å
Black; metallic; opaque.
In reflected light: light grey, isotropic, no bireflectance, nonpleochroic. *R*: (14.0%) 470 nm, (13.7%) 546 nm, (13.7%) 589 nm, (13.7%) 650 nm.
4.84(9), 2.52(10), 2.093(8), 1.612(8), 1.482(9), 1.092(7), 1.048(5).

IMA No. 94-035
$(Na,Ca,K)Cu_3(AsO_4)_2Cl{\cdot}5H_2O$
Tetragonal: $P4_22_12$ or $P4_222$
a 10.085(2), *c* 23.836(8) Å
Intense blue to emerald green; vitreous; translucent.
Uniaxial (–), ω 1.686, ε 1.635.
11.90(100), 9.29(60), 7.132(50), 5.043(60), 4.641(40), 3.098(80), 3.061(70).

IMA No. 94-036
$Hg_6^{1+}Hg^{2+}[Cl,(OH)]_2O_3$
Orthorhombic: *Pbma*
a 11.790(3), *b* 13.881(4), *c* 6.450(2) Å
Black to very dark brown; metallic; opaque.
In reflected light: white, strong anisotropism, moderate bireflectance, pleochroic from white to a higher reflecting blue-white. R_1 & R_2: (22.8, 29.6%) 470 nm, (20.7, 25.7%) 546 nm, (20.3, 24.6%) 589 nm, (20.2, 23.2%) 650 nm.
5.25(80), 3.164(60), 3.053(100), 2.954(70), 2.681(50), 2.411(50).

IMA No. 94-038
$Ag(Cd,Pb)AsS_3$
Tetragonal: *I*4/*amd*
a 5.499(5), *c* 33.91(4) Å
Grey; metallic; opaque.
In reflected light: greyish white with bluish tint; anisotropism, bireflectance and pleochroism not observed. R_O: (31.3%) 470 nm, (30.4%) 543 nm, (29.3%) 587 nm, (27.1%) 657 nm.
3.19(50), 2.77(100), 1.960(80), 1.679(70), 1.598(70), 1.274(60).

IMA No. 94-043
$Cu_3^{2+}Te^{6+}O_6 \cdot 2H_2O$
Monoclinic: $P2_1/n$
a 9.204(2), *b* 9.170(2), *c* 7.584(1) Å, β 102.32(3)°
Emerald green; adamantine; transparent.
Biaxial (sign unknown), *n* 1.91 – 1.92.
6.428(100), 3.217(70), 2.601(40), 2.530(50), 2.144(35), 1.750(35).

IMA No. 94-045
$Fe^{3+}(Mn,Fe^{2+},Mg)(PO_4)O$
Monoclinic: $I2/a$
a 9.977(2), b 6.339(2), *c* 11.836(3) Å, β 105.77(3)°
Black; weakly submetallic; opaque.
Optical properties could not be measured owing to the opaque nature of the mineral.
3.256(23), 2.970(100), 2.861(35), 2.810(98), 2.064(25), 1.778(22).

IMA No. 94-046 A member of the amphibole group
$(K,Na)Ca_2(Mg,Fe^{2+},Al,Fe^{3+},Ti)_5(Si,Al)_8O_{22}[(OH),F,O]_2$
Monoclinic: $C2/m$
a 9.9199(4), *b* 18.0591(8), *c* 5.3180(3) Å, β 105.36(1)°
Black; vitreous; opaque, but translucent in thin splinters.
Biaxial (-), α 1.654, β 1.664, γ 1.670, $2V$(meas.) = 79°, $2V$(calc.) = 75°.
8.45(95), 3.283(45), 3.140(100), 2.707(35), 2.344(70), 2.018(35), 1.652(40).

IMA No. 94-047
(Cu,Fe)(Sn,Sb)
Tetragonal: space group unknown
a 4.22(1), *c* 5.10(3) Å
Megascopic color was not observed; metallic; opaque.
In reflected light: pinkish white, distinct anisotropism, distinct bireflectance, pleochroic from light pink to pinkish white. $R_{max.}$ & $R_{min.}$: (72.6, 64.8%) 470 nm, (77.4, 68.2%) 546 nm, (78.5, 68.9%) 589 nm, (79.0, 69.0%) 650 nm.
2.96(9), 2.10(10), 1.72(3), 1.488(3), 1.214(4), 1.092(4).

IMA No. 94-048 A member of the epidote group
$(Mn^{2+},Ca)(La,Ce,Ca)(Al,Mn^{3+},Mn^{2+})_3(Si_3O_{11})O(OH)$
Monoclinic: $P2_1/m$
a 8.891(3), *b* 5.704(3), *c* 10.107(8) Å, β 113.99(2)°
Brown-red; vitreous; transparent.
Because of the small grain-size, most of the optical properties could not be determined.
2.897(100), 2.857(45), 2.707(60), 2.615(60), 2.178(60), 2.145(60).

IMA No. 94-049
$Mn_3(Nb,Ta)_3(Nb,Mn)_2W_2O_{20}$
Monoclinic: $P2_1$
a 24.73(2), *b* 5.056(3), *c* 5.760(3) Å, β 103.50(7)°
Red to brown-red; metallic; opaque.
In reflected light: light grey, weak anisotropism, weak bireflectance, nonpleochroic. $R_{max.}$ & $R_{min.}$: (19.2, 18.0%) 470 nm, (18.5, 17.5%) 546 nm, (19.3, 18.5%) 589 nm, (16.5, 16.0%) 650 nm.
6.0(5), 3.74(8), 3.69(8), 2.98(10), 1.783(5), 1.744(6), 1.732(7), 1.456(5).

IMA No. 94-050 An F-dominant, triclinic polymorph of canasite with additional H_2O
$K_3Na_3Ca_5(Si_{12}O_{30})(F_3OH) \cdot H_2O$
Triclinic: $P1$
a 10.0941(3), *b* 12.6913(2), *c* 7.2405(1) Å, α 90.00(2)°, β 111.02(2)°, γ 110.20(2)°
Lilac-grey, blue-grey, rarely greenish; vitreous; translucent.
Biaxial (-), α 1.536, β 1.539, γ 1.542, $2V$(meas.) = 70°, $2V$(calc.) = 89.8°.
5.88(37), 4.70(54), 4.21(40), 3.01(25), 2.915(100), 2.354(30), 2.307(21).

IMA No. 94-051
$Pb_2Bi_2Te_2S_3$
Hexagonal: space group unknown
a 4.230(4), *c* 33.43(2) Å
Dark grey to black; metallic; opaque.
In reflected light: greyish white with a slight pinkish tint, very faint anisotropism, very weak bireflectance, nonpleochroic. R_O & R_E: (40.4, 39.3%) 470 nm, (42.1, 40.8%) 546 nm, (41.3, 40.8%) 589 nm, (41.9, 40.9%) 650 nm.
3.35(40), 3.06(100), 2.22(25), 2.115(50), 1.311(25), 1.213(25).

IMA No. 94-052
$K_2Na_4Ca_3Ti_2Be_4Si_{12}O_{38}$
Orthorhombic: *Fddd*
a 12.778(4), *b* 14.343(3), *c* 33.69(1) Å
Pink, dark red, seldom white; vitreous; transparent.
Biaxial (+), α 1.630, β 1.644(calc.), γ 1.675, 2*V*(meas.) = 70°.
9.23(9), 4.15(10), 3.30(10), 3.16(10), 2.53(10), 2.42(10), 1.582(9).

IMA No. 94-053
$Na_2C_2O_4$
Monoclinic: $P2_1/a$
a 10.426(9), *b* 5.255(5), *c* 3.479(3) Å, β 93.14(8)°
Pale yellow; vitreous; transparent.
Biaxial (-), α 1.415, β 1.524, γ 1.592, 2*V*(meas.) = 72°, 2*V*(calc.) = 72°.
5.203(13), 2.898(27), 2.826(100), 2.602(56), 2.334(33), 2.177(13), 2.041(14).

IMA No. 94-054 A member of the zeolite group
$Na_3Mg_3Ca_5Al_{19}Si_{117}O_{272}{\cdot}93H_2O$
Orthorhombic: *Cmca*
a 13.698(2), *b* 25.213(3), *c* 22.660(2) Å
Colorless to light straw; vitreous; transparent.
Biaxial (-), α 1.480, β 1.485, γ 1.486, 2*V*(meas.) < 60°, 2*V*(calc.) 48°.
11.34(100), 10.64(31), 4.64(35), 4.37(79), 4.01(57), 3.938(36), 3.282(68).

IMA No. 94-055 A member of the cuprorivaite group
$SrCuSi_4O_{10}$
Tetragonal: *P4/ncc*
a 7.366(1), *c* 15.574(3) Å
Colorless; vitreous; transparent.
Uniaxial (–), ω 1.630, ε 1.590.
7.79(35), 3.444(40), 3.330(100), 3.119(55), 3.033(50), 2.605(30), 2.322(30).

IMA No. 94-056
$Ag_{24}HgAs_5S_{20}$
Hexagonal: space group unknown
a 15.00(1), *c* 15.46(3) Å
Wine-red to violet; metallic; opaque.
In reflected light: grey, weak to moderate anisotropism, very low bireflectance, weak pleochroism. $R_{max.}$ & $R_{min.}$: (31.0, 30.3%) 470 nm, (29.2, 27.6%) 546 nm, (27.6, 26.0%) 589 nm, (24.6, 23.9%) 650 nm.
3.17(6), 3.091(10), 2.998(4), 2.755(3), 1.878(8).

IMA No. 94-057 A member of the crichtonite group
$(Sr,Pb)(Y,U)(Ti,Fe^{3+})_{20}O_{38}$
Hexagonal (rhombohedral): $R\bar{3}$
a 9.197(1), α 68.75(2)°
Black; metallic; opaque.
In reflected light: ash-grey with pale bluish tones, weak anisotropism, low bireflectance, very weak pleochroism. R_1 & R_2: (17.73, 17.22%) 470 nm, (17.14, 16.50%) 546 nm, (16.54, 16.11%) 589 nm, (16.48, 16.00%) 650 nm.
3.412(m), 2.902(m), 2.846(mw), 2.499(mw), 1.916(mw), 1.603(m), 1.441(m).

IMA No. 94-058 — The Ba-analogue of hennomartinite

$BaMn_2^{3+}[Si_2O_7](OH)_2 \cdot H_2O$
Orthorhombic: *Cmcm* (?)
a 6.325(1), *b* 9.120(1), *c* 13.618(1) Å
Dark brown; earthy to brilliant; translucent to transparent.
Biaxial (-), α 1.82, β 1.845 (calc.), γ 1.85, 2*V*(meas.) 46°.
4.85(100), 4.557(50), 4.322(59), 3.416(77), 2.869(80), 2.729(82).

IMA No. 94-059 — A member of the amphibole group

$(Na,K)(Ca,Na,Fe^{2+})_2Mg_5(Si,Al)_8O_{22}(F,O,OH)_2$
Monoclinic: *C*2/*m*
a 9.893(4), *b* 18.015(5), *c* 5.279(3) Å, β 104.61(4)°
Grey to black; vitreous; opaque, but thin fragments are transparent.
Biaxial (-), α 1.603, β 1.613, γ 1.623, 2*V*(meas.) 90°, 2*V*(calc.) 89°.
9.06(6), 8.46(8), 3.282(9), 3.140(10), 2.703(6), 1.443(7).

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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, IMA, 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
Color; luster; 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

1995 PROPOSALS

IMA No. 95–001 A member of the crandallite group
$SrFe_3^{3+}(PO_4)_2(OH,H_2O)_6$
Hexagonal (trigonal): $R\bar{3}m$
a 7.28, *c* 16.85 Å
Yellow, brown; vitreous to resinous; transparent to translucent.
Uniaxial (–), ω 1.872, ε 1.862
5.88(10), 3.65(6), 3.06(9), 2.96(5), 2.81(5), 2.53(5), 2.25(6), 1.969(5), 1.820(5).

IMA No. 95–002 The Mn^{2+} and (O,F) analogue of paulkerrite
$(H_2O,K)_2Ti(Mn^{2+},Fe^{2+})_2(Fe^{3+},Ti^{4+})_2(PO_4)_4(O,F)_2 \cdot 14H_2O$
Orthorhombic: *Pbca*
a 10.561, *b* 20.858, *c* 12.516 Å
Greenish yellow, in some cases light brown; vitreous; transparent.
Biaxial (+), α 1.612, β 1.621, γ 1.649, 2*V*(calc.) 59.9°.
10.40(90), 7.50(80), 6.28(100), 5.22(40), 3.97(40), 3.77(50), 3.13(100), 2.88(40).

IMA No. 95–003
$Cu(Pt,Ir)_2S_4$
Cubic: $Fd\bar{3}m$
a 9.940 Å
Steel grey; metallic; opaque.
In reflected light: white with greenish tint, isotropic, no bireflectance or pleochroism. R: (37.3%) 470 nm, (37.7%) 546 nm, (38.1%) 589 nm, (38.6%) 650 nm.
5.72(4), 2.98(6), 2.48(5), 1.90(7), 1.75(10), 1.29(5), 1.014(5).

IMA No. 95–005 The strontium end-member of the cryptomelane group
$(Sr,Ba,K)Mn_8O_{16}$
Monoclinic: $P2_1/n$
a 10.00, *b* 5.758, *c* 9.88 Å, β 90.64°
Black; submetallic; opaque.
In reflected light: grey, strong anisotropism, grey-blue to white bireflectance, pleochroism strong. R_{max} and R_{min}: (34.2, 26.0%) 470 nm, (31.7, 24.4%) 546 nm, (30.6, 23.4%) 589 nm, (27.9, 22.3%) 650 nm.
3.15(100), 3.13(80), 2.409(80), 2.229(40), 2.170(60), 2.170(60), 1.556(50).

IMA No. 95–006 The silver analogue of roquesite in the chalcopyrite group
$AgInS_2$
Tetragonal: $I\bar{4}2d$
a 5.880, *c* 11.21 Å
Havana brown; metallic; opaque.
In reflected light: brownish grey; abundant red internal reflections; strong anisotropism in oil from red brick with orange tint to bluish grey and purplish; pleochroism weak, brown to clear brown-grey in oil. R_{max} and R_{min}: (29.3, 27.8%) 460 nm, (27.5, 25.9%) 540 nm, (27.65, 25.6%) 580 nm, (27.4, 27.5%) 660 nm.
3.351(100), 2.941(80), 2.082(75), 2.030(75), 1.767(80), 1.188(40).

IMA No. 95–007 Probably belongs to the marcasite group
CoSbAs
Orthorhombic: space group unknown
a 3.304, *b* 6.092, *c* 10.26 Å
White; metallic; opaque.
In reflected light: silver-white, weak to distinct anisotropism, weak bireflectance, nonpleochroic. R_2 and R_1: (58.2, 55.5%) 470 nm, (56.8, 55.6%) 546 nm, (55.8, 55.5%) 589 nm, (55.0, 55.5%) 650 nm.
2.63(10), 2.53(8), 1.942(10), 1.730(4), 1.640(4), 1.3963(4), 1.1182(8).

IMA No. 95–009 The natural analogue of synthetic $PtSe_2$
$PtSe_2$
Hexagonal (trigonal): $P\bar{3}m1$
a 3.730, *c* 5.024 Å
Silvery lead grey; metallic; opaque.
In reflected light: white; anisotropism moderate to strong with tints from pinkish yellow to dark grey – lilac; strong bireflectance; pleochroism: R_{max} light yellow, R_{min} light lilac. R_{max} and R_{min}: (48.4, 35.1%) 470 nm, (48.3, 35.0%) 546 nm, (49.1, 35.3%) 589 nm, (50.8, 36.5%) 650 nm.
5.04(3), 2.72(10), 1.983(5), 1.859(5), 1.747(3), 1.360(4).

IMA No. 95–011
$Cu(Mg,Cu,Fe,Zn)_2Te^{6+}O_6{\cdot}6H_2O$
Hexagonal (trigonal): $P3$
a 5.305, *c* 9.693 Å
Pale yellow to pale orange-yellow; vitreous; transparent to somewhat translucent.
Uniaxial (–), ω 1.803, ε 1.581 (calc.).
9.70(100), 4.834(80), 4.604(60), 2.655(60), 2.556(70), 2.326(70), 1.789(40).

IMA No. 95–012
$Cu[AsO_3OH]{\cdot}2H_2O$
Triclinic: $P\bar{1}$
a 6.020, *b* 7.632, *c* 11.168 Å, α 74.43°, β 89.32°, γ 86.55°
Turquoise blue; vitreous; transparent.
Biaxial (–), α 1.615, β 1.660, γ 1.700, 2*V*(meas.) 82°, 2*V*(calc.) 84°.
7.35(100), 5.239(50), 4.440(60), 3.936(60), 3.302(40), 3.008(50), 2.840(35).

IMA No. 95–013 The zinc analogue of arsenbrackebuschite
$Pb_2(Zn,Fe)[(As,S)O_4]_2{\cdot}H_2O$
Monoclinic: $P2_1$ or $P2_1/m$
a 8.973, *b* 5.955, *c* 7.766 Å, β 112.20°

Pale olive green with streaks of white; adamantine; transparent.
In reflected light: pale brownish grey; abundant colorless to very pale yellow internal reflections; anisotropism not detectable by eye; bireflectance measurable but not noticeable by the eye; nonpleochroic. R_{min} and R_{max}: (11.2, 11.5%) 470 nm, (10.8, 10.9%) 546 nm, (10.7, 10.8%) 589 nm, (10.7, 10.8%) 650 nm.
4.85(50), 3.659(30), 3.246(100), 2.988(60), 2.769(60), 2.293(30), 2.107(50), 1.889(30).

IMA No. 95–014
$Ca_2FeCl[B_9O_{13}(OH)_6]\cdot 4H_2O$
Monoclinic: $P2_1$
a 11.64, *b* 9.38, *c* 8.735 Å, β 98.40°
Pale yellow; vitreous; transparent.
Biaxial (+-), α 1.550, β 1.554, γ 1.592, 2*V*(meas.) 36.6°, 2*V*(calc.) 32.6°.
8.65(3), 7.29(10), 5.32(2), 4.50(2), 2.958(3), 2.744(2), 2.113(3).

IMA No. 95–015
$Ca_5(SiO_4)_2SO_4$
Orthorhombic: *Pnma*
a 6.863, *b* 15.387, *c* 10.181 Å
Bright blue; vitreous; transparent.
Biaxial (–), α 1.630, β 1.637, γ 1.640, 2*V*(meas.) 63.3°, 2*V*(calc.) 66.2°.
3.198(27), 3.042(32), 2.853(40), 2.830(100), 2.617(32), 2.565(57), 1.9612(26), 1.8924(27).

IMA No. 95–016
$Mn_2V(V,As)O_7\cdot 2H_2O$
Monoclinic: $P2_1/n$
a 7.809, *b* 14.554, *c* 6.705 Å, β 93.25°
Orange-red; vitreous; transparent.
Biaxial, mean *n* 1.82, 2*V* small.
5.32(80), 3.436(50), 3.260(50), 3.039(100), 2.723(60), 2.573(50b), 2.441(50), 1.592(60).

IMA No. 95–017 The natural analogue of synthetic $FeNb_3S_6$
$FeNb_3S_6$
Hexagonal: $P6_322$
a 5.771, *c* 12.190 Å
Dark grey to black; metallic; opaque.
In reflected light: grey; distinct to strong anisotropism from blue-grey to dark brown; distinct bireflectance; pleochroism, light grey to grey. R_{max} and R_{min}: (36.3, 29.5%) 470 nm, (36.6, 29.4%) 546 nm, (36.1, 28.9%) 589 nm, (34.7, 28.1%) 650 nm.
6.11(8), 3.04(6), 2.88(5), 2.606(8), 2.096(10), 1.665(8), 1.524(6).

IMA No. 95–018 A member of the mica group (compare 95–019)
$K(Fe^{2+},Mg)(Fe^{3+},Al)Si_4O_{10}(OH)_2$
Monoclinic: *C2/m*
a 5.270, *b* 9.106, *c* 10.125 Å, β 100.27°
Blue green; earthy; translucent in thin section.
Complete optical data could not be measured, mean *n* 1.640.
3.65(52), 3.358(86), 3.321(100), 3.090(60), 2.584(50).

IMA No. 95–019 A member of the mica group (compare 95–018)
$K(Fe^{2+},Mg)(Al,Fe^{3+})Si_4O_{10}(OH)_2$
Monoclinic: *C2/m*
a 5.270, *b* 9.106, *c* 10.125 Å, β 100.27°
Blue green; earthy; translucent in thin section.
Complete optical data could not be measured, mean *n* 1.625.
3.65(52), 3.358(86), 3.321(100), 3.090(60), 2.584(50).

NOTE: The minerals represented by 95–018 and 95–019 occur intimately mixed, have the same unit-cell parameters, and give the same X-ray powder-diffraction data. They differ in chemical composition.

IMA No. 95–020
$CaB_3O_4(OH)_3$
Monoclinic: *Pc*
a 7.234, *b* 8.130, *c* 8.378 Å, β 98.22°
Colorless to white; vitreous; transparent to translucent.
Biaxial (–), α 1.580, β 1.605, γ 1.623, 2*V*(meas.) 63°, 2*V*(calc.) 80°.
4.30(64), 3.379(100), 3.169(25), 3.122(31), 2.151(20), 1.919(20), 1.846(45).

IMA No. 95–021 The natural analogue of synthetic $PbSb_2O_6$
$PbSb_2O_6$
Hexagonal (trigonal): *P*31*m*
a 5.295, *c* 5.372 Å
Colorless to pale yellow; resinous; transparent.
Uniaxial (–), ω 2.092, ε 1.920
3.49(VS), 2.648(M), 2.110(W), 1.887(W), 1.651(W), 1.531(W).

IMA No. 95–022
$KFe^{3+}_8(PO_4)_6(OH)_7{\cdot}8H_2O$
Monoclinic: *C*2, *Cm* or *C*2/*m*
a 29.52, *b* 5.249, *c* 18.56 Å, β 109.27°
Yellowish brown, pale yellow, cream to white; vitreous to silky; translucent.
Biaxial (+), α 1.780, β 1.785, γ 1.800, 2*V*(calc.) 60°.
9.41(60), 4.84(90), 4.32(70), 4.25(50), 3.470(60), 3.216(100), 3.116(80).

IMA No. 95–023
$Sr_3Na(La,Ce)(PO_4)_3(F,OH)$
Hexagonal (trigonal): *P*3
a 9.647(1), *c* 7.170(1) Å
Bright yellow to greenish yellow; vitreous; transparent.
Uniaxial (–), ω 1.653, ε 1.635.
3.59(87), 3.30(65), 3.17(32), 2.897(100), 2.884(100), 2.790(54), 1.910(36), 1.796(36).

IMA No. 95–024 The cubic polymorph of lueshite and natroniobite
$NaNbO_3$
Cubic: $Pm\bar{3}$ or *P*23
a 3.911 Å
Brownish black; adamantine; opaque.
In reflected light: bluish; reddish brown internal reflections; isotropic; nonpleochroic. R: (15.75%) 480 nm, (15.00%) 540 nm, (14.70%) 580 nm, (14.35%) 660 nm.
3.915(35), 2.765(100), 1.953(53), 1.747(8), 1.594(30), 1.380(22), 1.234(7).

IMA No. 95–025
$[Zn_{8-x}Al_x(OH)_{16}][(SO_4)_{x/2+y/2}Na_y(H_2O)_6]$
Hexagonal (trigonal): $P\bar{3}$
a 3.082, *c* 11.116 Å
Pale blue; vitreous to waxy, translucent.
Uniaxial (sign unknown), ω 1.532, ε unknown.
11.12(100), 5.549(24), 3.704(15), 2.595(6), 2.408(6), 2.167(4), 1.926(4).

IMA No. 95–026 A member of the zeolite group
$NaCaAl_3Si_{17}O_{40}{\cdot}7H_2O$
Orthorhombic: *Cmcm*
a 9.747, *b* 23.880, *c* 20.068 Å
Colorless; vitreous; transparent.
Biaxial (+), α 1.476, β 1.478, γ 1.483, 2*V*(meas.) 65°, 2*V*(calc.) 65°.
11.94(40), 9.04(33), 8.23(29), 7.69(29), 3.79(100), 3.61(40).

IMA No. 95–027
$Cu_5(VO_4)_2O_2 \cdot n(Cs,Rb,K)Cl$
Hexagonal (trigonal): *P*3
a 6.375, *c* 8.399 Å
Black; resinous to metallic; opaque.
Reflectance measurements could not be made because the material is too fine grained.
3.43(7), 2.810(4), 2.315(10), 2.131(3), 1.598(4).

IMA No. 95–028 An hexagonal polymorph of alabandite
MnS
Hexagonal: $P6_3mc$
a 3.9817, *c* 6.4447 Å
Dark brown to black; resinous; opaque.
In reflected light: steel grey; brown-red internal reflections; anisotropism, 2.62 to 2.77; bireflectance, 0.15; nonpleochroic. R_{max} and R_{min}: (24.5, 22.1%) 470 nm, (22.6, 20.5%) 546 nm, (22.1, 20.0%) 589 nm, (21.6, 19.6%) 650 nm.
3.445(89), 3.217(72), 3.036(66), 1.988(82), 1.820(100), 1.691(63).

IMA No. 95–029 The Mn-analogue of berthierite
$MnSb_2S_4$
Orthorhombic: *Pnam*
a 11.47, *b* 14.36, *c* 3.81 Å
Black; submetallic; opaque.
In reflected light: light grey; distinct anisotropism; faint bireflectance; nonpleochroic. R_{max} and R_{min}: (35.0, 24.0%) 470 nm, (36.1, 23.9%) 546 nm, (36.9, 24.9%) 589 nm, (35.6, 25.7%) 650 nm.
4.46(40), 3.69(90), 3.23(70), 3.05(40), 2.90(80), 2.65(100), 2.18(40), 1.906(40), 1.813(50).

IMA No. 95–030
$Zn_3Cu_2(SO_4)_2(OH)_6 \cdot 4H_2O$
Triclinic: *P*$\bar{1}$
a 5.415, *b* 6.338, *c* 10.475 Å, α 94.38°, β 90.08°, γ 90.24°
Greenish blue; vitreous; transparent.
Biaxial (+), α 1.629, β 1.630, γ 1.637, 2*V*(meas.) 60–, 2*V*(calc.) 42°.
10.459(61), 5.230(74), 3.486(40), 3.157(6), 2.728(6), 2.493(7), 2.355(7), 1.743(9).

IMA No. 95–031
$(K,Na)_2(Nb,Ti)_2Si_4O_{12}(O,OH)_2 \cdot 4H_2O$
Monoclinic: *Cm*
a 14.692, *b* 14.164, *c* 7.859 Å, β 117.87°
White; vitreous; translucent.
Biaxial (+), α 1.649, β 1.655, γ 1.759, 2*V*(meas.) 20°, 2*V*(calc.) 28°.
7.10(9), 4.98(6), 3.262(10), 3.151(8b), 2.956(6), 2.549(4), 1.723(4), 1.591(4b), 1.451(4b).

IMA No. 95–032
(Fe,Os,Ru,Ir)
Hexagonal: $P6_3/mmc$
a 2.591, *c* 4.168 Å
Megascopic color unknown; metallic; opaque.
In reflected light: white; weak anisotropism. R: (57.4%) 470 nm, (53.4%) 546 nm, (53.3%) 589 nm, (54.4%) 650 nm.
2.246(5), 2.087(6), 1.976(10), 1.297(6b), 1.180(6b), 1.100(5b).

IMA No. 95–033
$Na_6Mn(Ti,Nb)Si_{10}(O,OH)_{28} \cdot 4H_2O$
Monoclinic: *I*2/*m*
a 13.033, *b* 18.717, *c* 12.264 Å, β 99.62°
Yellow, pinkish yellow or pink; vitreous to greasy; translucent to transparent.
Biaxial (–), α 1.536, β 1.545, γ 1.553, 2*V*(meas.) 87°, 2*V*(calc.) 86°.
10.56(100), 6.38(50), 5.55(45), 4.78(40), 4.253(40), 3.196(80), 2.608(50).

IMA No. 95–034
$Na_5(Y,Dy,Gd)(Ti,Nb)Si_6O_{18}\cdot 6H_2O$
Hexagonal (trigonal): *R*32
a 10.696, *c* 15.728 Å
Colorless; vitreous; transparent or cloudy.
Uniaxial (–), ω 1.612, ε 1.607.
5.99(60), 3.21(100), 3.093(40), 2.990(85), 2.61(40), 1.998(55), 1.481(44b).

IMA No. 95–035
(Nb,Ta)C
Cubic: *Fm*3*m*
a 4.45 Å
Bronze-yellow; metallic; opaque.
In reflected light: yellowish to rose-cream; no anisotropism, bireflectance or pleochroism. R: (33.9%) 480 nm, (38.5%) 540 nm, (45.1%) 580 nm, (52.8%) 660 nm.
2.56(10), 2.22(9), 1.574(8), 1.343(8), 1.289(7), 1.115(3).

IMA No. 95–036 The calcium-dominant analogue of belovite-(Ce)
$Na(Ca,Sr)_3Ce(PO_4)_3F$
Hexagonal (trigonal): *P*3
a 9.51, *c* 7.01 Å
Bright yellow; vitreous; transparent.
Uniaxial (–), ω 1.682, ε 1.660.
3.51(30), 3.12(40), 2.84(100b), 2.753(40), 1.967(30), 1.870(30).

IMA No. 95–037 The natural analogue of synthetic $Fe_3^{3+}PO_7$
$Fe_3^{3+}PO_7$
Hexagonal (trigonal): *R*3*m*
a 7.994, *c* 6.855 Å
Brown to red brown; greasy; nontranslucent.
Optical data could not be obtained because of the small size of the domains.
4.86(10), 3.09(100), 2.446(16), 2.078(20), 1.997(13), 1.845(11), 1.623(23), 1.545(12), 1.440(16).

IMA No. 95–038 The natural analogue of synthetic $Fe^{3+}PO_4$
$Fe^{3+}PO_4$
Hexagonal (trigonal): $P3_121$
a 5.048, *c* 11.215 Å
Brown to red-brown; greasy; nontranslucent.
Optical data could not be obtained because of the small size of the domains.
4.360(19), 3.445(100), 2.518(7), 2.362(14), 2.298(7), 2.180(10), 1.8846(12), 1.5814(8), 1.4214(10).

IMA No. 95–039
$Cu_5Zn_3(Te^{6+}O_4)_4(OH)_8\cdot 7H_2O$
Triclinic: *P*1 or $P\bar{1}$
a 8.794, *b* 9.996, *c* 5.660 Å, α 104.10°, β 90.07°, γ 96.34°
Pale blue to deeper blue-green; vitreous to pearly; transparent to translucent.
In reflected light: very pale light brown; light emerald green internal reflections; anisotropism unknown; slight bireflectance. R values could not be measured with certainty.
9.638(100), 8.736(50), 4.841(100), 2.747(60), 2.600(45).

IMA No. 95–040
$Ba_2Ce(CO_3)_3F$
Monoclinic: $P2_1/m$ or $P2_1$
a 13.396, *b* 5.067, *c* 6.701 Å, β 106.58°
Yellow; vitreous; transparent.
Biaxial (–), α 1.584, β 1.724, γ 1.728, 2*V*(meas.) 16°, 2*V*(calc.) 18°.
4.000(10), 3.269(100), 2.535(20), 2.140(40), 2.003(40), 1.635(10), 1.373(10).

IMA No. 95–041
In_2Pt
Cubic: $Fm\bar{3}m$, $F\bar{4}32$ or $F\bar{4}3m$
a 6.364 Å
Bright white; metallic; opaque.
In reflected light: bright white with yellowish tint; no anisotropism, bireflectance or pleochroism. R: (49.3%) 470 nm, (60.6 %) 550 nm, (68.5%) 590 nm, (80.1%) 650 nm.
2.25(100), 1.92(60), 1.59(60), 1.299(80), 1.125(60), 1.076(60), 1.006(60).

IMA No. 95–042
$InPt_3$
Cubic: $Pm\bar{3}m$
a 3.988 Å
Bright white; metallic; opaque.
In reflected light: bright white with yellowish tint; no anisotropism, bireflectance or pleochroism. R: (56.1%) 470 nm, (62.5%) 550 nm, (65.7%) 590 nm, (71.3%) 650 nm.
2.30(100), 1.99(60), 1.411(40), 1.203(80), 1.151(40), 0.997(20).

IMA No. 95–043
$Fe_2(Ta,Nb)$
Hexagonal: $P6_3/mmc$, $P6_3mc$ or $P\bar{6}2c$
a 4.87, *c* 7.76 Å
Greyish yellow; metallic; opaque.
In reflected light: greyish white; no anisotropism, bireflectance or pleochroism. R: (55.4%) 460 nm, (60.8%) 540 nm, (65.7%) 590 nm, (71.3%) 660 nm.
2.84(7), 2.46(6), 2.22(9), 2.00(3), 1.92(4), 1.41(3), 1.34(8).

IMA No. 95–044 The natural analogue of synthetic $Bi_{16}CrO_{27}$
$Bi_{16}CrO_{27}$
Tetragonal: $I4$, $I\bar{4}$ or $I4/m$
a 8.649, *c* 17.24 Å
Orange-brown; adamantine; translucent.
Uniaxial (+), ω 2.50, ε 2.55.
In reflected light: greyish white to light orange; orange internal reflections; weak anisotropism; weak bireflectance; very weak pleochroism. $R_{E'}$ and R_O: (21.46, 19.40%) 470 nm, (27.46, 25.22%) 546 nm, (29.80, 26.22%) 589 nm, (29.98, 25.96%) 650 nm.
3.19(100), 2.730(40), 1.980(40), 1.715(30), 1.655(55), 1.124(25), 1.054(25).

IMA No. 95–045 A member of the amphibole group
$Li_2(Mg,Fe^{2+})_3Fe_2^{3+}Si_8O_{22}(OH)_2$
Monoclinic: $C2/m$
a 9.474, *b* 17.858, *c* 5.268 Å, β 101.88°
Black; vitreous; translucent.
Biaxial (+), α 1.699, β 1.703, γ 1.708, 2*V*(meas.) 72°, 2*V*(calc.) 84°.
8.222(61), 4.458(19), 3.044(100), 2.741(53), 2.712(14), 2.341(14), 1.433(46), 1.392(14).

IMA No. 95–046
$Na_2(Sr,Ba)_{14}Na_2Al_{12}F_{64}(F,OH)_4$
Monoclinic: $C2/m$
a 16.046, *b* 10.971, *c* 7.281 °, β 101.734°
Colorless to white; vitreous; translucent.
Biaxial (–), α 1.436, β 1.442, γ 1.442, 2*V*(meas.) 0–5°, 2*V*(calc.) 0°.
7.844(8), 3.643(9), 3.453(10), 3.193(10), 3.112(9), 2.989(9), 2.220(8), 2.173(9), 2.001(8).

IMA No. 95–047
IrBiS
Cubic: $P2_13$
a 6.164 Å

Steel black; metallic; opaque.
In reflected light: bright white with yellowish tint, isotropic. R: (46.2%) 470 nm, (47.2%) 550 nm, (47.6%) 590 nm, (47.4%) 650 nm.
2.75(70), 2.51(60), 1.860(100), 1.090(50), 1.090(50).

IMA No. 95–048 — A polymorph of geminite

$Cu^{2+}(AsO_3OH)\cdot H_2O$
Triclinic: $P1$ or $P\bar{1}$
a 6.435, b 11.257, c 18.662 Å, α 79.40°, β 86.48°, γ 83.59°
Very light green to colorless; vitreous; transparent.
Biaxial (+), α 1.602, β 1.642, γ 1.725, $2V$(meas.) 70°, $2V$(calc.) 73°.
18.3(25), 11.00(100), 3.171(30), 2.952(50), 2.920(60), 2.816(50), 2.492(25).

IMA No. 95–049 — The Pt-dominant analogue of taimyrite

$(Pt,Pd,Cu)_9Cu_3Sn_4$
Orthorhombic: *Pmmm*, *Pmm*2 or *P*222
a 7.89, b 4.07, c 7.73 Å
Pinkish lilac; metallic; opaque.
In reflected light: pinkish lilac, distinct to moderate anisotropism, weak to distinct bireflectance, pleochroic from brownish pink to pinkish lilac. R_{max} and R_{min}: (44.1, 42.8%) 470 nm, (50.0, 49.5%) 546 nm, (54.6, 51.8%) 589 nm, (56.8, 55.6%) 650 nm.
2.283(10), 2.163(4), 2.030(2), 1.369(3), 1.218(2), 1.143(2).

IMA No. 95–050 — The vanadium analogue of atelestite

$Bi_2O(OH)VO_4$
Monoclinic: $P2_1/c$
a 6.973, b 7.539, c 10.881 Å, β 107.00°
Light brown; adamantine; transparent to translucent.
Biaxial (+), α 2.26, β 2.27, γ 2.30, $2V$(meas.) 65°, $2V$(calc.) 61°.
6.667(23), 6.102(22), 4.279(38), 3.267(100+), 3.150(62), 2.734(36), 2.549(21), 1.889(21).

IMA No. 95–051 — A member of the zeolite group

$Ca_4(Ca,Sr,K,Ba)_3Cu_3Al_{12}Si_{12}O_{48}(OH)_8\cdot\sim H_2O$
Cubic: *Fm*3*m*
a 31.62 Å
Light blue; vitreous; transparent.
Isotropic: n 1.505.
18.34(100), 15.82(50), 9.69(5), 4.43(5), 3.87(5), 3.47(5).

IMA No. 95–052 — A member of the mica group; the Cr-dominant analogue of muscovite

$KCr_2[AlSi_3O_{10}](OH,F)_2$
Monoclinic: *C*2/*c*
a 5.32, b 9.07, c 20.20 Å, β 95.6°
Emerald green; vitreous; transparent.
Biaxial (–), α 1.619, β 1.669, γ 1.673, $2V$(meas.) 31°, $2V$(calc.) 31°.
9.94(6), 4.52(8), 2.60(10), 2.40(6), 2.15(6), 1.519(10).

IMA No. 95–053 — The lanthanum-dominant analogue of ancylite-(Ce)

$SrLa(CO_3)_2(OH)\cdot H_2O$
Orthorhombic: *Pmcn*
a 5.072, b 8.589, c 7.276 Å
Light yellow to yellowish brown; vitreous; transparent.
Biaxial (+), α 1.640, β 1.668 (calc.), γ 1.731, $2V$(meas.) 70°.
4.36(92), 3.738(88), 3.705(90), 2.955(100), 2.664(89), 2.358(87), 2.092(80).

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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, 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 [*d* in Å(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**
$Cu_5(Te^{6+}O_4)_2(As^{5+}O_4)_2 \cdot 3H_2O$
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**
$[Ca_{0.75}(H_3O)_{0.25}](UO_2)_3(SeO_3)_2(OH)_{3.75} \cdot 2.5H_2O$ — The calcium-dominant analogue of **guilleminite**
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, $2V$(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**
$(Fe^{3+},Te^{6+},Ti,Mg)Te^{4+}{}_3O_8$ — The Fe^{3+}-dominant analogue of **winstanleyite**
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; 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. **96-006**
$NaZn_4(SO_4)(OH)_6Cl{\cdot}6H_2O$
Hexagonal (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. **96-007**
$(K,Na)_5Fe^{3+}{}_7Si_{20}O_{50}(OH)_6]{\cdot}12H_2O$
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, 2*V*(meas.) 30°, 2*V*(calc.) 32°
12.36(100), 11.60(40), 10.21(14), 3.411(37), 3.281(15), 2.896(12)

IMA No. **96-008**
$(Fe,Mg,Al)_2(Na,\square)[Be_3Si_6O_{18}]{\cdot}H_2O$ The Fe^{3+}-dominant analogue of **beryl**
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°
Colorless to white; vitreous; transparent to translucent
Biaxial (–), α 1.506, β 1.527, γ 1.532, 2*V*(meas.) 56°, 2*V*(calc.) 51°
8.10(10), 4.04(4), 3.56(2), 2.834(2), 2.535(2), 2.276(2)

IMA No. **96-010**
$(Fe^{3+},Ti)_4Ti_3AsO_{13}(OH)$ The Fe^{3+}-dominant analogue of **tomichite**
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% (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)

IMA No. **96-012**
$Ca(H_2O)_3(C_2O_4)$ or $CaC_2O_4{\cdot}3H_2O$
Triclinic: *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, 2*V*(meas.) 70°, 2*V*(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 *Pnn*2
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.), 2*V*(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: *C*2/*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**
$Cu_5O_2(SeO_3)_2Cl_2$
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, 2*V*(meas.) large, 2*V*(calc.) 82°
6.88(68), 5.511(50), 2.990(100), 2.963(94), 2.566(67), 2.296(95)

IMA No. **96-017**
$Cu_3(AsO_4)(OH)_3$ A triclinic polymorph of **clinoclase**
Triclinic: *P*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, 2*V*(meas.) 77°, 2*V*(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
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. **96-020**
$Pb_{12}O_6Mn(Mn,Mg)_4(Mg,Mn)_2(SO_4)(CO_3)_4Cl_4(OH)_{12}$
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**
$(Ca,R)_5(PO_4)_3F$ R = Sr, Na, *REE* A polymorph of **fluorapatite**
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**
$(Na,REE)_{15}(Ca,REE)_6Mn_3Zr_3NbSi_{25}O_{76}F_2$ A manganese- and fluorine-rich member of the eudialyte group
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**
$ScPO_4$ The scandium-dominant analogue of **xenotime-(Y)**
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**
$Na_3Ca_4Al_{11}Si_{85}O_{192}\cdot 60H_2O$ A member of the zeolite group
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, 2*V*(calc.) 70°
11.20(84), 9.98(35), 3.85(100), 3.75(98), 3.67(27), 3.00(32)

IMA No. **96-026**
γ-$Hg_3S_2Cl_2$ An orthorhombic polymorph of **corderoite**
Orthorhombic: *Ammm*, *A*222 or *A*2*mm* (*Am*2*m*, *Amm*2)
a 9.332, *b* 16.82, *c* 9.108 Å
Canary yellow; glassy; transparent
Biaxial (+), mean index of refraction 2.25, 2*V*(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, 2*V*(meas.) 20°, 2*V*(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**
$NaFe^{2+}{}_4(PO_4)_3$
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: *C*2/*m*, *Cm* or *C*2
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*V*(meas.) 82°, 2*V*(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
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. $R_{min.}$, $R_{max.}$: 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**
$NaY(CO_3)F_2$
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, 2*V*(meas.) 82°, 2*V*(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
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**
$Mg_7(PO_4)_2(OH)_8$ 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, 2*V*(meas.) 46°, 2*V*(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**
$PbCuFe^{3+}(PO_4)_2(OH,H_2O)_2$ The phosphate-dominant analogue of **gartrellite**
Triclinic: *P*1 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, 2*V*(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**
$Th(Ca,Na)_2(K_{1-x}\square_x)Si_8O_{20}{\cdot}nH_2O$ The calcium-dominant analogue of **steacyite**
Tetragonal: *P*4/*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**
$[Cu_{1-x}Al_x(OH)_2][(SO_4)_{x/2}(H_2O)_n]$, $0 < x < 0.67$ and $n > 3x/2$
The copper-dominant analogue of **carrboydite** and **glaucocerinite**
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**
$(Cr,Fe)_{23}C_6$ The chromium-dominant analogue of **haxonite**
Cubic: $Fm3m$
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. **96-040**
$Ca_2(Zr,Ti)_5(Sb^{5+},Mn^{3+})_2O_{16}$ The 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. **96-041**
$KLi_3Ti_2Si_{12}O_{30}$ The 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. **96-043**
$Pb_3Sb^{5+}(SO_4)(AsO_4)(OH)_6\cdot 3H_2O$ The antimony-dominant analogue of **fleischerite** (with AsO_4 replacing one SO_4)
Hexagonal: $P6_322$
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. **96-044**
$Ag_2Pd_3Se_4$
Monoclinic: $P2_1/m$ or $P2_1$
a 6.350, *b* 10.387, *c* 5.683 Å, β 114.90°
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; $^{im}R_1$, $^{im}R_2$: 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**
$Pb_{7.5}B_{0.5}(OH)_{3.5}O_{4.5}Cl_4$ or $Pb_8O_4(OH)_4Cl_4$
Monoclinic: *C*2/*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% (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**
$(Fe,Cu)(Rh,Ir,Pt)_2S_4$ The iron-dominant analogue of **cuprorhodsite**
Cubic: *Fd*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**
$Cu_9O_2(SeO_3)_4Cl_6$
Monoclinic: *I*2
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, 2*V*(meas.) 66°, 2*V*(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: *C*2/*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, 2*V*(calc.) 88°
10.69(100), 6.36(50), 5.65(50), 3.590(70), 3.121(80), 3.051(80)

IMA No. **96-050**
Cu_2CdGeS_4 The cadmium-dominant analogue of **briartite**
Tetragonal: $I\bar{4}2m$
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 ^{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**
$Ca_2B_2O_5 \cdot H_2O$ 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, 2*V*(calc.) 75°
6.73(70), 3.354(30), 2.975(60), 2.855(20), 2.237(100), 1.776(20)

IMA No. **96-052**
Cu_2HgSnS_4 The mercury-dominant analogue of **černýite** and **stannite**
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 color effects form violet-blue do 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)

IMA No. **96-053**
$Ca_4Al_2(OH)_{12}(SO_4)\cdot 6H_2O$ The sulfate-dominant rhombohedral analogue of **hydrocalumite**
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**
$Ba[Fe^{2+}{}_6Ti_5Mg]O_{19}$ The Fe^{2+}-dominant analogue of **hawthorneite**
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; ${}^{im}R_{E'}$, ${}^{im}R_O$, $R_{min.}$: 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)

IMA No. **96-055**
$(Ce,Nd,La)Al(SO_4)_2(C_2O_4)\cdot 12H_2O$ The cerium-dominant analogue of 96-057, but structurally different
Monoclinic: *C*2/*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, 2*V*(meas.) 85°, 2*V*(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-colored; vitreous; transparent
Biaxial (–), α 1.544, β 1.578, γ 1.602, 2*V*(meas.) 65°, 2*V*(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**
$(Y,Nd,Ce)Al(SO_4)_2(C_2O_4)\cdot 12H_2O$ The yttrium-dominant analogue of 96-055, but structurally different
Monoclinic: *P*2/*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, 2*V*(meas.) 7°, 2*V*(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**
$(Rb,K)AlSi_3O_8$ The rubidium-dominant analogue of **microcline**
Triclinic: $P\bar{1}$
a 8.81, *b* 13.01, *c* 7.18 Å, α 90.3°, β 115.7°, γ 88.2°

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**
$Fe^{3+}Mo_2O_6(OH)_3 \cdot H_2O$
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, 2*V*(meas.) ~ 90°, 2*V*(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**
$CaMgSc(PO_4)_2(OH) \cdot 4H_2O$ 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, 2*V*(meas.) ~50°, 2*V*(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**
$Na_4Zr_2Si_{10}O_{26} \cdot 9H_2O$ The sodium-dominant analogue of **lemoynite** with additional H_2O
Monoclinic: *C*2/*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, 2*V*(meas.) 63°, 2*V*(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)

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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, 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 [*d* in Å(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

1997 PROPOSALS

IMA No. **97-001**
$(Bi,Pb)_2Fe(O,OH)_3PO_4$ Chemically related to **paulkerrite**
Monoclinic: *C2/m*
a 12.278, *b* 3.815, *c* 6.899 Å, β 111.14°
Black to dark brown; vitreous to adamantine; opaque to translucent
Biaxial (–), α 2.06, β 2.15(calc.), γ 2.19, 2*V*(meas.) 70°
5.726(54), 3.372(77), 3.322(37), 3.217(46), 3.011(100), 2.863(34), 2.750(62)

IMA No. **97-002**
$Ca_2B_2SiO_7$ The boron-dominant analogue of **gehlenite** (melilite group)
Tetragonal: $P42_1m$
a 7.116, *c* 4.815 Å
Creamy-white; earthy; earthy
Probably uniaxial (–), *n* 1.67
3.479(40), 2.862(55), 2.654(100), 2.231(15), 2.129(20), 1.920(35), 1.644(20)

IMA No. **97-003**
$NaK_2(Ti,Nb)_2Si_4O_{12}(O,OH)_2 \cdot 2H_2O$ The Ti-dominant analogue of **nenadkevichite**
Monoclinic: *C2/m*
a 14.39, *b* 13.900, *c* 7.825 Å, β 117.6°
Colorless; vitreous; transparent to translucent
Biaxial (+), α 1.667, β 1.677, γ 1.802, 2*V*(meas.) 32°, 2*V*(calc.) 33°
6.94(61), 6.39(43B), 3.186(100), 3.100(96), 2.600(28), 2.586(28), 2.489(24)

IMA No. **97-004**
$AgSbS_2$ A polymorph of **miargyrite**
Cubic: *Fm3m*
a 5.650 Å
Greyish black; metallic; opaque
In reflected light: grey. *R*: 34.5% (470 nm), 33.8% (546 nm), 32.8% (589 nm), 28.7% (650 nm).
3.26(9), 2.83(10), 1.998(8), 1.703(6), 1.630(5), 1.296(2), 1.263(3)

IMA No. **97-005**
$(UO_2)H(AsO_3)$
Tetragonal: space group unknown

a 11.00, *c* 15.96 Å
Yellow; dull; translucent
Uniaxial (–), ω 1.84, ϵ 1.75
5.58(8), 4.95(10), 4.40(6), 3.33(8), 3.03(6), 2.91(5)

IMA No. **97-007**
$Na_3SrCeMnSi_6O_{17}$ The Mn^{2+}-dominant analogue of **nordite-(Ce)**
Orthorhombic: *Pcca*
a 14.449, *b* 5.187, *c* 19.849 Å
Colorless, pale brownish, brown; vitreous; transparent
Biaxial (–), α 1.623, β 1.636, γ 1.642, 2*V*(meas.) 60°, 2*V*(calc.) 68°
7.22(38), 4.215(100), 3.326(67), 2.965(83), 2.875(55), 2.597(54), 2.443(35)

IMA No. **97-008**
$Na_3SrCeFeSi_6O_{17}$ The Fe^{2+}-dominant analogue of **nordite-(Ce)**
Orthorhombic: *Pcca*
a 14.460, *b* 5.187, *c* 19.848 Å
Colorless or light coffee color; vitreous; transparent
Biaxial (–), α 1.623, β 1.636, γ 1.642, 2*V*(meas.) 60°, 2*V*(calc.) 68°
7.22(41), 4.216(100), 3.325(67), 2.964(73), 2.879(62), 2.595(46), 2.444(31)

IMA No. **97-009**
$CaCu_6[(AsO_4)_2(AsO_3OH)(OH)_6]\cdot 3H_2O$
The calcium- and arsenate-dominant member of the **mixite** group
Hexagonal: $P6_3/m$
a 13.571, *c* 5.880 Å
Pale green; vitreous; transparent
Uniaxial (+), ω 1.688, ϵ 1.765
11.64(100), 4.431(41), 3.387(17), 3.254(22), 2.9347(42), 2.6932(29), 2.5624(30)

IMA No. **97-010**
$Pb_4As_2S_7$
Orthorhombic: *Pba*2 or *Pbam*
a 15.179, *b* 38.117, *c* 4.0428 Å
Silvery lead grey; metallic; opaque
In reflected light: white with a greenish tint, distinct anisotropism (dark grey to greenish grey, weak bireflectance, weak pleochroism. $R_{min.}$ & $R_{max.}$: 33.8, 34.0% (470 nm), 31.8, 31.9% (546 nm), 31.2, 31.3% (589 nm), 30.4, 30.4% (650 nm)
4.462(40), 3.699(37), 3.392(100), 2.817(45), 2.735(31), 2.156(25), 2.150(22)

IMA No. **97-012**
$Ca(Al,Fe^{2+},Mg,Mn)_2(AsO_4)_2(OH)_2$
Monoclinic: *C*2
a 8.9252, *b* 6.1427, *c* 7.352 Å, β 115.25°
Light brownish to brownish pink, orange-brown; vitreous; transparent
Biaxial (sign unknown), *n* 1.76 parallel to fiber, *n* 1.70 perpendicular to fiber
4.914(58), 3.376(65), 3.164(100), 3.084(61), 2.945(72), 2.687(53), 2.522(84)

IMA No. **97-013**
$Ca_8Mg(SiO_4)_4Cl_2$
Cubic: $Fd\bar{3}$
a 15.0850 Å
Orange brown to amber; vitreous; transparent
Isotropic, *n* 1.676
2.901(40), 2.666(100), 2.549(30), 1.9637(30), 1.8845(30), 1.7774(30), 1.5400(50), 1.4585(30)

IMA No. **97-014**
$Mg_2Al_3B_2O_9(OH)$ Chemically and structurally related to **sinhalite**
Monoclinic: $P2_1/c$
a 7.49, *b* 4.33, *c* 9.85 Å, ß 110.7°
Colorless; vitreous; transparent
Biaxial (–), α 1.691, β 1.713, γ 1.730, 2*V*(meas.) 80.0°, 2*V*(calc.) 82°
3.21(40), 2.61(40), 2.14(100), 2.102(60), 1.625(100), 1.607(40), 1.399(40)

IMA No. **97-015**
$(Na,Ca)_5Ca(Ti,Nb)_5Si_{12}O_{34}(OH,F)_8\cdot 5H_2O$
A Ca-dominant polymorph of **zorite**
Orthorhombic: *C*222
a 7.024, *b* 23.155, *c* 6.953 Å
Pale brown, brown, orange-yellow; vitreous; transparent to translucent
Biaxial (+), α 1.599, β 1.610, γ 1.696, 2*V*(meas.) 38°, 2*V*(calc.) 41°
11.564(100), 6.932(90), 5.258(40), 4.446(40), 3.052(75), 2.977(70), 2.582(40)

IMA No. **97-017**
Sb_2O_4 ($Sb^{3+}Sb^{5+}O_4$, β-phase) A monoclinic polymorph of **cervantite**
Monoclinic: *C*2/*c*
a 12.061, *b* 4.836, *c* 5.383 Å, β 104.60°
Colorless; vitreous; transparent
Biaxial (sign unknown), α′ 1.72, γ′ 2.10
3.244(VS), 2.920(M), 2.877(S), 1.619(M)

IMA No. **97-018**
$K(Ca,Mn,Na)_2(K_{2-x}\square_x)_2Zn_3Si_{12}O_{30}$ A member of the **milarite** group
Hexagonal: *P*6/*mcc*
a 10.505, *c* 14.185 Å
Colorless, white; vitreous; transparent to translucent
Uniaxial (+), ω 1.561, ϵ 1.562
7.11(35), 3.830(100), 3.345(60), 3.304(40), 2.940(50), 2.795(85), 2.627(35)

IMA No. **97-019**
$Zn_4Al_2(OH)_{12}(CO_3)\cdot 3H_2O$ The zinc-dominant member of the **manasseite** group

Hexagonal: $P6_3/mmc$
a 3.0725, *c* 15.1135 Å
White; vitreous; transparent
Optical properties could not be measured
7.51(vs), 3.794(m), 2.511(mw), 2.175(mw), 1.830(mw), 1.542(ms), 1.539(ms)

IMA No. **97-021**
$HgBi_2S_4$
Monoclinic: *C*2/*m*
a 14.164, *b* 4.053, *c* 13.967 Å, β 118.28°
Grey-black; metallic; opaque
In reflected light: creamy-white, distinct anisotropism, low bireflectance, nonpleochroic. R_1 & R_2: 35.7, 37.8% (470 nm), 35.4, 37.5% (546 nm), 34.9, 37.0% (589 nm), 33.9, 35.8% (650 nm)
3.86(m), 3.55(m), 3.05(S), 2.914(mS), 2.865(mS), 2.644(m), 1.913(m), 1.805(m)

IMA No. **97-022**
$(Cd,Ca,Mn)KCu_5(AsO_4)_4[As(OH)_2O_2](H_2O)_2$
The cadmium-dominant analogue of 97-023
Monoclinic: $P2_1/m$
a 9.8102, *b* 10.0424, *c* 9.9788 Å, β 101.686°
Electric blue; vitreous; transparent
Biaxial (–), α 1.720, β 1.749, γ 1.757, 2*V*(meas.) 50°, 2*V*(calc.) 55°
9.64(100), 4.46(40), 3.145(50), 3.048(40), 2.698(40)

IMA No. **97-023**
$(Ca,Cd,Mn)KCu_5(AsO_4)_4[As(OH)_2O_2](H_2O)_2$
The calcium-dominant analogue of 97-022
Monoclinic: $P2_1/m$
a 9.8102, *b* 10.0424, *c* 9.9788 Å, β 101.686°
Electric blue; vitreous; transparent
Biaxial (–), α 1.713, β 1.743, γ 1.749, 2*V*(meas.) 50°, 2*V*(calc.) 48°
9.64(100), 4.46(40), 3.145(50), 3.048(40), 2.698(40)

IMA No. **97-024**
$Cu_4Cd(SO_4)_2(OH)_6 \cdot 4H_2O$ The cadmium-dominant analogue of **campigliaite**
Monoclinic: $P2_1/m$
a 5.543, *b* 21.995, *c* 6.079 Å, β 92.04°
Bluish green; vitreous; transparent
Biaxial (–), α 1.619, β 1.642, γ 1.661, 2*V*(meas.) 66°, 2*V*(calc.) 83°
11.02(90), 5.496(100), 5.322(25), 4.079(50), 3.437(30), 3.243(40), 2.470(30)

IMA No. **97-025**
$UO_2CO_3 \cdot H_2O$
Hexagonal: space group unknown
a 15.79, *c* 23.93 Å
Canary yellow; silky; translucent
Uniaxial (+), ω 1.588, ϵ 1.612
7.86(47), 6.91(55), 6.56(77), 4.76(40), 4.34(36), 3.39(33), 3.056(100)

IMA No. **97-026**
$Ca_{19}(Al,Mg,Fe,Ti)_{13}(B,Al,\square)_5Si_{18}O_{68}(O,OH,F)_{10}$
The boron-dominant analogue of **vesuvianite**
Tetragonal: *P*4/*nnc*
a 15.752, *c* 11.717 Å
Dark green; vitreous; translucent
Uniaxial (+), ω 1.721, ϵ 1.725
2.776(100), 2.617(61), 2.592(43), 2.491(61), 2.121(20), 1.660(26), 1.640(23)

IMA No. **97-027**
$Ca(Co,Fe,Ni)_2(AsO_4)_2(OH,H_2O)_2$
The cobalt-dominant analogue of **lotharmeyerite**
Monoclinic: *C*2/*m*
a 9.024, *b* 6.230, *c* 7.421 Å, β 115.15°
Brown; vitreous; translucent
Biaxial (+), α 1.78, β 1.79, γ 1.85(calc.), 2*V*(meas.) 48°
4.955(38), 3.398(85), 3.188(28), 3.115(33), 2.972(100), 2.709(28), 2.545(34)

IMA No. **97-029**
$Rh_{17}S_{15}$ The rhodium- and sulfur-dominant analogue of **palladseite**
Cubic: $Pm\bar{3}m$, $P\bar{4}3m$ or *P*432
a 10.024 Å
Color unknown; metallic; opaque
In reflected light: grey with slight bluish tint, isotropic. R: 38.6% (480 nm), 39.0% (540 nm), 39.1% (580 nm), 38.8% (660 nm)
3.33(2), 3.17(7), 3.02(9), 2.68(5), 2.24(9), 1.931(8), 1.774(10)

IMA No. **97-030**
$Rh_{12}As_7$
Hexagonal: $P6_3/m$
a 9.31, *c* 3.64 Å
Color unknown; metallic; opaque
In reflected light: brownish grey, weak anisotropism from grey to brownish grey, weak bireflectance, nonpleochroic. $R_{min.}$ & $R_{max.}$: 44.5, 47.8% (480 nm), 44.7, 48.3% (540 nm), 46.4, 49.2% (580 nm), 48.6, 51.3% (660 nm)
2.33(4), 2.03(2), 1.852(9), 1.767(6), 1.755(10), 1.549(8)

IMA No. **97-032**
$(Ca,Cu)_4Fe_6[(As,Si)O_4]_4(OH)_8 \cdot 18H_2O$
The Fe^{2+}-dominant analogue of **wallkilldellite**
Hexagonal: $P6_3/mmc$, $P6_3mc$ or *P*62*c*
a 6.548, *c* 23.21 Å
Brown-yellow; vitreous to resinous; translucent
Uniaxial (–), ω 1.750, ϵ could not be determined
11.6(100), 5.670(80), 3.275(70), 2.850(10), 2.760(15), 2.547(10), 1.641(25)

IMA No. **97-034**
$ZnFe^{3+}_2(AsO_4)_2(OH)_2$
Monoclinic: $P2_1/n$
a 6.629, *b* 7.616, *c* 7.379 Å, β 91.79°
Dark green; adamantine; translucent
Biaxial (sign unknown), *n* 1.94; the mineral reacts with liquids of $n > 1.9$
3.385(100), 3.315(78), 2.939(47), 2.839(28), 2.381(29), 2.331(29), 1.652(32), 1.621(34)

IMA No. **97-035**
$(K,Na)Ca_2Fe^{2+}Fe^{3+}_2[Si_5Al_3O_{22}](OH)_2$ A member of the amphibole group
Monoclinic: *C*2/*m*
a 9.94, *b* 18.08, *c* 5.38 Å, ß 105.5°
Black; vitreous; transparent
Biaxial (–), α 1.696, β not determined, γ 1.715, 2*V*(meas.) 45°
8.44(90), 3.405(25), 3.285(30), 3.145(100), 2.823(26), 2.722(52), 2.606(27), 2.579(25)

IMA No. **97-036**
$Ca(Ce,REE)_2(CO_3)_4 \bullet H_2O$
Triclinic: $P\bar{1}$
a 6.397, *b* 6.389, *c* 12.383 Å, α 96.58°, β 100.85°, γ100.46°
Colorless to white; vitreous; translucent
Biaxial (–), α 1.635, β 1.725, υ 1.750, 2V(calc.) 53°
5.901(59), 5.049(72), 4.695(37), 4.468(36), 4.006(110), 3.899(45), 3.125(39), 3.0051(448)

IMA No. **97-037**
$Na_2CaCu^{2+}_2(P_2O_7)_2(H_2O)_{10}$
Orthorhombic: *Fdd*2
a 11.938, *b* 32.854, *c* 11.017 Å
Blue-green; vitreous; transparent
Biaxial (+), α 1.508, β 1.511, γ 1.517, 2*V*(meas.) 76.2°, 2*V*(calc.) 71°
8.23(30), 6.52(100), 4.05(40), 3.255(40), 2.924(40), 2.807(25), 2.614(20)

IMA No. **97-041**
$Na_2Zn(SO_4)_2 \bullet 4H_2O$ The zinc-dominant analogue of **blödite**
Monoclinic: $P2_1/a$
a 11.077, *b* 8.249, *c* 5.532 Å, β 100.18°
Colorless; vitreous; transparent
Biaxial (–), α 1.507, β 1.512, γ 1.516 (all for synthetic material)
4.550(58), 4.245(32), 3.325(25), 3.289(100), 3.262(35), 3.245(25), 2.631(27)

IMA No. **97-042**
$Pb_9Sb_{10}S_{24}$
Triclinic: $P\bar{1}$
a 24.789, *b* 8.26, *c* 21.787 Å, α 90.53°, β 99.58°, γ 94.78°
Black; metallic; opaque
In reflected light: black, low anisotropism, low bireflectance, nonpleochroic. R_1 & R_2: 38.95, 37.64% (470 nm), 42.35, 38.26% (546 nm), 41.67, 37.63% (589 nm), 37.43, 36.53% (650 nm)
3.47(vs), 3.35(ms), 3.24(ms), 2.986(s), 2.947(s), 2.229(ms)

IMA No. **97-043**
$PbSnS_3$
Orthorhombic: *Pnma*
a 8.8213, *b* 3.7725, *c* 14.0053 Å
Greyish black; metallic; opaque
In reflected light: white, weak anisotropism, weak bireflectance, nonpleochroic. R_1 & R_2: 33.9, 36.0% (470 nm), 31.3, 32.9% (546 nm), 30.0, 31.4% (589 nm), 28.8, 29.9% (650 nm)
4.128(100), 3.730(30), 3.1085(28), 2.8081(51), 2.7421(41), 2.6692(51), 1.9335(54)

IMA No. **97-044**
$(Mg,Fe)SiO_3$ A member of the **ilmenite** group
Hexagonal (trigonal): $R\bar{3}$
a 4.78, *c* 13.6 Å
Colorless; vitreous; transparent
Uniaxial, no other data could be determined
3.509(61), 2.616(100), 2.366(52), 2.097(45), 1.755(45), 1.636(65), 1.366(50)

IMA No. **97-045**
Na_2LiAlF_6
Monoclinic: $P2_1$ or $P2_1/m$
a 7.5006, *b* 7.474, *c* 7.503 Å, β 90.847°
Pale buff-cream; somewhat greasy; transparent to translucent
Almost isotropic (birefringence = 0.0009), biaxial, *n* 1.359, 2*V*(meas.) up to 27°
4.33(100), 2.65(60), 2.25(70), 2.18(50), 2.158(40), 1.877(90)

IMA No. **97-047**
$(Na,Y)(Y,REE)(HCO_3)(OH)_2 \bullet 5H_2O$
Monoclinic: *P*2 (pseudo-tetragonal)
a 4.566, *b* 13.018, *c* 4.566 Å, ß 90.15°
White to yellow; vitreous; translucent to transparent
Uniaxial (–), ω 1.540, ϵ 1.40, 2*V*(meas.) 0–5°
12.97(10), 6.52(3), 4.57(3), 4.32(5), 3.223(3), 3.133(5), 2.016(4)

IMA No. **97-048**
$NaCa_2Mg_2(VO_4)_3$ The magnesium-dominant analogue of **palenzonaite**
Cubic: $Ia\bar{3}d$
a 12.427 Å
Red; adamantine; transparent
Isotropic, *n* 1.94
3.108(44), 2.779(100), 2.652(20), 2.535(39), 1.723(26), 1.662(40)

IMA No. **97-049**
$KFe^{3+}_3(H_2PO_4)_6(HPO_4)_2 \bullet 4H_2O$

Monoclinic: *C*2/*c*
a 16.95, *b* 9.59, *c* 17.57 Å, β 90.85°
White; vitreous; translucent
Biaxial (–), α 1.557, β 1.598, γ 1.602, 2*V*(meas.) 32°, 2*V*(calc.) 34°
8.83(10), 7.60(4), 3.75(10), 3.30(4), 3.23(5), 3.11(4), 3.02(9)

IMA No. **97-050**
$BaMn_9[(V,As)O_4]_6(OH)_2$
Cubic: $Pa\bar{3}$
a 12.845 Å
Dark red; adamantine; transparent
Isotropic, $n > 2.0$
3.01(87), 2.790(100), 2.608(100), 2.332(44), 2.134(53), 1.510(99), 1.0020(35)

IMA No. **97-051**
$TlAg_2(As,Sb)_3S_6$
Orthorhombic: *Pnmb* or $P2_1nb$
a 12.479, *b* 15.522, *c* 5.719 Å
Dark grey; metallic; opaque
In reflected light: pure white, extremely weak anisotropism, no bireflectance, nonpleochroic. $R_{min.}$ & $R_{max.}$: 31.43, 33.43% (470 nm), 28.31, 30.52% (546 nm), 27.10, 29.11% (589 nm), 25.57, 27.44% (650 nm)
3.655(16), 3.363(50), 3.290(23), 3.210(26), 3.118(27), 2.822(100), 2.540(17), 2.070(15)

PROPOSALS FROM PREVIOUS YEARS APPROVED IN 1997

IMA No. **93-029**
$Na_4SrCeTiSi_8O_{22}F{\bullet}5H_2O$
Monoclinic: *P*2/*a* (?)
a 23.88, *b* 14.40, *c* 7.238 Å, β 91.0°
Yellow, pink-yellow or cream; vitreous and silky; translucent
Biaxial (–), α 1.542, β 1.569, γ 1.571, 2*V*(meas.) 28°, 2*V*(calc.) 30°
12.36(100), 3.232(13), 3.190(29), 3.108(29), 3.087(21), 3.058(13), 2.708(12)

IMA No. **96-016**
$Mg_4Cl(OH)_7{\bullet}6H_2O$
Orthorhombic: *Pcmm*, $Pcm2_1$, or *Pc*2*m*
a 11.215, *b* 3.124, *c* 19.21 Å
Yellowish white; vitreous or pearly; translucent
Biaxial (–), α 1.532, β ~ γ 1.562, 2*V*(meas.) ≤ 5°
11.41(29), 9.78(46), 9.60(38), 4.25(20), 3.498(100)

IMA No. **96-018**
$\square(LiAl_2)Al_6(BO_3)_3(Si_6O_{18})(OH)_4$ A member of the tourmaline group
Hexagonal (trigonal): *R*3*m*
a 15.770, *c* 7.085 Å
Pink; vitreous; translucent
Uniaxial (–), ω 1.645, ε 1.624
4.181(58), 3.950(100), 3.434(52), 2.924(56), 2.552(93), 1.898(72)

IMA No. **96-061**
$Fe^{3+}AsO_4{\bullet}2H_2O$ Hexagonal or trigonal dimorph of **scorodite**
Hexagonal: *P*-*c*- (extinction symbol)
a 8.9327, *c* 9.9391 Å
White to light yellow-brown; vitreous; translucent
Uniaxial (sign unknown), ω and ε > 1.72
4.973(61), 4.184(44), 4.076(100), 3.053(67), 2.806(68), 2.661(59), 2.520(54), 2.2891(44)

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NEW MINERALS RECENTLY APPROVED IN 1998 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. D. Grice[1], Chairman and G. Ferraris[2], Vice-Chairman, CNMMN IMA

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1998 PROPOSALS

IMA No. 98-001
Cu_3 $(AsO4)_2{\cdot}4H_2O$ New structure type
Orthorhombic: *Pnma*
a 5.6906, *b* 17.061, *c* 9.732 Å
Bottle green; vitreous; transparent
Biaxial (−), α 1.745, β 1.755, γ 1.760, 2*V*(meas) 71°, 2*V* (calc) 70°
8.52(100), 3.721(60), 3.221(90), 3.102(40), 2.817(35), 2.795(35), 2.350(25)

IMA No. 98-002
$Ca_3Ge(OH)_6(SO_4)(CO_3){\cdot}12H_2O$
A member of the ettringite group; structure
Hexagonal: $P6_3/m$
a 11.056, *c* 10.629 Å
White; vitreous; transparent
Uniaxial (−), ω 1.509, ε 1.479
9.57(vs), 5.53(s), 3.83(s), 3.56(ms), 3.44(m), 2.74(ms), 2.53(m)

IMA No. 98-003
$(Ca,Fe^{3+})_2Cu_5(Bi,Cu)(PO_4)_4(H_2O,OH,Cl)_{13}$
The Bi-P-dominant analogue of rechelsdorfite
Monoclinic: *C*2/*m*
a 14.200, *b* 13.832, *c* 14.971 Å, β 102.08°
Honey-brown; resinous; translucent
Biaxial (−), α 1.718, β 1.748, γ 1.748, 2*V*(calc) 0°
14.57(100), 6.95(40), 6.28(40), 3.469(30b), 3.104(30), 2.816(40), 2.506(30), 2.452(30)

IMA No. 98-004
$Pb_{32}As_{40}S_{92}$
A member of the rathite (sartorite) group
Monoclinic: $P2_1$
a 8.368, *b* 115.75, *c* 7.903 Å, β 90.11°
Lead-gray; metallic; opaque
In reflected light: deep red, anisotropic. R_{min} & R_{max}: 37.9, 41.8% (470 nm), 36.5, 40.8% (546 nm), 35.0, 39.7% (589 nm), 32.7, 37.7% (650 nm)
3.663(70), 3.216(48), 2.978(100), 2.872(48), 2.735(60), 2.713(50), 2.339(65)

IMA No. 98-006
$MnPO_4 \cdot H_2O$ Related to the kieserite group
Monoclinic: *C*2/*c*
a 6.914, *b* 7.468, *c* 7.364 Å, β 112.29°
Dark brown to dark greenish black; adamantine; translucent
Biaxial α 1.75, β 1.79, γ >1.79
4.856(12), 4.633(15), 3.503(100), 3.271(10), 2.957(10), 2.516(19), 2.104(12)

IMA No. 98-007
(, Na)$_1$Ca$_2$(Mn^{2+}, Mg, Fe^{2+})$_2$(Fe^{3+},Mg,Al)$_2$ $Mn_2^{2+}(PO_4)_6(H_2O)_2$
Isostructural with wicksite and grischunite; structure
Orthorhombic: *Pcab*
a 12.559, *b* 12.834, *c* 11.714 Å
Very dark brown to black; vitreous; transparent
Biaxial (−), α 1.729, β 1.738, γ 1.741, 2*V*(meas) 54°, 2*V*(calc) 60°
6.419(31), 3.006(67), 2.927(78), 2.856(31), 2.814(35), 2.768(100), 2.110(33)

IMA No. 98-009
$Cu_3O[(Mo,S)O_4SO_4]$
Unique combination of elements; structure
Orthorhombic: *Pnma*
a 7.420, *b* 6.741, *c* 13.548 Å
Olive-green; vitreous; transparent
Average refractive index 1.925 (calculated from reflectance)
3.391(60), 3.342(60), 3.077(100), 2.542 (60), 2.500(60), 2.275(60)

IMA No. 98-010
$Ca_4Al_6Si_6O_{24}(SO_4)$
A member of the scapolite group; structure
Tetragonal: *I*4/*m*
a 12.182, *c* 7.604 Å
Colourless to slightly yellow; subvitreous; transparent
Uniaxial (−), ω 1.585, ε 1.553
3.83(20), 3.46(100), 3.08(40), 3.05(15), 2.70(15)

IMA No. 98-012
$Cu_3(OH)_2(As_2O_7)$ Related to olivenite; structure
Orthorhombic: *Pmma*
a 8.3212, *b* 2.9377, *c* 4.6644 Å
Dark pistachio green; vitreous to adamantine; translucent
Biaxial (+), α 1.81, β 1.82, γ 1.86, 2*V*(meas) 57°, 2*V*(calc) 54°
3.104(100), 2.486(70), 2.400(25), 1.672(30), 1.596(25), 1.330(25)

IMA No. 98-013
$Cu_4Al_3(OH)_{14}F_3 \cdot 2H_2O$ New structure type
Monoclinic: *C*2/*m*
a 12.346, *b* 2.907, *c* 10.369 Å, β 97.90°
Bright blue; vitreous; translucent
Biaxial (+), α 1.585, β 1.615, γ 1.648, 2*V*(calc) 89°
10.29(80), 5.589(90), 4.232(100), 2.828(90), 2.362(100), 2.006(100), 1.871(80)

IMA No. 98-014
$Pb(Zn,Fe,Cu)_2(AsO_4)_2(OH,H_2O)_2$
The Zn-dominant analogue of gartrellite; structure
Triclinic: ?tf="PS2B42">$P\bar{1}$
a 5.550, *b* 5.620, *c* 7.621 Å, α 68.59, β 69.17, γ 69.51°
Green-yellow; vitreous; transparent to translucent
Biaxial (−), α 1.91, β 1.94 (calc), γ 1.97, 2*V*(meas) 87°
4.731(74), 4.669(86), 3.283(89), 3.252(91), 2.999(100), 2.894(74), 2.880(70)

IMA No. 98-015
$Pb(Co,Ni,Zn,)_2(AsO_4)_2 \cdot 2H_2O$
The Co-dominant analogue of helmutwinklerite; structure
Triclinic: $P\bar{1}$
a 11.216, *b* 10.604, *c* 7.618 Å, α 100.10, β 110.26, γ 98.87°
Red to red-brown; vitreous; translucent
Biaxial (+), α 1.85(calc), β 1.87, γ 1.90, 2*V*(meas) 85°
4.670(97), 3.256(100), 3.170(29), 3.072(56), 2.890(40), 2.760(37), 2.568(46)

IMA No. 98-017
$Mg(H_2O)_6[Sb(OH)_6]_2$
The Mg-dominant analogue of bottinoite**;** structure
Trigonal: *P*3
a 16.114, *c* 9.863 Å
Colourless; vitreous; transparent
Uniaxial (−), ω 1.570, ε 1.569
4.946(50), 4.636(100), 4.217(20), 3.392(70), 2.595(20), 2.356(40), 2.103(20)

IMA No. 98-018
(Na, Ca, Bi)$_2$Ta$_2$O$_6$F
A member of the microlite group; structure
Cubic: *Fd*3*m*
a 10.4451 Å
Green; adamantine; transparent
Isotropic, η > 2.0, 2.03(calc)
6.023(31), 3.148(33), 3.015(100), 2.610(27), 1.846(59), 1.574(47), 1.198(23)

IMA No. 98-019
$Na_{3-x}(Ti,Nb)_2[Si_4O_{12}](OH,O)_2 \cdot 3\text{-}4H_2O$
The Ti-dominant analogue of nenadkevichite; structure
Orthorhombic: *Pbam*
a 7.349, *b* 14.164, *c* 7.130 Å
Colourless; vitreous; transparent
Biaxial (+), α 1.646, β 1.654, γ 1.763, 2*V*(meas) 30°, 2*V*(calc) 32°
7.09(72), 6.53(85), 3.262(100), 3.180(52), 2.553(56), 2.075(57), 1.735(50)

IMA No. 98-023
$(Ni,Fe)_3P$
The Ni-dominant analogue of schreibersite
Tetragonal: $I\bar{4}$
a 8.99, *c* 4.396 Å
White with pinkish yellow-tint; metallic; opaque
In reflected light: weak anisotropy in oil, in yellowish-pinkish colours. R_{min} & R_{max}: 42.3, 43.9% (460 nm), 45.7, 47.5% (540 nm), 47.6, 49.1% (580 nm), 50.3, 51.7% (640 nm)
2.17(10), 2.13(5), 2.08(5), 1.955(7)

IMA No. 98-024
$(Fe^{3+}, Zn)_{12}(As^{3+}, Si)_8O_{30}$ New structure type
Hexagonal: $P6_3mc$
a 12.771, *c* 5.051 Å
Brownish black; vitreous; transparent
Uniaxial (+), ω ~ 1.99, ε ~ 2.08
6.37(80), 3.221(100), 2.531(40), 2.420(70), 1.788(40), 1.672(50), 1.507(50)

IMA No. 98-025
$NaCa_2Al_2(AsO_4)[AsO_3(OH)](OH)_2F_4(H_2O)$
New structure type
Monoclinic: $P2_1/m$
a 9.687, *b* 10.7379, *c* 5.5523 Å, β 105.32°
Pale blue-green; vitreous; transparent to translucent
Biaxial (−), α 1.580, β 1.588, γ 1.593, 2*V*(meas) 74°, 2*V*(calc) 76°
5.364(80), 4.796(80), 3.801(80), 3.527(90), 2.966(100), 2.700(90), 2.246(60)

IMA No. 98-026
$[Zn_{1-x}Al_x(OH)_2][(SO_4)_{x/2}(H_2O)_n]$ $x = 0.33$, $n \approx 0.96$
A member of the hydrotalcite group; polytype 1*T*
Trigonal: $P\bar{3}$
a 3.063, *c* 8.91 Å
Pale blue; waxy; translucent
Uniaxial, η(max) 1.558
8.81(100), 4.406(2.5), 2.654(4), 2.545(5)

$[Zn_{1-x}Al_x(OH)_2][(SO_4)_{x/2}(H_2O)_n]$ $x = 0.32-0.50$, $n = 0.59$ Polytype 3*R*
Trigonal: $R\bar{3}m$
a 3.065, *c* 25.42 Å
Pale bluish to bluish-white; waxy; translucent
Uniaxial, ω 1.5636
8.50(100), 4.248(33), 2.600(5), 2.354(4)

IMA No. 98-027
$(Al,Mg,Fe)_{16}(Al,Si,Be)_{12}O_{40}$
A member of the sapphirine group
Monoclinic: $P2_1/c$
a 9.9000, *b* 14.369, *c* 11.2537 Å, β 125.53°
Very dark green; vitreous; transparent
Biaxial (−), α 1.725, β 1.740, γ 1.741, 2*V*(meas) 34°, 2*V*(calc) 29°
2.985(38), 2.834(30), 2.826(45), 2.566(36), 2.445(100), 2.439(44), 2.340(43)

IMA No. 98-028
$Fe^{2+}Ti(Ta,Nb)_2O_8$ A member of the wodginite group
Monoclinic: $C2/c$
a 9.402, *b* 11.384, *c* 5.075 Å, β 90.33°
Very dark brown to black; opaque; submetallic
In reflected light: creamy white, very abundant internal reflections, anisotropic, moderate pleochroism. R_{min} & R_{max}: 18.2, 18.7% (470nm), 18.1, 19.1% (546nm), 16.9, 17.9% (589nm), 15.6, 16.4% (650nm)
3.626(70), 2.963(100), 2.939(90), 2.484(45), 1.759(45), 1.715(50), 1.711(45)

IMA No. 98-030
$Ca(HCOO)_2$ β-calcium formate
Tetragonal: $P4_12_12$
a 6.770, *c* 9.463 Å
White, light-blue; vitreous; transparent
Uniaxial (+), ω 1.553, ε 1.573
5.54(90), 3.40(100), 3.19(60), 2.859(80), 2.196(70), 2.046(50), 1.947(60)

IMA No. 98-031
$(MoO_2)_2As_2O_5{\cdot}3H_2O$ New structure type
Monoclinic: $P2_1/c$
a 7.0516, *b* 12.0908, *c* 12.2190 Å, β 101.268°
Green to grey-green; vitreous, translucent
Biaxial (+), α 1.757, β 1.778, γ 2.04, 2*V*(calc) 35°
6.92(26), 6.05(100), 3.457(16), 3.325(59), 2.624(15), 2.593(12), 2.264(19)

IMA No. 98-032
$Cu_{10}(AsO_4)_4(SO_4)(OH)_6{\cdot}8H_2O$ Structure
Monoclinic: $C2/c$
a 21.778, *b* 12.317, *c* 10.716 Å, β 92.81°
Green with a bluish tint; vitreous; transparent
Biaxial (−), α 1.590, β 1.740, γ 1.744, 2*V*(meas) 18°, 2*V*(calc) 17°
10.8(100), 5.43(50), 4.90(30), 3.625(50), 3.090(40), 2.675(40), 2.630(60)

IMA No. 98-033
$Zn_2AlSb(OH)_{12}$ Related to cualstibite; structure
Trigonal: $P312$
a 5.327, *c* 9.792 Å
Colourless; vitreous; transparent
Optical properties could not be measured
4.897(100), 4.615(35), 4.180(57), 3.366(18), 2.667(31), 2.342(88), 1.887(10)

IMA No. 98-034
$SrAl_2Si_2O_7(OH)_2{\cdot}H_2O$
A member of the lawsonite group
Orthorhombic: $Cmcm$
a 6.031, *b* 8.945, *c* 13.219 Å
Blue; vitreous; transparent
Biaxial (+), α 1.664, β 1.674, γ 1.688, 2*V*(calc) 81°
4.68(s), 4.26(vs), 3.31(vs), 2.75(vs), 2.68(vvs), 2.63(s), 2.50(s)

IMA No. 98-035
$Pb_{10}(SO_4)O_7Cl_4 \cdot H_2O$
Related to the nadorite and kombatite groups; structure
Triclinic: $P\bar{1}$
a 8.796, *b* 10.768, *c* 13.096 Å, α 68.87, β 86.52, γ 75.79°
Venetian pink; vitreous; translucent
In reflected light: colourless or pale pink, anisotropic. R_{min} & R_{max}: 14.3, 14.6% (470nm), 13.6, 13.9% (546nm), 13.4, 13.75% (589nm), 13.3, 13.55% (650nm)
6.573(4), 3.768(4), 3.286(9), 2.955(9), 2.911(10), 2.793(8)

IMA No. 98-036
$Pb_4^{2+}(S^{6+}O_3S^{2-})O_2(OH)_2$ or $Pb_4(S_2O_3)O_2(OH)_2$
New structure type
Triclinic: $P\bar{1}$
a 7.455, *b* 6.496, *c* 11.207 Å, α 114.33, β 89.65, γ 88.69°
Beige-cream to colourless; vitreous to pearly; opaque to transparent
In reflected light: light grey with yellow-brown internal reflections, bireflectant and slightly pleochroic.
10.13(100), 5.93(50), 4.401(35), 3.414(100), 3.198(80), 2.889(35), 2.805(35), 2.622(40)

IMA No. 98-037
$(Mg_2Al)Al_6(Si_6O_{18})(BO_3)_3\ (OH)_4$
A member of the tourmaline group; structure
Trigonal: *R*3*m*
a 15.884, *c* 7.178 Å
Bluish grey; dull; transparent
Uniaxial (−), ω 1.650, ε 1.624
6.366(6), 4.211(9), 3.969(10), 3.470(6), 2.949(7), 2.567(10), 2.037(5)

IMA No. 98-038
$Pb_3Cl_4(SeO_3) \cdot H_2O$ Structure
Triclinic: $P\bar{1}$
a 8.115, *b* 8.433, *c* 9.242 Å, α 62.52, β 71.87, γ 75.01°
Colourless to white; vitreous to silky, diaphaneity not given
η1.96, birefringent
3.548(m), 3.258(s), 3.188(s), 2.728(m), 2.365(s), 2.298(m)

IMA No. 98-039
$Sr_2Fe\ (Fe,Mg)_2Al_4(PO_4)_4(OH)_{10}$ New structure type
Triclinic: $P\bar{1}$
a 5.455, *b* 9.118, *c* 9.769 Å, α 108.48, β 91.62, γ 97.38°
Pale blue to dark-yellow green; vitreous; transparent to translucent
Biaxial: α 1.660, γ 1.684
4.473(47), 3.596(75), 3.470(45), 3.215(100), 3.132(75), 3.016(54), 2.878(43), 2.811(60)

IMA No. 98-042
$Na_{12}Sr_3Ca_6Fe_3WZr_3(Si_{25}O_{73})(O,OH\ Cl)_5 \cdot (H_2O)$
A member of the eudialyte group; structure
Trigonal: *R*3*m*
a 14.2958, *c* 30.084 Å
Orange-red; vitreous; transparent to translucent
Uniaxial (−): ω 1.6279, ε 1.6254
See X-ray powder data for IMA No. 98-043

IMA No. 98-043
$Na_{12}Sr_3Ca_6Mn_3WZr_3(Si_{25}O_{73})(O,OH\ Cl)_5 \cdot (H_2O)$
A member of the eudialyte group
Trigonal: *R*3*m*
a 14.282, *c* 30.12 Å
Orange; vitreous; transparent to translucent
Uniaxial (−): ω 1.629, ε 1.626
11.50(90), 9.535(70), 6.452(50), 6.072(50), 5.735(50), 3.406(50), 3.213(50), 3.167(50), 2.980(100), 2.856(80)

IMA No. 98-044
$PbMn_2^{3+}(VO_4)_2(OH)_2$
A member of the tsumcorite group; structure
Monoclinic: *C*2/*m*
a 9.275, *b* 6.284, *c* 7.682 Å, β 117.97(4)°
Dark brown to black; vitreous to adamantine; translucent to opaque
In reflected light: light grey to light brownish grey, strong anisotropism (dark metallic blue to light purplish brown-grey), distinct bireflectance, slight pleochroism. R_{min} & R_{max}: 15.8, 19.2% (470 nm), 14.8, 17.8% (546 nm), 14.4, 17.3% (589 nm), 14.1, 16.8% (650 nm)
4.695(34), 3.388(95), 3.270(100), 2.946(51), 2.850(49), 2.491(93), 1.869(35), 1.697(83), 1.6378(31)

IMA No. 98-045
$Pb_6^{2+}Sb^{3+}{}_6S_{14}^{2-}S_2^{1-}S^0$ Structure
Orthorhombic: $P2_122_1$
a 5.328, *b* 4.0400, *c* 23.054 Å
Black; metallic; opaque
Reflectance data could not be obtained
3.724(ms), 3.559(m), 3.427(s), 3.232(m), 3.047(ms), 2.952(m), 2.844(ms), 2.779(ms), 2.753(ms), 2.422(m)

IMA No. 98-046
$NaNa_2(Mg_3Fe^{3+}Ti^{4+})Si_8O_{22}O_2$
A member of the amphibole group; structure
Monoclinic: C2/*m*
a 9.795, *b* 17.949, *c* 5.290 Å, β 104.19(2)°
Pink; vitreous; transparent
Biaxial (−), α 1.643, β 1.657, γ 1.670, 2*V*(meas) 81°, 2*V*(calc) 87°

8.414(100), 4.467(50), 3.390(60), 3.117(50), 2.705(70), 2.531(50)

IMA No. 98-047
$Ba(V^{4+}OPO_4)_2 \cdot 4H_2O$
The Ba-dominant analogue of sincosite
Tetragonal: *P*4/*n* or *P*4/*nmm*
a 9.031, *c* 12.755 Å
Pale green; vitreous; transparent
Uniaxial (−), ω 1.721, ε 1.715
5.722(100), 4.519(40), 3.548(30b), 3.192(60), 3.101(40), 2.858(50), 2.794(50), 2.375(70), 2.022(50)

IMA No. 98-048
$BaV_3^{3+}(PO_4)_2(OH,H_2O)_6$
A member of the crandallite group
Trigonal: $R\bar{3}m$, *R*3*m* or *R*32
a 7.258, *c* 17.361 Å
Black; adamantine to semimetallic; opaque
Uniaxial (−). ω 1.858, ε 1.817
5.90(9), 3.627(4), 3.073(10), 2.301(4), 1.971(5), 1.814(4)

IMA No. 98-049
$YbPO_4$ A member of the xenotime group
Tetragonal: $I4_1/amd$
a 6.866, *c* 6.004 Å
Colourless to slightly yellow or brown; vitreous; transparent
Uniaxial (+), ω 1.717, ε 1.802
4.515(7), 3.437(10), 2.730(3), 2.556(8), 2.138(3), 1.760(5)

IMA No. 98-054
Cu(OH)Cl
Monoclinic: $P2_1/a$
a 5.552, *b* 6.668, *c* 6.124(2) Å, β 115.00(3)°
Yellowish-green to olive-green; vitreous; transparent to translucent
Probably biaxial, η > 1.8
5.553(100), 2.785(14), 2.516(18), 2.241(27), 1.996(12), 1.851(21), 1.869(16)

IMA No. 98-055
$Sr_4ZrTi_4Si_4O_{22}$
The Sr-Zr-dominant analogue of perrierite
Monoclinic: $P2_1/a$
a 13.97, *b* 5.675, *c* 11.98 Å, β 114.26(8)°
Dark brown; adamantine; diaphaneity not given
Optical properties could not be measured
4.15(m), 3.20(m), 3.12(s), 3.05(vvs), 2.99(vs), 2.84(s), 2.78(m), 2.74(s), 2.51(m), 2.30(m), 1.967(m)

IMA No. 98-056
$NaNa_2Mg_4Fe^{3+}(Si_8O_{22})(F,OH)_2$
A member of the amphibole group
Monoclinic: *C*2/*m*
a 9.81, *b* 18.05, *c* 5.29 Å, β 103.9(2)°
Grey; vitreous; transparent to translucent
Biaxial (−), α 1.618, β 1.629, γ 1.633, 2*V*(meas) 54°, 2*V*(calc) 61.8°
8.42(34), 3.264(23), 3.129(100), 2.804(28), 2.716(10), 2.708(10), 1.895(10), 1.654(10)

IMA No. 98-057
$(Ba,K,Pb)_4(Y,Ca)_2Si_8(B,Si)_4O_{28}F$
The Y-dominant analogue of hyalotekite; structure
Triclinic: $I\bar{1}$
a 11.181, *b* 10.850, *c* 10.252 Å, α 90.64, β 90.05, γ 89.97°
Light pink to white; vitreous; translucent
Biaxial (+), α 1.637, β 1.628, γ 1.624, 2*V*(meas) 69°, 2*V*(calc) 67°
7.79(65), 3.773(100), 3.742(70), 3.493(56), 2.936(50), 2.921(37), 2.912(42), 2.564(35)

IMA No. 98-058
$K_2(Mn,Fe)Ti_4[Si_4O_{12}]_2(OH)_4 \cdot 5H_2O$
A member of the labuntsovite group; structure
Monoclinic: *C*2/*m*
a 14.369, *b* 13.906, *c* 7.812 Å, β 117.09°
Yellow; vitreous; transparent
Biaxial (+), α 1.683, β, 1.687, γ 1.775, 2*V*(calc) 25°
7.00(9), 6.33(8), 4.86(7), 3.17(10), 3.08(5), 2.58(4), 2.47(4), 1.551(4)

IMA No. 98-059
$(Bi,U,Ca,Pb)_{1+x}(Nb,Ta)_2O_6(OH) \cdot nH_2O$
A member of the pyrochlore group
Metamict, Cubic after heating: *Fd*3*m*
a 10.41 Å
Dark greenish-brown to brown; vitreous; translucent
Isotropic, η 2.10
5.98(4), 2.967(10), 2.614(7), 1.848(9), 1.569(9), 1.500(4), 1.195(8), 1.145(5)

IMA No. 98-060
$PbBi_4S_7$
Orthorhombic: *Bbmm*
a 13.18, *b* 37.4, *c* 4.05(3) Å
Silver grey; metallic; opaque
In reflected light: white, distinct anisotropism (without colour effects), very weak bireflectance, nonpleochroic. R_{min} & R_{max}: 35.8, 40.2% (460 nm), 35.3, 40.6% (540 nm), 35.0, 40.6% (580 nm), 34.8, 40.1% (640 nm)
3.80(10), 3.58(3), 3.40(2), 3.30(3), 2.95(4b), 2.92(2), 2.81(2), 2.34(4b), 1.917(2b)

IMA No. 98-061
$Na(LiNa)(Fe_2^{3+}Mg_2Li)Si_8O_{22}(OH)_2$
A member of the amphibole group; structure
Monoclinic: *C*2/*m*
a 9.536, *b* 17.789, *c* 5.277 Å, β 102.53°
Green; vitreous; translucent
Biaxial (+), α 1.694, β 1.698, γ 1.702, 2*V*(meas) 83°, 2*V*(calc) 85°

8.25(24), 4.45(22), 3.396(28), 3.057(100), 2.749(54), 2.699(60), 1.920(20), 1.639(44), 1.396(23)

IMA No. 98-062
$(Zn,Mn)(Mn^{2+},Mg,Fe,^{3+},Al)_{14}(As^{3+}O_3)(As^{5+}O4)_2(OH)_{23}$ New structure type
Monoclinic: *Cc*
a 14.236, *b* 8.206, *c* 24.225 Å, β 93.52°
Red-brown to orange-brown; resinous to submetallic; opaque
Biaxial (−), α 1.723, β 1.744, γ 1.750, 2*V*(meas) 44°, 2*V*(calc) 56°
12.07(100), 6.05(100), 4.12(30), 9.04(90), 3.148(30), 3.030(70), 2.411(40), 1.552(70)

IMA No. 98-064
$Na_{15}Ca_3Mn_3Fe_3Zr_3Nb(Si_{25}O_{73})(O,OH,H_2O)_3(OH,Cl)_2$
A member of the eudialyte group; structure
Trigonal: *R*3
a 14.192, *c* 29.983 Å
Yellowish brown; vitreous; transparent to translucent
Uniaxial (−), ω 1.6450, ε 1.6406
11.35(44), 7.10(33), 6.02(36), 5.68(31), 4.29(36), 3.389(43), 3.199(31), 3.150(35), 3.013(30), 2.964(100), 2.844(89)

IMA No. 98-065
$Mg_9[Si_4O_{16}](OH)_2$
A member of the humite group; structure
Monoclinic: $P2_1/b$ (unique axis *a*)
a 4.7480, *b* 10.2730, *c* 13.6894 Å, α 100.72^0
Yellow-orange; vitreous, transparent
Biaxial (+), α 1.631, β 1.641, γ 1.664, 2*V*(meas) 70°, 2*V*(calc) 68°
5.05(70), 4.46(52), 3.35(64), 2.772(91), 2.748(50), 2.551(80), 2.516(93), 2.365(50), 2.269(100), 2.259(95), 1.747(79), 1.485(51)

IMA No. 98-066
$CaMg(VO_4,AsO_4)(OH)$
A member of the descloizite group; structure
Orthorhombic: $P2_12_12_1$
a 7.501, *b* 9.010, *c* 5.941 Å
Orange to orange-brown; adamantine; transparent
Biaxial, α 1.797, β 1.805-1.815, γ 1.828
4.50(72), 4.14(32), 3.170(100), 2.972(20), 2.785(30), 2.639(27), 2.596(21), 2.523(30), 1.733(20), 1.614(41)

IMA No. 98-067
$Cu[AlAsO_5]$ New structure type
Monoclinic: $P2_1/c$
a 7.314, *b* 10.223, *c* 5.576 Å, β 99.79°
Light green; vitreous; translucent
Biaxial(−), α1.672, β 1.718, γ 1.722, 2*V*(calc) 32°
7.20(100), 4.84(9), 4.33(23), 3.604(10), 3.125(20), 2.656(6), 2.458(8)

IMA No. 98-069
$K_2MnV_4O_{12}$ New structure type
Monoclinic: $P2_1/n$
a 8.173, *b* 9.243, *c* 8.640 Å, β 109.70°
Reddish brown; adamantine; translucent
Biaxial, α 1.925 β 1.960, γ > 1.988, 2*V*(meas) 82°
6.86(25), 5.91(27), 5.51(32), 3.957(25), 3.701(55), 3.336(100), 3.118(50), 3.000(36), 2.878(64), 2.752(68), 1.968(28), 1.860(28)

Proposals from Previous Years Approved in 1998

IMA No. 97-033
$(Mn,Fe,Mg)Al_2(PO_4)_2(OH)_2{\cdot}8H_2O$
Polymorph of mangangordonite
Triclinic: $P\bar{1}$
a 7.0102, *b* 10.2050, *c* 10.5040(7) Å, α 71.82, β 89.62, γ 69.90(1)°
Colourless to beige; vitreous; translucent to transparent
Biaxial (−), α 1.5665, β 1.5740, γ 1.5815, 2*V*(meas.) 94.7°, 2*V*(calc.) 90.6°
9.92(85), 6.54(100), 5.80(55), 4.746(85), 4.577(35), 3.885(30), 3.001(70), 2.900(30), 2.773(35)

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NEW MINERALS APPROVED IN 1999 BY THE COMMISSION ON NEW MINERALS AND MINERAL NAMES, INTERNATIONAL MINERALOGICAL ASSOCIATION

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The information given here is provided by the Commission on New Minerals and Mineral Names (CNMMN), 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; structure analysis)
Crystal system, space group
unit-cell parameters
Color; luster; diaphaneity
Optical properties
Strongest lines in the X-ray powder diffraction pattern [*d* in Å(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.

1999 PROPOSALS

IMA No. **99-002**
$(Mg, Mn^{2+})_2(Sb_{0.5}Mn^{3+}{}_{0.5})O_4$ Related to the spinel group
Trigonal: $R\bar{3}$ or $R3$
a 16.196, *c* 14.948 Å
Dark red; subadamantine; translucent
In reflected light: grey, internal reflections orange-red, anisotropy weak. *R*: 10.4% (470 nm), 10.0% (546 nm), 9.9% (589 nm), 9.8% (650 nm)
4.24(28), 3.052(33), 2.608(100), 2.162(28), 1.665(30), 1.527(39)

IMA No. **99-003**
$Hg^{1+}{}_3(CO_3)(OH)\cdot 2H_2O$ Polymorph of peterbaylissite; new structure-type
Monoclinic: $P2_1/c$
a 6.760, *b* 9.580, *c* 10.931 Å, β 105.53°
Pale greenish yellow; vitreous; transparent (before irradiation by X-rays)
7.09(70), 5.40(30), 5.32(40), 4.62(90), 2.831(100), 2.767(100), 2.391(40)

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IMA No. **99-005**
$Na_2Mg_5(PO_4)_4•7H_2O$ Probably Na-analogue of rimkorolgite; structure
Monoclinic: $P2_1/c$
a 8.324, *b* 12.926, *c* 17.519 Å, β 102.03(1)°
Colorless, yellowish, greenish; vitreous; transparent
Biaxial (+), α 1.538, β 1.540, γ 1.543, 2*V*(meas.) 70°, 2*V*(calc.) 78.6°
10.31(33), 8.56(100), 3.496(23), 3.314(23), 3.020(28), 2.849(33), 2.675(25)

IMA No. **99-006**
$Na_3(La,Ce,Ca)_3(CO_3)_5$ La-analogue of remondite-(Ce)
Monoclinic: $P2_1$
a 10.49, *b* 6.417, *c* 10.50(1) Å, β 119.8(1)°
Bright orange-yellow; vitreous; translucent
Biaxial (–), α 1.615, β 1.619, γ 1.622, 2*V*(meas.) 80°, 2*V*(calc.) 82°
5.28(5), 3.70(7), 3.036(9), 2.623(10), 2.143(8), 2.041(6), 1.939(6)

IMA No. **99-007**
$Ca(H_2AsO_4)_2$ New structure-type for minerals
Triclinic: *P*1
a 8.5485, *b* 7.6973, *c* 5.7198 Å, α 92.59, β 109.87, γ 109.92°
White or colorless; vitreous; translucent
Biaxial, α 1.602, γ 1.658
3.974(72), 3.700(60), 3.558(100), 3.101(82), 3.041(62), 2.666(52), 2.173(48)

IMA No. **99-008**
$Ca(Ni,Fe,Co)_2(AsO_4)_2(OH,H_2O)_2$ Isotypy with tsumcorite; structure
Monoclinic: *C*2/*m*
a 9.005, *b* 6.205, *c* 7.411 Å, β 115.31°
Brown to yellow; vitreous; small fragments are transparent
Biaxial (+), α 1.80(calc.), β 1.81, γ 1.87, 2*V*(meas.) 40°, strong pleochroism
4.938(34), 3.393(83), 3.182(87), 2.962(100), 2.703(72), 2.538(78), 1.697(57)

IMA No. **99-009**
$BaFe^{2+}{}_2Fe^{3+}{}_2(PO_4)_3(OH)_3$ Fe^{2+}-analogue of perloffite; structure
Monoclinic: $P2_1/m$
a 9.199, *b* 12.359, *c* 5.004 Å, β 100.19°
Greenish black; vitreous; opaque
Biaxial (–), α 1.817, β 1.829, γ 1.837, 2*V*(meas.) ~80–85°, 2*V*(calc.) 78.0°, pleochroism
9.1(3), 5.11(2), 4.573(4), 3.159(10), 3.091(4), 2.983(5), 2.749(5)

IMA No. **99-010**
$Cu_2(NO_3)(OH)_3$ Dimorph of gerhardtite; new structure-type
Monoclinic: $P2_1$
a 5.596, *b* 6.079, *c* 6.925 Å, β 94.67°
Dark emerald green; vitreous; transparent
Biaxial (+), α 1.700, β 1.715, γ 1.738, 2*V*(meas.) 81°, 2*V*(calc.) 79°, pleochroism
6.91(100), 3.457(90), 2.669(80), 2.462(80), 2.250(50), 2.154(40), 2.078(50)

IMA No. **99-011**
$(Ca,K,Ba,Na)_{3–4}Mn_{24}(Si,Al)_{40}(O,OH)_{112}•21H_2O$ Ganophyllite group
Monoclinic: $P2_1/a$
a 16.64, *b* 27.11, c 25.35 Å, β 98.74°
Colorless to pale yellowish brown; vitreous to pearly
Biaxial (–), β 1.61, 2*V*(meas.) < 15°
12.6(vvs), 3.46(m), 3.13(s), 2.84(s), 2.69(vs), 2.60(s), 2.46(s)

IMA No. **99-012**
$Ba_4(Mn,Fe,Al)_4O_3(OH)_3(Si_4O_{12})[Si_2O_3(OH)_4]Cl$ New structure-type
Tetragonal: *I*4/*mmm*
a 14.215, *c* 6.126 Å
Deep green; vitreous; transparent
Uniaxial (+), ε 1.765, ω 1.745, pleochroic
10.15(m), 5.63(m), 4.417(m), 3.319(s), 3.011(vs), 2.619(s), 2.577(m)

IMA No. **99-013**
FeTiP Anti-$PbCl_2$ structure
Orthorhombic: *Pnma*
a 6.007, *b* 3.602, *c* 6.897 Å
Cream white; metallic; opaque
2.307(47), 2.301(100), 2.188(88), 2.147(31), 1.938(45), 1.923(34), 1.801(45) calculated pattern

IMA No. **99-014**
$(Cs,K)Al_4Be_4(B,Be)_{12}O_{28}$ Cs-analogue of rhodizite
Cubic: *P*43*m*
a 7.3205 Å
Colorless to white to yellow; vitreous; transparent
Isotropic, *n* 1.693
3.28(35), 2.990(100), 2.441(50), 2.208(30), 2.113(70), 1.957(35), 1.776(40)

IMA No. **99-015**
$BaSi_2O_5•4H_2O$ Double-chain silicate; structure
Orthorhombic: *Pnma*
a 5.0453, *b* 9.044, *c* 18.366 Å
Colorless to white; vitreous to pearly; transparent
Biaxial (+), α 1.537, β 1.538, γ 1.541, 2*V*(meas.) 59.2°, 2*V*(calc.) 60.1°
9.19(30), 5.068(100), 4.054(85), 2.974(45), 2.706(60), 2.327(40), 2.257(75)

IMA No. **99-016**
$Ba(Ti_7Fe^{2+})O_{16}$ Hollandite group; structure
Tetragonal: *I*4/*m*
a 10.219, *c* 2.963 Å
Black; adamantine; opaque
In reflected light: grey. *R*: 16% (470 nm), 15% (546 nm), 16% (589 nm), 16% (650 nm)
3.231(41), 3.231(100), 2.486(55), 2.235(57), 1.901(38), 1.598(39), 1.405(34) calculated pattern

IMA No. **99-017**
$Na_2(\square,Na,Mn)Zr[Si_6O_{12}(OH,O)_6]$ Lovozerite group; structure
Monoclinic: *Cm*
a 10.589, *b* 10.217, *c* 7.355 Å, β 92.91°
Dark cherry-red to dark reddish brown; vitreous; transparent
Biaxial (–), α 1.546, β 1.574, γ 1.575, 2*V*(meas.) <10°, 2*V*(calc.) 21°
7.37(44), 5.29(100), 3.674(32), 3.329(74), 3.238(100), 2.981(39), 2.553(37)

IMA No. **99-018**
$Ca_{0.2}(H_2O)_2CrS_2$ Close to schöllhornite
Trigonal: *Rm*, *R*3*m* or *R*32
a 3.326, *c* 33.29 Å
Coal-black; submetallic; opaque
In reflected light: grey. R_{max} and R_{min}: 15.8–14.5% (460 nm), 17.6–15.7% (540 nm), 18.2–17.2% (580 nm), 18.6–16.6% (640 nm)
11.1(100) 5.56(10) 3.700(4) 2.719(5) 2.464(4) 2.180(49)

IMA No. **99-019**
$(Sb,As)_2MoO_6$ New structure-type
Monoclinic: *C*2/*c*
a 18.076, *b* 5.920, *c* 5.083 Å, β 96.97°
White; vitreous and silky; translucent
Biaxial, *n* (calc.) 2.15
5.622(65), 3.376(39), 3.104(61), 2.990(100), 2.960(100), 2.104(42), 1.962(32)

IMA No. **99-020**
$NaY(CO_3)_2{\cdot}6H_2O$ New structure-type
Triclinic: *P*1
a 6.2592, *b* 13.0838, *c* 13.2271 Å, α 91.13, β 103.55, γ 90.19°
Colorless to white; vitreous, sometimes pearly; translucent to transparent
Biaxial (+), α 1.480, β 1.498, γ 1.571, 2*V*(meas.) 53°, 2*V*(calc.) 55°
12.81(100), 6.45(70), 4.456(60), 4.291(60), 3.267(25), 2.869(30), 2.571(60)

IMA No. **99-021**
$Bi^{3+}{}_{24}Cr^{6+}{}_8O_{57}(OH)_6(H_2O)_3$ New structure-type
Hexagonal: *P*31*c*
a 15.067, *c* 15.293 Å
Yellow to dirty yellow-brown; resinous; transparent
In reflected light: grey; internal reflections, yellow. R_{min} and R_{max}: 17.9–18.6% (470 nm), 16.45–17.0% (546 nm), 16.0–16.5% (589 nm), 15.7–16.2% (650 nm)
7.65(50), 3.812(40), 3.382(100), 2.681(70), 2.175(40), 2.106(40), 1.701(50)

IMA No. **99-022**
$(Cu,Ca,Fe)_{10}Bi(AsO_4)_4(OH)_{11}{\cdot}2H_2O$ Chemically related to mixite
Tetragonal: $P4_2/nnm$
a 9.961, *c* 29.19 Å
Olive green to grass green; resinous to dull; translucent
Uniaxial (–), ω 1.785, ε 1.705, pleochroism
14.6(100), 7.04(50), 6.34(70), 5.07(50), 3.518(40), 3.494(40), 3.146(60), 2.535(50)

IMA No. **99-023**
Cu_2HgSe_2 Possibly related to Ag_2HgS_2
Monoclinic: $P2_1/n$
a 7.492, *b* 4.177, *c* 7.239 Å, β 114.20(5)°
Dark grey; metallic; opaque
In reflected light: white. R_{min} and R_{max}: 15.15–22.0% (470 nm), 13.3–20.15% (546 nm), 12.7–19.8% (589 nm), 12.3–19.25% (650 nm)
3.991(70), 3.576(50), 3.534(50), 3.414(50), 2.730(100), 2.223(70), 2.072(50)

IMA No. **99-024**
$KCrMg(Si_4O_{10})(OH)_2$ Cr-analogue of celadonite; structure
Monoclinic: *C*2
a 5.267, *b* 9.101, *c* 10.162 Å, β 100.67°
Emerald-green to dark green; vitreous to dull silky; transparent
Biaxial (–), α 1.605, β 1.648, γ 1.654, 2*V*(meas.) 12°, 2*V*(calc.) 40°, pleochroism
4.54(93), 4.36(40), 3.638(64), 3.097(51), 2.588(100), 2.583(36), 2.409(87)

IMA No. **99-025**
$Fe^{2+}Al_3(BO_3)(SiO_4)O_2$ Fe^{2+}-analogue of grandidierite; structure
Orthorhombic: *Pbnm*
a 10.363, *b* 11.129, *c* 5.769 Å
Blue; vitreous; transparent
Biaxial (–), α 1.631, β 1.654, γ 1.656, 2*V*(meas.) 31.5°, 2*V*(calc.) 32.5°
5.57(m), 5.21(vs), 5.05(vvs), 3.73(m), 3.51(m), 2.97(s), 2.90(m), 2.79(s), 2.18(s)

IMA No. **99-026**
$BaFe_3Al_2Si_2O_{10}(OH)_2$ Fe^{2+}-analogue of kinoshitalite; structure
Monoclinic: *C*2/*m*
a 5.389, *b* 9.337, *c* 10.054 Å, β 100.53°
Dark green; vitreous; translucent
Biaxial (–), β 1.680, 2*V*(meas.) 20°
2.662(100), 2.640(100), 2.181(40), 2.170(40), 1.659(25), 1.554(30), 1.547(30), 1.529(25)

IMA No. **99-027**
$Bi(Co,Ni)_2(AsO_4)_2(OH,H_2O)_2$ Tsumcorite group; structure
Monoclinic: *C*2/*m*
a 9.005, *b* 6.211, *c* 7.440 Å, β 115.19°
Brown; subadamantine; transparent
Biaxial (+), α 1.93(calc.), β 1.95, γ 1.98, 2*V*(meas.) 75°
4.589(61), 4.418(33), 3.193(100), 2.971(92), 2.820(61), 2.702(57), 2.528(42), 2.498(62), 1.869(37)

IMA No. **99-028**
$Bi(Ni,Co)_2(AsO_4)_2(OH,H_2O)_2$ Tsumcorite group; structure
Monoclinic: *C*2/*m*
a 8.995, *b* 6.207, *c* 7.462 Å, β 115.00°
Olive-green to brown; subadamantine; translucent
Biaxial (–), α 1.94(calc.), β 1.95, γ 1.97, 2*V*(meas.) 77°
4.586(40), 3.196(100), 2.980(72), 2.821(44), 2.507(47), 1.702(57)

IMA No. **99-029**
$Pb(Co,Fe)_2(AsO_4)_2(OH,H_2O)_2$ Tsumcorite group; structure
Monoclinic: *C*2/*m*
a 9.097, *b* 6.313, *c* 7.555 Å, β 115.08°
Brown to red-brown; subadamantine; transparent
Biaxial (+), α 1.92(calc.), β 1.94, γ 1.98, 2*V*(meas.) 77°
4.656(87), 4.462(96), 3.243(100), 3.010(58), 2.868(50), 2.733(47), 2.550(40)

IMA No. **99-030**
$Ca(Cu,Zn)(Fe,Zn)(AsO_4)_2(OH,H_2O)_2$ Tsumcorite group
Triclinic: $P\bar{1}$
a 5.457, *b* 5.539, *c* 7.399 Å, α 68.43, β 68.90, γ 69.44°
Yellow; vitreous to subadamantine; transparent
Biaxial (+), α 1.83, β 1.834(calc.), γ 1.89, 2*V*(meas.) 30°
4.953(22), 3.416(100), 3.186(40), 2.927(64), 2.832(26), 2.700(30), 2.533(30), 2.468(25)

IMA No. **99-031**
$Na_6(Mn,Fe^{2+})Al_4Si_8O_{26}$ Mn-analogue of naujakasite; structure
Monoclinic: *C*2/*m*
a 15.033, *b* 8.001, *c* 10.478 Å, β 113.51°
Blue; vitreous; transparent
Biaxial (–), α 1.539, β 1.551, γ 1.554, 2*V*(meas.) 54°, 2*V*(calc.) 53°
3.995(65), 3.623(92), 3.552(56), 3.485(58), 3.450(31), 3.362(33), 3.120(30), 3.068(100), 2.797(30), 2.613(39)

IMA No. **99-032**
$K_2NaMn_7(Nb,Zr)_2Si_8O_{26}(OH)_5$ Astrophyllite group; structure
Triclinic: $P\bar{1}$
a 5.4303, *b* 11.924, *c* 11.747 Å, α 112.927, β 94.750, γ 103.175°
Beige to brown; vitreous; transparent
Biaxial (+), α 1.718, β 1.733, γ 1.750(calc.), 2*V*(meas.) 87°
10.71(100), 4.405(20), 3.536(50), 3.294(20), 2.783(40), 2.677(30), 2.587(40), 2.503(20)

IMA No. **99-034**
$PbCr^{3+}{}_2(CO_3)_2(OH)_4{\bullet}H_2O$ Cr-analogue of dundasite
Orthorhombic: *Pbnm*, *Pbmm* or *Pbn*2_1
a 9.079, *b* 16.321, *c* .5.786 Å
Pale grey to pinkish violet; earthy to pearly; translucent
Biaxial (–), α 1.704, β 1.802, γ 1.842, 2*V*(calc.) 62°
7.94(10), 4.686(5b), 4.373(3), 3.633(7), 3.279(4), 2.690(4), 2.405(3), 2.101(3b), 1.781(3)

IMA No. **99-035**
SiO_2 Polymorphic relation with quartz; structure
Monoclinic: *I* 2/*a*
a 8.758, *b* 4.876, *c* 10.715 Å, β 90.08°
Grey; dull; transparent
n (mean) 1.526
4.43(9), 3.391(58), 3.335(100), 3.117(13), 1.830(11), 1.370(10)

IMA No. **99-036**
$Na(Mn^{3+},Fe^{3+})(PO_4)(OH){\bullet}2H_2O$
Monoclinic: $P2_1/n$
a 5.3757, *b* 19.955, *c* 5.3750 Å, β 108.915°
Dark brown to black; vitreous; translucent
9.43(10), 4.977(6), 4.102(3), 3.344(7), 2.663(8), 2.537(4)

IMA No. **99-039**
$(K,Na,Ca)(Al_7Si_{17}O_{48}){\bullet}22H_2O$ K-analogue of gmelinite; structure
Hexagonal: $P6_3/mmc$
a 13.696, *c* 10.203 Å
Colorless; vitreous; transparent
Uniaxial (–), ε 1.472, ω 1.477
11.9(80), 7.8(50), 5.16(70), 4.11(100), 3.27(70), 2.971(80), 2.852(80), 2.709(100), 2.085(50), 1.817(80)

IMA No. **99-040**
$Sr[Al_2Si_4O_{12}]\cdot 6H_2O$ Sr-analogue of chabazite
Trigonal: *Rm*
a 13.715, *c* 15.09 Å
Colorless; vitreous; transparent
Uniaxial (+), ε 1.503, ω 1.507
9.38(8), 5.55(6), 4.34(7), 2.92(10), 2.50(5), 1.697(7)

IMA No. **99-041**
$Na_2Zr(Si_4O_{11})\cdot 2H_2O$ Zr-analogue of penkvilksite-1*M*; structure
Monoclinic: $P2_1/c$
a 9.144, *b* 8.818, *c* 7.537 Å, β 113.22°
Colorless; vitreous; translucent to transparent
Biaxial (–), α 1.570, β 1.588, γ 1.594, 2*V*(meas.) 60°, 2*V*(calc.) 60°
8.40(10), 5.38(9), 4.00(8), 3.401(9), 2.902(9), 2.772(7), 2.691(9), 2.190(7)

IMA No. **99-042**
$Cu_2Pb_6Bi_8S_{19}$ Structure related to junoite
Monoclinic: *C*2/*m*
a 27.6367, *b* 4.0499, *c* 20.7409 Å, β 131.258°
Grey; metallic; opaque
In reflected light: white. R_{min} and R_{max}: 41.7–43.7% (470 nm), 40.4–41.9% (546 nm), 39.7–41.1% (589 nm), 39.2–40.3% (650 nm)
3.777(s), 3.507(s), 3.382(s), 2.918(s), 2.096(s), 2.062(s), 2.031(s), 1.744(s)

IMA No. **99-043**
$NiBi^{3+}As^{5+}O_5$ New structure-type
Triclinic: *P*1
a 6.7127, *b* 6.8293, *c* 5.2345 Å, α 107.625, β 95.409, γ 111.158°
Orange- to gold-brown; adamantine; transparent
In reflected light: grey. R_{min} and R_{max}: 12.8–13.1% (470 nm), 12.4–12.6% (546 nm), 12.2–12.5% (589 nm), 12.0–12.4% (650 nm)
5.94(100), 3.233(100), 3.067(60), 3.047(50), 2.116(50), 2.095(40), 1.659(40)

IMA No. **99-045**
$Na_4(UO_2)(CO_3)_3$
Triclinic: *P*1 or $P\bar{1}$
a 9.280, *b* 9.295, *c* 12.864 Å, α 90.293, β 91.124, γ 119.548°
Pale yellow to beige; diaphaneity not given; opaque
n(calc.) 1.583
8.022(84), 5.080(58), 5.024(61), 4.967(65), 4.639(100), 4.019(45), 3.221(55), 2.618(60)

IMA No. **99-046**
$Na_{15}Ca_6Fe_3Zr_3NbSi_{25}O_{73}(O,OH,H_2O)_3Cl_2$ Fe-analogue of kentbrooksite; structure
Trigonal: *R*3*m*
a 14.2099, *c* 30.067 Å
Reddish brown to red; vitreous; transparent
Uniaxial (–), ε 1.622, ω 1.619
7.104(38), 5.694(50), 4.300(43), 3.955(31), 3.391(51), 3.207(31), 3.155(31), 2.968(100), 2.847(98)

IMA No. **99-047**
As A polymorph of As
Orthorhombic: $Pmn2_1$ or $P2_1nm$
a 3.633, *b* 10.196, *c* 10.314 Å
Lead grey; metallic; opaque
In reflected light: white with greenish blue tint, anisotropic dark brown to dark greenish grey. R_{min} and R_{max}: 45.7–50.8% (470 nm), 44.0–49.6% (546 nm), 42.7–48.5% (589 nm), 41.9–46.8% (650 nm)
5.17(100), 4.60(24), 3.259(58), 2.840(27), 2.580(22), 2.299(23), 1.794(26)

IMA No. **99-048**
$KFe^{2+}{}_3AlSi_3O_{10}F_2$ F-analogue of annite; structure
Monoclinic: *C*2/*m*
a 5.370, *b* 9.289, *c* 10.154 Å, β 100.49°
Iron black; submetallic; translucent
Biaxial (–), α 1.596, β 1.648, γ 1.648, 2*V*(meas.) ~0°, 2*V*(calc.) 0°
10.09(100), 5.02(13), 3.336(56), 3.160(10), 2.933(10), 2.649(10), 2.507(10), 2.004(10), 1.671(10)

IMA No. **99-049**
$AgSbS_2$ Polymorphic relationship with miargyrite and cuboargyrite; structure
Triclinic: $P\bar{1}$
a 7.766, *b* 8.322, *c* 8.814 Å, α 100.62, β 104.03, γ 90.22(2)°
Iron black to greyish black; metallic; opaque
In reflected light: white with red internal reflections, anisotropic white through dark blue to brown. R_{min} and R_{max}: 31.3–39.6% (470 nm), 29.2–37.3% (546 nm), 27.8–36.1% (589 nm), 26.2–33.0% (650 nm)

IMA No. **99-050**
$NaMg_3V_6(Si_6O_{18})(BO_3)_3(OH)_4$ Tourmaline group; structure
Trigonal: *R*3*m*
a 16.12, *c* 7.39 Å
Dark green to black; pitch like; translucent to opaque
Uniaxial (–), ω 1.786, ε 1.729
6.54(9), 4.04(8), 3.57(7), 3.04(9), 2.62(10), 2.07(9)

IMA No. **99-051**
$NbBO_4$ Nb-analogue of behierite; structure
Tetragonal: $I4_1/amd$
a 6.206(5), *c* 5.487 Å
Greyish pink; vitreous; transparent
Uniaxial (+), *n* 2.30
4.115(100), 3.110(84), 2.481(36), 2.328(49), 1.939(29), 1.598(42) calculated pattern

IMA No. **98-016**
$Bi_2\,Fe^{3+}(Fe^{3+}_{-},Co)_2(O,OH)_2(OH)_2(AsO_4)_2$
Triclinic: *P*1
a 4.551, *b* 6.146, *c* 9.002 Å, α 95.41, β 99.28, γ 92.89°
Brown; adamantine; translucent to transparent
Biaxial (–), α 2.02, β (calc.) 2.08, γ 2.12, 2*V*(meas.) 65°
8.864(35), 3.772(90), 3.539(100), 3,495(73), 2.913(73), 2.797(51), 2.674(43)

IMA No. **98-063**
$Nd(CO_3)(OH)$ Ancylite group; structure
Orthorhombic: *Pmcn*
a 4.981, *b* 8.524, *c* 7.259 Å
Pale pinkish purple to white; vitreous; transparent
Biaxial, α 1.698, γ 1.780
5.52(70), 4.30(72), 4.26(84), 3.68(84), 3.34(100), 2.93(89), 2.65(72), 2.34(88), 1.892(78)

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NEW MINERALS APPROVED IN 2000 BY THE COMMISSION ON NEW MINERALS AND MINERAL NAMES, INTERNATIONAL MINERALOGICAL ASSOCIATION

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The information given here is provided by the Commission on New Minerals and Mineral Names (CNMMN), 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; structure analysis)

Crystal system, space group
unit-cell parameters
Color; luster; diaphaneity
Optical properties
Strongest lines in the X-ray powder-diffraction pattern [*d* in Å(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.

2000 PROPOSALS

IMA No. **2000–001**
$Cu_2Fe^{3+}(As^{5+}O_4)(As^{3+}O_2)(OH)_2 \cdot H_2O$ New structure-type

Orthorhombic: *Pnma*
a 9.553, *b* 13.099, *c* 8.0640 Å
Pistachio green; vitreous; transparent
Biaxial (–), α 1.80(5), β 1.84(5), γ 1.86(5), 2*V*(meas.) = 65(5)°, 2*V*(calc.) = 69(3)°
6.88(25), 6.161(90), 3.861(20), 3.231(40), 3.080(100), 2.700(25), 2.211(25)

IMA No. **2000–002**
$NaCu_4(AsO_4)_3$ Alluaudite–wyllieite group structure determined

Monoclinic: *C*2/*c*
a 12.051, *b* 12.434, *c* 7.2662 Å, β 117.94°
Dark-blue; strong vitreous; translucent
Biaxial (–), α 1.76, β 1.92, γ 1.96, 2*V*(calc.) 49.5°
6.22(13), 3.60(21), 3.43(100), 3.21(35), 2.791(24), 2.696(18), 2.683(30)

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IMA No. **2000–003**
$Ba_3[(Si,Al)_4O_8]OCl[Cl,(H_2O)]_4$ Cymrite-like structure determined
Hexagonal: $P6_3mc$
a 5.243, *c* 29.859 Å
Light-blue grey; vitreous; translucent
Uniaxial (–), ω 1.642, ε 1.594
14.67(100), 3.883(100), 3.357(50), 2.988(60), 2.887(50), 2.616(70)

IMA No. **2000–004**
$Bi(OH)SO_4•H_2O$ Second natural bismuth sulfate

Monoclinic: $P2_1/n$
a 6.0118, *b* 13.3355, *c* 6.4854 Å, β 112.91°
Light beige to light grey; vitreous; translucent
n 1.78
5.453(42), 5.193(32), 5.115(37), 4.260(100), 3.335(42), 3.113(36), 2.915(22)

IMA No. **2000–005**
$Ca_2Mn_3O_2(AsO_4)_2(CO_3)•3H_2O$ Mitridatite type

Monoclinic: *Cm*
a 11.253, *b* 19.628, *c* 8.932 Å, β 100.05°
Dark red-brown to black; vitreous; translucent
Biaxial (–), α 1.757, $\beta \approx \gamma > 1.80$, $\Delta_{\beta,\gamma} = 0.004$, $2V$(meas.) ~ 32°
8.796(100), 5.654(31), 2.934(76), 2.886(23), 2.816(24), 2.769(39), 2.201(57)

IMA No. **2000–006**
$Mg(HCO_2)_2•2H_2O$ Second natural formate

Monoclinic: $P2_1/c$
a 8.64, *b* 7.15, *c* 9.38 Å, β 98.0°
White; vitreous; translucent
Biaxial (+), α 1.465, β 1.486, γ 1.516, $2V$(calc.) 81(5)°
4.90(9), 4.64(8), 4.30(7), 3.68(8), 3.40(10), 3.05(4), 2.87(4)

IMA No. **2000–007**
$(Mn,Mg)_{25.5}[(V,As)O_4]_3(SiO_4)_3O_5(OH)_{20}$ Similar to mcgovernite
Trigonal: $R\bar{3}c$ structure determined
a 8.259, *c* 204 Å
Bright yellow to orange; vitreous; transparent
Uniaxial (–), *n* 1.787
4.13(70), 3.46(60), 3.26(80), 2.86(100), 2.38(60), 2.35(50), 1.559(90)

IMA No. **2000–008**
$KBSi_2O_6$ Similar to Li–A(BW) zeolite structure determined
Orthorhombic: $P2_12_12_1$
a 9.9630, *b* 10.4348, *c* 4.7044 Å
Colorless; vitreous; transparent
Biaxial (–), α 1.561, β 1.563, γ 1.564, $2V$(meas.) 51°, $2V$(calc.) 70°
3.944(5), 3.495(8), 3.282(10), 3.149(4), 2.704(4), 2.293(4)

IMA No. **2000–009**
$NaBSiO_4$ Similar to kalsilite and beryllonite structure determined
Hexagonal: $P6_3$
a 13.8964, *c* 7.7001 Å
White, colorless in thin fragments; vitreous; transparent or slightly turbid
Uniaxial (–), ω 1.591, ε 1.582
3.86(6), 3.61(6), 2.780(10), 2.320(7), 2.216(9), 1.928(5), 1.721(7)

IMA No. **2000–010**
$(Na,H_3O)_{15}(Ca,Mn,REE)_6Fe^{3+}{}_2Zr_3(\square,Zr)(\square,Si)Si_{24}O_{66}(O,OH)_6Cl•nH_2O$ ($2 < n < 3$) Eudialyte group

Trigonal: $R3m$
a 14.167, *c* 30.081 Å
Yellow; vitreous; transparent
Uniaxial (+), ω 1.612, ε 1.615
6.41(41), 4.30(91), 3.521(57), 3.205(44), 2.963(92), 2.841(100), 2.588(37)

IMA No. **2000–011**
$KCaCu_5(AsO_4)_4[As(OH)_2O_2]_2•H_2O$ Polymorph of calcioandyrobertsite
Orthorhombic: *Pnma* structure determined
a 19.576, *b* 10.0536, *c* 9.921 Å
Intense blue; vitreous; transparent
Biaxial (–), α 1.715, β 1.730, γ 1.735, $2V$(meas.) 55°, $2V$(calc.) 60°
7.064(70), 6.642(60), 4.810(70), 4.469(90), 3.950(60), 3.105(100), 2.748(90)

IMA No. **2000–012**
$Bi_2Fe^{3+}(Co,Fe^{3+})(O,OH)_2(OH)_2(AsO_4)_2$ Co-dominant analogue of neustädtelite
Triclinic: $P\bar{1}$ structure determined
a 9.156, *b* 6.148, *c* 9.338 Å, α 83.24, β 70.56, γ 86.91°
Brown; adamantine; transparent to translucent
Biaxial (–), α 2.02, β 2.09(calc.), γ 2.12, $2V$(meas.) 65°
8.757(55), 3.752(100), 3.552(55), 3.507(44), 2.901(96), 2.750(39), 2.667(72)

IMA No. **2000–014**
$Pd_3Pb_2S_2$ Related to parkerite, $Ni_3Bi_2S_2$

Monoclinic: *C*2/*m*
a 11.673, *b* 8.323, *c* 8.419 Å, β 135.38°
Cream with a brownish tint (in reflected light in air); opaque; metallic
In reflected light (air): brownish; internal reflections not observed, anisotropy weak. R_{min} and R_{max}: 45.2–46.1% (460 nm), 46.3–47.2% (540 nm), 47.4–48.5% (580 nm), 49.3–49.8% (640 nm)
5.953(6), 4.144(10), 3.379(4), 2.917(9), 2.413(8), 2.365(7), 2.082(5)

IMA No. **2000–015**
$Na_3Sr(La,Ce)FeSi_6O_{17}$ Nordite group

Orthorhombic: *Pcca*
a 14.440, *b* 5.191, *c* 19.86 Å
Colorless, pale brownish; vitreous; transparent
Biaxial (–), α 1.624, β 1.637, γ 1.644, 2*V*(meas.) 60°, 2*V*(calc.) 72°
7.20(40), 4.21(100), 3.323(82), 2.964(88), 2.873(99), 2.595(58), 2.442(44)

IMA No. **2000–016**
$(Ti,Fe,Mg,Mn)_{1-x}Ti_2O_5$ Pseudobrookite group

Orthorhombic: *Pban*
a 9.765, *b* 3.732, *c* 9.957 Å
Dark grey
In reflected light (air): blue–grey, no internal reflections, anisotropic. R_{min} and R_{max}: 11.5–11.1% (460 nm), 10.3–(10.3)% (540 nm), 10.1–10.2% (580 nm), 10.3–10.4% (640 nm)
3.47(7), 2.75(10), 1.965(3), 1.871(9), 1.727(9), 1.548(3)

IMA No. **2000–017**
$Na_{11}Ca_9(Fe^{3+},Fe^{2+})_2Zr_3Nb[Si_{25}O_{73}](OH,H_2O,Cl,O)_5$ Eudialyte group
Trigonal: *R*3*m* structure determined
a 14.255, *c* 30.170 Å
Dark brown to brownish black; vitreous; translucent
Uniaxial (–), ω 1.616, ε 1.620
6.43(39), 4.31(69), 3.218(56), 3.036(42), 2.977(81), 2.854(100), 2.602(44)

IMA No. **2000–018**
$VOSO_4(H_2O)_5$ Polymorph of minasragrite structure determined
Orthorhombic: $Pmn2_1$
a 7.246, *b* 9.333, *c* 6.210 Å
Bright blue to pale blue; vitreous
Biaxial(–), α 1.529, β 1.534, γ 1.534, 2*V*(meas.) 2°, 2*V*(calc.) 0°
4.70(100), 3.734(20), 3.322(50), 2.865(40), 2.602(30), 2.363(20), 2.030(20)

IMA No. **2000–019**
$Cu_5(UO_2)_6(SO_4)_3(OH)_{16}\cdot 14H_2O$ Second natural uranyl sulfate
Triclinic: *P*1 or $P\bar{1}$
a 13.754, *b* 9.866, *c* 8.595 Å, α 103.84, β 90.12, γ 106.75°
Grey olive; opaque
Biaxial (+), α 1.725, β 1.730, γ 1.787, 2*V*(calc.) 33.8°
9.13(100), 7.09(26), 5.511(22), 4.566(80), 3.443(17), 3.367(15), 3.046(26)

IMA No. **2000–020**
$Fe_4[AsO_3OH]_5[AsO_2(OH)_2]_2\cdot 20\ H_2O$

Orthorhombic
a 10.676, *b* 19.027, *c* 10.012 Å
White-beige; aggregates are earthy; opaque
n 1.615 (calc.)
9.50(100), 9.31(85), 6.81(24), 5.45(23), 4.221(35), 3.586(39), 3.302(24)

IMA No. **2000–021**
$Ca_3(Si,Fe^{3+},Al)[SO_4][B(OH)_4](OH,O)_6\cdot 12H_2O$ Ettringite group
Trigonal (pseudo-hexagonal): *P*31*c* (by analogy)
a 11.14, *c* 20.99 Å
Light grey with violet shade; vitreous, earthy in aggregates; translucent
Uniaxial (+), ω 1.523, ε 1.532
9.70(8), 3.85(6), 3.040(8), 2.736(6), 2.596(10), 2.374(6), 2.121(9)

IMA No. **2000–022**
$Ca_2Mn^{2+}Fe^{3+}Si_4O_{12}(OH)(H_2O)_2$ Four-membered silicate rings
Triclinic: $P\bar{1}$ structure determined
a 9.960, *b* 13.875, *c* 6.562 Å, α 133.19, β 101.50, γ 66.27°
Dark brown (clusters), light brown (thinner crystals); vitreous
Biaxial (–), α 1.667, β 1.679, γ 1.690, 2*V*(meas.) 89°, 2*V*(calc.) 87°
9.07(100), 8.24(90), 5.00(30), 3.192(30), 3.126(70), 3.095(70), 2.781(60)

IMA No. **2000–023**
$Ba_6Fe^{3+}{}_3Si_8O_{23}(CO_3)_2Cl_3\cdot H_2O$ Unique structure

Trigonal: *P*3*m*1
a 10.740, *c* 7.0950 Å
Jet black to a dirty grey-brown; vitreous to adamantine; opaque to translucent
Uniaxial (–), ω 1.723, ε 1.711
3.892(100), 3.148(40), 2.820(90), 2.685(80), 2.208(40), 2.136(40), 1.705(35)

IMA No. **2000–024**
$Na_2BeSi_4O_{10}•4H_2O$ Four-membered and eight-membered silicate rings
Orthorhombic: $P2_12_12_1$ structure determined
a 9.722, *b* 10.142, *c* 12.030 Å
Colorless, whitish; vitreous; transparent
Biaxial (+), α 1.499, β 1.507, γ 1.511, 2*V*(meas.) 65°, 2*V*(calc.) 70°
6.11(80), 5.97(100), 5.07(35), 3.46(45), 3.09(70), 3.06(50), 2.988(60)

IMA No. **2000–025**
$(Sr,Ca)_2Na[Al_5Si_5O_{20}]•7H_2O$ Thomsonite-series zeolite
Orthorhombic: *Pcnn* structure determined
a 13.050, *b* 13.123, *c* 13.241 Å
Colorless; vitreous; transparent
Biaxial (+), α 1.528, β 1.532, γ 1.540, 2*V*(meas.) 62°, 2*V*(calc.) 71°
6.63(7), 4.66(8), 3.49(9), 3.19(8), 2.960(10), 2.860(10), 2.691(10)

IMA No. **2000–026**
$(Mn,Li)_4(Ta,Sn)_4(Ta,Nb)_8O_{32}$ Wodginite group

Monoclinic: *C*2/*c*
a 9.5104, *b* 11.5196, *c* 5.1179 Å, β 91.221(48)°
Reddish brown; vitreous; translucent
$n > 2.0$
3.644(46), 2.976(100), 2.966(95), 2.465(36), 1.767(17), 1.715(23), 1.455(18)

IMA No. **2000–027**
$Sr_4TiTi_4Si_4O_{22}$ Perrierite group

Monoclinic: $P2_1/a$ (pseudo-*C*2/*m*)structure determined
a 13.848, *b* 5.626, *c* 11.878 Å, β 114.19°
Grey with a blue tint; adamantine; transparent
Pale green with a yellow tint in thin section
3.62(60), 3.16(70), 3.09(95), 3.01(90), 2.96 (95), 2.71(100), 2.17(90)

IMA No. **2000–028**
$Na_{27}K_8Ca_{12}Fe_3Zr_6Si_{52}O_{144}(O,OH,H_2O)_6Cl_2$ Eudialyte group
Trigonal: *R*3*m* structure determined
a 14.249, *c* 60.969 Å
Pink; vitreous; transparent
Uniaxial (+), ω 1.598, ε 1.600
6.48(47), 4.345(81), 3.565(41), 3.249(57), 2.987(100), 2.861(70), 2.695(40)

IMA No. **2000–029**
$Cu_5Cl_2(OH)_8(H_2O)_2$ Similar to atacamite structure determined
Monoclinic: *C*2/*m*
a 10.301, *b* 6.758, *c* 8.835 Å, β 111.53°
Pale blue; vitreous; transparent
Biaxial (–), α 1.724, β 1.745, γ 1.750, 2*V*(meas.) 33°, 2*V*(calc.) 52°
8.20(100), 5.52(100), 5.03(40), 2.883(80), 2.693(40), 2.263(40), 2.188(50), 1.767(40)

IMA No. **2000–030**
$CaMg_3(Al_5Mg)(Si_6O_{18})(BO_3)_3(OH)_3(OH)$ Tourmaline group
Trigonal: *R*3*m* structure determined
a 15.954, *c* 7.214 Å
Orange; vitreous; transparent
Uniaxial (–), ω 1.646, ε 1.624
6.38(50), 4.981(50), 4.596(50), 4.234(90), 3.978(100), 3.491(70), 2.969(80), 2.582(90)

IMA No. **2000–031**
$K_2Mn(Nb,Ti)_4(Si_4O_{12})_2(OH)_4•6H_2O$ Labuntsovite group
Monoclinic: *C*2/*m* structure determined
a 14.551, *b* 14.001, *c* 15.702 Å, β 117.6°
Brown to pink; vitreous; translucent
Biaxial (+), α 1.683, β 1.692, γ 1.775, 2*V*(meas.) 40°, 2*V*(calc.) 38°
6.99(100), 6.43(25), 4.936(28), 3.227(89), 3.123(68), 2.607(25), 2.520(29)

IMA No. **2000–032**
$Mg_3(PO_4)_2•22H_2O$–1*A*2 Synthetic equivalent

Triclinic: $P\bar{1}$
a 6.932, *b* 6.925, *c* 16.154 Å, α 82.21, β 89.70, γ 119.51°
Colorless; vitreous; transparent
Biaxial (–), α 1.459, β 1.470, γ 1.470, 2*V*(meas.) 25°, 2*V*(calc.) 0°
7.98(100), 5.32(63), 3.19(45), 2.896(33), 2.867(30), 2.728(32), 2.658(37)

IMA No. **2000–033**
$(Ba,Na,K)(Al,Mg)_2(Si,Al)_4O_{10}(OH)_2$ Mica group

Monoclinic: *C*2/*c*
a 5.2068, *b* 9.027, *c* 19.963 Å, β 95.87°
Light grey to silver; glassy; transparent
Biaxial (–), α(calc.) 1.600, β 1.619, γ 1.622, 2*V*(meas.) 43°
4.471(22), 4.302(21), 3.879(26), 3.730(27), 3.487(23), 2.596(46), 2.566(100), 1.504(63)

IMA No. **2000–034**
$(UO_2)_2CO_3(OH)_2•4H_2O$ Unique composition

Monoclinic: $P2_1/c$
a 4.1425, *b* 14.098, *c* 18.374 Å, β 103.62°
Canary yellow; vitreous; transparent
Biaxial (–), α 1.583, β 1.669, γ 1.712, 2*V*(calc.) 67.4°
8.95(65), 7.54(63), 4.546(96), 4.262(60), 3.463(62), 3.322(100), 3.029(85), 2.273(62)

IMA No. **2000–035**
$Na_2Ba_2FeTiSi_2O_7(CO_3)(OH)_3F$ Unique structure

Triclinic: *P*1
a 5.399, *b* 7.016, *c* 16.254 Å, α 102.44, β 93.18, γ 90.10°
Yellowish brown; vitreous or pearly; translucent
Biaxial (+), α 1.671, β 1.694, γ 1.734, 2*V*(meas.) 71°, 2*V*(calc.) 76°
3.910(44), 3.186(100), 3.055(38), 2.797(29), 2.738(62), 2.695(32), 2.677(29)

IMA No. **2000–036**
$Zn_2Mg_2Fe_4Sb_2O_{14}(OH)_2$ Isostructural with nolanite

Hexagonal: $P6_3/mmc$, $P6_3mc$ or $P\bar{6}2c$
a 5.9899, *c* 9.353 Å
Black; submetallic; opaque
In reflected light: grey with no internal reflections, anisotropy moderate. R_{min} and R_{max}: 12.21–13.62% (460 nm), 11.78–12.92% (540 nm), 11.67–12.67% (580 nm), 11.39–12.25% (640 nm)
3.474(34), 2.994(43), 2.673(44), 2.522(100), 1.517(33), 1.497(54)

IMA No. **2000–037**
$Ca_{19}(Al,Mg)_{13}[SiO_4]_{10}[Si_2O_7]_4(F,OH)_{10}$ F-analogue of vesuvianite
Tetragonal: *P*4/*nnc* structure determined
a 15.510, *c* 11.779 Å
Colorless to silky white; vitreous; transparent
Uniaxial (–), ω 1.702, ε 1.699
3.465(30), 3.040(30), 2.945(35), 2.743(90), 2.589(50), 2.453(100)

IMA No. **2000–038**
$(Fe,Ni)_2P$ Isostructural with rhodarsenide structure determined
Orthorhombic: *Pnma*
a 5.748, *b* 3.548, *c* 6.661 Å
Light straw-yellow; metallic; opaque
In reflected light: creamy with no internal reflections, anisotropy distinct. R_{min} and R_{max}: 36.8–46.7% (460 nm), 39.2–48.2% (540 nm), 40.7–49.6% (580 nm), 43.0–51.9% (640 nm)
2.238(100), 2.120(80), 2.073(70), 1.884(50), 1.843(40), 1.788(40), 1.774(40), 1.758(40)

IMA No. **2000–039**
$Ca_2(C_2O_4)Cl_2•2H_2O$ New structure-type

Monoclinic: *I*2/*m*
a 6.933, *b* 7.372, *c* 7.446 Å, β 94.5°
Colorless; vitreous; transparent
Biaxial (–), α 1.565, β 1.645, γ 1.725, 2*V*(meas.) 88°, 2*V*(calc.) 86°
5.24(60), 3.670(30), 2.945(100), 2.905(50), 2.619(50), 2.516(40), 2.339(30), 2.323(30)

IMA No. **2000–040**
$Ca_{19}Mn^{3+}(Al, Mn^{3+})_{10}(Mg,Mn^{2+})_2Si_{18}O_{69}(OH)_9$ Mn-dominant analogue of vesuvianite structuredetermined
Tetragonal: *P*4/*n* or *P*4*nc* (or both)
a 15.575, *c* 11.824 Å
Deep maroon-red; vitreous; transparent
Uniaxial (–), ω 1.731, ε 1.719
2.956(100), 2.756(87), 2.756(94), 2.753(60), 2.604(67), 2.598(66), 2.598(62)

IMA No. **2000–041**
$CaCe(Fe^{3+},Fe^{2+},Al)_3[SiO_4][Si_2O_7]O(OH)$ Fe^{3+}-analogue of allanite-(Ce)
Monoclinic: $P2_1/m$ structure determined
a 8.962, *b* 5.836, *c* 10.182 Å, β 115.02°
Black; vitreous to resinous; opaque to translucent
Biaxial (–), α 1.825, β 1.855, γ 1.880, 2V(calc.) 48.2°
3.54(70), 2.93(100), 2.715(80), 2.637(70), 2.155(80), 1.908(70), 1.651(90)

IMA No. **2000–042**
$Mg_6Cr_2(OH)_{16}Cl_2•4H_2O$ Hydrotalcite group structure determined
Trigonal: $R\bar{3}m$
a 3.103, *c* 24.111 Å
Magenta to purple; vitreous to waxy; transparent
Uniaxial (–), ω 1.555, ε 1.535
8.04(100), 4.020(48), 2.624(3), 2.349(5), 2.007(6)

IMA No. **2000–044**
$Cu_{1.6}Pb_{1.6}Bi_{6.4}S_{12}$ Bismuthinite–aikinite derivative structure determined
Orthorhombic: $Pmc2_1$
a 4.007, *b* 44.81, *c* 11.513 Å
Grey; metallic; opaque
In reflected light: greyish white with no internal reflections, anisotropy distinct. R_{min} and R_{max}: 39.15–48.36% (470 nm), 38.26–47.65% (546 nm), 37.23–47.14% (589 nm), 36.55–45.71% (650 nm)
3.631(99), 3.586(55), 3.552(85), 3.156(59), 3.136(95), 2.836(100)

IMA No. **2000–046**
$(Na,H_3O,K,Sr,Ba)_2(Ti,Nb)_2[Si_4O_{12}](OH,O)_2•3H_2O$ Labuntsovite group structure determined

Monoclinic: *Cm*
a 14.604, *b* 14.274, *c* 7.933 Å, β 117.40°
Colorless, white, light brown; vitreous; transparent to translucent
Biaxial (+), α 1.658, β 1.668, γ 1.770, 2*V*(meas.) 25°, 2*V*(calc.) 36°
7.01(44), 6.46(100), 4.991(28), 3.954(30), 3.236(98), 3.179(33), 3.160(38)

IMA No. **2000–047**
$Mg(V^{5+}{}_2O_6)•7H_2O$ Structural relationships to munirite and rossite

Monoclinic: *C*2/*c*
a 38.954, *b* 7.2010, *c* 16.3465 Å, β 97.602°
Light golden-brown; vitreous; translucent
Biaxial (–), α 1.612, β 1.674, γ 1.710, 2*V*(meas.) 78°, 2*V*(calc.) 73°
9.70(100), 8.12(60), 5.84(100), 4.061(50), 3.139(90), 2.920(60), 2.707(50)

IMA No. **2000–048**
$K_6Fe_{24}S_{26}(Cl,S)$ Cl-dominant analogue of bartonite structure determined

Tetragonal: *I*4/*mmm*
a 10.3810, *c* 20.614 Å
Black-brown; submetallic; opaque
In reflected light: yellowish-brown with no internal reflections, no anisotropy. R: 10.2% (460 nm), 13.1% (540 nm), 14.8% (580 nm), 17.1% (640 nm)
9.25(33), 5.97(65), 3.121(45), 2.986(100), 2.380(38), 2.374(57), 1.834(51), 1.830(82)

IMA No. **2000–049**
$NaCa_2Mg_5(Si_7Al)O_{22}F_2$ Amphibole group structure determined

Monoclinic: *C*2/*m*
a 9.8471, *b* 18.0171, *c* 5.2681 Å, β 104.845°
Intense yellow; vitreous to resinous; transparent
Biaxial (–), α 1.606, β 1.617, γ 1.625, 2*V*(calc.) 80.4°
8.40(57), 3.271(48), 3.125(100), 2.938(17), 2.807(33), 2.703(25), 1.894(18)

IMA No. **2000–050**
$KCdCu_7O_2(SeO_3)_2Cl_9$ Similarity to ilinskite structure determined

Hexagonal: $P6_3/mmc$
a 8.7805, *c* 15.521 Å
Dark red; vitreous to metalloid; opaque to translucent
No optical measurements possible, *n* (calc.) 1.804
7.78(100), 6.82(50), 4.391(80), 3.814(80), 3.066(70), 2.582(50), 2.501(60), 2.190(50)

IMA No. **2000–051**
$Ca_2ScSn(Si_2O_7)(Si_2O_6OH)$ Unique structure

Triclinic: *C*1
a 10.028, *b* 8.408, *c* 13.339 Å, α 90.01, β 109.10, γ 90.00°
Colorless to white; vitreous; transparent to translucent
n 1.74
5.18(53), 3.146(100), 3.089(63), 2.901(19), 2.595(34), 2.142(17)

IMA No. **2000–D**
$Ba_2Na(La,Ce)_2Fe^{2+}Ti_2Si_8O_{26}(OH,O,F)•H_2O$ Joaquinite group

Orthorhombic: probably *Ccmm*
a 10.539, *b* 9.680, *c* 22.345 Å
Brown; silky; transparent
Biaxial (+), α 1.754, β1.760, γ 1.797, 2V(meas.) 40°, 2V(calc.) 45°
5.58(67), 3.00(9), 2.95(17), 2.91(10), 2.80(100), 2.232(8), 1.596(13)

Proposals Approved in Previous Years

IMA No. **1999–033**
$(Ca,Y)_3Al[PO_3OH,CO_3](CO_3)(OH)_6•12H_2O$ Ettringite group

Hexagonal: $P6_3$ structure determined
a 10.828, *c* 10.516 Å
Colorless to white; vitreous; transparent
Uniaxial (–), ω 1.532, ε 1.503
9.38(100), 4.59(70), 3.77(50), 3.36(55), 2.491(80), 2.143(65)

IMA No. **1998–011**
$(Fe^{2+},Fe^{3+},Mg)_{11}(PO_4)_2O_2(OH)_{16}•4H_2O$ New structure-type

Monoclinic: $P2_1/n$
a 16.950, *b* 11.650, *c* 6.2660 Å, β 90.000°
Dark green; vitreous; translucent
Biaxial (–), α 1.722, β 1.730, γ 1.737, 2*V*(meas.) > 50, 2*V*(calc.) 86°
9.61(53), 6.87(77), 5.83(89), 4.805(100), 3.787(62), 3.533(84), 2.868(66)

IMA No. **1998–029**
$(Ce,REE,Ca)_4(Mg,Fe^{2+})(Cr,Fe^{3+})_2(Ti,Nb)_2Si_4O_{22}$ Cr-dominant analogue of chevkinite-(Ce) structure determined

Monoclinic: *C*2/*m*
a 13.397, *b* 5.697, *c* 11.041 Å, β 100.53°
Black; resinous; translucent in thin fragments
In reflected light: grey with weak brown internal reflections, no anisotropy. R: 11.2% (470 nm), 10.9% (546 nm), 10.7% (589 nm), 10.3% (650 nm)
5.44(40), 3.62(35), 3.18(50), 3.15(40), 3.12(35), 2.849(40), 2.715(100), 2.160(45)

IMA No. **1998–050**
$Na_4K_4[Ba_2(H_2O,OH)_2]$ Labuntsovite group
$Mg[Ti_8(Si_4O_{12})_4(O,OH)_8]\cdot 8H_2O$ structure determined

Monoclinic: *C*2/*m*
a 14.292, *b* 13.750, *c* 7.792 Å, β 117.03°
Colorless, yellowish, pink or light orange; vitreous; translucent or transparent
Biaxial (+), α 1.688, β 1.692, γ 1.802, 2*V*(meas.) 37°, 2*V*(calc.) 36°
6.94(51), 3.175(100), 3.093(57), 3.083(55), 3.024(51), 2.576(48)

IMA No. **1998–051**
$Na_4K_4[Ba_2(H_2O,OH)_2]Fe[Ti_8(Si_4O_{12})_4(O,OH)_8]\cdot 8H_2O$
Labuntsovite group
Monoclinic: *C*2/*m* structure determined
a 14.249, *b*13.791, *c* 7.777 Å, β 116.82°
Orange; vitreous; translucent or transparent
Biaxial (+), α 1.686, β 1.696, γ 1.835, 2*V*(meas.) 32°, 2*V*(calc.) 32°
6.95(56), 6.35(34), 3.169(100), 3.100(53), 3.032(53), 2.585(58)

IMA No. **1998–052**
$Na_2K_2Ba_{1-x}Ti_4(Si_4O_{12})_2(O,OH)_4\cdot 5H_2O$ Labuntsovite group
Monoclinic: *C*2/*m* structure determined
a 14.216, *b* 13.755, *c* 7.767 Å, β 116.7°
Bright orange to reddish orange; vitreous; transparent
Biaxial (+), α 1.683, β 1.690, γ 1.820, 2*V*(meas.) 37°, 2*V*(calc.) 28°
6.93(26), 6.31(28), 3.16(100), 3.09(24), 3.02(25), 2.577(25)

IMA No. **1997–016**
$MnNa_3P_3O_{10}\cdot 12H_2O$

Monoclinic: $P2_1/n$
a 14.71, *b* 9.33, *c* 15.13 Å, β 89.8°
Colorless; vitreous; transparent
Biaxial (–), α 1.453, γ 1.459, 2*V* and β not measured
10.50(75), 7.36(100), 3.316(60), 3.162(50), 2.889(60), 2.391(48)

IMA No. **1988–047**
$Bi_{8-x}(Se,Te,S)_{7+x}$ Tetradymite group

Trigonal: $P\bar{3}m1$, *P*3*m*1, *P*321
a 4.292, *c* 87.18 Å
Steel-grey; metallic; opaque
In reflected light: light yellow, no internal reflections, anisotropy moderate. R_{min} and R_{max}: 49.9–52.9% (470 nm), 50.6–54.5% (546 nm), 51.0–54.6% (589 nm), 51.2–54.7% (650 nm)
7.35(27), 4.604(80), 3.354(18), 3.131(100), 2.291(29), 2.146(19), 2.112(18), 1.9377(43)

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New minerals approved in 2001 by the Commission on New Minerals and Mineral Names International Mineralogical Association

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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.
Chemical formula (any relationship to other minerals; structure analysis)
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.

2001 Proposals

IMA No. **2001-001**
$SmPO_4$ Monazite group; structure determined
Monoclinic: $P2_1/n$
a 6.725, *b* 6.936, *c* 6.448 Å, β 104.02°
Yellowish; vitreous to greasy
Biaxial (+), α 1.768, β 1.771, γ 1.808, 2V(meas.) 29°, 2V(calc.) 32°
5.19(40), 4.65(50), 4.16(80), 3.492(40), 3.264(70), 3.065(100), 2.857(90)

IMA No. **2001-002**
$Cu_{17}Bi_{17}S_{35}$ Related to cuprobismutite
Monoclinic: C2/*m* (15)
a 35.054, *b* 3.91123, *c* 43.192 Å, β 96.713°
Lead grey; metallic; opaque
In reflected light (oil with N_D=1.515): dark brown; internal reflectance: not observed; weakly anisotropic. R_{min} and R_{max}: 40.6–42 % (460 nm), 41.1–43 % (540 nm), 41.1–43.15 % (580 nm), 40.9–43.4 % (640 nm)
5.36(40), 4.08(50), 3.904(37), 3.585(34), 3.120(40), 3.104 (68), 2.759(53), 2.752(44), 1.956(100)

IMA No. **2001-004**
$CaCu_6[(PO_4)_2(PO_3OH)(OH)_6]\cdot 3H_2O$ Mixite group
Hexagonal: $P6_3/m$
a 13.284, *c* 5.902 Å
Olive green; vitreous; translucent to transparent
Uniaxial (+), ω 1.674, ε >1.739 (~1.75)
11.51(100), 4.35(88), 4.14(46), 3.837(38), 3.321(44), 2.888(53), 2.877(37)

IMA No. **2001-005**
$PdSe_2$ New structure-type
Monoclinic: *C*2/*m*
a 6.659, *b* 4.124, *c* 4.438 Å, β 92.76°
Black; metallic; opaque
In reflected light (air): white; internal reflectance: none; moderate anisotropy. R_{min} and R_{max}: 47.7–51.8 % (460 nm), 48.8–53.0 % (540 nm), 48.5–55.0 % (580 nm), 48.7–56.9 % (640 nm)
4.42(30), 3.496(30), 2.718(100), 2.063(20), 1.955(50), 1.896(50), 1.815(20)

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IMA No. **2001-006**
$K_2Zn(Nb,Ti)_4(Si_4O_{12})_2(O,OH)_4 \cdot 6H_2O$
Labuntsovite group; structure determined
Monoclinic: *C*2/*m*
a 14.535, *b* 13.927, *c* 15.665 Å, β 117.6°
Pink, pinkish-brown, white; vitreous; translucent
Biaxial (+), α 1.683, β 1.688, γ 1.785, 2V(meas.) 45°, 2V(calc.) 27°
6.96(100), 6.43(24), 4.92(30), 3.222(84), 3.114(66), 2.514(30), 1.430(22)

IMA No. **2001-007**
$(K,Ba)_2Fe(Ti,Nb)_4(Si_4O_{12})_2(O,OH)_4 \cdot 7H_2O$
Labuntsovite group; structure determined
Monoclinic: *C*2/*m*
a 14.410, *b* 13.880, *c* 15.587 Å, β 117.53°
Orange to reddish-orange; vitreous; translucent
Biaxial (+), α 1.687, β 1.689, γ 1.805, 2V(meas.) 22°, 2V(calc.) 16°
6.96(100), 6.43(24), 4.92(30), 3.222(84), 3.114(66), 2.514(30), 1.430(22)

IMA No. **2001-008**
$KAlSiO_4$ Close to kalsilite; structure determined
Hexagonal: $P6_3$
a 18.106, *c* 8.462 Å
Colourless; vitreous; transparent
Uniaxial (–), ω 1.538, ε 1.531
3.18(50), 3.091(100), 2.612(70), 1.674(50), 1.585(50), 1.516(50), 1.240(60)

IMA No. **2001-009**
$K_2(H_2O)_2(Fe,Mn)[(Nb,Ti)_4(Si_4O_{12})_2(O,OH)_4] \cdot 4H_2O$
Labuntsovite group; structure determined
Monoclinic: *C*2/*m*
a 14.529, *b* 13.943, *c* 7.837 Å, β 117.61°
Pale yellow, yellow, orange yellow; vitreous to waxy; translucent, rarely transparent
Biaxial (+): α 1.6676, β 1.7001, γ 1.794, 2V(meas.) 58.5°, 2V(calc.) 63.71°
6.92(80), 6.42(50), 4.94(70), 3.225(100), 3.114(80), 3.069(20), 2.512(50)

IMA No. **2001-010**
$(Ag_3Hg)(V,As)O_4$ New structure-type
Tetragonal: $I\bar{4}$
a 7.727, *c* 4.648 Å
Red, brownish red; adamantine; translucent
Uniaxial (+), ω~ 2.3, ε ~2.5
5.45(25), 2.772(100), 2.735(100), 2.324(30), 2.254(20), 1.728(15), 1.683(15)

IMA No. **2001-012**
$CsNa_6[Be_2(Si,Al)_{18}O_{39}F_2]$
Related to leifite; structure determined
Trigonal: *P*3
a 14.3770, *c* 4.8786 Å
White; vitreous; transparent
Uniaxial (+), ω 1.526, ε 1.531
6.23(35), 4.15(50), 3.456(40), 3.382(75), 3.162(100), 3.113(36), 2.465(30)

IMA No. **2001-013**
$ZrSiO_4$ Scheelite structure
Tetragonal: $I4_1/a$
a 4.738, *c* 10.506 Å
White; adamantine; translucent
Indices >> 1.64, maximum birefringence roughly 0.015
4.30(40), 3.29(40), 2.81(100), 2.065(50), 1.805(30), 1.755(60), 1.55(45), 1.437(50)

IMA No. **2001-014**
$CaSr(Mn^{3+}, Fe^{3+})_2Al[Si_3O_{12}](OH)$
Epidote group; structure determined
Monoclinic: $P2_1/m$
a 8.900, *b* 5.700, *c* 10.350 Å, β 114.50°
Deep red; vitreous; transparent
Biaxial (+), average refractive index η = 1.825
3.513(50), 2.936(100), 2.854(40), 2.703(80), 2.586(80), 2.415(30), 2.182(80)

IMA No. **2001-015**
$Cu_{2.68}Pb_{2.68}Bi_{5.32}S_{12}$
Derivative of bismuthinite; structure determined
Orthorhombic: $Pmc2_1$
a 4.0285, *b* 44.986, *c* 11.599 Å
Tin white; metallic; opaque
In reflected light (air): white; internal reflectance: none; moderate anisotropy. R_{min} and R_{max}: 39.52–46.88 % (460 nm), 39.26–48.06 % (540 nm), 39.02–48.34 % (580 nm), 38.51–47.35 % (640 nm)
4.04(49), 3.656(100), 3.605(49), 3.567(81), 3.174(71), 3.152(78), 2.852(95)

IMA No. **2001-016**
$Cu_{1.7}Pb_{1.7}Bi_{6.3}S_{12}$
Derivative of bismuthinite; structure determined
Orthorhombic: *Pmcn*
a 4.0070, *b* 55.998, *c* 11.512 Å
Tin white; metallic; opaque
In reflected light (air): white; internal reflectance: none; distinct anisotropy. R_{min} and R_{max}: 38.32–48.16 % (460 nm), 37.42–48.56 % (540 nm), 36.93–48.09 % (580 nm), 36.20–46.69 % (640 nm)
4.01(56), 3.63(100), 3.58(55), 3.55(85), 3.155(57), 3.136(92), 2.836(93), 2.560(41)

IMA No. **2001-017**
$Cu_{3.4}Fe_{0.6}Bi_5S_{10}$
Cuprobismutite series; structure determined
Monoclinic: *C2/m*
a 17.512, *b* 3.9103, *c* 12.869 Å, β 108.57°
Grey; metallic; opaque
In reflected light (air): greyish white; internal reflectance: none; moderate anisotropy. R_{min} and R_{max}: 33.48–40.29 % (460 nm), 33.90–41.06 % (540 nm), 34.15–41.28 % (580 nm), 34.26–41.42 % (640 nm)
6.03(42), 3.596(68), 3.239(34), 3.213(44), 3.128(100), 3.071(70), 2.683(48)

IMA No. **2001-018**
$TlAl[SO_4]_2 \cdot 12H_2O$
Cubic: *Pa*3

a 12.212 Å
Light yellow to white; vitreous; transparent
Isotropic; η 1.495
7.03(54), 6.11(27), 4.31(100), 3.676(22), 3.524(24), 2.801(70), 2.731(35)

IMA No. **2001-019**
$[Ca_3(REE)]_4(REE)_2Al\square_2[Si_4B_4O_{22}](OH,F)_2$
Hellandite group; structure determined
Monoclinic: *P2/a*
a 19.068, *b* 4.745, *c* 10.289 Å, β 111.18°
Pale-brown; vitreous; transparent
Biaxial (–); *cf.* 2001-020
3.238(50), 2.916(35), 2.855(56), 2.652(100), 2.635(73), 1.905(49), 1.901(41)

IMA No. **2001-020**
$Ca_4(Ca,Ce)_2AlBe_2[Si_4B_4O_{22}](O)_2$
Hellandite group; structure determined
Monoclinic: *P2/a*
a 19.032, *b* 4.746, *c* 10.248 Å, β 110.97°
Brownish; vitreous; transparent
Biaxial (–), α 1.680(5), β 1.694(2), γ 1.708(5), 2V(meas.) ~90°, 2V(calc.) 89.3°
3.238(39), 3.080(41), 2.916(41), 2.855(48), 2.644(100), 2.635(80), 1.905(46)

IMA No. **2001-021**
$Ca_4[(Th,U)(REE)]_2Al\square_2[Si_4B_4O_{22}](OH,F)_2$
Hellandite group; structure determined
Monoclinic: *P2/a*
a 19.059, *b* 4.729, *c* 10.291 Å, β 111.33°
Pale-brown; vitreous; transparent
Biaxial (–), *cf.* 2001-020
4.729(72), 3.454(79), 3.089(86), 2.846(100), 2.653(80), 2.648(79), 2.634(84)

IMA No. **2001-022**
$Pb_2Fe^{3+}(VO_4)_2(OH)$ Mn-free brackebuschite
Monoclinic: $P2_1/m$
a 7.66, *b* 6.12, *c* 8.93 Å, β 112.0°
Red-orange to red-brown; vitreous or adamantine; translucent to transparent
Refractive index > 2.1
4.89(43), 4.17(34), 3.253(100), 3.062(25), 2.989(48), 2.755(48), 2.450(20)

IMA No. **2001-023**
$(Ca,K,Na,Sr,Ba)_{48}[(Ti,Nb,Fe,Mn)_{12}(OH)_{12}Si_{48}O_{144}]$
$(F,OH,Cl)_{14}$ Close to astrophyllite
Monoclinic: *P**/* *c* unique axis
a 14.069, *b* 24.937, *c* 44.31 Å, β 95.02°
Light-brown, yellow; silky; semitransparent
Biaxial (–), α 1.631, β 1.641, γ 1.647, 2V(calc.) 75°
12.33(51), 6.199(42), 3.127(65), 3.110(52), 2.990(59), 2.940(45), 2.835(100)

IMA No. **2001-024**
CaV_3O_7
Orthorhombic: *Pnam*
a 10.42, *b* 5.28, *c* 10.34 Å
Pale olive green; vitreous; transparent
η ~2
5.16(m), 3.45(w), 3.00(s), 2.88(w), 1.85(m)

IMA No. **2001-026**
$Ca(Mn^{3+},Mg,\square)_2(AsO_4)_2(OH,H_2O)_2$
Tsumcorite group; structure determined
Monoclinic: *C2/m*
a 9.043, *b* 6.2314, *c* 7.3889 Å, β 116.392°
Brown-red to dark reddish orange; vitreous; transparent
Biaxial (+), α 1.785, β 1.814, γ 1.854, 2V(meas.) ~85°, 2V(calc.) 82°
4.93(80), 3.182(100), 2.927(70), 2.822(70), 2.718(80), 2.555(100), 2.134(70)

IMA No. **2001-027**
$(Y,REE)_4Cu(CO_3)_4Cl(OH)_5\cdot 2H_2O$
Monoclinic: *P*2, *Pm*, or *P2/m*
a 8.899, *b* 22.77, *c* 8.589 Å, β 120.06°
Intense royal blue turquoise-blue; pearly on cleavages; transparent
Biaxial (–), α 1.608, β ~ γ 1.638°
22.78(30), 7.46(30), 7.09(50), 6.24(100), 4.22(30), 3.530(40), 3.336(30)

IMA No. **2001-028**
$(Na,Ca,K)_2Ca(Nb,Ti)_4(Si_4O_{12})_2(O,OH)_4\cdot 7H_2O$
Labuntsovite group; structure refined
Monoclinic: *C2/m*
a 14.641, *b* 14.214, *c* 7.9148 Å, β 117.36°
White; vitreous; translucent
Biaxial (+), α 1.656, β 1.662, γ 1.755, 2V(meas.) 30°, 2V(calc.) 29.7°
7.10(73), 7.03(100), 6.48(45), 5.00(74), 3.253(38), 3.171(56), 3.150(38)

IMA No. **2001-029**
$Cu(CH_3COO)_2\cdot H_2O$ Structure determined
Monoclinic: *C2/c*
a 13.162, *b* 8.555, *c* 13.850 Å, β 117.08°
Bluish green; vitreous; transparent
Biaxial (+), α 1.533, β 1.541, γ 1.554, 2V(meas.) 85°, 2V(calc.) 76°
6.92(100), 6.18(14), 5.87(9), 5.38(10), 3.592(11), 3.532(28), 2.278(10)

IMA No. **2001-030**
$CaCu(CH_3COO)_4\cdot 6H_2O$
Tetragonal: *I*4/*m*
a 11.155, *c* 16.236 Å
Deep sky blue; vitreous; translucent
Uniaxial (+), ω 1.439, ε 1.482
9.30(6), 8.13(8), 7.90(100), 5.59(15), 3.530(20), 3.042(3), 2.497(4)

IMA No. **2001-031**
$Pb_2Al(PO_4)(VO_4)(OH)$
Brackebuschite group; structure determined
Monoclinic: $P2_1/m$
a 7.734, *b* 5.814, *c* 8.69 Å, β 112°

Bright-yellow; vitreous; translucent
Biaxial (–), α 1.99, β 2.03, γ 2.06, 2V(meas.) large, 2V(calc.) 80°
4.68(80), 3.57(50), 3.21(100), 2.91(80), 2.71(70), 2.27(40), 2.05(50)

IMA No. **2001-032**
$NaLi_2(Fe^{3+}{}_2Mg_2Li)Si_8O_{22}(OH)_2$
Amphibole group; structure determined
Monoclinic: *C*2/*m*
a 9.501, *b* 17.866, *c* 5.292 Å, β 102.17°
Black; vitreous; translucent
Biaxial (–), α 1.695, β 1.700, γ 1.702, 2V(meas.) 125°, 2V(calc.) 116°
8.25(29), 4.47(22), 3.050(100), 2.747(31), 2.711(37), 1.642(39), 1.394(32)

IMA No. **2001-033**
$(Cu,Ag)Pb_{10}Sb_{12}S_{27}(Cl,S)_{0.6}O$
Zinkenite group; structure determined
Monoclinic: *C*2/*m*
a 55.824, *b* 4.0892, *c* 24.128 Å, β 113.14°
Black; metallic; opaque
In reflected light (air): R (polarisation direction perpendicular to the elongation of the measured crystal): 38.6 % (460 nm), 37.4 % (540 nm), 37.0 % (580 nm), 35.3 % (640 nm)
4.01(25), 3.423(100), 2.779(22), 2.274(32), 2.225(43), 2.142(21), 2.081(23)

IMA No. **2001-034**
$(Pb,Sr)(Y,Mn)Fe_2(Ti,Fe)_{18}O_{38}$
Crichtonite group; structure determined
Trigonal: $R\,\overline{3}$
a 10.411, *c* 20.97 Å
Black; metallic; opaque
In reflected light (air): black; internal reflectance: none; very weak anisotropy; R: 19.2 % (470 nm), 17.9 % (546 nm), 17.6 % (589 nm), 17.4 % (650 nm)
3.002(100), 2.892(70), 2.852(50), 2.258(70), 2.147(50), 1.809(60), 1.606(95)

IMA No. **2001-035**
$Hg^{2+}Hg^{1+}{}_{10}O_4I_2(Cl_{1.16}Br_{0.84})_{\Sigma 2}$ New structure-type
Triclinic: $A\,\overline{1}$
a 7.0147, *b* 11.8508, *c* 12.5985 Å, α 115.583, β 82.575, γ 100.619°
Very dark red to black; vitreous to adamantine to submetallic; opaque to translucent
In reflected light (air): bluish white; internal reflectance: deep red to purplish red; moderate anisotropy. R_{min} and R_{max}: 27.40–29.85 % (460 nm), 24.60–27.70 % (540 nm), 23.10–25.90 % (580 nm), 21.80–24.00 % (640 nm)
6.52(30), 5.28(50), 3.143(90), 3.005(70), 2.885(100), 2.675(90), 2.508(40)

IMA No. **2001-036**
$(K,Na)Ca_2(Mg,Fe^{2+})_4Al(Si_6Al_2O_{22})(Cl,OH)_2$
Amphibole group
Monoclinic: *C*2/*m*
a 9.843, *b* 18.130, *c* 5.362 Å, β 105.5°
Black; vitreous; opaque
Biaxial (–), α 1.675, β 1.687, γ 1.690, 2V(meas.) 65°, 2V(calc.) 53°
8.42(80), 3.12(30), 2.951(30), 2.714(100), 2.562(70), 1.444(30)

IMA No. **2001-037**
$K_2Zn(Ti,Nb)_4(Si_4O_{12})_2(OH,O)_4\cdot 6–8H_2O$
Labuntsovite group; structure determined
Monoclinic: *Cm*
a 14.43, *b* 13.898, *c* 7.797 Å, β 117.4°
Colourless, white, greyish, pale-pink, light-brown; vitreous; transparent to translucent
Biaxial (+), α 1.680, β 1.688, γ 1.785, 2V(meas.) 25°, 2V(calc.) 33°.
6.97(100), 3.20(90), 3.10(80), 2.59(40), 2.48(50), 1.734(40), 1.695(40), 1.422(60)

IMA No. **2001-038**
$CaK_2Mn(Ti,Nb)_4(Si_4O_{12})_2(O,OH)_4\cdot 5H_2O$
Labuntsovite group; structure determined
Monoclinic: *Cm*
a 14.30, *b* 13.889, *c* 7.760 Å, β 117.51°
Pale yellowish-pink; vitreous; transparent
Biaxial (+), α 1.688, β 1.700, γ 1.805, 2V(meas.) 35°, 2V(calc.) 39°
7.0(70b), 6.33(50), 3.22(90), 3.05(100), 2.57(50), 2.48(60), 1.520(30), 1.428(30)

IMA No. **2001-039**
$NaFe^{2+}{}_6Al_3(SO_4)_2(OH)_{18}(H_2O)_{12}$
Halotrichite group; structure determined
Trigonal: $R\,\overline{3}$
a 9.347, *c* 33.000 Å
Green; dull; transparent
Uniaxial (–), ω 1.560(1), ε not measurable
10.98(100), 5.54(60), 4.31(20), 3.67(50), 2.624(25), 2.425(30), 2.176(20), 1.932(30)

IMA No. **2001-040**
$VO(SO_4)(H_2O)_5$
Polymorph of minasragrite; Structure determined
Triclinic: $P\,\overline{1}$
a 7.533, *b* 7.792, *c* 7.818 Å, α 78.96, β 71.86, γ 65.41°
Pale blue; vitreous; transparent
Biaxial (+), α 1.548, β 1.555, γ 1.574, 2V(meas.) 86°, 2V(calc.) 63°
7.05(80), 6.62(100), 5.314(30), 4.12(80), 3.71(80), 3.21(70), 2.934(50), 2.555(30)

IMA No. **2001-041**
$Na_{15}Sr_{12}Zr_{14}Si_{42}B_6O_{138}(OH)_6\cdot 12H_2O$
Benitoite group; structure determined
Hexagonal: $P6_3cm$
a 19.720, *c* 7.9148 Å
Grey, pale green, and brown; vitreous; translucent
Uniaxial (+), ω 1.627, ε 1.645
9.87(23), 6.46(38), 5.43(33), 3.96(51), 3.76(49), 3.30(23), 3.13(70), 2.752(100)

IMA No. **2001-042**
$(La,Ce,Ca)_9(Mg,Fe^{+3})(SiO_4)_6[SiO_3(OH)](OH)_3$
La-dominant analogue of cerite-(Ce); structure determined
Trigonal: *R*3*c*
a 10.7493, *c* 38.318 Å
Light-yellow to pinkish-brown; vitreous; translucent
Uniaxial (+), ε 1.820, ω 1.810
3.47(40), 3.31(38), 2.958(100), 2.833(37), 2.689(34), 1.949(34)

IMA No. **2001-043**
$Na_2KMn_2LiV_2Si_8O_{24}$
Isostructural with neptunite; structure determined
Monoclinic: *Cc* or *C*2/*c*
a 16.450, *b* 12.492, *c* 9.995 Å, β 115.32°
Yellow green; vitreous; translucent
Biaxial (+), α 1.686, β(calc) 1.694, γ 1.720, 2V 60°
9.58(84), 4.52(85), 3.52(63), 3.19(100), 2.94(90), 2.90(66), 2.49(93)

IMA No. **2001-044**
$Ca_2Be_4(Fe^{2+},Mn)_5(PO_4)_6(OH)_4\cdot 6H_2O$
Fe-dominant analogue of roscherite; structure determined
Monoclinic: *C*2/*c*
a 15.903, *b* 11.885, *c* 6.677 Å, β 94.68°
Dark olive green; vitreous; transparent
Biaxial (–), α 1.624, β 1.634, γ 1.638, 2V(meas.) 80°, 2V(calc.) 64°
9.48(100), 5.94(80), 4.82(60), 3.96(90), 3.07(60), 2.982(70), 2.783(80), 2.638(70)

IMA No. **2001-045**
$KMn_3(AlSi_3)_4O_{10}(OH,F)_2$
Mn-dominant analogue of phlogopite; structure determined
Monoclinic: *C*2/*m*
a 5.3791, *b* 9.319, *c* 0.2918 Å, β 100.18°
Dark reddish brown; pearly to vitreous; transparent
Biaxial (–), α 1.592, β ~γ 1.635, 2V very small
10.09(100), 3.43(33), 3.38(51), 2.646(96), 2.458(46), 2.194(36)

IMA No. **2001-048**
$(Fe,Mg,Zn,Al)_6Al_{14}(Ti,Fe)_2O_{30}(OH)_2$
Högbomite group; structure determined
Hexagonal: 6_3mc
a 5.734, *c*18.389 Å
Chestnut brown; adamantine; translucent
Uniaxial (–), ω 1.852, ε 1.827
2.948(32), 2.860(53), 2.603(88), 2.427(100), 2.053(34), 1.475(44), 1.430(56)

IMA No. **2001-049**
$KNa_2Mg_2Fe^{3+}{}_2LiSi_8O_{22}(OH)_2$
Amphibole group; structure determined
Monoclinic: *C*2/*m*
a 9.922, *b* 17.987, *c* 5.286 Å, β 104.07°
Reddish brown; vitreous; translucent
Biaxial (+), α 1.672, β 1.680, γ 1.692, 2V(calc) 79°
8.48(67), 4.50(89), 3.40(46), 3.28(45), 3.16(72), 2.83(49), 2.74(44), 2.71(41), 2.53(100), 2.34(38)

IMA No. **2001-050**
$(Ca,REE)_4(Al,Mg,Fe)_4[Si_2O_7][SiO_4]_3(O,F,OH)_3$
Related to epidote; structure determined
Monoclinic: $P2_1/a$
a 17.770, *b* 5.651, *c* 17.458 Å, β 116.18°
Colourless; vitreous; transparent to translucent
Biaxial; η_{calc} 1.807
15.67(87), 7.97(27), 4.61(33), 3.49(50), 2.967(100), 2.826(44), 2.740(32), 2.610(56)

IMA No. **2001-051**
$Ca_{16}(Mg,Li,\square)_2[B_{13}O_{17}(OH)_{12}]_4Cl_6\cdot 28H_2O$
Structure determined
Orthorhombic: *Pba*2
a 15.52, *b* 22.74, *c* 8.761 Å
Colourless to white; vitreous; transparent to translucent
Biaxial (+), α 1.516, β 1.532, γ 1.554, 2V(meas.) 82°, 2V(calc.) 82.0°
12.82(100), 7.78(80), 6.80(20), 6.32(40), 5.65(30), 4.14(20), 3.17(30), 2.570(30), 2.413(20)

IMA No. **2001-052**
$CoFe^{3+}{}_2(AsO_4)_2(OH)_2\cdot 4H_2O$
Co-dominant analogue of arthurite; structure determined
Monoclinic: $P2_1/c$
a 10.27, *b* 9.72, *c* 5.545 Å, β = 94.46°
Straw yellow to dark brown; vitreous to silky; translucent
Biaxial (+), α 1.741, β 1.762, γ 1.797, 2V(calc.) 76.8°
10.2(95), 7.04(100), 4.81(65), 4.51(20), 4.24(60), 3.05(20), 2.89(25), 2.87(55)

IMA No. **2001-053**
(Fe,Mg)S Fe-dominant analogue of niningerite
Cubic: *Fm*3*m*
a 5.17 Å
Grey in reflected light; opaque
2.985(8), 2.585(100), 1.828(60), 1.492(15), 1.292(7), 1.156(13), 1.055(10)

IMA No. **2001-054**
$CaFe^{3+}{}_2(AsO_4)_2(OH)_2$
Ca-dominant analogue of carminite; structure determined
Orthorhombic: *Cccm*
a 16.461, *b* 7.434, *c* 12.131 Å
Dark red to lighter red-orange; vitreous; translucent
In reflected light: light bluish grey with internal reflections, anisotropy absent. R_{min} and R_{max}: 10.12–10.71 % (460 nm), 9.53–10.07 % (540 nm), 9.30–9.98 % (580 nm), 8.99–9.66 % (640 nm)
4.87(90), 3.47(50), 3.39(60), 3.26(40), 3.17(100), 3.02(50), 2.988(50), 2.919(70), 2.696(40), 2.503(90)

IMA No. **2001-055**
$CaSrAl_3(Si_2O_7)(SiO_4)O(OH)$
Epidote group; structure determined
Monoclinic: $P2_1/m$
a 8.890, *b* 5.5878, *c* 10.211 Å, β 115.12°
Pale grey; vitreous; transparent
Biaxial; η ~1.725
5.05(23), 3.22(25), 2.90(100), 2.79(48), 2.70(26), 2.60(24), 2.11(24)

IMA No. **2001-056**
$[Mg_3(H_2O)_{28}]\,(UO_2)_8\,(SO_4)_4\,O_6\,(OH)_2$
Zippeite group; structure determined
Triclinic: $P\bar{1}$
a 10.815, *b* 11.249, *c* 13.851 Å, α 66.224, β 72.412, γ 69.95°
Yellow-orange; vitreous; transparent
Biaxial; η 1.735-1.750
9.46(100), 8.63(20), 6.46(20), 6.33(20), 4.73(80), 3.44(80), 3.39(70), 3.16(20), 3.11(20), 3.08(20), 2.88(30)

IMA No. **2001-057**
$Ca_6B_{14}O_{19}(SO_4)(OH)_{14}\cdot 5H_2O$
Monoclinic (pseudo-hexagonal): *P2/m, P*2, or *Pm*
a 14.10, *b* 19.53, *c* 14.05 Å, β 120.39°
White; vitreous; transparent
Biaxial (–), α 1.532, β 1.537, γ 1.540, 2V(meas.) 75°, 2V(calc.) 75°
12.2(100), 4.42(40), 3.45(50), 3.04(60), 2.911(40), 2.720(70), 2.108(40), 1.992(50)

IMA No. **2001-058**
$(Cu_{0.70}\square_{0.30})(Cd_{1.68}Ca_{0.32})_{\Sigma 2.00}Al_3(PO_4)_4F_2(H_2O)_{10}(H_2O,F)_2$
New structure type
Triclinic: $P\bar{1}$
a 6.787, *b* 9.082, *c* 10.113(2) Å, α 101.40, β 104.27, γ 102.51°
Pale blue to blue-grey; vitreous to glassy; transparent to translucent
Biaxial (+), α 1.570, β 1.573, γ 1.578, 2V(meas.) 30°, 2V(calc.) 75.7°
9.43(100), 4.73(30), 3.70(30), 3.17(30), 3.01(30), 2.896(30), 2.820(50)

IMA No. **2001-059**
$(Na,\square,Ca)_{11}Ca_4(Si,S,B)_{14}B_2O_{40}F_2\cdot 4H_2O$
Reyerite group; structure determined
Triclinic: $P\bar{1}$
a 9.5437, *b* 14.0268, *c* 9.5349 Å, α 71.057, β 119.788, γ 105.846°
Colourless to purple; vitreous; transparent
Biaxial (–), α 1.529, β 1.549, γ 1.551, 2V(meas.) 38°, 2V(calc.) 35°
13.18(100), 6.58(43), 3.29(34), 2.968(37), 2.908(27), 1.794(20)

IMA No. **2001-060**
$Ba(Na,Ba)\{(Na,Ba)\{Na_3Ti[Ti_2O_2Si_4O_{14}](OH,F)_2\}$
Lamprophyllite group; structure determined
Monoclinic: *P2/m*
a 19.741, *b* 7.105, *c* 5.408 Å, β 96.67°
Brown to yellowish brown; vitreous; translucent
Biaxial (+), α 1.750, β 1.755 (calc.), γ 1.799, 2V(meas.) 40°
9.87(96), 3.75(65), 3.45(90), 3.28(78), 3.04(41), 2.797(100), 2.610(43)

IMA No. **2001-061**
$Pd_8Hg_3Se_9$
Orthorhombic: *Pmmn*, $P2_1mn$ or $Pm2_1n$
a 7.219, *b* 16.782, *c* 6.467 Å
Buff to beige (reflected light); metallic; opaque
In reflected light (air): buff to beige; internal reflections not observed, anisotropy moderate. R_{min} and R_{max}: 46.2–50.8 % (460 nm), 49.3–53.1 % (540 nm), 49.9–53.2 % (580 nm),49.3–52.9 % (640 nm)
4.82(40), 4.37(40), 2.797(60), 2.743(100), 2.325(40), 2.116(40), 2.091(100)

IMA No. **2001-062**
$(UO_2)Bi_4(PO_4)O_4\cdot 2H_2O$ P-analogue of walpurgite
Triclinic: $P\bar{1}$
a 7.060, *b* 10.238, *c* 5.464 Å, α 101.22, β 109.93, γ 87.93°
Brownish grey; vitreous to adamantine; translucent
Biaxial, η ~1.9
10.06(100), 3.35(43), 3.25(72), 3.12(86), 3.08(95), 3.00(52), 2.726(42)

IMA No. **2001-063**
$K(NaMg_2)Si_4O_{10}F_2$ Mica group; structure determined
Monoclinic: *C2/m*
a 5.269, *b* 9.071, *c* 10.178 Å, β 100.03°
Colourless to pale grey; pearly to vitreous; transparent to translucent
Biaxial (–), α 1.526, β 1.553, γ 1.553, 2V(meas.) 5°, 2V(calc.) 0°
10.0(70), 3.36(90), 2.59(90), 2.41(100), 1.665(80), 1.522(100)

IMA No. **2001-064**
$NaMg_6[Si_3AlO_{10}](OH,O)_8\cdot H_2O$ Structure determined
Triclinic: *C*1 (No.1)
a 5.354, *b* 9.263, *c*14.653 Å, α 89.860, β 96.844, γ 90.030°
Colourless; vitreous; transparent
Biaxial (+), α 1.569, β 1.569, γ 1.571, 2V(meas.) 17°, 2V(calc.) 0°
7.27(30), 4.63(30), 2.992(40), 2.597(60), 2.556(100), 2.457(50), 1.544(100)

IMA No. **2001-065**
$(Mg,Fe)_7Si_8O_{22}(OH)_2$
Amphibole group; structure determined
Orthorhombic: *Pnmn*
a 9.3553, *b* 17.9308, *c* 5.3117 Å
White; vitreous; translucent
Biaxial (–), α 1.593, β(calc.) 1.609, γ 1.615, 2V(meas.) 64°
8.32(71), 3.66(100), 3.27(49), 3.08(81), 2.84(96), 2.56(49), 2.51(57)

IMA No. **2001-066**
$\square Li_2(Fe^{3+}{}_2Fe^{2+}{}_3)\,Si_8O_{22}(OH)_2$
Amphibole group; structure determined
Monoclinic: *C2/m*
a 9.462, *b* 17.898, *c* 5.302 Å, β 101.88°
Black; vitreous; translucent
Biaxial, no other optical properties given
8.23(40), 3.04(47), 2.718(100), 2.491(51), 1.584(19), 1.389(27)

IMA No. **2001-067**
$\square Li_2(Fe^{3+}{}_2Mg_3)Si_8O_{22}(OH)_2$
Amphibole group; structure determined
Monoclinic: *C*2/*m*
a 9.535, *b* 17.876, *c* 5.234 Å, β 102.54°
Black; vitreous; translucent
Biaxial, no other optical properties given
8.27(15), 3.41(18), 3.06(36), 2.710(100), 2.501(68), 1.581(19), 1.399(20)

Proposals from previous years approved in 2001

IMA No. **1997-040**
$(Na,K,Ca)_x(Al,Fe,Mg)_4(Si,Al)_8O_{20}(OH)_4 \cdot nH_2O$,
x = 0.35, n = 3.54
Pyrophyllite group
Pseudo monoclinic: Pseudo 2/*m*
a 5.2, *b* 9.1, *c* 24.4 Å
Grey to yellowish grey; dull; transparent
No optical properties obtainable
22.3(48), 11.0(100), 7.32(2), 5.48(7), 4.47(3), 3.17(33), 2.01(4)

IMA No. **1998-070**
$Pb(U^{4+},U^{6+})(Ti,Fe^{2+},Fe^{3+})_{20}(O,OH)_{38}$ Crichtonite group
Trigonal: *R*
a 10.576, *c* 21.324 Å
Black; sub-metallic; opaque
In reflected light (air): light grey; internal reflections not observed, isotropic. R: 18.4 % (460 nm), 17.5 % (540 nm), 17.4 % (580 nm), 17.4 % (640 nm)
6.86(30), 5.16(30), 3.41(60), 3.23(25), 3.06(30), 2.993(30), 2.891(60), 2.858(40), 2.248(35)

IMA No. **1999-037**
$NaCaCu_5(AsO_4)_4Cl \cdot 5H_2O$
Tetragonal: $P4_122$ or $P4_322$
a 10.0156, *c* 36.691 Å
Dark blue; vitreous; translucent
Uniaxial (–), ω 1.749, ε 1.647
9.18(100), 4.59(40), 4.17(11), 3.06(18), 2.610(6)

IMA No. **2000-013**
$Li_{1+3x}Al_{4-x}(BSi_3)O_{10}(OH)_8$, where x = 0–0.33
Chlorite group
Pseudo-monoclinic: pseudo *C*2/*m*
a 5.121, *b* 8.856, *c* 14.073 Å, β 96.95°
Light pinkish grey; greasy; opaque
Biaxial: α 1.574, β 1.580, γ 1.591, 2V(calc.) 72°
14.1(10), 7.05(50), 4.71(70), 3.51(100), 2.807(20), 2.304(16), 1.946(17)

IMA No. **2000-045**
$VO(SO_4)(H_2O)_3$ Structure determined
Monoclinic: $P2_1/m$
a 7.3940, *b* 7.4111, *c* 12.0597 Å, β 106.55°
Pale to bright blue; vitreous; transparent
Biaxial (+), α 1.555, β 1.561, γ 1.574, 2V(meas.) 72°, 2V(calc.) 69°
5.79(100), 5.41(37), 4.57(20), 3.88(48), 3.498(90)

IMA No. **2000-052**
$Fe^{3+}{}_3(PO_4)_2(OH)_3 \cdot 5H_2O$
Amorphous
Light brown to brown; vitreous; translucent
η 1.695

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New minerals approved in 2002 and nomenclature modifications approved 1998–2002 by the Commission on New Minerals and Mineral Names, International Mineralogical Association

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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.
Chemical Formula (any relationship to other minerals; structure analysis)
Crystal system, space group
unit-cell parameters
Color; luster; 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.

2002 PROPOSALS

IMA No. **2002-001**
$(Ce,La,Nd,Ba)(Fe^{3+},Al)_3[(As,Al)O_4]_2(OH)_6$
Fe-dominant analogue of arsenoflorencite-(Ce)
Trigonal: $R\bar{3}m$
a 7.260, *c* 16.77 Å
Light-green to brownish; resinous; transparent
Uniaxial(-), mean refractive index = 1.97
5.906(25), 3.636(40), 3.052(100), 2.792(30), 2.239(35), 1.817(35)

IMA No. **2002-002**
$(\square,K)_1(Mg,Fe^{2+})_3Fe^{3+}_2[Si_{12}O_{30}]$ Milarite group; structure determined
Hexagonal: *P6/mcc*
a 10.050, *c* 14.338 Å
Deep blue to yellowish-green; vitreous; translucent
Uniaxial (-), ω 1.589, ε 1.586
8.70(97), 7.17(100), 5.535(96), 5.026(61), 4.352(53), 3.207(85)

IMA No. **2002-003**
$NaSrKZn(Ti,Nb)_4(Si_4O_{12})_2(O,OH)_4\cdot 7H_2O$
Labuntsovite group; structure determined
Monoclinic: *Cm*
a 14.495, *b* 13.945, *c* 7.838 Å, β 117.75°
White, pale-brown; vitreous; translucent to transparent
Biaxial (+), α 1.680, β 1.687, γ 1.787, 2V(meas.) 25°, 2V(calc.) 31°
6.96(100), 3.21(80), 3.11(90), 2.60(35), 2.50(40), 1.74(30), 1.70(40)

IMA No. **2002-004**
$CoSO_4\cdot H_2O$ Kieserite group
Monoclinic: C2/*c*
a 6.980, *b* 7.588, *c* 7.639 Å, β 118.65°
Pink; powdery; transparent
Biaxial (+), *n* ~ 1.65 (calc.)
4.83(33), 3.405(100), 3.339(34), 3.291(32), 3.062(56), 2.567(30), 2.513(49)

IMA No. **2002-005**
$(K,Ba,Na)_2(Ti,Nb)_2(Si_4O_{12})(OH,O)_2\cdot 3H_2O$
Labuntsovite group; structure determined
Monoclinic: C*m*
a 14.327, *b* 13.802, *c* 7.783 Å, β 116.95°
Light brown, white, and colorless; vitreous; transparent
Biaxial (+), α 1.689, β 1.700, γ 1.775, 2V(meas.) 35°, 2V(calc.) 43°
6.87(100), 4.85(50), 3.95(50), 3.20(60), 3.05(80), 3.00(60), 2.56(90)

IMA No. **2002-006**
$(Ba,Na,K)_{2-x}(Ti,Nb)_2(Si_4O_{12})(OH,O)_2\cdot 4H_2O$
Labuntsovite group; structure determined
Monoclinic: C2/*m*
a 14.551, *b* 14.001, *c* 15.702 Å, β 117.58°
Brown; vitreous; transparent
Biaxial (+), α 1.667, β 1.674, γ 1.770, 2V(meas.) 30°, 2V(calc.) 31°
7.11(100), 4.08(80), 3.95(100), 3.24(90), 3.11(80), 2.403(80), 1.914(90)

IMA No. **2002-007**
$NaK_3Fe(Ti,Nb)_4(Si_4O_{12})_2(O,OH)_4\cdot 6H_2O$
Labuntsovite group; structure determined
Monoclinic: *Cm*
a 14.450, *b* 13.910, *c* 7.836 Å, β 117.42°
Pale-brown; vitreous; translucent to transparent
Biaxial (+), α 1.677, β 1.684, γ 1.790, 2V(meas.) 25°, 2V(calc.) 30°
6.93(100), 4.93(80), 3.21(100), 3.11(90), 2.62(60), 2.49(50), 1.687(40)

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NOTE: new mineral proposals should be sent to the new Chairman:
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0003-004X/03/0010–1620$05.00

IMA No. **2002-008**
$Na_2H(PO_4)\cdot 8H_2O$ New structure type
Orthorhombic: *Ibca*
a 11.488, *b* 11.647, *c* 16.435 Å
Colorless; vitreous to resinous; transparent
Biaxial (-), α 1.443, β 1.457, γ 1.458, 2V(meas.) 29°, 2V(calc.) 30°
5.78(40), 4.90(43), 4.73(62), 3.75(81), 2.876(77), 2.782(100), 2.744(74)

IMA No. **2002-010**
$NaNa_2(Al_2Mg_3)(Si_7Al)O_{22}(F,OH)_2$ Amphibole group; structure determined
Monoclinic: *C*2/*m*
a 9.666, *b* 17.799, *c* 5.311 Å, β 104.10°
Bluish-grey; luster not given; translucent
Biaxial (–), α 1.633, β 1.624, γ 1.626, 2V medium; calculated from chemical composition
8.31(64), 4.45(26), 3.38(42), 3.079(58), 2.691(100), 2.571(32), 2.532(47)

IMA No. **2002-011**
GaO(OH) Isostructural with goethite
Orthorhombic: *Pbnm*
a 4.512, *b* 9.772, *c* 2.967 Å
Pale greenish yellow to beige; pearly; translucent
Biaxial, *n*(calc.) 1.96.
4.09(100), 2.632(33), 2.530(22), 2.404(100), 1.690(26), 1.538(21)

IMA No. **2002-012**
$Na_2(Na,Ca)_4Ca_4(Mn,Ca)_2Zr_2Ti_2(Si_2O_7)_4(O,F)_4F_4$ Rosenbuschite group;
structure determined
Triclinic: $P\bar{1}$
a 10.032, *b* 11.333, *c* 7.202 Å, α 90.19, β 100.33, γ 111.55°
Colorless to pale shade of brown; vitreous; transparent
Biaxial (+), α 1.684, β 1.695, γ 1.718, 2V(meas.) 73°, 2V(calc.) 70°
3.951(30), 3.028(60), 2.908(100), 2.600(80), 1.868(60), 1.670(50)

IMA No. **2002-013**
$Ba_3NaCe(PO_4)_3(F,Cl)$ Ba-dominant analogue of belovite-(Ce); structure determined
Trigonal: $P\bar{3}$
a 9.909, *c* 7.402 Å
Light rose; vitreous; translucent
Uniaxial (-), ω 1.694, ε 1.669
4.078(40), 3.693(40), 2.969(100), 2.867(60), 1.965(80), 1.863(60)

IMA No. **2002-014**
$Pb_3[(UO_2)_6O_8(OH)_2](H_2O)_x$; x ~ 3 New structure type
Monoclinic: *C*2/*c*
a 28.355, *b* 11.990, *c* 13.998 Å, β 104.248°
Bright orange; vitreous; transparent
Biaxial, n_{min} 1.807, n_{max} 1.891
6.92(60), 6.02(30), 3.46(80), 3.10(100), 2.74(30), 2.01(30), 1.918(60)

IMA No. **2002-015**
$BaBe_2Si_2O_7$ Dimorphous with barylite; structure determined
Monoclinic: *Pm*
a 11.637, *b* 4.918, *c* 4.668 Å, β 89.80°
Colorless; vitreous; transparent
Biaxial (+), α 1.698, β 1.700, γ 1.705, 2V(meas.) 70°, 2V(calc.) 65°
3.39(84), 3.25(45), 3.04(40), 2.926(55), 2.458(100), 2.335(48), 2.076(38)

IMA No. **2002-016**
$CaFe^{2+}Fe^{3+}(Mn,Fe^{2+})(Si_2O_7)O(OH)$ Mn-dominant analogue of ilvaite
Monoclinic: $P2_1/a$
a 13.0246, *b* 8.8511, *c* 5.8485 Å, β 90.17°
Black; vitreous; opaque
In reflected light (in air): grey to bluish grey; internal reflections: red; anisotropy: strong in blue-greyish. R_{min} and R_{max}: 8.3–10% (460 nm), 7.5–9.8% (540 nm), 7–9.7% (580 nm), 6.1–9.5% (640 nm)
2.875(85), 2.848(90), 2.718(100), 2.687(70), 2.180(48), 2.111(47), 1.475(48)

IMA No. **2002-017**
$MnV_2O_6\cdot 4H_2O$ New structure type
Monoclinic: *C*2/*c*
a 13.171, *b* 10.128, *c* 6.983 Å, β 111.57°
Carmine red; adamantine; transparent
Biaxial, n_{min} 1.797, n_{max} 1.856
7.82(100), 5.69(20), 5.06(20), 4.51(30), 3.91(30), 3.029(70)

IMA No. **2002-018**
$(Mg,Fe)(Ta,Nb)_2O_6$ Columbite-tantalite group
Orthorhombic: *Pbcn*
a 14.355, *b* 5.735, *c* 5.058 Å
Black; semi-metallic to metallic; opaque
Light-grey; internal reflections (in air): brownish-red; anisotropism: weak; bireflectance: very weak.
R_{min} and R_{max}: 13.97–12.82% (460 nm), 13.33–13.20% (540 nm), 14.25–13.94% (580 nm), 15.61–15.31% (640 nm)
3.67(60), 2.96(100), 1.774(60), 1.728(70), 1.462(90), 1.196(60), 1.105(60)

IMA No. **2002-019**
$Ba_2(La,Th,Ce)(CO_3)_3F$ La-dominant analogue of kukharenkoite-(Ce);
structure determined
Monoclinic: $P2_1/m$
a 13.396, *b* 5.111, *c* 6.672 Å, β 106.63°
Pale leek-green, colorless, white; vitreous; transparent to translucent
Biaxial (-), α 1.581, β 1.715, γ 1.715, 2V(meas.) 5°, 2V(calc.) 0°
4.01(100), 3.27(100), 2.54(50), 2.38(20), 2.14(80), 1.998(80), 1.636(20)

IMA No. **2002-020**
$(Ca,K,Na)_{2-x}(Ti,Nb)_2(Si_4O_{12})(OH,O)_2\cdot 4H_2O$ Labuntsovite group; structure determined
Monoclinic: *C*2/*m*
a 14.484, *b* 14.191, *c* 7.907Å, β 117.26°
White, pale brownish; vitreous; transparent
Biaxial (+), α 1.666, β 1.676, γ 1.780, 2V(meas.) 30°, 2V(calc.) 36°
7.02(60), 6.38(40), 3.53(45), 3.16(100), 2.62(45), 2.51(85), 1.718(50)

IMA No. **2002-021**
$(Na,K,Ca)_{48}Si_{36}Al_{36}O_{144}[(SO_4)_8Cl_2]\cdot 3H_2O$ Cancrinite-sodalite group;
structure discussed
Hexagonal or trigonal: $P\bar{6}2c$ or $P31c$
a 12.880, *b* 31.761 Å
Colorless; vitreous; transparent
Uniaxial(+), ε 1.497, ω 1.495
4.20(42), 3.725(100), 3.513(80), 3.296(35), 3.089(40), 2.555(35), 2.150(40)

IMA No. **2002-022**
$Hg^{1+}Hg^{2+}OI$ Related to terlinguaite; new structure type
Monoclinic: *C*2/*c*
a 17.580, *b* 6.979, *c* 6.693 Å, β 101.71°
Dark grey-black; metallic; opaque
Calculated index of refraction: 2.35–2.38
8.55(70), 3.275(100), 2.993(80), 2.873(80), 2.404(50), 1.878(50)

IMA No. **2002-023**
$Ce_2Si_2O_7$ Isostructural with $Ln_2Si_2O_7$
Tetragonal: $P4_1$
a 6.781, *c* 24.689 Å
White to colorless; resinous; transparent
Uniaxial (+), ω 1.840, ε 1.846
3.27(31), 3.14(27), 3.12(24), 3.08(100), 3.011(18), 2.846(22), 2.034(19)

IMA No. **2002-024**
$(Cu_{4.7}Ag_{3.3})_{\Sigma 8}GeS_6$ Argentian variety of α-Cu_8GeS_6
Cubic: $F\bar{4}3m$
a 10.201 Å
Iron-black; vitreous to metallic; opaque
In reflected light (air): pale rose-brownish;

internal reflections: no;
R_{min} and R_{max}: 29.4% (460 nm), 23.6% (560 nm), 26.0% (580 nm), 25.3% (640 nm)
5.90(30), 3.07(60), 2.943(100), 1.962(50), 1.805(70)

IMA No. **2002-025**
$Ce_3CaMg_2Al_2Si_5O_{19}(OH)_2F$ Related to epidote group; structure determined
Monoclinic: $P2_1/m$
a 8.939, *b* 5.706, *c* 15.855 Å, β 94.58
Dark brown; vitreous
Biaxial (+), α 1.781, β 1.792(calc.), γ 1.810, 2V(meas.) 75°, 2V(calc.) 78°
4.64(10), 3.50(20), 2.979(100), 2.847(10), 2.682(13), 2.622(19), 2.185(15)

IMA No. **2002-026**
$(Na,Ca)_6(Ca,Na)_3Si_{16}O_{38}(F,OH)_2 \cdot 3H_2O$ Reyerite group; structure determined
Triclinic: $P\bar{1}$
a 9.613, *b* 12.115, *c* 9.589 Å, α 92.95, β 119.81, γ 96.62°
Colorless; pearly
Biaxial (-), α 1.522, β 1.528, γ 1.529, 2V(meas.) 48°, 2V(calc.) 44°
11.99(100), 5.97(85), 3.97(40), 2.967(50), 2.888(100), 1.820(50)

IMA No. **2002-027**
$BaB_2Si_2O_8$ Ba-dominant analogue of danburite; structure determined
Orthorhombic: *Pnma*
a 8.141, 8.176, *c* 9.038 Å
White; vitreous; transparent
Biaxial (-), α 1.649, β 1.656, γ 1.656, 2V(meas.) 5°, 2V(calc.) 0°
6.07(60), 4.86(30), 3.62(100), 3.39(60), 2.83(50), 2.481(40), 2.021(70)

IMA No. **2002-028**
$Ca_{0.3}(Fe^{2+},Mg,Fe^{3+})_3(Si,Al)_4O_{10}(OH)_2 \cdot 4H_2O$ Smectite group
Monoclinic: probably *C*-cell
a 5.363, *b* 9.306, *c* 14.64 Å, β 94.98°
Dark-green, brownish-green; vitreous, translucent
Biaxial (-),α 1.448 (calc.), β 1.641, γ 1.642; 2V(meas.) 5°, 2V(calc.) 7.5°.
7.37(90), 4.72(90), 3.80(80), 3.03(100), 2.585(90), 2.429(90), 1.549(90)

IMA No. **2002-029**
$Na_6MnTi_4Si_8O_{28} \cdot 4H_2O$ Mn-dominanat analogue of kukisvumite
Orthorhombic: *Pccn*
a 29.05, *b* 8.612, *c* 5.220 Å
Colorless; vitreous; transparent
Biaxial (-),α (calc.) 1.657, β 1.744, γ 1.792, 2V(meas.) 70°, 2V(calc.)70°
14.47(100), 6.43(20), 4.83(10), 3.025(40), 2.881(20)

IMA No. **2002-030**
$Mg_2(BO_3)F$ Isostructural with $Mg_2(BO_3)F$; structure determined
Orthorhombic: $Pna2_1$
a 20.490, *b* 4.571, *c* 11.890 Å
Colorless; vitreous; transparent
Biaxial (+), α 1.609, β 1.620, γ 1.642, 2V(meas.) 65°, 2V(calc.) 71°
2.743(77), 2.474(49), 2.414(46), 2.241(100), 2.234(49), 1.708(92), 1.705(44)

IMA No. **2002-031**
$Na_2K(Y,REE)[Si_6O_{15}]$ K and *REE* analogue of $Na_3Y[Si_6O_{15}]$;
structure determined
Orthorhombic: *Ibmm*
a 10.623, *b* 14.970, *c* 8.552 Å
White; vitreous; transparent
Biaxial (+), α 1.555, β 1.558, γ1.566, 2V (meas.) 64°, 2V (calc.) 63°
5.32(35), 4.98(100), 3.45(50), 3.26(85), 3.05(75), 2.753(42), 2.490(45)

IMA No. **2002-033**
$Na_{1-2}(Ti,Fe^{3+})_4(Si_7Al)O_{22}(OH)_4(H_2O)$ Related to vinogradovite; structure determined
Triclinic: *P*1
a 5.2533, *b* 8.7411, *c* 12.9480 Å, α 70.47, β 78.47, γ 89.93°
White; vitreous; translucent to transparent
Biaxial (-), α 1.707, β 1.741, γ 1.755, 2V(meas.) 64°, 2V(calc.) 64°
11.9(58), 5.98(35), 5.88(65), 4.35(38), 3.182(100), 3.085(29), 2.735(21)

IMA No. **2002-034**
$CdSO_4 \cdot 4H_2O$ Rozenite group
Monoclinic: $P2_1/n$
a 6.5859, *b* 14.329, *c* 8.5712 Å, β 91.51°
Colorless to light blue; vitreous, transparent
Uniaxial (-), α 1.430, β 1.454, γ 1.470, 2V(meas.) ~70°, 2V(calc.) 77.3°
5.98(85), 4.84(70), 3.146(85), 2.967(85), 2.708(75), 2.654(100)

IMA No. **2002-035**
$(\square,Cu^{2+},V^{3+})_8Al_8(PO_4)_8F_8(H_2O)_{23}$
New structure type
Orthorhombic: *Pmmn*
a 12.123, *b* 18.999, *c* 4.961 Å,
Pale green to turquoise; vitreous; translucent
Biaxial (-), α 1.540, β 1.548, γ 1.553, 2V(meas.) 76°, 2V(calc.) 76°
9.54(80), 6.08(100), 5.62(90), 3.430(40), 2.983(60), 2.661(40)

IMA No. **2002-036**
$(Ba,Ca)_2Al_3(Si,Al)_4O_{10}(CO_3)(OH)_6 \cdot nH_2O$ Surite series
Monoclinic: *C*2/*m*, *C*2 or C*m*
a 5.176, *b* 8.989, *c* 16.166 Å, β 96.44°
White with light-greenish tint; pearly; translucent
Biaxial (-), α 1.580, β 1.625, γ 1.625, 2V(meas.) 0–10°, 2V(calc.) 0°
4.49(90), 3.68(60), 2.585(100), 2.230(90), 2.069(80), 1.692(60)

IMA No. **2002-037**
$(Ca,Na)(Ba,K)(Fe^{2+},Mn)_4Ti_2(Si_4O_{14})O_2(F,OH,O)_3$ Bafertisite series; structure determined
Monoclinic: *C*2
a 10.723, *b* 13.826, *c* 20.791 Å, β 95.00°
Brownish red; vitreous; transparent to translucent.
Biaxial (-), α 1.790(calc.), β 1.858, γ 1.888, 2V(meas.) 65°
10.39(20), 3.454(100), 3.186(15), 2.862(15), 2.592(70), 2.074(40), 1.728(15)

IMA No. **2002-038**
$Mg_2(Al_{1-2x}Mg_xSn_x)(BO_3)O_2$ Hulsite group; structure determined
Monoclinic: *P*2/*m*
a 5.3344, *b* 3.0300, *c* 10.506) Å, β 94.46°
Brown to blue-green in transmitted light; luster not observed; transparent.
Biaxial (+), α' 1.78, γ' 1.805, 2V(meas.) 33°, 2V(calc.) 39°.
10.47(29), 5.24(49), 4.90(32), 2.618(50), 2.532(100), 2.318(30), 2.001(54), 1.515(28)

IMA No. **2002-039**
$Hg_4^{1+}Al(PO_4)_{1.74}(OH)_{1.78}$ New structure type
Monoclinic: *C*2/*c*
a 17.022, *b* 9.074, *c* 7.015 Å, β 101.20°
Colorless to white; vitreous; transparent to translucent
Biaxial (+), *n*(calc.) 1.94
8.33(100), 4.74(50), 2.979(80), 2.952(50), 2.784(80), 2.660(75)

IMA No. **2002-041**
$KPb_{1.5}ZnCu_6O_2(SeO_3)_2Cl_{10}$New structure type
Orthorhombic: *Pnnm*
α 9.132, *b* 19.415, *c* 13.213 Å
Olive green; vitreous, transparent
Biaxial (-), no refractive indices given
8.26(70), 7.63(60), 4.11(90), 3.660(100), 2.996(40), 2.887(50), 2.642(40)

IMA No. **2002-043**
$Na_2(Ba,K)_6Ce_2Fe^{2+}Ti_3Si_{12}O_{36}(OH)_3(OH,H_2O)_9$
New structure type
Trigonal: $R\bar{3}$
a 10.713, *c* 60.67 Å
Yellowish orange; vitreous; transparent
Uniaxial (+), ω 1.705, ε 1.708
10.12(27), 3.236(100), 3.094(21), 2.654(38), 2.642(44), 2.234(19), 2.026(61)

IMA No. **2002-047**
$Zn_2Te_3O_8$ Related to spiroffite
Monoclinic: C2/*c*
a 12.676, *b* 5.198, *c* 11.781 Å, β 99.6(1)°
Grey; vitreous; translucent.
In reflected light (air): grey; internal reflections not observed, anisotropy weak. R_{min} and R_{max}: 6.7–7.3% (460 nm), 7.4–7.8% (540 nm)
4.76(w), 3.240(w), 2.928(m), 2.820(w), 2.155(w), 1.985(w), 1.599(w)

IMA No. **2002-048**
$K(\square,Na)_2(Mn,Fe,Mg)_2(Be,Al)_3[Si_{12}O_{30}]$
Milarite group; structure determined
Hexagonal: *P6/mcc*
a 9.997, *c* 14.090 Å
Yellow to orange; vitreous; transparent
Uniaxial (-), ω 1.560, ε 1.559
7.05(40), 5.00(40), 4.08(80), 3.187(90), 2.882(100), 2.732(50), 1.826(40)

IMA No. **2002-049**
$(Mn^{2+},Ca)(Ce,REE)AlMn^{3+}Mn^{2+}Si_2O_7SiO_4O(OH)$ Epidote group; structure determined
Monoclinic: $P2_1/m$
a 8.901, *b* 5.738, *c* 10.068 Å, β 113.425°
Dark brown; vitreous to adamantine; transparent
Biaxial (+), α > 1.74, 2V(meas.) 81°
3.51(37), 2.896(100), 2.713(34), 2.707(43), 2.622(58), 2.591(32), 2.185(31)

IMA No. **2002-050**
$Ca_4AlSi(SO_4)F_{13}\cdot 12H_2O$ Related to chukhrovite-(Ce)
Cubic: $Fd\bar{3}$
a 16.722 Å
White to yellowish; vitreous; transparent
Isotropic; *n*(calc.) 1.430
9.63(100), 5.91(46), 5.04(27), 4.17(19), 3.219(32), 2.235(28), 2.178(33)

IMA No. **2002-051**
$(Na,K)Ca_2(Mg_3Al_2)Si_5Al_3O_{22}(OH)_2$ Amphibole group; structure determined
Monoclinic: *C* 2/*m*
a 9.905, *b* 18.00, *c* 5.322 Å, β 105.47°
Brownish black; vitreous; translucent
Biaxial (+), α 1.674, β (calc.) 1.683, γ 1.694, 2V(meas.) 85°
8.47(70), 3.38(60), 3.13(70), 2.70(100), 2.59(70), 2.57(100), 2.16(60), 1.447(60)

IMA No. **2002-052**
$K[(Al,Zn)_2(As,Si)_2O_8]$ Feldspar group; structure determined
Monoclinic: *C*2/*c*
a 13.416, *b* 13.370, *c* 8.772 Å, β 100.067°
Colorless; vitreous; transparent
Biaxial (-), α 1.532, β 1.535, γ 1.537, 2V(meas.) 60°; 2V(calc.) 78°
4.33(70), 3.90(70), 3.364(100), 3.300(50), 3.066(40), 2.981(60), 2.646(40)

IMA No. **2002-053**
$Tl_6Ag_3Cu_6As_9S_{21}$ Related to imhofite; structure determined
Triclinic: *P*1bar
a 12.138, *b* 12.196, *c* 15.944 Å, α 78.537, β 84.715, γ 60.470°
Black; metallic; translucent
In reflected light (air): white; internal reflections frequent, anisotropy weak. R: 30.7% (460 nm), 29.4% (540 nm), 28.2% (580 nm), 26.8% (640 nm)
15.63(100), 3.531(80), 3.263(50), 3.143(90), 2.978(60), 2.911(70), 2.520(60)

IMA No. **2002-054**
$La(CO_3)(OH)$ Ancylite group
Orthorhombic: *Pmcn*
a 4.986, *b* 8.513, *c* 7.227 Å
Pale pinkish purple to white; vitreous; diaphaneity not given
No optical data
4.31(100), 3.69(72), 2.93(57), 2.64(30), 2.49(29), 2.33(50), 2.06(48), 1.994(35)

IMA No. **2002-055**
$Na_{12}Sr_3Ca_6Fe_3Zr_3NbSi_{25}O_{73}(O,OH,H_2O)_3Cl_2$
Eudialyte group; structure determined
Trigonal: *R*3*m*
a 14.286, *c* 29.99 Å
Clove brown to yellowish brown; vitreous; transparent
Uniaxial (-); ω 1.649, ε 1.638
11.49(50), 9.51(90), 3.43(90), 3.19(80), 2.98(100), 2.86(100)

IMA No. **2002-056**
$(Na,\square)_{12}(Na,Ce)_3Ca_6Mn_3Zr_3Nb(Si_{25}O_{73})(OH)_3(CO_3)\cdot H_2O$ Eudialyte group; structure determined
Trigonal: *R*3*m*
a 14.239, *c* 30.039 Å
Yellow; vitreous; transparent
Uniaxial (-); ω 1.645, ε 1.635
6.39(25), 4.30(24), 3.204(38), 3.155(35), 3.019(34), 2.970(83), 2.849(100), 2.134(23)

IMA No. **2002-057**
$(Na,\square)_{12}(Ce,Na)_3Ca_6Mn_3Zr_3Nb(Si_{25}O_{73})(OH)_3(CO_3)\cdot H_2O$ Eudialyte group; structure determined
Trigonal: *R*3*m*
α 14.248, *c* 30.076 Å
Cream; vitreous; transparent
Uniaxial(-); ω 1.648, ε 1.637
4.32(51), 3.975(37), 3.536(33), 3.220(100), 3.166(56), 2.979(95), 2.857(88)

IMA No. **2002-058**
$Cu_4AgPb_2Bi_9S_{18}$ Related to makovickyite; structure determined
Monoclinic: *C2/m*
a 13.396, *b* 4.013, *c* 29.93 Å, β 100.07°
Grey; metallic; opaque
In reflected light (air): greyish white; internal reflections not observed, anisotropy moderate. R_{min} and R_{max}: 42.3–48.5% (460 nm), 41.1–47.1% (540 nm), 40.0–46.0% (580 nm), 39.8–45.2% (640 nm)
3.645(56), 3.486(40), 3.478(100), 3.345(32), 2.964(33), 2.885(29), 2.842(95), 2.282(31)

IMA No. **2002-059**
$(Ni,Co,Cu)_{30}(As_2O_7)_{15}$ New structure type
Monoclinic: *C*2
a 33.256, *b* 8.482 Å, *c* 14.191 Å, β 104.145°
Dark violet-red to dark brownish red; vitreous; translucent
In reflected light (air): dark grey; internal reflections orange, anisotropy not obvious. R: 9.63% (460 nm), 9.33% (540 nm), 9.27% (580 nm), 9.33% (640 nm)
4.23(30), 3.118(100), 3.005(60), 2.567(50), 1.637(50), 1.507(30)

IMA No. **2002-060**
$Cu_2Pd_3Se_4$ Chrisstanleyite series; structure determined
Monoclinic: $P2_1/c$
a 5.672, *b* 9.910, *c* 6.264 Å, β 115.40(2)°
Silvery grey; metallic; opaque
In reflected light (air): buff to grey-green; internal reflections not observed, anisotropy moderate. R_{min} and R_{max}: 40.4–48.4% (460 nm), 44.2–50.7% (540 nm), 44.7–50.6% (580 nm), 45.1–50.6% (640 nm)
2.776(22), 2.759(23), 2.676(100), 2.630(64), 2.508(31), 2.269(27)

IMA No. **2002-061**
$Na(H_3O)(UO_2)_3(SeO_3)_2O_2\cdot 4H_2O$ Related to

haynesite; structure determined
Monoclinic: *P*11*m*
a 6.9806, *b* 17.249, *c* 7.6460 Å, β 90.039°
Yellow; vitreous; transparent
Biaxial (-), α 1.597, β 1.770, γ 1.775, 2V(meas.) 20°; 2V(calc.) 18°
8.63(43), 7.67(100), 7.02(33), 3.85(40), 3.107(77), 2.874(53), 1.411(30)

IMA No. **2002-062**
$Cu_2HgPb_{23}Sb_{27}S_{65.5}$ New structure type
Monoclinic: *C*2 or *C*2/*m*
a 43.113, *b* 4.059, *c* 37.874 Å, β 117.35°
Black; metallic, opaque
In reflected light (air): white; internal reflections red, anisotropy distinct. R: 39.0% (460 nm), 36.4% (540 nm), 35.2% (580 nm), 33.4% (640 nm)
3.84(31), 3.402(100), 3.369(74), 2.815(70), 2.756(36), 2.251(31), 2.116(31), 1.955(30)

IMA No. **2002-063**
$(Ni,Zn)Al_4(VO_3)_2(OH)_{12}(H_2O)_{2.5}$ Ni-dominant analogue of alvanite;
structure determined
Monoclinic: $P2_1/n$
a 17.8098, *b* 5.1228, *c* 8.8665 Å, β 92.141°
Colorless to white, light green to light blue; vitreous; diaphaneity not given
Biaxial (-), α 1.653, β 1.680, γ 1.706, 2V(meas.) 86°, 2V(calc.) 88°
8.89(100), 7.83(100), 3.266(50), 1.970(80), 1.904(70), 1.605(50), 1.481(80)

IMA No. **2002-064**
$(K,Na,\square)(Mn^{2+},Fe^{2+},Li)_2(Al,Si)_4Si_4O_{12}(OH)_4(F,OH)_4$ Carpholite group
Orthorhombic: *Ccca*
a 13.715, *b* 20.302, *c* 5.138 Å
White to straw-yellow; silky; diaphaneity not given
Biaxial (-), α 1.578, β 1.592 γ 1.598, 2V(meas.) 57°, 2V(calc.) 66°
5.70(100), 3.819(80), 3.43(80), 3.048(90), 2.744(80), 2.613(100), 2.050(80), 1.467(80)

IMA No. **2002-065**
$(Na,K,Sr)_{35}Ca_{12}Fe_3Zr_6TiSi_{51}O_{144}(O,OH,H_2O)_9Cl_3$
Eudialyte group; structure determined
Trigonal: *R*3
a 14.239, *c* 60.733 Å
Pink; vitreous; transparent
Uniaxial (+), ω 1.597, ε 1.601
6.45(33), 5.70(34), 4.32(68), 3.55(39), 3.230(44), 3.049(36), 2.977(100), 2.853(88)

IMA No. **2002-066**
$(H_3O)_8(Na,K,Sr)_5Ca_6Zr_3Si_{26}O_{66}(OH)_9Cl$
Eudialyte group; structure determined
Trigonal: *R*3
a 14.078, *c* 31.24 Å
Pink; vitreous; translucent
Uniaxial (+), ω 1.569, ε 1.571
11.43 (39), 10.50(44), 7.06(42), 6.63(43), 4.39(100), 3.624(41), 2.987(100), 2.850(79)

IMA No. **2002-067**
$Na_{15}Ca_3Fe_3(Na,Zr)_3Zr_3(Si,Nb)(Si_{25}O_{73})(OH,H_2O)_3(Cl,OH)$ Eudialyte group; structure determined
Trigonal: *R*3
a 14.229, *c* 30.019 Å
Red; vitreous; transparent
Uniaxial (+), ω 1.608, ε 1.611
11.48(33), 5.72(35), 4.31(66), 4.09(37), 3.209(58), 3.023(40), 2.974(86), 2.853(100)

PROPOSALS FROM PREVIOUS YEARS APPROVED IN 2002

IMA No. **2000-010**
$(Na,H_3O)_{15}(Ca,Mn,REE)_6Fe_2^{3+}Zr_3(\square,Zr)(\square,Si)Si_{24}O_{66}(O,OH)_6Cl\cdot nH_2O$ Eudialyte group; structure determined
Trigonal: *R*3*m*
a 14.167, *c* 30.081 Å
Yellow; vitreous; translucent
Uniaxial (+), ω 1.612, ε 1.615
6.41(41), 4.30(91), 3.521(57), 3.205(44), 2.963(92), 2.841(100), 2.588(37)

IMA No. **2000-028**
$Na_{27}K_8Ca_{12}Fe_3Zr_6Si_{52}O_{144}(OH,O)_6Cl_2$
Eudialyte group; structure determined
Trigonal: *R*3*m*
a 14.249, *c* 60.969 Å
Pink; vitreous; transparent
Uniaxial (+), ω 1.598, ε 1.600
6.48(47), 4.34(81), 3.565(41), 3.249(57), 2.987(100), 2.861(73), 2.695(40)

IMA No. **2001-069**
$Na(Na_{1.0\text{-}1.5}Li_{0.5\text{-}1.0})_2(Fe_2^{3+}Mg_2Li)Si_8O_{22}(OH)_2$
Amphibole group; structure determined
Monoclinic: C2/*m*
a 9.712, *b* 17.851, *c* 5.297 Å, β 103.63(2)°
Bluish black; vitreous; translucent
No optical data could be given
3.392(33), 3.098(37), 2.701(100), 2.576(14), 2.524(100), 2.157(20), 1.646(20), 1.581(15)

IMA No. **2001-070**
$Ca_3(PO_4)$ Related to whitlockite
Trigonal: *R*3*m*
a 5.258, *c* 18.727 Å
White to yellowish grey; vitreous; diaphaneity not given
Uniaxial (+), ω 1.706, ε 1.701
2.891(80), 2.628(100), 2.214(20), 2.078(12), 2.047(16), 1.945(47), 1.730(25)

NOMENCLATURE MODIFICATIONS 1998-2002

IMA Code 98-D – Monsmedite **discredited** = voltaite.

IMA Code 98-E – Arsenobismite **discredited** = mixture of preisingerite, minor atelestite and minor beudantite/signitite

IMA Code 99-A – Platynite **discredited** = mixture of laitakarite and selenian galena.

IMA Code 99-B – Peprossiite-(Ce) **redefined** as $(Ce,La)(Al_3O)_{2/3}B_4O_{10}$.

IMA Code 00-A – **Redefinition** (the new name is the second one): vuoriyarvite = vuoriyarvite-K; kuzmenkoite = kuzmenkoite-Mn; lemmleinite = lemmleinite-K; labuntsovite of Semenov & Burova (1955) = labuntsovite-Mn; labuntsovite of Milton et al. (1958) = paralabuntsovite-Mg.

IMA Code 00-B – Kurgantaite **revalidated**.

IMA Code 00-C – Baiyuneboite-(Ce) **discredited** = cordylite-(Ce).

IMA Code 00-D – Nomenclature of joaquinite group **redefined** to conform with the Levinson system. The members of the group are: joaquinite(Ce), orthojoaquinite-(Ce), orthojoaquinite-(La), strontiojoaquinite, strontio-orthojoaquinite, bario-orthojoaquinite, byelorussite-(Ce).

IMA Code 00-E. Destinezite **redefined** as triclinic $Fe_2(PO_4)(SO_4)(OH)\cdot 6H_2O$.

IMA Code 00-F. – **Redefinition** (the new name is the second one): hellandite = hellandite-(Y); tadzhikite = tadzhikite-(Ce).

IMA Code 00-G – Neotype approved and magnesium-zippeite **redefined** as monoclinic

$Mg(UO_2)_2(SO_4)(OH)_4\cdot 1.5H_2O$

IMA Code 01-A – **Redefinition** (the new name is the second one): högbomite-8*H* = magnesiohögbomite-2*N*2*S*; högbomite-10*T* = magnesiohögbomite-2*N*3*S*; högbomite-24*R* = magnesiohögbomite-6*N*6*S*; zincohögbomite-8*H* = zincohögbomite-2*N*2*S*; zincohögbomite-16*H* = zincohögbomite-2*N*6*S*; nigerite-6*T* = ferronigerite-2*N*1*S*; nigerite-24*R* = ferronigerite-6*N*6*S*; pengzhizhongite-6*T* = magnesionigerite-2*N*1*S*; pengzhizhongite-24*R* = magnesionigerite-6*N*6*S*; taaffeite = magnesiotaaffeite-2*N*'2*S*; musgravite = magnesiotaaffeite-6*N*'3*S*; pehrmanite = ferrotaaffeite-6*N*'3*S*;

IMA Code 01-B - Duhamelite **discredited** = mottramite.

IMA Code 02-A - Tripuhyite is **redefined** as $FeSbO_4$ and squawcreekite of Ford et al. (1991) is **discredited**.

IMA Code 02-B - Arhbarite is **redefined** as triclinic $Cu_2Mg(AsO_4)(OH)_3$.

IMA Code 02-D - The mineral name mahlmoodite is **corrected** in malhmoodite.

Name change approved – "magnocolumbite" is now magnesiocolumbite

New minerals approved in 2003 and nomenclature modifications approved in 2003 by the Commission on New Minerals and Mineral Names, International Mineralogical Association

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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.
Chemical Formula
Any relationship to other minerals
Structure analysis
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.

2003 PROPOSALS

IMA No. **2003-001**
$(Ba,Ca,K,Na,Sr)_5Al_9Si_{27}O_{72}\cdot 22H_2O$
Ba-dominant analogue of heulandite
Structure determined
Monoclinic: *C*2/*m*
a 17.738, *b* 17.856, *c* 7.419 Å, β 116.55˚
Colourless to white, rarely very pale yellowish white; vitreous, pearly; translucent to transparent
Biaxial (+), α 1.5056, β 1.5064, γ 1.5150, 2V(meas.) 38˚, 2V(calc.)34.1˚
7.94(66), 5.12 (59), 4.65(66), 3.978(97), 3.181(56), 2.973(100), 2.807(65)

IMA No. **2003-002**
$Na(Ba,Sr,Na,REE)PO_4$
Ba-dominant analogue of olgite
Structure determined
Trigonal: *P*3

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a 5.549, *c* 7.032(2) Å
Light-green; vitreous; transparent
Uniaxial (–), ω 1.628, ε 1.623
7.04(22), 3.964(60), 2.839(100), 2.774(100), 2.344(20), 1.984(40), 1.611(26)

IMA No. **2003-003**
$Ba_2Zn(Ti,Nb)_4(Si_4O_{12})_2(O,OH)_4 \cdot 7H_2O$
Labuntsovite group, kuzmenkoite subgroup
Structure determined
Monoclinic: *Cm*
a 14.381, *b* 13.889, *c* 7.793(2) Å, β 117.52˚
Pale brown (light coffee-coloured); vitreous; transparent
Biaxial (+), α 1.683, β 1.692, γ 1.795, 2V(meas.) 30˚, 2V(calc.) 34.5˚
6.95(37), 6.39(10), 4.91(6), 3.194(100), 3.101(22), 3.050(8), 2.906(6)

IMA No. **2003-004**
$(Cu,Fe)(Re,Mo)_4S_8$
Cubic: $F\bar{4}3m$
a 9.563 Å
Black; metallic; opaque
In reflected light: bluish-green, no internal reflections, isotropic. R(air): 38.2 (470 nm), 37.9 (546 nm), 37.4 (589 nm), 36.6 (650 nm)
5.53(100), 2.885(90), 2.389(90), 2.194(70), 1.952(60), 1.841(90), 1.690(80)

IMA No. **2003-005**
$Ca_2(Zn, Mg)[PO_4]_2 \cdot 2H_2O$
Zn-dominant analogue of collinsite
Structure determined
Triclinic: $P\bar{1}$
a 5.736, *b* 6.767, *c* 5.462 Å, α 97.41, β 108.59, γ 107.19˚
Colourless, grey with greenish or bluish tint in aggregates and larger crystals; vitreous in crystals and silky in aggregates; transparent
Biaxial (+), α 1.6348, β 1.6495, γ 1.6686, $2V_z$ (calc.) 83.4˚
6.24(34), 3.230(22), 3.130(37), 3.038(40), 2.690(100), 1.668(22)

IMA No. **2003-006**
$BaV^{4+}{}_2V^{3+}{}_{12}Si_2O_{27}$
New structure type
Trigonal: $P\bar{3}$
a 7.6014, *c* 9.2195 Å
Steel-grey to black; submetallic to dull; opaque
In reflected light: grey with weak brownish tint; no internal reflections; weak bireflectance, pleochroism and anisotropy. R_{min} and R_{max} (air): 15.9-16.8 (470 nm), 16.0-17.3 (546 nm), 15.9-17.4 (589 nm), 16.1-17.7 (650 nm)
9.22(53), 3.100(70), 2.785(100), 2.679(62), 2.402(48), 2.190(97), 1.934(75)

IMA No. **2003-007**
$(Ca,Fe,Th)(REE,Ca)(Al,Cr,Ti)_2(Mg,Fe,Al)Si_3O_{12}(OH,F)$ with La > Ce
Epidote group

Structure determined
Monoclinic: $P2_1/m$
a 8.9616, b 5.7265, c 10.2353 Å, β 115.193˚
Black, very dark brown; vitreous; opaque
Biaxial (+), α 1.7395, β 1.7434, γ 1.7495, $2V_\gamma$(meas.) 77.0˚, $2V_\gamma$(calc.) 77.5˚
3.53(49), 2.926(100), 2.860(53), 2.714(41), 2.699(44), 2.623(38), 2.553(51)

IMA No. **2003-008**
$(Na,Sr,K,Ca)_7(Ti,Nb)_8[Si_4O_{12}]_4(O,OH)_8 \cdot nH_2O$ $n \sim 8$
Labuntsovite group
Structure determined
Monoclinic: $C2/m$
a 14.596, b 14.249, c 15.852 Å, β 117.27(10)˚
Colourless; vitreous; transparent
Biaxial (+), α 1.657, β 1.666, γ 1.765, 2V(meas.) 19-31˚, 2V(calc.) 35˚
7.09(100), 3.24(90), 3.15(80), 3.11(80), 2.54(70), 2.491(70)

IMA No. **2003-009**
$U^{6+}_{2-x}Ti(O_{8-x}OH_{4x})[(H_2O)_3Ca_x]$
New structure type
Trigonal: $P3$
a 10.824, c 7.549 Å
Canary-yellow to orange-yellow; vitreous; translucent
Uniaxial (+), ω 1.815, ε 1.910
4.60(100), 2.90(80), 1.87(30), 1.747(30), 1.211(30)

IMA No. **2003-010**
$CuZn(PO_4)OH$
Zn-dominant analogue of libethenite
Structure determined
Orthorhombic: $Pnnm$
a 8.3263, b 8.2601, c 5.8771 Å
Bright-green with a bluish tint; vitreous; translucent
Biaxial (–), α 1.660, β 1.705, γ 1.715
5.87(39), 4.79(100), 3.699(22), 2.935(33), 2.632(47), 2.405(19), 2.304(18)

IMA No. **2003-011**
$(Cd,Pb)Bi_2S_4$
Pavonite homologous series
Structure determined
Monoclinic: $C2/m$
a 13.096, b 4.004, c 14.717 Å, β 115.602(5)˚
Dark grey (reddish); metallic; opaque
In reflected light: white, no internal reflections, distinct bireflectance, strong anisotropy
R_{min} and R_{max} (air): 29.6-36.4 (470 nm), 32.4-38.8 (546 nm), 31.8-38.2 (589 nm), 31.4-37.7 (650 nm)
3.689(97), 3.648(84), 3.508(81), 3.109(38), 2.935(100), 2.804(93), 2.338(43)

IMA No. **2003-012**
$Cu_2[BO(OH)_2](OH)_3$

New structure type
Orthorhombic: *Pnma*
a 9.455, *b* 5.866, *c* 8.668 Å
Blue; vitreous; translucent
Biaxial (–), α 1.627, β 1.699, γ 1.769, 2V(calc.) 86˚
4.73(100), 3.941(90), 3.192(40), 2.545(45), 2.489(50), 1.838(40), 1.712(40)

IMA No. **2003-013**
$Na_{12}(Mn,Sr,REE)_3Ca_6Fe^{2+}{}_3Zr_3NbSi_{25}O_{76}Cl_2{\cdot}H_2O$
Eudialyte group
Structure determined
Trigonal: *R*3*m*
a 14.262, *c* 29.949 Å
Yellow-green (different shades); vitreous; transparent or translucent
Uniaxial (–), ω 1.639, ε 1.631
6.42(54), 4.30(62), 3.202(100), 3.155(71), 2.975(98), 2.857(94), 2.591(54)

IMA No. **2003-014**
Fe_2Si
Cubic: *Pm*3*m*
a 2.831 Å
No macroscopic data (grains up to 35 μm)
In reflected light: yellowish-white, isotropic. R: 47.1 (470 nm), 48.8 (546 nm), 50.0 (589 nm), 50.9 (650 nm)
2.831, 2.000, 1.631, 1.415, 1.267, 1.157, 1.000 (no intensities given)

IMA No. **2003-015**
$(K,Na)_2(Mn,Fe)(Nb,Ti)_4(Si_4O_{12})_2(O,OH)_4{\cdot}6H_2O$
Labuntsovite group
Structure determined
Monoclinic: *C*2/*m*
a 14.563, *b* 13.961, *c* 7.851(2) Å, β 117.62˚
Orange-yellow to brownish ; vitreous; translucent to transparent
Biaxial (+), α 1.670, β 1.685, γ 1.775(5), 2V(meas.) 52°, 2V(calc.) 46°
6.96(100), 6.40(20), 4.94(80), 3.22(90), 3.10(80), 2.510(40)

IMA No. **2003-016**
$(Hg_2)^{2+}{}_{10}O_6I_3(Br_{1.6}Cl_{1.4})_{\Sigma 3.0}[(CO_3)_{0.8}S^{2-}{}_{0.2}]_{\Sigma 1.0}$
Structure determined
Triclinic: $P\bar{1}$
a 9.344, *b* 10.653, *c* 18.265 Å, α 93.262, β 90.548, γ 115.422º
Silvery grey to black to dark red-black; adamantine to metallic; translucent to opaque
In reflected light: grey; abundant, orange-red to blood-red internal reflections; no bireflectance, no pleochroism; moderate to strong anisotropy. R_{min} and R_{max} (air): 28.6-29.5 (470 nm), 26.2-27.1 (546 nm), 24.6-25.7 (589 nm), 22.8-24.0 (650 nm)
7.64(60), 4.20(80), 3.296(50), 3.132(90), 2.894(100), 2.722(80), 2.629(50)

IMA No. **2003-017**
$(REE,Ca)_4(Fe^{3+},Ti,Fe^{2+},\square)(Ti,Fe^{3+},Fe^{2+},Nb)_4Si_4O_{22}$
Fe-dominant analogue of polyakovite-(Ce)

Structure determined
Monoclinic: *C*2/*m*
a 13.385, *b* 5.742, *c* 11.059 Å, β 100.60˚
Black or brown-black; submetallic pitchy; opaque
Biaxial (–), α 1.937, β not determined, γ 1.970
In reflected light: grey; yellowish-grey internal reflections; weak bireflectance and pleochroism; strong anisotropy. R_{min} and R_{max} (air): 12.5-14.6 (470 nm), 12.1-14.4 (546 nm), 12.1-14.3 (589 nm), 11.2-13.7 (650 nm)
4.89(35), 3.490(40), 3.189(80), 3.004(40), 2.874(40), 2.760(40), 2.722(100)

IMA No. **2003-018**
$Na_{5.5}Mn_{0.25}ZrSi_6O_{16}(OH)_2$
Lovozerite group
Structure determined
Monoclinic: *C*2/*m*
a 10.693, *b* 10.299, *c* 7.373(4) Å, β 91.91°
Dark cherry-coloured; vitreous; transparent
Biaxial (–), some grains are uniaxial (-); α 1.585, β ≈ γ 1.589, 2V(meas.) < 5°, 2V(calc.) -0°
7.40(36), 5.31(51), 3.690(43), 3.342(84), 3.270(92), 2.652(100), 2.580(91), 1.849(39)

IMA No. **2003-019**
$Na_6Sr_{12}Ba_2Zr_{13}Si_{39}B_4O_{123}(OH)_6 \cdot 20H_2O$
Related to benitoite
Structure determined
Hexagonal: $P6_3cm$
a 26.509, *c* 9.975 Å
Colourless to grey; vitreous; translucent
Uniaxial (+), ω 1.640, ε 1.663
5.76(40), 3.924(30), 3.761(90), 3.310(25), 3.150(50), 2.760(100), 1.991(70)

IMA No. **2003-020**
Cu_6GeWS_8
Hexagonal: $P6_3/mmc$, $P\bar{6}2c$ or $P6_3mc$
a 7.523, *c* 12.384 Å
Grey; metallic; opaque
In reflected light: greyish white with a distinct brownish tint; red internal reflections; no pleochroism, weak bireflectance; weak anisotropy. R_{min} and R_{max} (air): 24.5-25.2 (470 nm), 24.1-24.5 (546 nm), 24.5-25.1 (589 nm), 23.4-23.7 (650 nm)
6.18(40), 5.78(100), 3.153(40), 2.887(40), 2.417(40), 1.971(50), 1.881(80), 1.744(50)

IMA No. **2003-021**
$Cu_2Mg_2(Mg,Cu)(OH)_4(H_2O)_4(AsO_4)_2$
Isotypic with akrochordite
Structure determined
Monoclinic: $P2_1/c$
a 5.475, *b* 16.865, *c* 6.915 Å, β 99.80˚
Blue; vitreous; transparent
Biaxial (–), α 1.664, β 1.691, γ 1.695, 2V (meas.) 31˚, 2V (calc.) 42˚
8.42(100), 4.32(21), 4.21(64), 3.016(12), 2.907(10), 2.809(7)

IMA No. **2003-022**
$Cs(Be_2Li)Al_2Si_6O_{18}$
Beryl group
Structure determined
Hexagonal: *R*3*c*
a 15.946, *c* 27.803 Å
Raspberry red to pink; vitreous; translucent to transparent
Uniaxial (–), ω 1.616, ε 1.608
3.271(100), 3.027(41), 3.019(29), 2.871(52), 2.229(12), 2.215(14), 1.636(14)

IMA No. **2003-024**
$(Zr,Mn)_2(Zr,Ti)(Mn,Na)(Na,Ca)_4(Si_2O_7)_2(O,F)_4$
Seidozerite group
Structure determined
Monoclinic: *P*2/*c*
a 5.6082, *b* 7.1387, *c* 18.575 Å, β 102.60˚
Yellowish brown to dark brown; vitreous; translucent
Biaxial, birefringence on (001) is 0.041: α 1.694, γ_I 1.735, 2V > 90º
3.949(15), 3.027(68), 2.898(100), 2.613(26), 2.459(24), 1.853(24), 1.786(14), 1.650(14)

IMA No. **2003-025**
$Th_{0.5}(UO_2)_2Si_5O_{13}\cdot 3H_2O$
Isostructural with weeksite
Orthorhombic: *Cmmb*
a 14.1676, *b* 14.1935, *c* 35.754 Å
Yellow; waxy to silky; transparent to translucent
Biaxial (–), α 1.620, β 1.627, γ 1.629, 2V(meas.) 40˚, 2V(calc.) 56.1˚
7.06(100), 5.56(59), 4.58(47), 3.528(86), 3.287(57), 3.188(73), 2.981(46), 2.904(78)

IMA No. **2003-026**
$(Cu,\square)_6(Pb,Bi)Se_4$
Structure determined
Monoclinic: $P2_1/m$
a 9.5341, *b* 4.1004, *c* 10.2546 Å, β 100.066º
Black; metallic; opaque
In reflected light: grey, no internal reflections, no pleochroism, very weak bireflectance, very weak anisotropism. R_{min} and R_{max} (air): 36.6-38.1 (470 nm), 36.45-38.1 (546 nm), 36.6-38.3 (589 nm), 36.6-38.5 (650 nm)
3.189(100), 3.132(100), 2.601(70), 2.505(50), 2.151(60), 2.058(80), 1.909(50)

IMA No. **2003-027**
$Pb_{21}SnAs_{11}Bi_{11}S_{50}Cl_8Se$
Structure determined
Orthorhombic: *F*2*mm*
a 45.824, *b* 8.368, *c* 53.990 Å
Silvery grey; metallic; opaque
In reflected light: white, no internal reflections, no pleochroism, no bireflectance, weak anisotropism. R (air): 34.25 (470 nm), 32.95 (546 nm), 32.60 (589 nm), 31.05 (650 nm)
3.34(80), 3.17(60), 2.85(80), 2.69(80), 2.17(60), 2.10(70), 2.07(100), 2.04(50)

IMA No. **2003-028**
(La,Ce)OF
Structure determined
Cubic: *Fm*3*m*
a 5.628 Å
Light yellow; powdery; translucent
Isotropic, n = 1.85
3.252(100), 2.815(26), 1.991(56), 1.6969(39)

IMA No. **2003-029**
$Mn(C_2O_4)\cdot 2H_2O$
Mn analogue of humboldtine (oxalate)
Monoclinic: *C*2/*c*
a 11.955, *b* 5.632, *c* 9.967 Å, β 128.34˚
White to greyish white; vitreous; transparent
Biaxial (–), α 1.424, β 1.550, γ 1.65, 2V(meas.) 80°, 2V(calc.) 77°
4.85(26), 4.80(100), 4.70(84), 3.91(23), 3.62(22), 2.996(58)

IMA No. **2003-030**
$CeCu_6(AsO_4)_3(OH)_6\cdot 3H_2O$
Mixite group
Hexagonal: $P6_3/m$
a 13.59, *c* 5.89 Å
Green to yellowish green; vitreous, in part silky; translucent to transparent
Uniaxial (+), ω 1.725, ε 1.810
11.88(10), 4.47(8), 3.56(8), 2.95(8), 2.70(5), 2.57(5), 2.46(9)

IMA No. **2003-032**
Tl(Cl,Br)
Sal ammoniac group
Structure determined
Cubic: *Pm*3*m*
a 3.8756 Å
Grey-brown; resinous to greasy; translucent
Isotropic, n (calc.) 2.015
3.887(80), 2.745(100), 2.237(55), 1.937(50), 1.733(45), 1.583(70)

IMA No. **2003-033**
$NaFe^{3+}_2(Mg,Mn)(AsO_4)_3\cdot H_2O$
Alluaudite group
Structure determined
Monoclinic: *C*2/*c*
a 12.181, *b* 12.807, *c* 6.6391 Å, β 112.441˚
Brown to brown-black; adamantine; translucent
Biaxial (–), α 1.870, β 1.897, γ 1.900, 2V(meas.) 35˚, 2V(calc.) 36.5˚
6.40(20), 5.63(20), 3.575(30), 3.202(40), 2.917(35), 2.768(100), 2.611(40)

IMA No. **2003-034**
$Cs_4\,Na_2\,Zr_3(Si_{18}O_{45})(H_2O)_2$
Phyllosilicate

New structure type
Monoclinic: *C*2/*c*
a 26.3511, *b* 7.5464, *c* 22.9769, β 107.237˚
Colourless; vitreous; transparent
Biaxial (–), α 1.585, β 1.598, γ 1.603, 2V(calc.) 63˚
6.32(50), 3.65(50), 3.35(100), 3.14(90), 2.82(50), 2.62(70)

IMA No. **2003-035**
$SrB_2Si_2O_8$
Sr-dominant analogue of danburite
Structure determined
Orthorhombic: *Pnma*
a 8.155, *b* 7.919, *c* 8.921 Å
Colourless; vitreous; transparent
Biaxial (–), α 1.597, β 1.627, γ 1.632, 2V (meas.) 43˚, 2V(calc.) 44˚
5.94(60), 3.62(100), 3.51(90), 3.31(80), 3.01(60), 2.786(90), 2.706(60), 1.982(70)

IMA No. **2003-036**
$Ba_2Mn(VO_4)_2(OH)$
Mn-dominant analogue of gamagarite
Monoclinic: $P2_1/m$
a 9.10, *b* 6.13, *c* 7.89, β 112.2˚
Black-red; vitreous; translucent
Biaxial, n (calc.) 2.03
3.46(26), 3.31(100), 3.00(16), 2.90(19), 2.80(62), 2.71(40), 2.16(18)

IMA No. **2003-037**
$Ce_2Fe^{2+}[Si_2O_7](CO_3)$
New structure type
Monoclinic: $P2_1/c$
a 6.512, *b* 6.744, *c* 18.94(4) Å, β 111.90˚
Brown; vitreous; translucent
Biaxial (–), α 1.785, β 1.810, γ 1.820, 2V (meas.) 66˚, 2V(calc.) 64˚
4.41(4), 3.61(4), 3.30(5), 2.92(10), 2.65(5), 2.23(5)

IMA No. **2003-039**
$Pb_2(Pb,Sb)_2S_8[Te,Au]_2$
Nagyágite-buckhornite homologous series
Monoclinic: $P2_1/m$
a 4.361, *b* 6.618, *c* 20.858 Å, β 92.71˚
Dark silver-grey; metallic; opaque
In reflected light: grey colour, very low bireflectance and pleochroism, distinct anisotropy.
R(air): 38.4-40.3 (471 nm), 38.1-40.1 (548 nm), 37.5-39.4 (587 nm), 35.9-38.0 (652 nm)
6.93(38), 4.80(52), 4.10(40), 3.56(100), 3.47(58), 3.31(40), 2.99(50), 2.98(30), 2.56(41)

IMA No. **2003-040**
$(Mg,Cu)SO_4 \cdot 7H_2O$
Melanterite group
Structure determined
Monoclinic: $P2_1/c$

a 14.166, *b* 6.534, *c* 10.838 Å, β 105.922˚
Blue; vitreous; transparent
Biaxial (+), α 1.462, β 1.465, γ 1.469, 2V(meas.) 79.8˚, 2V(calc.) 82˚
4.85(100), 4.79(14), 4.44(16), 3.779(38), 3.663(15), 3.254(15), 3.078(14), 2.721(14)

IMA No. **2003-041**
$Cu_3Zn(OH)_6Cl_2$
Related to paratacamite
Structure determined
Trigonal: $R\bar{3}m$
a 6.834, *c* 14.075 Å
Dark-green to blue-green; vitreous; transparent
Uniaxial (−), ω 1.825, ε 1.815
5.47(55), 4.70(14), 2.899(11), 2.764(100), 2.730(13), 2.266(36), 1.820(13), 1.709(18)

IMA No. **2003-042**
$CdIn_2S_4$
Linnaeite group
Cubic: *Fd*3*m*
a 10.81 Å
Black; adamantine; translucent
In reflected light: grey colour, isotropic, brown-red internal reflections. R(air): 23.9 (470 nm), 21.6 (546 nm), 20.8 (589 nm), 20.2 (650 nm)
3.87(4), 3.27(10), 2.70(6), 2.07(8), 1.91(9), 1.41(6), 1.246(7), 1.107(9), 1.045(8)

IMA No. **2003-043**
$KNa_2Fe^{2+}{}_4Fe^{3+}Si_8O_{22}(OH)_2$
Amphibole group
Structure determined
Monoclinic: *C*2/*m*
a 10.002 *b* 18.054 *c* 5.319(1) Å, β 103.90(3)˚
Black or dark blue-green; vitreous; translucent to transparent
Biaxial (–), α 1.683, β 1.692, γ 1.699, 2V(meas.) > 60˚, 2V(calc.) 82˚
9.02(28), 8.53(100), 3.419(12), 3.303(23), 3.184(40), 2.847(17), 2.725(10)

IMA No. **2003-044**
$BaNa\{(Na,Ti)_4[(Ti,Nb)_2(OH,O)_3Si_4O_{14}](OH,F)_2\}\cdot 3H_2O$
Heterophyllosilicate
Structure determined
Monoclinic: *I*11*b*
a 5.552, *b* 7.179, *c* 50.94(1) Å, γ 91.10˚
Creamy or pale yellow; silky; semi-transparent
Biaxial (+), α 1.668, β 1.679, γ 1.710, 2V(meas.) 63˚, 2V(calc.) 63˚
25.50(100), 12.68(14), 8.48(72), 5.11(11), 3.44(14), 3.17(74), 2.763(20), 2.110(14)

IMA No. **2003-046**
$(U,Th)(Ca,Na)_2(K_{1-x}\square_x)Si_8O_{20}\cdot H_2O$
Steacyite group
Structure determined
Tetragonal: *P*4/*mcc*

a 7.6506, *c* 14.9318 Å
Dark-green; vitreous; transparent
Uniaxial (–), ω 1.615, ε 1.610
5.34(23), 5.28(38), 3.37(100), 3.31(59), 2.640(64), 2.515(21), 2.161(45), 2.016(29), 1.644(30)

IMA No. **2003-047**
$Ca_3(Al,Mn^{3+})_2(SiO_4)_2(OH)_4$
Garnet group
Structure determined
Tetragonal: $I4_1/acd$
a 12.337, *c* 11.930 Å
Brownish yellow; vitreous; transparent
Uniaxial (+), ω 1.718, ε 1.746
3.08(44), 2.978(45), 2.757(55), 2.743(100), 2.685(54), 2.501(47), 1.614(56)

IMA No. **2003-048**
$KMg(PO_4)\cdot 6H_2O$
Schertelite-struvite group
Structure determined
Orthorhombic: $Pmn2_1$
a 6.892, *b* 6.166, *c* 11.139 Å
Colourless; vitreous; transparent
Biaxial (+), α 1.490(2), β 1.493(2), γ not determined, $2V_z$ (meas.) large
4.26(100), 4.14(80), 3.27(90), 2.905(50), 2.699(50), 2.650(70), 1.954(50)

IMA No. **2003-049**
CuPd
CsCl structure
Cubic: *Pm*3*m*
a 3.0014 Å
Steel-grey with a bronze tint; metallic; opaque
In reflected light: creamy to bright white, isotropic, no internal reflections. R(air): 58.7 (470 nm), 62.6 (546 nm), 64.1 (589 nm), 65.3 (650 nm)
2.122(100), 1.500 (30), 1.225(70), 1.061(40), 0.9491(50), 0.8021(60)

IMA No. **2003-050**
$NaCa_2(Mg_3Fe^{2+}Al)_5(Si_6Al_2)_8O_{22}F_2$
Amphibole group
Structure detemined
Monoclinic: *C*2/*m*
a 9.8771, *b* 18.041, *c* 5.3092 Å, β 105.133˚
Black; vitreous; transparent to translucent in very thin fragments
Biaxial (+), α 1.634, β 1.642, γ 1.654, 2V(meas.) 68˚, 2V(calc.) 79˚
8.42(100), 3.28(20), 3.21(84), 3.00(13), 2.825(54), 2.379(17), 2.347(15), 1.443(15)

IMA No. **2003-051**
$Bi_7O_4(MoO_4)_2(AsO_4)_3$
New structure type
Orthorhombic: *Pnca*
a 5.303, *b* 16.169, *c* 23.980 Å

Yellow; adamantine; transparent
Biaxial (–), α 2.22, β 2.255, γ 2.26, 2V(meas.) 42˚, 2V(calc.) 41˚
3.41(37), 2.996(69), 2.963(48), 2.688(100), 2.001(28), 1.887(13), 1.657(14)

IMA No. **2003-052**
$Fe^{3+}Ge^{4+}{}_3O_7(OH)$
Orthorhombic: *P****
a 8.302, *b* 9.718, *c* 4.527 Å
Dirty brown-green; vitreous; opaque in aggregates, transparent in crystals
Biaxial (+), with at least two indices of refraction greater than 1.8, 2V(meas.) large
4.11(40), 3.68(100), 3.12(60), 2.921(100), 2.512(40), 2.403(90), 1.646(80), 1.624(50)

IMA No. **2003-053**
$YTaO_4$
Dimorphous with formanite
Structure determined
Monoclinic: *P*2/*a*
a 5.262, *b* 5.451, *c* 5.110 Å, β 95.12˚
Amber brown to brown; vitreous to adamantine; translucent
R(air): 13.8-14.1 (470 nm), 13.6-13.8 (546 nm), 13.6-13.9 (589 nm), 13.7-14.0 (650 nm)
3.13(100), 2.95(94), 2.73(26), 2.62(23), 1.890(29), 1.862(29), 1.614(20)

IMA No. **2003-055**
$Mn^{2+}V^{3+}Al(Si_2O_6)(OH)_4$
Carpholite group
Structure determined
Orthorhombic: *Ccca*
a 13.830, *b* 20.681, *c* 5.188 Å
Pale straw-yellow to brown; vitreous to silky; transparent
Biaxial (+), α 1.684, β 1.691 (calc.), γ 1.700, 2V (meas.) 85˚
5.75(100), 5.15(18), 4.72(14), 3.46(15), 3.08(22), 2.641(26)

IMA No. **2003-056**
PdSbSe
Ullmannite group
Structure determined
Cubic: $P2_1/3$
a 6.3181 Å
Silver-grey; metallic; opaque
In reflected light: white, isotropic, no internal reflections. R(air): 48.6 (470 nm), 47.5 (546 nm), 47.6 (589 nm), 49.0 (650 nm)
3.16(53), 2.825(100), 2.579(81), 2.233(32), 1.905(98), 1.752(27), 1.688(25), 1.379(18)

IMA No. **2003-057**
$(Fe^{2+},Mg)_6Fe^{3+}{}_2(OH)_{18}\cdot 4H_2O$
Meixnerite group
Structure determined
Trigonal: $R\bar{3}m$
a 3.125, *c* ~ 22.5 Å
Bluish-grey; earthy

No optical data
7.97(100), 3.97(32), 2.692(34), 2.027(19), 1.595(9), 1.563(10)

IMA No. **2003-058**
$Na_8Al_8Si_{28}O_{72}·30H_2O$
Zeolite group
Structure determined
Hexagonal: $P6_3/mmc$
a 18.235, *c* 7.636 Å
Colourless, white; vitreous; transparent
Uniaxial (+), ω 1.471, ε 1.472
9.08(100), 6.86(70), 5.95(70), 4.68(40), 3.79(80), 3.51(40), 3.15(70)

IMA No. **2003-059**
$WO_3·0.5H_2O$
Related to ferritungstite
Cubic: $Fd3m$
a 10.203 Å
White; vitreous; translucent
Isotropic, *n* 2.240
5.88(100), 3.08(62), 2.944(78), 2.551(12), 1.964(17), 1.804(23), 1.725(14), 1.538(14)

IMA No. **2003-060**
$Sr_3Al_{3.5}Si_{3.5}O_{10}(OH,O)_8Cl_2·H_2O$
New structure type
Monoclinic: $P2/m$, $P2$ or Pm
a 5.893, *b* 7.262, *c* 10.288 Å, β 97.23˚
White; silky; translucent
Biaxial (+), α 1.639, β 1.648, γ 1.665, 2V (meas.) 75˚, 2V (calc.) 72.7˚
10.13(100), 3.23(80), 2.96(100), 2.90(100), 2.505(100), 2.182(80), 2.104(60), 1.855(70)

IMA No. **2003-061**
$NaNa_2(Mg_2Mn^{3+}LiTi^{4+})Si_8O_{22}O_2$
Amphibole group
Structure determined
Monoclinic: $C2/m$
a 9.808, *b* 17.840, *c* 5.2848 Å, β 104.653˚
Pink-red; vitreous; transparent
Biaxial (+), α 1.688, β 1.692, γ 1.721. 2V (meas.) 49˚, 2V (calc.) 41˚
4.45(6), 3.38(7), 3.13(8), 2.697(10), 2.542(9), 2.154(7), 1.434(7)

IMA No. **2003-062**
$Na(CaMn)_{\Sigma 2}\ Mg_5(Si_7Al)O_{22}(OH)_2$
Amphibole group
Structure determined
Monoclinic: $C2/m$
a 9.795, *b* 18.047, *c* 5.287 Å, β 104.28˚
Very pale pinkish-brown; vitreous; translucent
Biaxial (–), α 1.620, β 1.632, γ 1.642, 2V (calc.) 84˚
10.53(50), 3.39(59), 3.27(48), 3.12(61), 2.948(47), 2.720(46), 2.711(100), 2.594(49)

IMA No. **2003-063**
□$NaFe^{2+}Fe^{3+}Al(PO_4)_3$
Wyllieite group
Structure determined
Monoclinic: $P2_1/n$
a 11.838, *b* 12.347, *c* 6.2973 Å, β 114.353˚
Dark-green to bronze; resinous; transparent
Biaxial (–), α 1.730, β 1.758, γ 1.775, 2V (meas.) 82˚, 2V (calc.) 75˚
8.10(30), 6.17(50), 5.38(40), 4.05(45), 3.45(65), 3.01(40), 2.693(75), 2.677(100)

IMA No. **2003-064**
$Cu_2AgPbBiS_4$
Higher homologue of miharaite
Structure determined
Monoclinic: $P2_1/n$
a 4.0329, *b* 12.734, *c* 14.639 Å, β 90.103˚
Grey; metallic; opaque
In reflected light: yellowish-brownish, moderate bireflectance, distinct anisotropy, no internal reflections. R(air): 40.2-45.7 (470 nm), 39.3-44.5 (546 nm), 38.9-44.1 (589 nm), 38.6-44.1 (650 nm)
3.67(100), 3.66(64), 3.41(60), 3.319(62), 3.317(62), 3.111(69), 3.022(72), 3.017(72)

IMA No. **2003-065**
$Ca(REE,Ca)Al_2(Fe^{2+},Fe^{3+})(SiO_4)(Si_2O_7)O(OH)$
Epidote group
Structure determined
Monoclinic: $P2_1/m$
a 8.914, *b* 5.726, *c* 10.132 Å, β 114.87˚
Black; vitreous; transparent to translucent
Biaxial, α' 1.755, β 1.760, γ' 1.765, 2V not determined
7.93(15), 3.51(20), 2.901(100), 2.860(40), 2.692(60), 2.611(50), 2.283(15), 2.174(25)

IMA No. **2003-066**
Parvowinchite $Na(NaMn)_{\Sigma2}(Mg_4Fe^{3+})_{\Sigma5}Si_8O_{22}(OH)_2$
Amphibole group
Structure determined
Monoclinic: $C2/m$
a 9.704, *b* 17.990, *c* 5.297 Å, β 103.51˚
Straw-yellow; vitreous; translucent
Mean index of refraction (*n*) 1.665 (calc.)
8.36(76), 3.40(62), 3.26(34), 3.10(66), 2.714(100), 2.591(35), 2.522(61), 2.166(36)
Exceptionally, the name of this new mineral is published here, on request of the author (Roberta Oberti of Pavia, Italy). Similar amphibole material has been previously described as 'tirodite', but this name was discredited in the 1997 paper on amphibole nomenclature, the new name being '(alkali-bearing) manganocummingtonite'. The new name 'parvowinchite' has already been attributed in the Leake *et al.* (2003) amphibole paper (Canadian Mineralogist, 41, 1355-1362) to the specimen described by Oberti and Ghose (1993, European Journal of Mineralogy, 5, 1153-1160). Because further characterization of the available material is not possible, no further report will be published.

OLDER PROPOSALS

IMA No. **95-020c**
$CaB_3O_4(OH)_3$
New structure type
Monoclinic: $P2_1/a$
a 8.386, b 8.142, c 7.249 Å, β 98.33°
White to colourless; vitreous; translucent to transparent
Biaxial (+), α 1.573, β 1.586, γ 1.626, 2V(meas.) 60°, 2V(calc.) 61°
4.32(57), 3.39(100), 3.13(50), 2.93(23), 2.606(25), 2.360(17), 2.287(19), 1.849(25)

IMA No. **2000-043a**
$(Al,Ga)_2(Ge,C)O_4(OH)_2$
Isotypic with topaz
Structure determined
Orthorhombic: $Pnma$
a 9.1111, b 8.5276, c 4.8064 Å
Beige to white; greasy; translucent
Biaxial, n(calc.) = 1.757
3.811(78), 3.315(48), 3.016(100), 2.464(24), 2.417(27), 2.247(38), 1.398(29)

IMA No. **2001-067a**
$^{A}\square\ ^{B}(Na_1Li_1)^{C}(Fe^{3+}{}_2Mg_3)^{T}Si_8O_{22}(OH)_2$
Amphibole group
Structure determined
Monoclinic: $C2/m$
a 9.535, b 17.876, c 5.234 Å, β 102.54º
Black; vitreous; translucent
Biaxial, no other optical properties given
8.27(15), 3.408(18), 3.058(36), 2.710(100), 2.501(68), 1.581(19), 1.399(20)

IMA No. **2002-009a**
$Ca_2Fe^{2+}{}_4Fe^{3+}TiSi_4BeAlO_{20}$
Aenigmatite group
Structure determined
Triclinic: $P\bar{1}$
a 10.3549, b 10.7508, c 8.8732 Å, α 105.707, β 96.227, γ 124.861º
Black; vitreous; opaque.
Biaxial (sign not known), α 1.799, β -, γ 1.86, 2V not known
8.00(57), 4.78(29), 3.12(32), 2.924(69), 2.676(77), 2.530(100), 2.410(28), 2.075(39)

OTHER NOMENCLATURE DECISIONS

IMA No. **03-A**
It has been approved that the general CNMMN advocacy of Schaller modifiers (Hey & Gottardi, Can. Mineral. 18 [1980], 261-262; Nickel & Mandarino, Can. Mineral. 25 [1987], 353-377) is to be dropped. When it is desired to indicate the presence of subordinate chemical components in a mineral, Schaller modifiers may be used in unambiguous cases, namely those

in which the element has two, and only two, valence states. In the more general case, adjectival modifiers such as "-bearing" or "-rich" should be used, together with the specified element(s), and with the numerical oxidation state, if required, *e.g.*, "$Mn^{(2+)}$-rich", "V(III)-deficient", "Mg-bearing", *etc.*

IMA No. **03-B**
Spodiosite discredited: Spodiosite is a mixture of fluorapatite, calcite and serpentine.

IMA No. **03-C**
Naming polytypes of wagnerite: The known polytypes of wagnerite, ideally $Mg_2(PO_4)F$, are named wagnerite-*Ma*2*bc* (space group $P2_1/c$), wagnerite-*Ma*5*bc* (space group *Ia*), wagnerite-*Ma*7*bc* (space group $P2_1$) and wagnerite-*Ma*9*bc* (space group *Ia*). Polytypes of zwieselite and triplite can be written in analogy with those of wagnerite.
Magniotriplite discredited: Magniotriplite and wagnerite are polytypes, not polymorphs, of one another. The name wagnerite has priority (1821 vs. 1951 for magniotriplite), therefore the species and name *magniotriplite* is discredited.

Nomenclature of a mineral group
Amphiboles**:** additions and revisions to the International Mineralogical Association's amphibole nomenclature.
See Can. Mineral. 41 (2003), 1355-1362, Eur. J. Mineral. 16 (2004), 191-196, and other journals, and also on the CNMMN website (www.geo.vu.nl/~ima-cnmmn).

IMA No. **2003-058**
Mazzite renamed mazzite-Mg**:** the approval of IMA No. 2003-058 as a new mineral automatically implies that the name of the existing mazzite is changed to mazzite-Mg, and that these two minerals form the new mazzite series within the zeolites.

Withdrawal of an approved mineral
Prassoite**:** the mineral prassoite, Rh_3S_4, was approved as mineral 70-041 by the CNMMN in March 1971. The author, Kingston, published some data in his Ph.D. thesis in 1977. These data were summarized by Cabri in 1981, but he stated that the true formula might be $Rh_{17}S_{15}$. Augé found the same mineral as Kingston in 1988, with the formula Rh_3S_4 (Can. Mineral. 26, 177-192), and this paper was mentioned by Jambor in 1989 (Am. Mineral. 74, 1220).
Britvin *et al.* proposed the mineral miassite (97-029) to the CNMMN with the formula $Rh_{17}S_{15}$. This mineral was approved in October 1997, but the name was suspended because of possible problems with prassoite. The authors were asked to contact Kingston. They tried to do so, but to no avail.
After having heard from Britvin *et al.* that Kingston did not reply to any search, the suspension on the name miassite was lifted, but the CNMMN chairman then made a mistake (probably by not having access to the 1971 archives). In his Memorandum of July 1999, Joel Grice wrote: 'Prassoite' was never approved by the CNMMN, and no type material can be found. It is apparent that the authors of miassite have done everything possible to establish or refute the existence of this dubious mineral and the name 'prassoite' is to be discouraged from further usage. In his letter to Britvin *et al.*, lifting the suspension, Joel Grice wrote: I would ask you to make it clear in your publication that all attempts were made to find the type material for a formal discrediation of prassoite but none existed.
Britvin *et al.* published their miassite in ZVMO 130(2), 41-44 (2001), stating in the paper that prassoite was never approved by the CNMMN, this of course on the authority of Joel Grice.

The paper was abstracted by Jambor (Am. Mineral. 87, p. 1511), with the correction that prassoite had indeed been approved by the CNMMN back in 1971.
Later, it became apparent that the type material of prassoite was present in the British Museum (on the same specimen as the type material for kingstonite), but the letters of Britvin *et al.* to Kingston were never forwarded to the curator of the British Museum.
We have meanwhile the strange fact that there are at least ten papers using the name prassoite (the most recent one in Can. Mineral. 40 (2002), 1127-1146), but only a single paper on miassite! Moreover, the name 'prassoite' has never been officially discredited or withdrawn.
In view of the delay in the (incomplete) publication of the inadequately described prassoite and the uncertainties about its composition, the name ‘prassoite’ is withdrawn for the time being in favour of miassite. Unambigous evidence for the existence of Rh_3S_4 as a mineral might reinstate the name prassoite.

Recommendations on CNMMN procedures
On request and proposal of Donald Peacor the following recommendations on CNMMN procedures have been approved in 1999/2000, but never published until now:

- Mineral status should be accorded to those materials occurring in sub-micrometer-sized crystallites only if they are of sufficient total volume or concentration to be detected by at least one commonly used laboratory technique.
- CNMMN criteria for approval of mineral species status should be viewed as flexible guidelines.

NEW MINERALS APPROVED IN 2004
NOMENCLATURE MODIFICATIONS APPROVED IN 2004
BY THE
COMMISSION ON NEW MINERALS AND MINERAL NAMES
INTERNATIONAL MINERALOGICAL ASSOCIATION

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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 number
Type locality
Corresponding author
Chemical formula
Relationship to other minerals
Crystal system, Space group, Structure determined, yes or no
Unit-cell parameters
Interplanar spacing (Å) and intensity of the 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.

This list is also available on the CNMMN website:
http://sheba.geo.vu.nl/~ima-cnmmn/minerals2004.pdf

NO OTHER INFORMATION WILL BE RELEASED BY THE COMMISSION

2004 PROPOSALS

IMA No. **2004-001**
Little Patsy pegmatite, Jefferson Co., Colorado, USA
William B. Simmons
[(REE+Y),U,Th,Ca,Fe,…](Nb,Ta,Ti)O_4 with Yb as dominant REE
Yb-dominant analogue of samarskite
Monoclinic: *P*2/*c*
a 5.687 *b* 9.918, *c* 5.201 Å, β 93.18˚ (for heated material)
3.664(21), 3.086(25), 2.981(100), 1.895(12), 1.865(20), 1.769(15), 1.746(12), 1.587(20)

IMA No. **2004-002**
Tastyg spodumene deposit, Tuva, Siberia, Russia

Roberta Oberti
$NaLi_2(Mg_2Al_2Li)_{\Sigma 5}Si_8O_{22}F_2$
Amphibole group
Monoclinic: *C*2/*m*; Structure determined
a 9.357, *b* 17.580, *c* 5.267 Å, β 102.37˚
8.11(56), 4.39(54), 3.371(43), 3.002(66), 2.869(26), 2.675(100)

IMA No. **2004-003**
Findlay Gulch, Saguache Co., Colorado, USA
Luca Bindi
$Ag_3HgPbSbTe_5$
Strong similarities with petrovicite
Orthorhombic: *Pna*2$_1$ or *Pnam* (probably)
a 16.495, *b* 14.762, *c* 4.506 Å
3.65(60), 3.60(40), 3.26(50), 3.17(60), 3.01(100), 2.754(60), 2.316(45), 2.137(50), 1.806(55)

IMA No. **2004-004**
Tahara, Hirukawa-mura, Ena-gun, Gifu Prefecture, Japan
Satoshi Matsubara
$Ce_2Be_2(SiO_4)_2(OH)_2$
Gadolinite group
Monoclinic: *P*2$_1$/*a*
a 9.8973, *b* 7.6282, *c* 4.7505 Å, β 90.416˚
6.06(42), 3.74(37), 3.44(34), 3.13(86), 2.85(100), 2.56(46), 2.21(33), 1.976(30)

IMA No. **2004-005**
Palitra pegmatite, Lovozero, Kola Peninsula, Russia
Igor V. Pekov
$CsFe_2S_3$
Cs-dominant analogue of rasvumite and picotpaulite
Orthorhombic: *Cmcm*
a 9.477, b 11.245, c 5.485 Å
4.69(30), 4.28(20), 2.981(100), 2.723(40), 2.003(30), 1.910(60), 1.785(30), 1.565(40)

IMA No. **2004-006**
ca. 7.5 km southwest of Wolf Mountain, Thunder Bay District, Ontario, Canada
Anton R. Chakhmouradian
$(Ca,Na)_5[(P,S)O_4]_3(OH,Cl)$
Apatite group
Monoclinic: *P*2$_1$/*b*
a 9.445, *b* 18.853, *c* 6.8783 Å, γ 120.00˚
2.817(66), 2.781(41), 2.724(79), 2.630(24), 2.267(100), 1.945(39), 1.841(58), 1.784(70)

IMA No. **2004-007**
Mesamax Northwest deposit, Cape Smith, Ungava region, Canada
Louis J. Cabri
Pd_2Sb
Orthorhombic: *Cmc*2$_1$
a 3.3906, *b* 17.5551, *c* 6.957 Å
2.407(34), 2.303(35), 2.245(100), 2.057(52), 2.001(40), 1.367(35), 1.284(42), 1.212(50)

IMA No. **2004-008**
Eveslogchorr Mountain, Khibiny massif, Kola Peninsula, Russia
Igor V. Pekov
$(Sr,Ba,K)(Ti,Nb)_2(Si_4O_{12})(OH,O)_2 \cdot 3H_2O$
Labuntsovite group
Monoclinic: *Cm*; Structure determined
a 14.490, *b* 14.23, *c* 7.881 Å, β 117.28˚
7.10(90), 6.45(50), 5.01(40), 3.230(100), 3.135(80), 2.510(80), 1.728(50), 1.570(45)

IMA No. **2004-009**
Dora-Maira massif, Vallone di Gilba, Val Varaita, Piemonte, Italy
Christian Chopin
$Mg_2(PO_4)(OH)$
Triplite-triploidite group
Monoclinic: $P2_1/c$
a 9.646, *b* 12.7314, *c* 11.980Å, β 108.38˚
3.292(50), 3.117(66), 2.984(100), 2.851(80), 2.752(28), 2.710(19), 2.484(14)

IMA No. **2004-010**
Shergotty SNC meteorite
Charles T. Prewitt
SiO_2
Polymorphous with quartz
Orthorhombic: *Pbcn* or *Pb*2*n*; Structure determined
a 4.097, *b* 5.0462, *c* 4.4946 Å
3.181(72), 2.596(100), 1.970(25), 1.938(64), 1.514(31), 1.499(44), 1.288(19), 1.265(15)

IMA No. **2004-011**
Kumdy-Kul, Kokchetav, Kazakhstan
Shyh-Lung Hwang
$KAlSi_3O_8$
Feldspar group
Hexagonal: probably *P*6/*mmm*
a 5.27, *c* 7.82 Å
7.82, 4.56, 3.94, 2.97, 2.63, 2.50, 2.26, 1.80

IMA No. **2004-012**
Dara-i-Pioz glacier, Tajikistan
Leonid A. Pautov
$CsLi_2AlSi_4O_{10}F_2$
Mica group
Monoclinic: *C*2/*m*, *C*2 or *Cm*
a 5.182, *b* 9.005, *c* 10.692 Å, β 99.82˚
3.897(49), 3.682(80), 3.418(65), 3.174(100), 2.980(41), 2.634(79), 2.582(66), 2.107(94)

IMA No. **2004-013**
Fernando-do-Noronha Island, Brazil
Frank C. Hawthorne
$(Ba,K)(Mg,Fe^{2+},Ti^{4+})_3(Si,Al)_4O_{10}O_2$

Mica group
Monoclinic: *C*2/*m*; Structure determined
a 5.3516, *b* 9.2817, *c* 10.0475 Å, β 100.337˚
3.646(7), 3.383(6), 3.130(7), 2.902(5), 2.637(10), 2.435(5), 2.172(9), 1.988(5)

IMA No. **2004-014**
Le Coreux, Ardennes, Belgium
Werner Schreyer
$La_3Mn^{2+}{}_3Cu^{2+}(Mn^{3+},Fe^{3+},Mn^{4+})_{26}(Si_2O_7)_6O_{30}$
New structure type determined
Trigonal: $P3_1$
a 11.525, *c* 33.347 Å
11.116(18) 5.446(31), 3.1873(19), 2.7789(40), 2.7232(100), 2.3702(29), 1.6887(28), 1.6635(40)

IMA No. **2004-015**
Central Pyrenees, France
Christian Chopin
$(Mn^{2+},Ca)(REE)V^{3+}AlMn^{2+}(Si_2O_7)(SiO_4)O(OH)$, with Ce as dominant REE
Epidote group
Monoclinic: $P2_1/m$; Structure determined
a 8.856, *b* 5.729, *c* 10.038 Å, β 113.088˚
3.5004, 2.8891, 2.8645, 2.7114, 2.7023, 2.6124, 2.5916

IMA No. **2004-016**
Silver Gill mine, Cumbria, United Kingdom
Joseph J. Pluth
$Cu_6(OH)_{10}(SO_4)\cdot H_2O$
Langite group
Monoclinic: $P2_1/c$; Structure determined
a 3.155, *b* 10.441, *c* 19.436 Å, β 90.089˚
9.72(90), 7.11(100), 4.60(30), 4.068(20), 2.880(30), 2.318(50), 2.000(15), 1.941(15)

IMA No. **2004-017**
Dara-i-Pioz glacier, Tajikistan
Leonid A. Pautov
$CsKNaCa_2TiO[Si_7O_{18}(OH)]$
Cs-dominant analogue of tinaksite
Triclinic: $P\bar{1}$; Structure determined
a 10.4191, *b* 12.2408, *c* 7.0569 Å, α 90.857, β 99.193, γ 91.895º
4.08(13), 3.33(11), 3.25(16), 3.14(21), 3.06(100), 2.959(20), 2.038(17)

IMA No. **2004-018**
Mariposa mine, Texas, USA
Andrew C. Roberts
$Hg^{2+}{}_3O_2Cl_2$
Oxyhalide with Hg
Orthorhombic: *Imam*, *Imcm*, *Ima*2, or *I*2*cm*
a 6.737, *b* 25.528, *c* 5.533 Å
5.413(30), 4.063(80), 3.201(50), 3.023(50), 2.983(60), 2.858(30), 2.765(50), 2.518(100)

IMA No. **2004-019**
Qaqarssuk complex, Greenland
Joel D. Grice
$Ba(Ce,REE)(CO_3)_2F$
Polymorph of huanghoite-(Ce)
Trigonal: *P*3; Structure determined
a 7.2097, *c* 18.187 Å
4.552(43), 3.674(32), 3.539(41), 3.351(100), 3.096(40), 2.571(35), 2.109(39), 2.080(60)

IMA No. **2004-020**
Mesamax Northwest deposit, Québec, Canada
Louis J. Cabri
Pd_4Sb_3
Pd-dominant analogue of genkinite
Tetragonal: $P4_12_12$, $P4_122$, $P4_32_12$, $P4_22_12$, or $P4_222$
a 7.7388, *c* 24.145 Å
3.0077(90), 2.2633(100), 2.1471(30), 1.9404(60), 1.2465(30), 1.2002(30), 0.9221(30)

IMA No. **2004-021**
Kovdor massif, Kola Peninsula, Russia
Victor N. Yakovenchuk
$Co_3(PO_4)_2{\cdot}8H_2O$
Vivianite group
Monoclinic: *C*2/*m*
a 10.034, *b* 13.341, *c* 4.670 Å, β 105.02˚
6.67(10), 4.85(4), 3.84(4), 3.195(6), 2.948(7), 2.691(7), 2.521(6), 2.408(6)

IMA No. **2004-022**
Horní Halže, Krušné Hory Mts., Czech Republic
Jiří Sejkora
$Pb_2(UO_2)_{11}(BiO)_8(PO_4)_5(OH)_{19}{\cdot}6H_2O$
P-dominant analogue of asselbornite
Cubic: *Im*3*m*, *I*432, *Im*3 or *I*23
a 15.5728 Å
5.513(53), 4.499(48), 4.163(100), 3.671(77), 3.484(31), 3.179(99), 2.596(54), 1.9776(30)

IMA No. **2004-023**
Kara-Oba deposit, Kazakhstan
Leonid A. Pautov
$Ca_3(Nd,Y)Al_2(SO_4)F_{13}{\cdot}12H_2O$
Nd-dominant analogue of chukhrovite
Cubic: *Fd*3
a 16.759 Å
9.7(10), 5.92(7), 4.20(4), 3.22(8), 2.555(7), 2.240(5), 2.180(6), 1.827(5)

IMA No. **2004-024**
Kara-Tangi deposit, Kyrgyzstan
Leonid A. Pautov
$ZnAl_4(SO_4)(OH)_{12}{\cdot}3H_2O$

Zn-dominant analogue of chalcoalumite
Monoclinic: $P2_1/n$
a 10.246, *b* 8.873, *c* 17.22 Å, β 96.41˚
8.60(100), 7.93(70), 4.83(80), 4.27(100), 2.516(70), 2.292(80), 1.998(95), 1.896(65)

IMA No. **2004-025**
Tolbachik volcano, Kamchatka Peninsula, Russia
Sergey V. Krivovichev
$Cu^{+}Cu^{2+}_5PbO_2(SeO_3)_2Cl_5$
New structure type determined
Monoclinic: $C2/m$
a 18.468, *b* 6.1475, *c* 15.314 Å, β 119.284˚
3.86(80), 3.55(80), 3.08(100), 2.504(20), 1.710(30), 1.543(50), 1.448(30), 1.348(40)

IMA No. **2004-026**
Poudrette Quarry, Mont Saint-Hilaire, Rouville County, Quebec, Canada
Joel D. Grice
$Na_{12}(Ce,REE,Sr)_3Ca_6Mn_3Zr_3W(Si_{25}O_{73})(OH)_3(CO_3)\cdot H_2O$
Eudialyte group
Trigonal: $R3m$; Structure determined
a 14.249, *c* 30.06 Å
11.308(95), 9.460(81), 3.547(36), 3.395(38), 3.363(32), 3.167(75), 2.968(100), 2.849(81)

IMA No. **2004-028**
Mina Challacollo, Chile
Jochen Schlüter
KPb_2Cl_5
New structure type determined
Monoclinic: $P2_1/c$
a 8.864, *b* 7.932, *c* 12.491 Å, β 90.153˚
8.8547(39), 5.3350(14), 3.9614(31), 3.6859(100), 3.6093(13), 2.6691(42), 2.5483(18)

IMA No. **2004-029**
La Creusaz, Valais, Switzerland, and Radium Ridge, South Australia
Joël Brugger
$(Ce,Nd,Ca)[(UO_2)_3O(OH)(PO_4)_2]\cdot 6H_2O$
Related to phosphuranyllite group
Monoclinic: $P2_1/c$
a 9.295, *b* 15.53, *c* 13.718 Å, β 112.39˚
7.76(100), 5.77(60), 4.42(30), 4.37(30), 3.87(60), 3.43(70), 3.14(80), 2.038(40)

IMA No. **2004-030**
Greenbushes, Western Australia
Roberta Oberti
$\square Li_2(Fe^{2+}_3Al_2)_{\Sigma 5}(Si_8O_{22})(OH)_2$
Amphibole group
Orthorhombic: *Pnma*; Structure determined
a 18.287, *b* 17.680, *c* 5.278 Å
8.11(100), 4.42(26), 3.62(13), 3.00(48), 2.797(17), 2.648(14), 2.536(11)

IMA No. **2004-031**
Nagybörzsöny ore deposit, Börzsöny Mountains, Hungary
Werner Paar
$AuBi_5S_4$
Monoclinic: *F*2/*m*, *F*2 or *Fm*
a 18.329, *b* 4.108, *c* 13.974 Å, β 100.90˚
9.002(40), 6.876(30), 6.046(20), 3.460(30), 3.382(40), 2.959(100), 2.101(50), 2.086(50)

IMA No. **2004-032**
Mutnovsky volcano, Kamchatka Peninsula, Russia
Filippo Vurro
$Pb_2AsS_3(I,Cl)$
Orthorhombic: *Pnma*; Structure determined
a 11.543, *b* 6.6764, *c* 9.359 Å
4.690(32), 4.370(67), 3.340(73), 3.190(100), 2.715(61), 2.648(66), 2.539(31), 1.894(30)

IMA No. **2004-033**
Koashva Mountain, Khibiny massif, Kola Peninsula, Russia
Igor Pekov
$Cu_3FeS_3 \cdot 2H_2O$
Orthorhombic: *Pmmm*
a 5.147, *b* 7.289, *c* 5.889 Å
5.12(40), 4.21(40), 3.69(30), 3.104(100), 2.727(50), 2.292(50), 1.897(70), 1.828(50)

IMA No. **2004-034**
Ilmen Mountain Ridge, South Ural, Russia
Alfred G. Bazhenov
$(\square,Na)(Na,Ca)_2(Mg, Fe^{2+})_4Fe^{3+}[Si_8O_{22}](OH)_2$
Amphibole group
Monoclinic: *C*2/*m*
a 9.811, *b* 18.014, *c* 5.295 Å, β 104.10˚
8.42(100), 3.391(10), 3.268(13), 3.116(60), 2.800(10), 2.711(20)

IMA No. **2004-035**
Iron Monarch quarry, Iron Knob, South Australia
Allan Pring
$Mn_7(PO_4)_2(OH)_8$
Monoclinic: $P2_1/c$; Structure determined
a 11.364, *b* 5.570, *c* 10.455 Å, β 96.61˚
4.436(70), 3.621(100), 3.069(50), 2.941(40), 2.890(20), 2.842(20), 2.780(35), 2.718(20)

IMA No. **2004-036**
Mina Santa Rosa, Iquique, Chile
Jochen Schlüter
$Na_2Cu(CO_3)_2$
Monoclinic: $P2_1/a$
a 6.171, *b* 8.171, *c* 5.645 Å, β 116.23˚
5.06(66), 4.57(57), 4.30(37), 4.26(75), 2.666(100), 2.619(65), 2.450(33), 2.390(25)

IMA No. **2004-037**

Mány coal deposit, Tatabánya, Hungary
István E. Sajó
$CaAl_2(CO_3)_2(OH)_4 \cdot H_2O$
Dresserite group
Orthorhombic: *Pnma*
a 15.564, *b* 5.591, *c* 9.112 Å
7.86(87), 7.78(62), 5.92(100), 4.37(86), 2.957(48), 2.946(44), 2.569(17), 1.902(26)

IMA No. **2004-038**
Krásno near Horní Slavkov, Bohemia, Czech Republic
Jiří Sejkora
$Cu_{13}(AsO_4)_6(AsO_3OH)_4 \cdot 23H_2O$
Triclinic: $P\bar{1}$; Structure determined
a 6.408, *b* 14.491, *c* 16.505 Å, α 102.87, β 101.32, γ 97.13°
15.70(3), 11.98(100), 6.99(3), 5.99(6), 3.448(5), 2.967(5), 2.895(3), 2.400(4)

IMA No. **2004-040**
Iron Mine, Kovdor massif, Kola Peninsula, Russia
Nikita V. Chukanov
$Na_9(Ca,Na)_6Ca_6Fe_2Zr_3\square Si_{25}O_{72}(CO_3)(OH)_4$
Eudialyte group
Trigonal: *R*3*m*; Structure determined
a 14.232, *c* 30.210 Å
4.31(64), 3.213(100), 3.163(44), 3.027(65), 2.977(91), 2.859(79), 2.703(46), 2.595(45)

IMA No. **2004-041**
Linópolis, Divino das Laranjeiras, Minas Gerais State, Brazil
Nikita V. Chukanov
$Ca_2Fe^{2+}\square Mg_2Fe^{2+}{}_2Be_4(PO_4)_6(OH)_4 \cdot 6H_2O$
Related to roscherite
Triclinic: $P\bar{1}$; Structure determined
a 6.668, *b* 9.879, *c* 9.883 Å, α 73.53, β 85.60, γ 86.93°
9.47(41), 5.92(100), 3.31(34), 3.17(53), 2.784(86), 2.639(30), 2.225(26), 2.202(32)

IMA No. **2004-043**
Farnese, Viterbo province, Latium, Italy
Giancarlo Della Ventura
$(Na_{37}K_9Ca_{10})_{\Sigma 56}(Si_{42}Al_{42})_{\Sigma 84}O_{168}(SO_4)_{12} \cdot 6H_2O$
Cancrinite-sodalite group
Hexagonal: $P6_3/m$; Structure determined
a 12.8784, *c* 37.0078 Å
5.404(20), 3.862(23), 3.722(100), 3.668(26), 3.485(65), 3.119(36), 2.648(32), 2.149(34)

IMA No. **2004-044**
Fianel Alp, Ferrera valley, Graubünden, Switzerland
Joël Brugger
$Na(Mn,Mg,Zn)_9[VSi_9O_{28}(OH)](OH)_3$
Related to saneroite
Triclinic: $P\bar{1}$; Structure determined

a 9.831, *b* 10.107, *c* 13.855 Å, α 86.222, β 73.383, γ 71.987˚
8.68(50), 7.91(70), 4.83(30), 3.94(30), 3.22(40), 3.09(80), 2.92(40), 2.71(100)

IMA No. **2004-045**
Arnold mine, Fowler, St. Lawrence Co., New York, USA
Roberta Oberti
$^{A}\square^{B}(CaMn)_{\Sigma 2}{}^{C}Mg_5{}^{T}Si_8O_{22}(OH)_2$
Amphibole group
Monoclinic: *C*2/*m*; Structure determined
a 9.7807, *b* 18.0548, *c* 5.2928 Å, β 104.19˚
9.027(54), 8.395(62), 3.395(62), 3.269(56), 3.113(80), 2.950(51), 2.713(100), 2.531(59)

IMA No. **2004-046**
Skaergaard Intrusion, Greenland
Andy McDonald
$PdCu_3$
Tetragonal: *I*4/*mmm*
a 3.715, *c* 14.651 Å
3.657(60), 2.138(100), 1.8604(70), 1.8337(40), 1.3049(60), 1.1188(55), 1.0655(30), 0.8459(25)

IMA No. **2004-047**
Buraco do Ouro gold mine, Cavalcante, Goiás State, Brazil.
Nilson F. Botelho
PdAsSe
Gersdorffite group
Cubic: $Pa\bar{3}$
a 6.089 Å
3.027(75), 2.725(65), 2.478(65), 1.838(100), 1.077(80), 0.988(70), 0.929(90), 0.918(70)

IMA No. **2004-048**
Skrikerum, Sweden
Luca Bindi
Ag_3CuSe_2
Tetragonal: $I4_1/amd$
a 8.939, *c* 11.844 Å
4.47(60), 2.891(85), 2.813(80), 2.552(50), 2.473(75), 2.426(100), 2.162(70), 2.034(60)

IMA No. **2004-049**
Kasagu-mura, Gifa Prefecture, Japan
Yasuyuki Banno
$NaMg_3(AlSi_3)O_{10}(OH)_2$
Mica group
Monoclinic: *C*2/*m*; Structure determined
a 5.291,*b* 9.16, *c* 10.12 Å, β 105.1˚
9.77(100), 4.59(25), 3.26(50), 2.61(100), 2.55(25), 2.45(20), 2.19(20)
Triclinic: $C\bar{1}$; Structure determined
a 5.289, *b* 9.16, *c* 9.892 Å, α 94.45, β 97.74, γ 90.0˚
9.73(80), 4.57(40), 3.26(40), 2.62(100), 2.55(30), 2.43(25), 2.19(25), 2.17(25)

IMA No. **2004-050**
Grube Mark near Essershausen, Taunus, Hesse, Germany
Uwe Kolitsch
$Fe_3(PO_4)_2(OH)_3 \cdot 5H_2O$
Wavellite group
Monoclinic: $P2_1/n$; Structure determined
a 9.777, *b* 7.358, *c* 17.830 Å, β 92.19°
8.90(100), 8.41(60), 5.870(50), 4.873(30), 3.600(50), 3.357(40), 3.231(80), 2.177(20)

IMA No. **2004-051**
Kulet Kol region, Kokchetav massif, Kazakhstan
Shyh-Lung Hwang
$5Al_2O_3 \cdot H_2O$
Hexagonal: $P6_3mc$; Structure determined
a 5.58, *c* 8.86 Å
4.839, 4.423, 4.231, 2.783, 2.530, 2.361, 1.673, 1.435, 1.417

IMA No. **2004-052**
Chivruai river valley, Lovozero massif, Kola Peninsula, Russia
Sergey V. Krivovichev
$Ca_3Ti_5[(Si_6O_{17})_2|O(OH)_4] \cdot 14H_2O$
Zorite group
Orthorhombic: *Cmmm*; Structure determined
a 7.17, *b* 22.98, *c* 6.94 Å
11.6(10), 6.91(9), 5.23(5), 3.41(5), 3.35(5), 3.04(8), 2.97(4), 2.58(5)

IMA No. **2004-053**
Mt. Lepkhe-Nelm, Lovozero massif, Kola Peninsula, Russia
Victor N. Yakovenchuk
$Pb_3[Al(OH)_6](SO_4)(OH)$
New structure type determined
Trigonal: *R*3*c*
a 7.693, *c* 31.57 Å
3.58(10), 3.10(6), 2.591(9), 2.216(5), 2.048(7), 1.893(5), 1.859(4), 1.704(8)

IMA No. **2004-054**
Sixiangkou L6 chondrite
Ahmed El Goresy
$(Na,Ca)AlSi_3O_8$
Feldspar group
Tetragonal: *I*4/*m*
a 9.263, *c* 2.706 Å
6.55(66), 4.63(60), 2.931(100), 2.265(35), 2.032(85), 1.737(37), 1.543(33), 1.450(42)

OLDER PROPOSALS

IMA No. **2003-031a**
Aitern-Süd, Black Forest, Germany
Kurt Walenta
$(Pb,REE,Ca)Cu_6(AsO_4)_3(OH)_6 \cdot 3H_2O$

Mixite group
Hexagonal: $P6_3/m$
a 13.77, *c* 5.94 Å
12.01(10), 4.51(6), 3.60(8), 3.31(5), 2.98(6), 2.74(5), 2.61(5), 2.49(7), 1.817(5)

IMA No. **99-004a**
Kudriavy volcano, Iturup Island, Kuriles, Russia
Ilya V. Chaplygin
ReS_2
Triclinic: $P\bar{1}$; Structure determined
a 6.470, *b* 6.368, *c* 6.401 Å, α 105.0, β 91.59, γ 118.90˚
2.7834(10), 2.764(10), 2.733(10), 2.642(8), 2.404(8), 2.371(9), 2.1035(8), 2.0914(9)

IMA No. **2003-045a**
Heftetjern pegmatite, southern Norway
Frank C. Hawthorne
$(Sc,Ca)_2KBe_3Si_{12}O_{30}$
Milarite group
Hexagonal: *P*6/*mmc*; Structure determined
a 10.097, *c* 13.991 Å
7.012(4), 5.044(5), 4.097(7), 3.504(5), 3.229(10), 2.880(8), 1.836(4), 1.751(4)

IMA No. **2002-042a**
Aris intrusion, Namibia
Fernando Cámara
$Na_3La[Si_6O_{15}]\cdot 2H_2O$
La-dominant analogue of sazhinite
Orthorhombic: *Pmm*2; Structure determined
a 7.415, *b* 15.515, *c* 7.164 Å
7.42(59), 6.50(48), 5.36(60), 5.26(68), 3.411(100), 3.345(45), 3.252(83), 3.226(45)

NOMENCLATURE OF A MINERAL GROUP

Application and status of the amphibole nomenclature: discrimination between approved amphiboles and named amphiboles

New root names for amphibole species can only be proposed when new heterovalent substitutions (= substitutions not mentioned in the 1997 and 2003/4 amphibole reports) have been observed in natural material; such material consists of a new amphibole species, and **it must be submitted to the CNMMN with its new root or trivial name, and it should fulfil the requirements asked for all new mineral species**. If approved, these new amphiboles receive *A* status in IMA listings.
New amphibole names originating from new homovalent substitutions are always formed by use of an appropriate prefix to an existing root or trivial name, according to the schemes of the 1997 and 2003/4 reports. **The status of such new amphibole names will depend on their authors: they will have the choice to submit the new amphibole to the CNMMN for approval, or not.**
This will lead to two categories of amphibole species:
Approved amphiboles

An amphibole is considered as an approved species and receives *A* status in the IMA listing if it has been submitted to, and approved by the CNMMN, according to the usual rules applied to all new mineral species. New root names need CNMMN approval.

Named amphiboles

Those researchers who have not enough data to prepare a regular new-mineral proposal, or just are not willing to submit a proposal for whatever reason, may give a name to their amphibole according to the 1997 and 2003/4 amphibole nomenclature schemes and publish it. These amphibole names, however, will not receive *A* status and will not be included in the official IMA listings, because the material to which such a name was applied has not been investigated according to the rules for a new species. **Authors not seeking approval run the risk that other researchers will submit their own material for species approval with the same name.**

A proper order for the use of prefixes in amphibole names

The approved ordering scheme does not split any of the 'end-member' names, as listed in 1997 & 2003/04 amphibole reports, nor any of the names that appear in the nomenclature figures. It is not possible to implement any scheme of prefix order based on systematically increasing or decreasing elements according to valencies, or of M1, M2, M3 & M4 order, without splitting the existing 'end-member' names. So the approved scheme is:

1. Any magnesio or ferro prefixes come immediately in front of the root name.
2. Alumino, ferri, ferric, mangani or chromio prefixes come next in front. [More than one together is not known].
3. The very first (*i.e.*, at the front) prefix is proto, parvo or magno.
4. Next after (3) come any anions, chloro, or fluoro.
5. Finally any remaining prefixes come after (4) and before (2) being in alphabetical order.

Prefixes are hyphenated except that the prefix immediately before the root name is joined to the root name without a hyphen, unless two vowels would then come together or it would be unclear (see 1997 amphibole report).

The decisions on named amphiboles and the order of prefixes in amphibole names have been published by Burke & Leake [Canadian Mineralogist, 42 (2004), 1881-1883; American Mineralogist, 90 (2005), 516-517].

MONTHLY ANNOUNCEMENT OF NEW MINERALS ON THE CNMMN WEBSITE

After approval of a new mineral by the CNMMN, the following data will be published one month after the approval date of the CNMMN website:

IMA number
Type locality
Corresponding author
Chemical formula
Relationship to other minerals
Crystal system, Space group, Unit-cell parameters
Structure determined, yes or no
Strongest lines in the X-ray powder-diffraction pattern

DISCREDITATION
The approval of proposal 2004-002 implies the official discreditation of clinoholmquistite, as holotype material from the latter mineral was used for the description of the former, new mineral. Clinoholmquistite is now only a theoretical name in the amphibole nomenclature system.

RENAMED MINERAL
IMA No. 04-A: cesium kupletskite is renamed as kupletskite-(Cs).

NEW MINERALS APPROVED IN 2005
NOMENCLATURE MODIFICATIONS APPROVED IN 2005
BY THE
COMMISSION ON NEW MINERALS AND MINERAL NAMES
INTERNATIONAL MINERALOGICAL ASSOCIATION

Ernst A.J. Burke* (Chairman, CNMMN) and Giovanni Ferraris** (Vice-Chairman, CNMMN)

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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 number
Type locality
Corresponding author
Chemical formula
Relationship to other minerals
Crystal system, Space group; Structure determined, yes or no
Unit-cell parameters
Strongest lines in the X-ray powder-diffraction pattern: *d*(Å), (Intensity)

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

This list is also available on the CNMMN website:
http://sheba.geo.vu.nl/~ima-cnmmn/minerals2005.pdf

NO OTHER INFORMATION WILL BE RELEASED BY THE COMMISSION

2005 PROPOSALS

IMA No. **2005-002**
Uroi hill, Hunedoara district, Romania
Hans-Peter Bojar
$(Na,K)Ca_2(Mg,Fe^{3+},Ti)_5(Si,Al)_8O_{22}F_2$
Amphibole group
Monoclinic: *C*2/*m*; structure determined
a 9.872, *b* 18.007, *c* 5.314 Å, β 105.37˚
9.007(27), 8.421(61), 3.376(44), 3.271(61), 3.124(100), 2.931(35), 2.805(28), 2.700(54)

IMA No. **2005-003**
Bota-Burum, Kazakhstan
Nikita V. Chukanov

$Al(UO_2)_2(AsO_4)_2(F,OH)\cdot 6.5H_2O$
Related to threadgoldite
Monoclinic: *P*2/*m*, *P*2 or *Pm*
a 19.99, *b* 9.79, *c* 19.62 Å, β 110.7˚
9.34(100), 9.14(100), 4.93(18), 4.87(20), 4.76(27), 4.69(17), 3.55(15), 2.281(13)

IMA No. **2005-004**
Tolbachik volcano, Kamchatka Peninsula, Russia
Sergey V. Krivovichev
$VO(SO_4)$
New structure type
Orthorhombic: *Pnma*; structure determined
a 7.389, *b* 6.274, *c* 7.079 Å
5.11(27), 4.70(18), 3.54(31), 3.28(100), 3.14(73), 2.845(18), 2.237(17), 2.209(17)

IMA No. **2005-005a**
Prairie Lake, Thunder bay district, Ontario, Canada
Anton R. Chakhmouradian
$Na_2Ca_4(Nb,Zr)_2(Si_2O_7)_2(O,F)_4$
Cuspidine group
Monoclinic: $P2_1$; structure determined
a 10.845, *b* 10.226, *c* 7.272 Å, β 109.33˚
3.64(m), 3.23(m), 3.04(s), 2.98(s), 2.85(s), 2.48(m), 2.42(m), 2.02(s)

IMA No. **2005-006**
Greenwood iron mine, Harriman State Park, Tuxedo, Orange County, New York, USA
Marian V. Lupulescu
$KCa_2(Fe^{2+}{}_2Mg_2Fe^{3+})_{\Sigma 5}(Si_6Al_2)_{\Sigma 8}O_{22}F_2$
Amphibole group
Monoclinic: *C*2/*m*; structure determined
a 9.9480, *b* 18.1777, *c* 5.3302 Å, β 105.140˚
8.499(100), 3.401(11), 3.299(32), 3.151(76), 2.830(53), 2.722(23), 2.402(17), 1.661(10)

IMA No. **2005-007**
Dashkesan Co-Fe deposit, Minor Caucasus, Azerbaijan
Igor V. Pekov
$KCa_2(Fe^{2+}{}_3MgFe^{3+})_{\Sigma 5}(Si_6Al_2)_{\Sigma 8}O_{22}Cl_2$
Amphibole group
Monoclinic: *C*2/*m*; structure determined
a 9.964, *b* 18.31, *c* 5.351 Å, β 105.0˚
8.53(100), 3.32(11), 3.16(51), 2.981(12), 2.839(18), 2.749(23), 2.191(10)

IMA No. **2005-008**
Vetralla, Viterbo Province, Latium, Italy
Athos Callegari
$(Ca_8REE_2)_{\Sigma 10}(Al_{0.5}Fe^{3+}{}_{0.5})_{\Sigma 1}(\square,Be)_2Si_6B_8O_{36}(OH,F)_2$
Hellandite group
Monoclinic: *P*2/*a*; structure determined
a 28.097, *b* 4.777, *c* 10.236 Å, β 96.81˚
3.33(40), 3.20(31), 3.01(34), 2.90(45), 2.78(43), 2.65(100), 1.91(48), 1.74(28)

IMA No. **2005-009**
Sounion mine #19, Lavrion, Attica, Greece
Werner Krause
$Cu_3Zn(OH)_6Cl_2$
Polymorphous with herbertsmithite
Trigonal: $P\bar{3}m1$; structure determined
a 6.300, *c* 5.733 Å
5.73(100), 2.865(11), 2.761(12), 2.730(39), 2.464(81), 1.976(32), 1.576(17), 1.519(10)

IMA No. **2005-010**
Skorpion zinc deposit, Namibia
Werner Krause
$Ca_3Zn_2(PO_4)_2CO_3(OH)_2 \cdot H_2O$
New structure type
Monoclinic: *C*2/*c*; structure determined
a 19.045, *b* 9.320, *c* 6.525 Å, β 92.73˚
9.501(53), 5.328(30), 3.170(100), 3.063(42), 3.014(54), 2.788(67), 2.582(21), 2.260(21)

IMA No. **2005-011**
Gentil mine, Mendes Pimentel County, Minas Gerais, Brazil
Daniel Atencio
$NaMgAl_5(PO_4)_4(OH)_6 \cdot 2H_2O$
Dufrénite group
Monoclinic: *C*2/*c*; structure determined
a 25.075, *b* 5.0470, *c* 13.4370 Å, β 110.97˚
11.75(86), 6.58(100), 4.02(50), 3.297(25), 3.109(60), 2.670(49), 1.941(34), 1.543(37)

IMA No. **2005-012a**
Fabi quarry, near Lanzada, Valmalenco, Sondrio, Lombardy, Italy
Francesco Demartin
$NaBa_3CaY(CO_3)_3(OH)_6 \cdot 3H_2O$
Donnayite group
Triclinic: *P*1; structure determined
a 9.1526, *b* 9.1574, *c* 13.7953 Å, α 109.43, β 109.33, γ 60.00˚
6.394(36), 4.312(48), 3.187(28), 3.114(100), 2.641(27), 2.614(35), 2.032(29), 2.013(27)

IMA No. **2005-013**
Helikon II pegmatite, Karibib, Namibia
Paul Keller
$(Mn^{2+},Mn^{3+},Fe^{3+})_2(PO_4)O$
Triplite/triploidite groups
Monoclinic: *I*2/*a*; structure determined
a 11.888, *b* 6.409, *c* 9.804 Å, β 106.17˚
3.600(4), 3.209(6), 3.077(8), 2.819(10), 2.184(4), 2.082(5), 1.787(5), 1.495(5)

IMA No. **2005-014**
Bayun Obo iron mine, Inner Mongolia, China
Xu Jinsha
$(Ce,La)_4Fe^{2+}(Ti,Fe^{2+},Mg,Fe^{3+})_2Ti_2Si_4O_{22}$

Chevkinite group
Monoclinic: $P2_1/a$ (pseudo-$C2/m$); structure determined
a 13.4656, *b* 5.7356, *c* 11.0977 Å, β 100.636˚
3.342(39), 3.198(68), 3.162(46), 3.095(39), 2.8702(52), 2.7524(100), 2.7263(98), 2.5460(54)

IMA No. **2005-015a**
Zhelezny mine, Kovdor carbonatite massif, Kola Peninsula, Russia
Sergey V. Britvin
$[Mg_{18}Al_9(OH)_{54}][Sr_2(CO_3,PO_4)_9(H_2O,H_3O)_{11}]$
Layered double hydroxide
Trigonal: space group not determined
a 16.055, *c* 25.66 Å
8.52(10), 6.41(6), 5.13(3), 4.27(6), 3.665(9), 3.547(9), 3.081(6), 2.513(1)

IMA No. **2005-016**
Carrière de la Flèche, near Bertrix, Ardennes, Belgium
Frédéric Hatert
$Ca_2(Al,Fe^{2+},Mg)Al_2(SiO_4)(Si_2O_7)(OH,O)_2\cdot H_2O$
Pumpellyite group
Monoclinic: $A2/m$; structure determined
a 8.818, *b* 5.898, *c* 19.126 Å, β 97.26º
8.735(35), 4.371(65), 3.787(80), 3.040(70), 2.912(95), 2.895(100), 2.731(40), 2.191(45)

IMA No. **2005-017**
Indarch meteorite, Shusha, Nagorno-Karabakh, Azerbaijan
Sergey N. Britvin
(Fe,Zn)S
Sphalerite group
Cubic: $F\bar{4}3m$
a 5.426 Å
3.130(100), 2.714(10), 1.919(50), 1.634(40), 1.246(30), 1.107(30), 1.045(30)

IMA No. **2005-018**
Gambatesa mine, Val Graveglia, Genova, Italy
Maria Franca Brigatti
$Ca_2(V^{3+},Fe^{3+},Mg)(V^{3+},Al)_2(Si,Al)_3(O,OH)_{14}$
Pumpellyite group
Monoclinic: $C2/m$; structure determined
a 19.2889, *b* 6.0444, *c* 8.8783 Å, β 97.328˚
4.739(34), 3.817(70), 2.930(100), 2.756(34), 2.551(62), 2.548(65), 2.367(51), 1.612(57)

IMA No. **2005-019**
Mt. Alluaiv, Lovozero alkaline massif, Kola Peninsula, Russia
Alexander P. Khomyakov
$Na_{30}(Ca,Na,Ce,Sr)_{12}(Na,Mn,Fe,Ti)_6Zr_3Ti_3MnSi_{51}O_{144}(OH,H_2O,Cl)_9$
Eudialyte group
Trigonal: $R3m$; structure determined
a 14.153, *c* 60.72 Å
7.11(40), 4.31(50), 2.964(100), 2.839(90), 2.675(30), 2.159(60), 1.770(60), 1.362(50)

IMA No. **2005-020**
Paratoo copper mine, near Yunta, Olary Province, South Australia, Australia
Allan Pring
$(REE,Ca,Na,Sr)_{12}Cu_2(CO_3)_{16}$
Orthorhombic: *P*222 or *P*222$_1$
a 10.0862, *b* 12.8088, *c* 7.2360 Å
5.04(53), 4.80(49), 3.96(43), 3.48(43), 2.94(100), 2.93(52), 2.53(52), 1.97(56)

IMA No. **2005-021a**
Mangazeiskoye silver ore deposit, Eastern Yakutia, Siberia, Russia
Gennady N. Gamyanin
$Al_2(SO_4)(OH)_4 \cdot 3H_2O$
Aluminite group
Triclinic: *P*1 or $P\bar{1}$
a 8.286, *b* 9.385, *c* 11.35 Å, α 96.1, β 98.9, γ 96.6˚
8.14(19), 7.59(49), 7.16(46), 4.520(13), 4.258(100), 4.060(48), 3.912(43), 3.795(12)

IMA No. **2005-022**
Mica Mine, Kovdor alkaline-ultramafic complex, Kola Peninsula, Russia
Igor V. Pekov
$Ba_4Na_3Ti_3Si_4O_{14}(PO_4,SO_4)_2(O,F)_3$
Bafertisite series
Triclinic: *P*1 or $P\bar{1}$
a 5.38, *b* 7.10, *c* 14.76 Å, α 99.00, β 94.94, γ 90.14˚
14.5(100), 3.455(40). 3.382(35), 2.921(35), 2.810(40), 2.683(90), 2.133(80), 2.059(40)

IMA No. **2005-023**
Jacupiranga mine, Cajati County, São Paulo, Brazil.
Daniel Atencio
$Ba_2MgZr_4(\underline{B}aNb_{12}O_{42}) \cdot 12H_2O$
Cubic: $Im\bar{3}$; structure determined
a 13.017 Å
9.183(100), 4.592(12), 4.136(11), 3.256(16), 3.070(13), 2.923(11), 2.655(13), 1.741(21)

IMA No. **2005-024**
Pirquitas mining district, Puna Region, Rinconada Department, Jujuy Province, Argentina
Werner Paar
$(Pb,Sn)_{12.5}As_3Sn_5FeS_{28}$
Franckeite solid-solution series
Two monoclinic sub-cells:
Q layer: *a* 5.839, *b* 5.862, *c* 17.324 Å, β 94.073°
H layer: *a* 6.278, *b* 3.660, *c* 17.347 Å, β 91.416°
4.27(61), 3.426(72), 3.345(87), 3.122(78), 3.009(71), 2.966(94), 2.883(100), 2.065(51)

IMA No. **2005-026**
Capitana mine, Copiapó, Atacama Province, Chile
Anthony R. Kampf
$Ca_2Pb_3(PO_4)_3Cl$
Apatite group
Hexagonal: $P6_3/m$; structure determined

a 9.857, *c* 7.130 Å
8.538(20), 4.054(60), 3.565(30), 2.942(100), 2.882(30), 2.139(35), 1.918(25), 1.890(25)

IMA No. **2005-027**
Acapulcoite achondrite 'Northwest Africa 1054'
Vanni Moggi-Cecchi
$(Ni,Fe)_4P$
New structure type
Cubic: $P2_13$; structure determined
a 6.025 Å
2.694(15), 2.005(100), 1.906(60), 1.816(20), 1.420(10), 1.348(10), 1.182(15), 1.119(15)

IMA No. **2005-028**
Kirovskii apatite mine, Kukisvumchorr, Khibiny alkaline massif, Kola Peninsula, Russia
Igor V. Pekov
$K_3Na_2Mn_5Si_{12}(O,OH)_{36}\cdot 2H_2O$
Related to ganophyllite- and stilpnomelane-group minerals
Monoclinic: $P2_1/m$ or $P2_1$
a 12.55, *b* 5.721, *c* 26.86 Å, β 114.04°
12.28 (100), 4.31(81), 3.555(62), 2.840(90), 2.634(88), 2.366(76), 1.669(64), 1.614(56)

IMA No. **2005-029**
Pegmatite #61, Karnasurt, Lovozero, Kola Peninsula, Russia
Igor V. Pekov
$K_2Ca(Nb,Ti)_4(Si_4O_{12})_2(O,OH)_4\cdot 6H_2O$
Labuntsovite group
Monoclinic: *C*2/*m*; structure determined
a 14.6365, *b* 14.2049, *c* 7.8919 Å, β 117.467°
7.100 (100), 6.999(88), 6.476(38), 4.985(78), 3.252(42), 3.246(43), 3.167(46), 3.140(36)

IMA No. **2005-030**
De-Mix quarry, Mont Saint-Hilaire, Québec, Canada
Igor V. Pekov
$(K,Na)_2Na(Nb,Ti)_4(Si_4O_{12})_2(OH,O)_4\cdot 5H_2O$
Labuntsovite group
Monoclinic: *C*2/*m*; structure determined
a 14.626, *b* 14.160, *c* 7.910 Å, β 117.43°
7.102(29), 7.044(54), 6.510(42), 4.995(44), 3.252(51), 3.249(100), 3.163(24), 3.148(28)

IMA No. **2005-031**
Umbozero mine, Alluaiv, Lovozero, Kola Peninsula, Russia
Giovanni Ferraris
$(Na,Sr)_3(Fe^{3+},Mg)_{10}[Ti_2Si_{12}O_{37}](O,OH)_9\cdot 8H_2O$
Related to nafertisite
Monoclinic: *P*2/*n* (?)
a 16.47, *b* 5.303, *c* 24.39 Å, β 93.5°
14.1(20), 13.3(30), 12.1(100), 4.38(10), 2.968(8), 2.923(8), 2.692(12), 2.631(13)

IMA No. **2005-032**
Horrsjöberg, Värmland, Sweden

Christian Chopin
$SrFe^{2+}Na_2Ca(Fe^{2+},Mn,Mg)_{13}Al(PO_4)_{11}(PO_3OH)(OH,F)_2$
Arrojadite group
Monoclinic: *Cc*; structure determined
a 16.3992, *b* 9.9400, *c* 24.4434 Å, β 105.489°
3.3784(26), 3.1925(41), 3.0093(100), 2.8202(24), 2.8050(28), 2.7383(28), 2.6854(70), 2.5291 (23)

IMA No. **2005-033**
Horoman, Samani-cho, Urakawa-gun, Japan
A. Kitazake
$Cu(Fe,Ni)_8S_8$
Pentlandite group
Tetragonal: $P4_2/mnm$
a 10.566, *c* 9.749 Å
3.061(74), 2.975(32), 2.641(33), 2.072(100), 1.962(38), 1.954(42), 1.804(83), 1.791(85)

IMA No. **2005-035**
Mt. Kukisvumchorr, Kola Peninsula, Russia
Victor N. Yakovenchuk
$K_5Na_7Mn_{15}(Si_9O_{22})_4(OH)_{10}\cdot 4H_2O$
Modulated manganese phyllosilicate
Monoclinic: *C*2/*m*; structure determined
a 17.3335, *b* 23.5390, *c* 13.4895 Å, β 115.069°
12.9(9), 11.7(10), 3.021(9), 2.805(5), 2.608(8), 2.352(6), 1.668(6), 1.659(6)

IMA No. **2005-036**
Felbertal scheelite deposit, Salzburg Province, Austria
Dan Topa
$Cu_8Pb_4Ag_3Bi_{19}S_{38}$
Pavonite homologous series
Monoclinic: *C*2/*m*; structure determined
a 13.380, *b* 4.0007, *c* 31.083 Å, β 93.064°
3.6066(57), 3.4574(100), 3.4357(37), 3.3401(34), 2.9526(29), 2.8742(33), 2.8335(99), 2.2558(29)

IMA No. **2005-037**
Sparone, Val di Locana, Piedmont, Italy
Marco Pasero
$Mn^{2+}_4[Al_4(Mg,Al,Fe^{3+},Mn^{3+})_2][Si_5(V,Si)]O_{22}(OH)_6$
Ardennite group
Orthorhombic: *Pnmm*
a 8.760, *b* 5.838, *c* 18.56 Å
2.948(90), 2.609(100), 2.329(38), 2.271(37), 2.033(55), 1.585(75), 1.525(39), 1.477(45)

IMA No. **2005-039**
Dronino meteorite, Kasimov District, Ryazan Oblast, Russia
Igor V. Pekov
$Fe_2(CO_3)(OH)_2$
Malachite group

Monoclinic: $P2_1/m$ or $P2_1$
a 9.639, *b* 12.226, *c* 6.492 Å, β 96.06˚
6.13(40), 5.15(60), 3.73(80), 2.798(95), 2.645(100), 2.361(40), 2.171(40), 1.733(50)

IMA No. **2005-040**
Johnston Fjord, Stornes Peninsula, Prydz Bay, East Antarctica
Edward S. Grew
$(Y, Ca)Na_6(Ca,Na)_8(Mg,Fe)_{43}(PO_4)_{36}$
Fillowite group
Trigonal: $R\bar{3}$; structure determined
a 14.9628, *c* 42.756 Å
3.67(40), 3.52(40), 3.18(10), 2.94(60), 2.73(100), 2.62(10), 2.47(30), 1.84(40)

IMA No. **2005-042**
Bou Azzer, Anti-Atlas, Morocco
Joël Brugger
$(Mg,\square)_{11}\,Bi_6\,(Fe,Cr)_{14}\,(AsO_4,CrO_4)_{14}\,[AsO_3(H_2O)]_4O_{12}(OH)_4(H_2O)_{86}$
New structure type
Monoclinic: $P2_1/n$: structure determined
a 13.6322, *b* 30.469, *c* 18.4671 Å, β 91.134˚
15.78(60), 12.45(70), 11.79(100), 10.98(80), 10.16(80), 7.900(80), 3.414(40), 3.153(40)

IMA No. **2005-043**
Bota-Burum uranium deposit, Kazakhstan
Nikita V. Chukanov
$(NH_4,H_3O)_2(UO_2)_2(AsO_4,PO_4)_2\cdot 6H_2O$
Meta-autunite group
Tetragonal: *P*4/*mmm*
a 7.19, *c* 9.15 Å
9.27(100), 4.58(25), 3.86(20), 2.80(13), 2.28(20), 2.076(6), 1.823(8), 1.713(7)

IMA No. **2005-044**
Aghbar mine near Bou Azzer, Anti-Atlas, Morocco
Nicolas Meisser
$MgAl_2(AsO_4)_2(OH)_2\cdot 8H_2O$
Laueite group
Triclinic: $P\bar{1}$; structure determined
a 5.436, *b* 7.075, *c* 10.500 Å, α 97.701, β 102.021, γ 110.295˚
9.9 (100), 6.4(90), 4.90(80), 4.08(50), 3.314(40), 3.198(60), 2.885(60), 2.622(60)

IMA No. **2005-045**
Kunratice near Šluknov, Northern Bohemia, Czech Republic
František Laufek
Ni_2SbTe_2
Nickeline group
Hexagonal: $P6_3/mmc$; structure determined
a 3.9090, *c* 15.6820 Å
3.3848(13), 2.8421(81), 2.0704(16), 1.9556(100), 1.6114(23), 1.4218(7), 1.2437(20), 1.1290(14)

IMA No. **2005-046a**
Tolbachik volcano, Kamchatka Peninsula, Russia
Nikita V. Chukanov
$K_2Cu_5Cl_8(OH)_4 \cdot H_2O$
Monoclinic: *P*2/*m* or *P*2_1/*m*
a 24.34, *b* 5.878, *c* 11.626 Å, β 86.7°
11.63(100), 5.88(20), 5.80(27), 5.73(17), 5.12(12), 3.052(15), 2.518(19), 2.321(17)

IMA No. **2005-047**
Rapid Creek, Yukon Territory, Canada
Christian Chopin
$^{A1}K\ ^{A2}Na\ ^{B1}Na\ ^{B2}Na\ ^{Na1,2}Na_2\ ^{Na3}\square\ ^{Ca}Ca\ ^{M}(Fe,Mn,Mg)_{13}\ Al\ (PO_4)_{11}\ ^{P1x}\ (PO_3OH)\ ^{W}(OH,F)_2$
Arrojadite group
Monoclinic: *Cc*; structure determined
a 16.5520, *b* 10.0529, *c* 24.6477 Å, β 106.509°
5.86(29), 5.03(28), 3.009(34), 3.050(100), 2.798(25), 2.793(28), 2.777(24), 2.698(71)

IMA No. **2005-048**
Branchville, Fairfield Co., Connecticut, USA
Christian Chopin
$^{A1}K\ ^{A2}Na\ ^{B1}Mn\ ^{B2}\square\ ^{Na1,2}Na_2\ ^{Na3}Na\ ^{Ca}Ca\ ^{M}(Mn,Fe,Mg)_{13}\ Al\ (PO_4)_{11}\ ^{P1x}(PO_4)\ ^{W}(OH,F)_2$
Arrojadite group
Monoclinic: *Cc*; structure determined
a 16.6900, *b* 10.1013, *c* 24.8752(13) Å, β 105.616°
5.97(27), 3.245(33), 3.063(100), 2.868(27), 2.788(27), 2.779(29), 2.730(89), 2.570(27)

IMA No. **2005-049**
Grube Vereinigung, near Eisenbach, Taunus, Hesse, Germany
Uwe Kolitsch
$PbFe_3(PO_4)_2(OH)_4(H_2O,OH)_2$
Dimorphous with kintoreite
Triclinic: $P\ \bar{1}$; structure determined
a 5.307, *b* 7.209, *c* 7.349 Å, α 87.75, β 86.36, γ 71.42°
6.84(64), 4.85(100), 4.17(26), 3.667(47), 3.547(57), 3.417(52), 3.022(51), 2.834(45)

IMA No. **2005-050**
Fuka mine, Fuka, Bitchu-cho, Takahashi City, Okayama Prefecture, Japan
Isao Kusachi
$Ca_4CuB_4O_6(OH)_6(CO_3)_2$
Cu-dominant analogue of borcarite
Monoclinic: *C*2/*m*
a 17.794, *b* 8.381, *c* 4.4494 Å, β 102.42°
7.57(100), 2.899(44), 2.727(68), 2.671(84), 2.272(48), 2.201(28), 1.887(52), 1.698(34)

IMA No. **2005-051**
Johnston Fjord, Stornes Peninsula, Larsemann Hills, Prydz Bay, East Antarctica
Edward S. Grew
$(Na,\square)Ca_2(Mg,Fe^{2+},Fe^{3+})_2(Fe^{3+},Mg)_2(Fe^{2+},Mg)_2(PO_4)_6(H_2O)_2$
Wicksite group
Orthorhombic: *Pbca*; structure determined

a 12.4899, *b* 11.6264, *c* 12.7825 Å
6.40(5), 3.497(40), 3.000(80), 2.895(80), 2.735(100), 2.545(10), 2.091(30)

IMA No. **2005-053**
Jáchymov Ag-Bi-Co-Ni-U deposit, Krušné hory Mts., western Bohemia, Czech Republic
Jiří Sejkora
$(Zn,Cu,Co)Cu_4(AsO_4)_2(AsO_3OH)_2 \cdot 9H_2O$
Zn-dominant analogue of lindackerite
Triclinic: $P\ \bar{1}$; structure determined
a 6.3948, *b* 8.0024, *c* 10.3557 Å, α 85.488, β 79.354, γ 84.673˚
10.185(100), 7.974(12), 3.987(13), 3.637(15), 3.395(37), 3.238(15), 2.910(12), 2.668(16)

IMA No. **2005-054**
Titoskoe deposit, Chersky range, basin of the river Dogdo, Sakha Republic (Yakutia), Russia
Nikita V. Chukanov
$Mg_3(BO_3)(OH)_3$
OH-dominant analogue of fluoborite
Hexagonal: $P6_3/m$
a 8.912, *c* 3.112 Å
7.69(52), 4.45(82), 2.916(42), 2.573(65), 2.551(49), 2.422(100), 2.141(44), 2.128(60)

IMA No. **2005-055**
Madeni Zakh, Iran
Andreas Ertl
$K_2(Fe^{2+},Mg)_2(Mg,Fe^{3+})_4Fe^{3+}{}_2Al(SO_4)_{12} \cdot 18H_2O$
Voltaite group
Tetragonal: $I4_1/acd$; structure determined
a 19.2080, *c* 27.2158 Å
5.543(28), 3.396(100), 3.136(21), 3.038(39), 2.848(31), 2.534(21), 2.078(29), 1.601(21)

IMA No. **2005-056**
Sapucaia pegmatite, Galilea, Minas Gerais, Brazil
Christian Chopin
$PbFe^{2+}Na_2Ca(Fe^{2+},Mn,Mg)_{13}Al(PO_4)_{11}(PO_3OH)(OH,F)_2$
Arrojadite group
Monoclinic: *Cc*; structure determined
a 16.4304, *b* 9.9745, *c* 24.5869 Å, β 105.485˚
3.208(43), 3.019(100), 2.829(35), 2.820(33), 2.750(29), 2.698(55), 2.694(32), 2.538(30)

IMA No. **2005-058a**
Sidi-bou-Kricha, Marrakech province, Morocco
Christian Chopin
$BaFe^{2+}Na_2Ca(Fe^{2+},Mn,Mg)_{13}Al(PO_4)_{11}(PO_3OH)(F,OH)_2$
Arrojadite group
Monoclinic: *Cc*; structure determined
a 16.4970, *b* 10.0176, *c* 24.6359 Å, β 105.649˚
3.400(31), 3.211(47), 3.032(100), 2.841(34), 2.759(33), 2.706(39), 2.703(68), 2.543(38)

IMA No. **2005-061a**
Sapucaia mine, Minas Gerais, Brazil

Daniel Atencio
$Ca_{2\ \ 2}(Fe^{3+},Mn,Mg)_4Be_4(PO_4)_6(OH)_4\cdot 6H_2O$
Roscherite group
Monoclinic: *C*2/*c*
a 15.92, *b* 11.91, *c* 6.61 Å, β 96.4°
9.485(44), 5.943(100), 4.816(65), 3.169(44), 3.117(25), 3.065(22), 2.777(41), 2.643(42)

OLDER PROPOSALS

IMA No. **2002-032a**
Novodneprovskoe deposit, Kazakhstan
Galiya K. Bekenova
$AuPb_3$
Tetragonal: $I\bar{4}\ 2m$
a 11.954, *c* 5.890 Å
2.792(2), 2.668(1), 2.423(1), 2.342(10), 1.8705(2), 1.5825(3), 1.4705(2), 1.3890(1)

IMA No. **2004-027b**
Lake Bolshoi Ishkul, Ilmen Mountains, Ilmen Nature Reserve, South Urals, Russia
Victor G. Korinevsky
$(K,Na)Ca_2(Mg,Fe^{2+},Fe^{3+},Al)_5(Si,Al)_8O_{22}(OH,Cl)_2$
Amphibole group
Monoclinic: *C*2/*m*
a 9.958, *b* 18.037, *c* 5.346 Å, β 105.498˚
8.500(60), 3.385(41), 3.282(42), 3.135(100), 2.941(22), 2.720(45), 2.359(35), 2.168(29)

IMA No. **2004-042a**
Bunan deposit, Shandong Province, People's Republic of China
Xiang-Ping Gu
$Ag_9FeTe_2S_4$
Orthorhombic: space group unknown
a 12.769, *b* 14.814, *c* 16.233 Å
6.726(69), 6.416(39), 5.951(33), 3.265(100), 2.981(24), 2.188(71), 2.123(31), 1.949(33)

NOMENCLATURE MODIFICATIONS

IMA No. **05-B**
The name of the mineral noélbensonite has been modified in noelbensonite.

IMA No. **05-D**
A new nomenclature scheme has been approved for minerals of the arrojadite group, this will be published by the authors: Christian Chopin, Fernando Cámara and Roberta Oberti. Minerals of this group will have root names (arrojadite or dickinsonite), followed by suffixes. The species name sigimundite is replaced by the name arrojadite-(BaFe).

IMA No. **05-E**
Species and name natromontebrasite are discredited because natromontebrasite is a mixture of OH-rich amblygonite with lacroixite and subordinate wardite.

NULLIFIED CNMMN DECISION

Proposal 2004-051, hydrous alumina, was approved by the CNMMN (see publications 'Minerals approved in 2004). Several CNMMN members had asked, however, for a re-examination of akdalaite (69-002) which was approved as the first natural hydrous alumina. The authors of 2004-051 obtained holotype material of akdalaite from the Fersman museum in Moscow, and the re-examination showed that akdalaite and the material for 2004-051 are identical. The previously refined unit cell of akdalaite is incorrect, so that akdalaite and 2004-051 are actually the same mineral species. The name 'akdalaite' has priority; the fact that akdalaite was given a wrong space group does not necessitate a formal redefinition of this mineral. The re-examination and 2004-051 should be published as "New data and a new occurrence of akdalaite". The approval decision of the CNMMN on 2004-051 is consequently nullified.

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PROPOSALS APPROVED IN APRIL 2006

IMA No. **2006-001**
Tolbachik volcano, Kamchatka Peninsula, Russia
Sergey V. Krivovichev
$Cu_5O_2(SeO_3)_2Cl_2$
Dimorphous with georgbokiite
Monoclinic: $P2_1/c$; structure determined
a 5.3982 , *b* 8.0543, *c* 11.128 Å, β 99.258º
3.22(90), 3.01(100), 2.61(80), 2.270(70), 2.117(60), 1.953(40), 1.482(40), 1.406(40)

IMA No. **2006-002**
Mt. Kukisvumchorr, Kola Peninsula, Russia
Sergey V. Krivovichev
$K_3NaCaY_2(Si_{12}O_{30})\cdot 4H_2O$
New structure type
Orthorhombic: *Pcca*; structure determined
a 14.972, *b* 14.137, *c* 14.594 Å

7.00(4), 6.57(6), 5.25(3), 4.20(5), 3.337(10), 3.248(9), 3.101(4), 3.014(8)

IMA No. **2006-003**
Kaidun meteorite (South Yemen)
Michael E. Zolensky
FeCrP
Cr-dominant analogue of florenskyite
Orthorhombic: *Pnma*
a 5.833, *b* 3.569, *c* 6.658 Å
2.258(46), 2.247(100), 2.139(81), 2.074(31), 1.885(34), 1.866(31), 1.785(43), 1.298(22)

IMA No. **2006-004**
Brattnevet Peninsula, Larsemann Hills, Prydz Bay, East Antarctica
Edward S. Grew
$(Mg,Fe)_3(PO_4)_2$
Mg-dominant analogue of sarcopside
Monoclinic: $P2_1/c$; structure determined
a 5.9305, *b* 4.7583, *c* 10.2566 Å, β 90.663˚
5.92(42), 4.31(29), 3.84(100), 3.48(37), 2.97(25), 2.77(46), 2.51(59), 2.44(40)

IMA No. **2006-005**
Hundholmen, Tysfjord, Nordland, north Norway
Gunnar Raade
$(Y,REE,Ca,Na)_{15}(Al,Fe^{3+})Ca_xAs^{3+}_{1-x}(Si,As^{5+})Si_6B_3(O,F)_{48}$
Vicanite group
Trigonal: $R3m$; structure determined
a 10.675, *c* 27.02 Å
4.38(33), 3.114(43), 3.095(29), 2.972(100), 2.947(76), 2.924(66), 2.681(36), 1.978(37)

IMA No. **2006-006**
Augustinovka iron meteorite, Ekaterinoslav (now Dnepropetrovsk), Ukraine
Sergey N. Britvin
$Na_4Fe_7(PO_4)_6$
Fillowite group
Triclinic: $P\bar{1}$ or $P1$
a 9.643, *b* 9.633, *c* 17.645 Å, α 88.26, β 88.16, γ 64.83˚
5.12(2), 3.034(10), 2.888(2), 2.715(8), 2.585(3), 2.405(2), 1.870(2), 1.769(2)

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PROPOSALS APPROVED IN MAY 2006

IMA No. **2006-007**
Karnasurt mine, Mountain Kedykverpakhk, Lovozero massif, Kola Peninsula, Russia.
Igor V. Pekov
$Na_2[SiO_2(OH)_2]\cdot 8H_2O$
New structure type
Orthorhombic: *Ibca*; structure determined
a 11.7119, *b* 16.973, *c* 11.5652 Å
5.001(30), 4.788(42), 3.847(89), 2.932(42), 2.832(35), 2.800(97), 2.774(100), 2.035(20)

IMA No. **2006-008**
Silver Coin mine, Valmy, Edna Mountains, Humboldt Co., Nevada, USA
Nikita V. Chukanov
$ZnFe^{3+}_2(PO_4)_2(OH)$
Lipscombite group
Tetragonal: $P4_32_12$ or $P4_12_12$
a 7.242, *c* 13.125 Å

4.79(80), 3.326(100), 3.21(60), 2.602(45), 2.299(40), 2.049(40), 1.663(45), 1.605(50)

IMA No. **2006-009**
Mina Santa Rosa, Iquique, Northern Chile
Jochen Schlüter
$Na_2CaPb_3(CO_3)_5$
Burbankite group
Hexagonal: $P6_3mc$; structure determined
a 10.5564, *c* 6.6446 Å
3.769(100), 3.323(43), 3.066(51), 2.688(50), 2.640(65), 2.161(50), 2.066(34), 1.993(44)

IMA No. **2006-010**
Mountain Kukisvumchorr, Khibiny massif, Kola peninsula, Russia.
Igor V. Pekov
$(Ca,REE)_5[(Si,P)O_4]_3F$
Britholite group
Hexagonal: $P6_3/m$; structure determined
a 9.554, *c* 7.006 Å
3.51(45), 3.15(70), 2.85(100), 2.78(60), 1.965(25), 1.931(20), 1.236(25), 1.122(30)

IMA No. **2006-011**
Biancavilla, Catania, Mt. Etna, Sicily, Italy
Antonio Gianfagna
$KMg_3(AlSi_3)O_{10}F_2$
Mica group
Monoclinic (1*M* polytype): $C2/m$; structure determined
a 5.3094, *b* 9.1933, *c* 10.1437 Å, β 100.062˚
9.990(8), 3.369(10), 3.324(10), 3.121(8), 2.610(8), 2.426(8), 1.663(8), 1.532(8)

IMA No. **2006-012**
Srednyaya Padma U-V deposit, southern Karelia, Russia
Andrey A. Chernikov
$PdCuBiS_3$
Lapieite group
Orthorhombic: *Pmmm*
a 7.541, *b* 6.482, *c* 11.522 Å
3.77(1), 3.24(4), 2.88(8), 2.52(6), 2.44(1), 1.900(10), 1.715(2), 1.672(1)

05-F: DIVISION OF, AND NOMENCLATURE IN THE SYSTEM $2REEPO_4 – CaTh(PO_4)_2 – 2ThSiO_4$

a) - The current six-fold division (Bowie & Horne 1953) is discredited and the tripartite division (Nickel 1992) of the system $2REEPO_4 – CaTh(PO_4)_2 – 2ThSiO_4$ is accepted; in this system, the species huttonite, monazite-(Ce), -(La), -(Nd) and -(Sm) represent members dominated by $ThSiO_4$, $CePO_4$, $LaPO_4$, $NdPO_4$, and $SmPO_4$, respectively.
b) The name *brabantite* is discredited and to the members dominated by $CaTh(PO_4)_2$ in the system $2REEPO_4 – CaTh(PO_4)_2 – 2ThSiO_4$ the name *cheralite* is applied.

RECOMMENDED NOMENCLATURE OF EPIDOTE-GROUP MINERALS

The CNMMN has approved a new nomenclature scheme for epidote-group minerals. The full report will be published by the authors (Armbruster *et al.*) in European Journal of Mineralogy. Here follow the main decisions with (shortened) tables of nomenclature.

Epidote-group minerals are monoclinic in symmetry and have topology consistent with space group $P2_1/m$ and the general formula $A_2M_3[T_2O_7][TO_4](O,F)(OH,O)$. Zoisite is an orthorhombic polymorph of clinozoisite $Ca_2Al_3[Si_2O_7][SiO_4]O(OH)$ and is thus not considered a member of the epidote-group. Epidote-group minerals are divided into three subgroups. (1) Members of the **clinozoisite subgroup** are derived from the mineral clinozoisite $Ca_2Al_3[Si_2O_7][SiO_4]O(OH)$ by homovalent substitutions only. The key cation- and anion-sites are A1 = M^{2+}, A2 = M^{2+}, M1 = M^{3+}, M2 = M^{3+}, M3 = M^{3+}, O4 = O^{2-}, O10 = $(OH)^-$. In other words, the dominant valence as listed above must be maintained. (2) Members of the **allanite subgroup** are REE-rich minerals typified by the eponymous mineral "allanite". This subgroup may be derived from clinozoisite by homovalent substitutions and **one** coupled heterovalent substitution of the type $^{A2}(REE)^{3+} + {}^{M3}M^{2+} \rightarrow {}^{A2}Ca^{2+} + {}^{M3}M^{3+}$. Thus the valences on the key sites are: A1 = M^{2+}, **A2 = M^{3+}**, M1 = M^{3+}, M2 = M^{3+}, **M3 = M^{2+}**, O4 = O^{2-}, O10 = $(OH)^-$. (3) Members of the **dollaseite subgroup** are REE-rich minerals typified by the eponymous mineral "dollaseite". This subgroup may be derived from clinozoisite by homovalent substitutions and **two** coupled heterovalent substitutions of the type $^{A2}(REE)^{3+} + {}^{M3}M^{2+} \rightarrow {}^{A2}Ca^{2+} + {}^{M3}M^{3+}$ and $^{M1}M^{2+} + {}^{O4}F^- \rightarrow {}^{M1}M^{3+} + {}^{O4}O^{-2}$. Thus the valences on the key sites are: A1 = M^{2+}, **A2 = M^{3+}**, **M1 = M^{2+}**, M2 = M^{3+}, **M3 = M^{2+}**, **O4 = F^-**, O10 = $(OH)^-$.

The key cation-sites M3 and A1 (and, in principle, M2) determine the root name. In both clinozoisite and allanite subgroups no prefix is added to the root name if M1 = Al. The prefixes ferri, mangani, chromo, and vanado indicate dominant Fe^{3+}, Mn^{3+}, Cr^{3+}, and V^{3+} on M1, respectively. In the dollaseite subgroup no prefix is added to the root name if M1 = Mg. Otherwise a proper prefix must be attached; the prefixes ferro and mangano indicate dominant Fe^{2+} and Mn^{2+} at M1, respectively. The dominant cation on A2 (other than Ca) is treated according to the *Extended Levinson* suffix designation. This simple nomenclature requires renaming of a number of approved species, see the 3 Tables below.

Table 1. Available in Eur. J. Mineral. (final publication).

Table 2. Clinozoisite subgroup: accepted mineral species (in bold)

Name	Old name	A1	A2	M1	M2	M3	O4	O10
Clinozoisite		Ca	Ca	Al	Al	Al	O	OH
Clinozoisite-(Sr)*	*Niigataite*	Ca	Sr	Al	Al	Al	O	OH
Epidote		Ca	Ca	Al	Al	Fe^{3+}	O	OH
Epidote-(Pb)*	*Hancockite*	Ca	Pb	Al	Al	Fe^{3+}	O	OH
Mukhinite		Ca	Ca	Al	Al	V^{3+}	O	OH
Piemontite		Ca	Ca	Al	Al	Mn^{3+}	O	OH
Piemontite-(Sr)*	*Strontiopiemontite*	Ca	Sr	Al	Al	Mn^{3+}	O	OH
Manganipiemontite-(Sr)*	*Tweddillite*	Ca	Sr	Mn^{3+}	Al	Mn^{3+}	O	OH

Notes: * recommended new mineral names for accepted species

Table 3. Allanite subgroup: accepted mineral species (in bold)

Name	Old name	A1	A2	M1	M2	M3	O4	O10
Allanite-(Ce), -(La), -(Y)		Ca	$(REE)^{3+}$	Al	Al	Fe^{2+}	O	OH
Ferriallanite-(Ce)		Ca	$(REE)^{3+}$	Fe^{3+}	Al	Fe^{2+}	O	OH
Dissakisite-(Ce),-(La)		Ca	$(REE)^{3+}$	Al	Al	Mg	O	OH
Manganiandrosite-(La)*, -(Ce)▪	*androsite*	Mn^{2+}	$(REE)^{3+}$	Mn^{3+}	Al	Mn^{2+}	O	OH
Vanadoandrosite-(Ce)▪		Mn^{2+}	$(REE)^{3+}$	V^{3+}	Al	Mn^{2+}	O	OH

Notes: * recommended new mineral names for accepted species; ▪ approved by CNMMN but not yet published.

Table 4. Dollaseite subgroup: accepted mineral species (in bold)

Name	A1	A2	M1	M2	M3	O4	O10
Dollaseite-(Ce)	Ca	Ce^{3+}	Mg	Al	Mg	F	OH
Khristovite-(Ce)	Ca	Ce^{3+}	Mg	Al	Mn^{2+}	F	OH

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PROPOSALS APPROVED IN JUNE 2006

IMA No. **2006-013**
Miessijoki River, Lemmenjoki area, Inari commune, Lapland, Finland
Kari K. Kojonen
$Pd_{11}Te_2Se_2$
Isomertieite group
Cubic: *Fd*3*m*
a 12.448 Å
2.543(20), 2.395(80), 2.197(100), 2.072(20), 1.875(25), 1.555(25), 1.305(25), 1.271(30)

IMA No. **2006-014**
Qinglong Sb-deposit, Quinglong County, Guizhou Province, People's Republic of China
Jiří Sejkora
$Na_3(Sb_2O_3)_3(SbS_3)\cdot 3H_2O$
Na-dominant analogue of cetineite
Hexagonal: $P6_3$
a 14.1758, *c* 5.5712 Å

12.29(60), 4.64(51), 4.13(52), 3.406(57), 2.991(77), 2.906(100), 2.679(51), 1.4842(51)

IMA No. **2006-015**
Buca della Vena deposit, Tuscany, Italy
Yves Moëlo
$Hg_3Pb_{16}Sb_{18}S_{46}$
Sulphosalt
Monoclinic: *C* 2/*m*; structure determined
a 48.32, *b* 4.117, *c* 24.056 Å, β 118.84˚
4.02(33), 3.480(64), 3.418(88), 3.106(31), 2.994(100), 2.922(41), 2.056(52), 1.764(41)

IMA No. **2006-016**
Kudryavy volcano, Iturup Island, Kurile Islands, Russia
Marina A. Yudovskaya
$Pb_2SnInBiS_7$
Cylindrite family
Triclinic: $P\bar{1}$; structure determined: two subcells
Pseudo-tetragonal subcell: *a* 23.4, *b* 5.77, *c* 5.83 Å, α 89.1, β 89.9, γ 91.5°
Pseudo-hexagonal subcell: *a* 23.6, *b* 3.6, *c* 6.2 Å, α 91, β 92 , γ 90°
5.90(36), 3.90(100), 3.84(71), 3.166(26), 2.921(33), 2.902(16), 2.329(15),
2.186(18)

OLDER PROPOSAL

IMA No. **2005-060**
Great Australia deposit, Cloncurry, Queensland, Australia
Peter A. Williams
$(Cu,VO)Al_2(PO_4)_2(F,OH)_2{\cdot}4.5\text{-}5H_2O$
New structure type
Monoclinic: $P2_1/c$; structure determined
a 4.9573, *b* 12.1824, *c* 18.9749 Å, β 90.933˚
9.515(67), 6.101(100), 5.621(91), 4.753(17), 3.976(21), 3.338(21), 3.163(17), 3.047(13)

NEW MINERALS APPROVED IN 2006
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INTERNATIONAL MINERALOGICAL ASSOCIATION

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PROPOSALS APPROVED IN JULY 2006

IMA No. **2006-017**
Christiana mine No. 132, Kamareza, Lavrion District, Attikí Prefecture, Greece
Nikita V. Chukanov
$Ca_3Cu_2Al_2(AsO_4)_4(OH)_4 \cdot 2H_2O$
Orthorhombic: *Pban, Pbam* or *Pba*2
a 10.01, *b* 8.199, *c* 22.78 Å
22.8(100), 11.36(60), 5.01(90), 3.38(50), 2.780(70), 2.682(30), 2.503(50), 2.292(20)

IMA No. **2006-018**
Uranium deposit Menzenschwand, Southern Black Forest, Baden-Württemberg, Germany
Kurt Walenta
$U(OH)_4[(UO_2)_3(AsO_4)_2(OH)_2] \cdot 4H_2O$
Vanmeersscheite-althupite group
Orthorhombic: $P2_1mn$
a 17.36, *b* 16.96, *c* 7.02 Å
12.21(8), 8.56(10), 6.07(8), 5.42(7), 4.25(8), 3.86(5), 3.33(7), 3.11(6)

OLDER PROPOSAL

IMA No. **2001-003b**
Grube Silberbrünnle, Haigerach Valley near Gengenbach, Central Black Forest, Germany
Kurt Walenta
$KFe_3(H_2PO_4)_2(HPO_4)_4 \cdot 6H_2O$ or $KFe_3H_8(PO_4)_6 \cdot 6H_2O$
Hexagonal: $P6_3mc$
a 9.12, *c* 16.84 Å
7.89(4), 7.16(10), 4.57(7), 3.57(5), 3.23(6), 3.09(8), 2.87(4), 2.81(5)

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PROPOSALS APPROVED IN AUGUST 2006

IMA No. **2006-020**
Monte Cavalluccio, Campagnano municipality, Roma province, Latium region, Italy
Nikita V. Chukanov
$Na_5K_{1.5}Ca(Si_6Al_6O_{24})(SO_4)(OH)_{0.5}\cdot H_2O$
Cancrinite group
Trigonal: *P*31*c*; structure determined
a 12.892, *c* 21.340 Å
11.3(70), 4.85(90), 4.03(60), 3.76(80), 3.68(70), 3.33(100), 2.795(60), 2.694(70)

IMA No. **2006-021**
Kirov mine, Mount Kukisvumchorr, Khibina alkaline massif, Kola Peninsula, Russia
Giovanni Ferraris
$(Ba,Na)_2\{(Na,Ti,Mn)_4[(Ti,Nb)_2(OH)_3Si_4O_{14}](OH,O,F)_2\}\cdot 3H_2O$
Bafertisite series
Polytype 1*M*: Monoclinic, *P*2/*m*; structure determined
a 5.37, *b* 7.00, *c* 24.05 Å, β 91.1º

Polytype 2*M*: Monoclinic, *A*2/*m*; structure determined
a 5.38, *b* 7.04, *c* 48.10 Å, β 91.1°
24.06(100), 7.05(9), 5.95(97), 3.95(6), 2.828(16), 2.712(19), 2.155(13)

IMA No. **2006-022**
Marutoku quarry, Shodoshima Island in Seto Inland Sea, Kagawa Prefecture, Japan
Satoshi Matsubara
$Mn^{2+}CeAl_2Fe^{2+}(Si_2O_7)(SiO_4)O(OH)$
Epidote group
Monoclinic: $P2_1/m$; structure determined
a 8.865, *b* 5.717, *c* 10.060 Å, β 114.520˚
9.23(24), 8.03(26), 3.53(54), 2.92(100), 2.87(23), 2.71(43), 2.62(39), 2.14(19)

IMA No. **2003-038a**
Bear Lake Diggings, Bancroft area, Ontario, Canada
Vladimir Bermanec
$[(Y,Ln),Ca,Th,Fe](Nb,Ti,Ta)_2(O,OH)_6$
Aeschynite group
Orthorhombic: *Pbnm*
a 5.279, *b* 10.966, *c* 7.443 Å
3.079(20), 3.009(100), 2.970(36), 2.931(69), 2.783(12), 2.636(12), 1.863(14), 1.580(16)

IMA No. **2005-034a**
Pittong, 6 km west of Linton, 35 km west of Ballarat, Victoria, Australia
William D. Birch
$Na_{0.22}[(W,Fe^{3+})(O,OH)_3 \cdot 0.44H_2O$
New structure type
Hexagonal: $P\bar{6}m2$; structure determined
a 7.286, *c* 50.49 Å
5.956(52), 3.306(62), 3.153(100), 3.111(91), 2.450(59), 1.823(76), 1.578(64), 1.192(44)

IMA No. **2005-052a**
Luobusa mine, Qusong County, Tibet Autonomous Region, People's Republic of China
Li Guowu
$Fe_{0.84}Si_2$
Orthorhombic: *Cmca*; structure determined
a 9.874, *b* 7.784, *c* 7.829 Å
3.06(80), 2.849(20), 2.402(25), 1.977(40), 1.889(60), 1.865(40), 1.844(100), 1.750(15)

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PROPOSALS APPROVED IN SEPTEMBER 2006

IMA No. **2006-023**
Liset, near Selje, Möre og Romsdal County, Vestlandet, Norway
Roberta Oberti
$Na(CaNa)_{\Sigma 2}(Fe^{2+}{}_3Al_2)_{\Sigma 5}(Si_6Al_2)_{\Sigma 8}O_{22}(OH)_2$
Amphibole group
Monoclinic: *C*2/*m*; structure determined
a 9.7489, *b* 17.9377, *c* 5.3233 Å, β 104.539˚
8.352(100), 3.386(39), 3.098(68), 2.703(92), 2.586(48), 2.546(56), 2.322(40), 2.156(33)

IMA No. **2006-024**
Liset, near Selje, Möre og Romsdal County, Vestlandet, Norway
Roberta Oberti
$Na(CaNa)_{\Sigma 2}(Mg_3Al_2)_{\Sigma 5}(Si_6Al_2)_{\Sigma 8}O_{22}(OH)_2$
Amphibole group
Monoclinic: *C*2/*m*; structure determined
a 9.7899, *b* 17.8991, *c* 5.3192 Å, β 104.900˚

8.381(92), 3.374(56), 3.104(69), 2.934(41), 2.697(100), 2.580(53), 2.552(60), 2.325(41)

IMA No. **2006-025**
Jianchang, Su-Lu coesite-eclogite province, China
Roberta Oberti
$Na(CaNa)_{\Sigma 2}(Mg_3Al_2)_{\Sigma 5}(Si_6Al_2)_{\Sigma 8}O_{22}F_2$
Amphibole group
Monoclinic: *C*2/*m*; structure determined
a 9.7414, *b* 17.9095, *c* 5.3335 Å, β 104.672˚
8.340(82), 3.384(47), 3.094(67), 2.700(100), 2.583(54), 2.551(64), 2.321(39), 2.153(35)

IMA No. **2006-026**
N'Chwaning II mine, Kalahari field, Republic of South Africa
Paola Bonazzi
$CaMn[SiO_3(OH)](OH)$
Mn-dominant analogue of poldervaartite
Orthorhombic: *Pbca*; structure determined
a 9.249, *b* 9.076, *c* 10.342 Å
4.14(60), 4.10(30), 3.19(100), 2.807(35), 2.762(30), 2.545(35), 2.521(30), 2.361(40)

IMA No. **2006-027**
Konder river, Ayan-Maya region, Aldan Plateau, Khabarovsk District, Russia
Yury S. Polekhovsky
Pd_4Cu_3Zn
Tetragonal: possibly *P*4/*mmm*
a 6.00, *c* 8.50 Å
3.00(1), 2.67(1), 2.13(10), 1.737(1), 1.501(3), 1.346(2), 1.224(8), 1.059(4)

IMA No. **2006-028**
Granite pegmatite near the Piauí river, Itinga county, Minas Gerais, Brazil
Nikita V. Chukanov
$Ca_2(Zn,Mg,Fe)_5Be_4(PO_4)_6(OH)_4{\cdot}6H_2O$
Roscherite group
Monoclinic: *C*2/*c*
a 15.98, *b* 11.84, *c* 6.63 Å, β 95.15˚
9.48(90), 5.98(100), 4.82(80), 3.152(90), 3.052(70), 2.961(70), 2.841(70), 2.708(80)

IMA No. **2006-029**
Foote Mine, Kings Mountain District, Cleveland Co., North Carolina, USA
Daniel Atencio
$Ca_2Mn^{2+}\square Mn^{2+}{}_2Mn^{2+}{}_2Be_4(PO_4)_6(OH)_4{\cdot}6H_2O$
Roscherite group
Triclinic: $P\bar{1}$; structure determined
a 6.742, *b* 9.883, *c* 9.981 Å, α 74.12, β 86.10, γ 87.36°
9.393 (53), 5.922(100), 4.799(26), 3.173(44), 2.983(14), 2.787(35), 2.413(14)

NOMENCLATURE MODIFICATIONS

IMA No. **06-A**
New nomenclature rules for the minerals of the pearceite-polybasite group:

1) The name pearceite is applied to minerals having As > Sb;
old formula: $(Ag,Cu)_{16}(As,Sb)_2S_{11}$ – new formula: $[Ag_9CuS_4][(Ag,Cu)_6(As,Sb)_2S_7]$
The name polybasite is applied to minerals having Sb > As;
old formula: $(Ag,Cu)_{16}(Sb,As)_2S_{11}$ – new formula: $[Ag_9CuS_4][(Ag,Cu)_6(Sb,As)_2S_7]$

2) The following names are applied to the known polytypes:
pearceite-*Tac* (As > Sb – unit-cell type 111 – old name: pearceite)
polybasite-*Tac* (Sb > As – unit-cell type 111 – old name: antimonpearceite)
pearceite-*T2ac* (As > Sb – unit-cell type 221 – old name: arsenpolybasite)
pearceite-*M2a2b2c* (As > Sb – unit-cell type 222 – old name: arsenpolybasite)
polybasite-*T2ac* (Sb > As – unit-cell type 221 – old name: polybasite)
polybasite-*M2a2b2c* (Sb > As – unit-cell type 222 – old name: polybasite)

IMA No. **06-D**
Pradetite has been revalidated as a mineral species. The mineral was approved as 91-046, but after new results obtained on the holotype lindackerite, the CNMMN decided in 1995 that the latter name was to be preferred over pradetite. Single-crystal studies of lindackerite in 2003 showed that pradetite is the Co-dominant analogue of lindackerite. Mineral 2005-053 is the Zn-dominant analogue of lindackerite and pradetite.

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PROPOSALS APPROVED IN OCTOBER 2006

IMA No. **2006-030**
Tsumeb, Namibia
John L. Jambor
$Cu_5Ge_{0.5}S_4$
Cubic: *Fm*3*m*, *F*432, or $F\bar{4}3m$
a 5.337 Å
3.053(100), 2.639(10), 1.869(90), 1.595(30)

IMA No. **2006-031**
Långban deposit, Bergslagen ore region, Filipstad district, Värmland, Sweden
Nikita V. Chukanov
$Pb_{7+x}Mg_{4.5}[(Si,Al)_5O_{14}](BO_3)(BO_3,AsO_4)(CO_3)(OH,O)_7$
Layer silicate
Triclinic: $P\bar{1}$; structure determined
a 9.3409, *b* 9.3597, *c* 18.8333 Å, α 80.365, β 75.816, γ 59.870º
18.1 (100), 3.39(30), 3.02(90), 2.698(70), 2.275(30), 1.867(30), 1.766(40), 1.519(40)

IMA No. **2006-032**
Konsomolsk mine, Talnakh, Norilsk, Russia
Julia D. Grtisenko
$(Fe,Co)As_3$
Skutterudite group
Cubic: $Im\bar{3}$
a 8.17 Å
5.8(3), 3.34(4), 2.585(10), 2.182(9), 1.928(4), 1.829(7), 1.667(5), 1.602(7), 1.402(6)

IMA No. **2006-033**
Kirovskii mine, Mt. Kukisvumchorr, Khibiny massif, Kola Peninsula, Russia
Igor V. Pekov
$BaCa_2(CO_3)_2F_2$
New structure type
Orthorhombic: *Cmcm*; structure determined
a 12.511, *b* 5.857, *c* 9.446 Å
5.303(21), 3.527(100), 3.397(71), 2.609(20), 2.313(43), 2.302(22), 1.948(39), 1.940(40)

IMA No. **2006-034**
La Fossa crater, Vulcano, Eolian Islands, Italy
Italo Campostrini
$K_2[SiF_6]$
Polymorphous with hieratite
Hexagonal: $P6_3mc$; structure determined
a 5.6461, *c* 9.2322 Å
4.90(25), 4.62(75), 4.32(43), 2.358(22), 2.301(100), 2.155(54), 1.909(14), 1.403(13)

IMA No. **2006-035**
NWA 470 chondrite, near Er Rachidia, Moroccan Sahara
Marina A. Ivanova
$CaAl_2O_4$
Monoclinic: $P2_1/c$
a 7.95, *b* 8.62, *c* 10.25 Å, β 93.10˚
3.018(100), 2.920(83), 2.882(52), 2.559(42), 2.505(46), 2.371(31), 1.888(29), 1.467(29)

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IMA No. **2006-036**
Jadar Basin, Serbia
Chris J. Stanley
$LiNaB_3SiO_7(OH)$
New structure type
Monoclinic: $P2_1/n$
a 6.816, *b* 13.789, *c* 6.758 Å, β 111.08˚
4.666(62), 3.716(39), 3.180(82), 3.152(74), 3.027(40), 2.946(100), 2.252(38), 2.241(74)

CHANGES IN EXISTING NOMENCLATURE

IMA No. **06-C**
About 130 minerals and/or mineral names have been discredited in preparation of an official CNMNC list of GQN minerals (G = grandfathered, Q = questionable, N = non-approved). After approval of the GQN list it will constitute together with the ARD list (A = approved, R = redefined, D = discredited) and some other categories (group names, polytypes,

intermediate names) the official CNMNC list, to be made available as the MINERAL database (Nickel & Nicols), distributed by MDI.

IMA No. **06-E**
Species and name surkhobite (IMA 2002-037) have been discredited because the species corresponds to jinshajiangite (IMA 81-061).

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IMA No. **2006-037**
Dar-i-Pioz glacier, Alai mountain range, northern Tajikistan
Atali A. Agakhanov
$K_2Na(Ca_6Na)Ti_4Li_6Si_{24}O_{66}F_2$
Related to beryl-group and milarite-group minerals
Triclinic: $P\bar{1}$; structure determined
a 9.8156, *b* 9.8249, *c* 17.3087 Å, α 99.209, β 94.670, γ 119.839°
4.25(60), 3.35(100), 3.14(20), 3.06(90), 2.885(55), 2.870(10), 1.868(17), 1.848(40)

IMA No. **2006-038**
Dar-i-Pioz glacier, Alai mountain range, northern Tajikistan
Atali A. Agakhanov
$Li_2NaFe^{2+}{}_7Ti_2\,Si_8O_{26}(OH)_4F$
Astrophyllite group
Triclinic: $P\bar{1}$; structure determined
a 5.3745, *b* 11.9299, *c* 11.6509 Å, α 113.325, β 94.524, γ 103.080°

10.56(100), 3.50(100), 2.780(80), 2.648(45), 2.578(70), 2.295(30), 2.106(35), 1.760(30)

IMA No. **2006-039**
Shergotty meteorite, Gaya, Bihar, India
Sergey N. Britvin
$Ca_9NaFe(PO_4)_7$
Whitlockite group
Trigonal: *R*3*c*
a 10.372, *c* 37.217 Å
8.13(2), 6.42(2), 3.19(6), 2.990(2), 2.860(10), 2.747(2), 2.594(5), 1.917(2)

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IMA No. **2006-040**
Benitoite Mine, New Idria District, San Benito County, California, USA
Chi Ma
$BaTiO_3$
Perovskite group
Orthorhombic: *Amm*2
a 3.9874, *b* 5.6751, *c* 5.6901 Å
4.018(18), 2.845(30), 2.830(100), 2.316(20), 2.312(23), 2.009(28), 1.637(19), 1.415(15)

IMA No. **2006-041**
132 North deposit, Widgiemooltha, Western Australia, Australia
Peter A. Williams
$Cu_3NiCl_2(OH)_6$
Atacamite group
Trigonal: $R\bar{3}m$; structure determined
a 6.8364, *c* 13.8459 Å

5.463(100), 4.651(16), 4.519(11), 2.903(19), 2.755(69), 2.728(14), 2.257(39), 1.820(13)

IMA No. **2006-042**
La Fossa crater, Vulcano, Aeolian Islands, Italy
Francesco Demartin
$K_3Na_4[SiF_6]_3[BF_4]$
Orthorhombic: *Imm*2; structure determined
a 5.522, *b* 17.106, *c* 9.175 Å
8.55(50), 8.10(25), 4.724(25), 4.043(100), 3.175(30), 2.281(50), 2.095(25), 1.795(25)

IMA No. **2006-043**
La Fossa crater, Vulcano, Aeolian Islands, Italy
Francesco Demartin
$TlPb_2Cl_5$
Isostructural with challacolloite
Monoclinic: $P2_1/c$; structure determined
a 8.9477, *b* 7.9218, *c* 12.4955 Å, β 90.092˚
3.971(83), 3.696(100), 2.851(38), 2.569(42), 2.273(22), 2.236(25), 2.109(45), 1.848(41)

IMA No. **2006-044**
Mont Peylenc, near the town of St. Pierre Eynac, Massif Central, France
Alessandro F. Gualtieri
$NaK_6MgCa_2(Al_{13}Si_{47}O_{120})\cdot 36H_2O$
Zeolite group
Orthorhombic: *Pmmn*; structure determined
a 7.5789, *b* 18.2010, *c* 26.1539 Å
9.077(60), 7.846(41), 4.234(44), 3.549(47), 3.484(71), 3.269(55), 3.182(100), 2.907(48)

OLDER PROPOSAL

IMA No. **86-036a**
Parwan lava cave, 45 km WNW of Melbourne, Victoria, Australia
William D. Birch
$(Na,K)(Mg,Ca)_4Al_8(PO_4)_8\ (CO_3)(OH)_7\cdot 30H_2O$
Monoclinic: *P*2, *Pm*, *P*2/*m*, $P2_1$, *Pc* or $P2_1/c$
a 26.148, *b* 11.781, *c* 20.494 Å, β 111.27º
12.202(12), 10.538(100), 10.031(14), 9.570(13), 9.360(13), 8.937(10), 8.718(11), 4.878(10)

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PROPOSALS APPROVED IN FEBRUARY 2007

IMA No. **2006-045**
East Mine, Bayan Obo, Inner Mongolia, China
Ritsuro Miyawaki
BaFCl
Matlockite group
Tetragonal: *P*4/*mmm*
a 4.3951, *c* 7.223 Å
3.75(100), 3.11(94), 2.79(67), 2.36(82), 2.20(32), 1.898(49), 1.726(34), 1.670(39)

IMA No. **2006-046**
Haydee mine, 144 km South of Iquique, Tarapacá Province, Northern Chile
Jochen Schlüter
$Cu_3Mg(OH)_6Cl_2$
Atacamite group
Trigonal: $R\bar{3}m$; structure determined
a 6.2728, *c* 5.7462 Å
5.745(100), 2.872(17), 2.54(1), 2.455(2), 1.972(1), 1.915(9), 1.565(1), 1.437(1)

IMA No. **2006-047**
Kamariza, Lavrion, Attikí Prefecture, Greece
Nikita V. Chukanov
$CuZn(AsO_4)(OH)$
Libethenite group
Orthorhombic: *Pnnm*; structure determined
a 8.5839, *b* 8.5290, *c* 5.9696 Å
6.00(54), 4.860(64), 3.002(100), 2.690(67), 2.662(53), 2.456(94), 2.437(86), 1.604(49)

IMA No. **2006-048**
Broken Hill, New South Wales, Australia
Peter Elliott
$Cd_2Cu_2(PO_4)_2(SO_4)\cdot 5H_2O$
New structure type
Orthorhombic: *Pnma*; structure determined
a 20.8938, *b* 6.1640, *c* 10.4768 Å
10.451(100), 5.146(30), 4.223(40), 3.484(40), 2.902(70), 2.719(30), 2.652(30), 1.919(80)

IMA No. **2006-049**
Hirao mine, Minoo (Minoh) City, Osaka Prefecture, Japan
Masayuki Ohnishi
$Zn_4SO_4(OH)_6\cdot 5H_2O$
New structure type
Triclinic: $P\bar{1}$
a 8.358, *b* 8.337, *c* 11.027 Å, α 94.97, β 83.16, γ 119.6°
10.96(100), 5.47(16), 3.642(17), 3.229(8), 2.717(21), 2.663(8), 2.562(9), 1.574(18)

IMA No. **2006-050**
Veta Negra, Laurani, Bolivia
Werner H. Paar
$NaCu_5(Ti,Sb)_2O_2(AsO_4)_4[AsO_3(OH)]_2\cdot 8H_2O$
New structure type
Triclinic: $P\bar{1}$; structure determined
a 7.0308, *b* 9.8823, *c* 10.6754 Å, α 106.973, β 104.274, γ 93.839°
9.825(100), 5.887(50), 4.635(30), 3.354(30), 3.232(30), 2.947(60), 2.736(30), 2.442(30)

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PROPOSALS APPROVED IN MARCH 2007

IMA No. **2006-052**
Dolores prospect, Pastrana, Murcia Province, Spain
John L. Jambor
$(Ca,Cu,Na,Fe^{3+},Al)_{12}Fe^{3+}_2(AsO_4)_8(OH,Cl)_x \cdot nH_2O$
Smolianinovite group (?)
Monoclinic: *P*2/*a* or *Pa*
a 10.172, *b* 22.43, *c* 5.286 Å, β 93.09°
22.0(100), 11.2(70), 5.068(20), 3.345(20), 2.763(30), 2.660(20), 2.541(20)

IMA No. **2006-053**
De Lamar mine, Owyhee County, Idaho, U.S.A.
Luca Bindi
$[(Ag,Cu)_6(Sb,As)_2(S,Se)_7][Ag_9Cu(S,Se)_2Se_2]$
Pearceite-polybasite group
Trigonal: $P\bar{3}m1$; structure determined
a 7.5950, *c* 12.0731 Å

3.1731(48), 3.0183(84), 2.8880(48), 2.8880(100), 2.5466(23), 2.3629(34), 2.2237(28), 1.8987(31)

IMA No. **2006-054**
Pereval quarry, Sludyanka, Irkutsk region, Siberia, Russia
Leonid Z. Reznitsky
$V_8Ti_6[Ba(Si_2O)]O_{28}$
Derbylite-hemloite group
Triclinic: $P\bar{1}$; structure determined
a 7.521, *b* 7.643, *c* 9.572 Å, α 110.20, β 103.34, γ 98.28˚
3.10(8), 2.85(10), 2.63(8), 2.23(6), 2.13(8), 1.781(8), 1.582(10), 1.433(10)

IMA No. **2006-055**
Ananai mine, Ohotoyo town, Kochi Prefecture, Japan
Tetsuo Minakawa
$CaSrAl_2Fe^{3+}(Si_2O_7)(SiO_4)O(OH)$
Epidote group
Monoclinic: $P2_1/m$; structure determined
a 8.925, *b* 5.651, *c* 10.243 Å, β 114.45˚
3.500(42), 3.262(23), 2.921(100), 2.825(32), 2.724(41), 2.614(42), 2.580(49), 2.181(22)

IMA No. **2006-056**
Heftetjern pegmatite, Tørdal, Drangedal, Telemark, Norway
Uwe Kolitsch
$ScTaO_4$
Wolframite group
Monoclinic: $P2/c$; structure determined
a 4.784, *b* 5.593, *c* 5.120 Å, β 91.15˚
4.783(33), 3.807(32), 3.662(53), 3.000(100), 2.9570(97), 2.4877(34), 1.7639(27), 1.7157(22)

WITHDRAWAL OF AN APPROVED MINERAL

Proposal 2005-012 was approved (mineral and name) in June 2005. The authors have recently submitted additional data on this phase which show that it is merely a monoclinic polytype of mackelveyite-(Y), namely mackelveyite-(Y)-2*M*. The approval for this proposal is thus withdrawn.

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PROPOSALS APPROVED IN April 2007

IMA No. **2007-001**
A quarry, 10 km SSW of the township of Lake Boga, north-western Victoria, Australia
Stuart J. Mills
$CaNaFe_2H(UO_2)_2(PO_4)_4(OH)_2(H_2O)_8$
Uranyl phosphate
Monoclinic: *Cc*; structure determined
a 19.6441, *b* 7.0958, *c* 18.7029 Å, β 115.692˚
6.60(10), 4.07(2), 3.80(2), 3.56(2), 3.31(2), 3.16(4), 2.797(2), 2.002(2)

IMA No. **2007-002**
Dovyren massif, Siberia, Russia
Evgeny V. Galuskin
$Ca_6ZrSi_4O_{14}(OH)_4$
New structure
Orthorhombic: *Pnnm*; structure determined
A 5.666, *B* 18.844, *C* 3.728 Å

5.4260(63), 3.1406(39), 3.0727(100), 2.7468(36), 2.5979(25), 1.8786(26), 1.8640(33), 1.6848(26)

IMA No. **2007-003**
Chende Region, China
Zuxiang Yu
$CuPtBiS_3$
Lapieite group
Orthorhombic: $P2_12_12_1$; structure determined
a 7.7152, *b* 12.838, *c* 4.9248 Å
6.40(30), 5.93(20), 3.24(80), 3.03(100), 2.27(40), 2.14(50), 1.865(60), 1.423(30)

IMA No. **2007-004**
Grandview mine, Grand Canyon National Park, Coconino County, Arizona, USA
Peter A. Williams
$Cu_3Al_9(SO_4)_2(OH)_{29}$
Monoclinic: *P*2, *Pm* or *P*2/*m*
a 10.908, *b* 6.393, *c* 10.118 Å, β 107.47˚
9.667(33), 6.208(100), 5.287(35), 3.949(79), 3.625(10), 2.990(9), 2.816(14), 2.413(9)

IMA No. **2007-005**
Vanadium Queen mine, 18 km east of La Sal, San Juan County, Utah, USA
John M. Hughes
$Na_2Mg_2(V_{10}O_{28})\cdot 20H_2O$
Pascoite-sherwoordite group
Monoclinic: *C*2/*c*; structure determined
a 23.9019, *b* 10.9993, *c* 17.0504 Å, β 118.284˚
9.72(100), 9.09(60), 8.19(60), 7.42(70), 6.67(80), 2.882(50), 2.706(50), 1.861(50)

OLDER PROPOSAL

IMA No. **2006-019a**
Cassagna mine, Val Graveglia, eastern Liguria, northern Apennines, Italy
Riccardo Basso
$(Ca,Mn^{2+})_4(Fe^{3+},Mn^{3+},Al)_4(OH)_4(V^{3+},Mg,Al)_2(O,OH)_4(Si_3O_{10})(SiO_4)_2$
Orthorhombic: *Cmcm*; structure determined
a 6.066, *b* 8.908, *c* 18.995 Å
9.52(100), 4.98(45), 4.85(50), 4.03(40), 3.02(60), 2.66(70), 2.54(60), 2.32(40)

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PROPOSALS APPROVED IN MAY 2007

IMA No. **2007-006**
San Piero in Campo, Elba, Italy
Rainer Thomas
$Rb[B_5O_6(OH)_4]\cdot 2H_2O$
Neso-pentaborate
Orthorhombic: *Aba*2
a 11.304, *b* 10.963, *c* 9.337 Å
3.554(100), 5.481(85), 3.391(63), 2.826(47), 6.018(38), 3.329(38), 2.894(28), 3.259(26)

IMA No. **2007-007**
San Piero in Campo, Elba, Italy
Rainer Thomas
$Cs[B_5O_6(OH)_4]\cdot 2H_2O$
Neso-pentaborate
Monoclinic: *C*2/*c*
a 8.130, *b* 12.045, *c* 11.792 Å, β 93.34˚

6.023(100), 3/365(68), 2.943(55), 3.278(49), 3.467(44), 3.464(44), 5.886(43), 3.321(34)

IMA No. **2007-008**
Koashva apatite quarry, Khibina alkaline massif, Kola Peninsula, Russia
Alexander P. Khomyakov
$Na_{12}(K,Sr,Ce)_3Ca_6Mn_3Zr_3NbSi_{25}O_{73}(O,H_2O,OH)_5$
Eudialyte group
Trigonal: *R*3*m*; structure determined
a 14.281, *c* 30.243 Å
6.447(60), 5.719(40), 4.322(71), 3.540(38), 3.222(70), 3.170(50), 2.982(100), 2.860(94)

IMA No. **2007-009**
Monte Trisa, Torrebelvicino, Vicenza, Italy
Paolo Orlandi
$Cu_6(SO_4)(OH)_{10}\cdot H_2O$
Dimorphous with redgillite
Orthorhombic: $Cmc2_1$; structure determined
a 2.989, *b* 16.970, *c* 14.812 Å
7.45(100), 3.73(35), 2.788(18), 2.654(8), 2.503(14), 2.341(9), 2.166(9), 1.598(20)

CHANGES IN EXISTING NOMENCLATURE

IMA No. **07-A**
The mineral surkhobite and its name are revalidated. Surkhobite is redefined as $(Ba,K)_2CaNa(Mn,Fe^{2+},Fe^{3+})_8Ti_4(Si_2O_7)_4O_4(F,OH,O)_6$, it differs from jinshajiangite because Mn prevails over Fe^{2+}, and it differs from perraultite because Ca dominates in the A(6) site. Decision IMA No. **06-E** [Species and name surkhobite (IMA 2002-037) have been discredited because the species corresponds to jinshajiangite (IMA 81-061)] is thus nullified.

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IMA No. **2007-010**
Zarshuran deposit, Takab region, NW Iran
Werner H. Paar
$PbHgAs_2S_6$
Sulphosalt
Monoclinic: *P* lattice
a 19.113, *b* 4.233, *c* 22.958 Å, β 114.78˚
8.672(80), 5.680(30), 4.653(50), 3.867(40), 3.395(50), 3.148(40), 2.722(100), 2.187(50)

IMA No. **2007-011**
Venables Valley, 20 km SSW of Ashcroft, British Columbia, Canada
Ronald C. Peterson and Elif Genceli
$MgSO_4 \cdot 11H_2O$
Triclinic: $P\bar{1}$; structure determined
a 6.7459, *b* 6.8173, *c* 17.2799 Å, α 88.137, β 89.481, γ 62.719˚
5.73(35), 5.62(56), 5.41(54), 4.91(84), 4.85(90), 2.988(58) 2.958(100), 2.940(67)

IMA No. **2007-012**
Kato mine, Munakata City, Fukuoka Prefecture, Japan
Satoshi Matsubara
$Pb_2Cu_2(Se^{4+}O_3)(SO_4)(OH)_4$
Linarite-chenite group
Monoclinic: *P*2_1/*m*
a 9.766, *b* 5.666, *c* 9.291(10) Å, β 102.40˚
4.86(44), 4.47(57), 3.53(39), 3.18(100), 3.14(68), 2.72(22), 2.33(18), 1.813(19)

OLDER PROPOSAL

IMA No. **98-053a**
Bendada near Guarda, province Beira Alta, central Portugal
Uwe Kolitsch
$Fe^{2+}Fe^{3+}_2(AsO_4)_2(OH)_2{\cdot}4H_2O$
Whitmoreite group
Monoclinic: *P*2_1/*c*; structure determined
a 10.239, *b* 9.713, *c* 5.552 Å, β 94.11˚
10.22(10), 7.036(8), 4.833(3), 4.520(2), 4.250(5), 3.490(2), 2.907(3), 2.865(4)

IMA No. **2006-051**
Dolores prospect, Pastrana, Murcia Province, Spain
John L. Jambor
$(Ca,Cu,Na,Fe^{3+},Al)_{12}Al_2(AsO_4)_8(OH,Cl)_x{\cdot}nH_2O$
Smolianinovite group (?)
Monoclinic: *P*2/*a* or *Pa*
a 9.972, *b* 22.44, *c* 5.272(8) Å, β 92.9˚
22.0(100), 11.16(70), 4.983(50), 3.655(25), 3.333(45), 3.003(30), 2.767(30)

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IMA No. **2007-013**
Mina Santa Rosa, Iquique, Northern Chile
Jochen Schlüter
CuB_2O_4
Natural analogue of copper metaborate
Tetragonal: $I\bar{4}2d$; structure determined
a 11.517, *c* 5.632 Å
3.797(100), 3.638(47), 2.876(17), 2.775(35), 2.572(26), 2.501(26), 1.822(21), 1.793(20)

IMA No. **2007-014**
Verkhn'echegemskiy volcanic structure, Kabardino-Balkaria, North Caucasus, Russia
Evgeny V. Galuskin
$CaZrO_3$
Perovskite group
Orthorhombic: *Pnma*; structure determined
a 5.65, *b* 7.93, *c* 5.55 Å

4.013(35), 4.009(16), 2.881(25), 2.836(100), 2.796(22), 2.006(29), 1.654(17), 1.622(24)

IMA No. **2007-015**
Sierra de los Filabres, Almería, SE Spain
Roberta Oberti
$K(CaNa)(Fe^{2+}{}_3Al_2)(Si_6Al_2)O_{22}(OH)_2$
Amphibole group
Monoclinic: *C*2/*m*; structure determined
a 9.8505, *b* 18.0075, *c* 5.3518 Å, β 104.775˚
8.420(100), 3.400(38), 3.127(53), 2.714(75), 2.596(49), 2.565(60), 2.340(32), 2.166(34)

IMA No. **2007-016**
Tip Top mine, Custer County, South Dakota, USA
Anthony R. Kampf
$NaFe^{3+}Mg_2Fe^{3+}{}_2(PO_4)_4(OH)_2{\cdot}8H_2O$
Whiteite-jahnsite group
Monoclinic: *P*2/*a*
a 15.0811, *b* 7.1403, *c* 9.8299 Å, β 110.445˚
9.218(100), 4.884(25), 3.537(25), 2.973(25), 2.854(20), 2.819(70), 2.593(25), 1933(20)

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PROPOSALS APPROVED IN AUGUST 2007

IMA No. **2007-017**
Vesle Arøy island, Langesundsfjord district, Larvik community, Vestfold county, Norway
Alf Olav Larsen
$KNa_6Be_2(Si_{15}Al_3)_{\Sigma=18}O_{39}F_2$
Leifite group
Trigonal: $P\bar{3}m1$; structure determined
a 14.3865, c 4.8733 Å
4.710(29), 4.153(21), 3.386(70), 3.161(100), 3.115(17), 2.466(31), 2.398(19), 2.217(20)

IMA No. **2007-020**
Bambolla mine, Moctezuma, Sonora, Mexico
Joël Brugger
$Ca_2Mn^{4+}{}_2Te^{6+}{}_2O_{12}\cdot H_2O$
Tellurate
Monoclinic: $P2$, $P2/m$, Pm, $P2_1$ or $P2_1/m$
a 10.757, b 4.928, c 8.492 Å, β 102.39˚

4.924(34), 4.361(51), 3.267(100), 2.520(71), 2.244(32), 1.996(21), 1.762(39), 1.455(24)

IMA No. **2007-021**
Mount Stafford, Northern Territory, Australia
Edward S. Grew
$Al_{4.5}SiB_{0.5}O_{9.5}$
Structurally related to mullite
Orthorhombic: $Cmc2_1$; structure determined
a 5.7168, *b* 15.023, *c* 7.675 Å
5.37(50), 3.38(100), 2.67(60), 2.51(60), 2.19(80), 2.11(50), 1.682(30), 1.512(80)

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IMA No. **2007-022**
La Fossa crater, Vulcano, Aeolian Islands, Italy
Francesco Demartin
BiSBr
New structure type
Orthorhombic: *Pnam*; structure determined
a 8.0424, *b* 9.8511, *c* 4.0328 Å
4.220(68), 3.740(62), 3.721(44), 2.909(100), 2.429(43), 2.036(47), 1.865(63), 1.774(88)

IMA No. **2007-023**
Mt. Alluaiv, Lovozero alkaline massif, Kola Peninsula, Russia
Alexander P. Khomyakov
$Na_{15}(Na,Ca,Ce)_3(Mn,Ca)_3Fe_3Zr_3Si_{26}O_{72}(OH,O)_4Cl \cdot H_2O$
Eudialyte group
Trigonal: *R*3; structure determined
a 14.205, *c* 30.265 Å
4.316(85), 3.536(41), 3.221(43), 3.166(37), 3.039(41), 2.970(100), 2.848(84), 2.157(34)

IMA No. **2007-024**
Silver Coin mine, Valmy, Iron Point district, Humboldt County, Nevada, USA
Anthony R. Kampf
$[Na(H_2O)_{2.5}][Fe^{3+}{}_8(PO_4)_6(OH)_7(H_2O)_4]$
Meurigite group
Monoclinic: *C*2/*c*
a 28.835, *b* 5.1848, *c* 19.484 Å, β 106.983˚
13.80(20), 9.349(100), 4.843(20), 4.318(20), 3.206(40), 3.107(30), 2.971(15), 1.574(20)

IMA No. **2007-025**
Blue Cap mine, about 15 km east of La Sal, San Juan Co., Utah, USA
Anthony R. Kampf
$Ca_2Mg[V_{10}O_{28}]\cdot 16H_2O$
Pascoite group
Monoclinic: *C*2/*m*; structure determined
a 19.8442, *b* 9.9353, *c* 10.7149 Å, β 120.305˚
9.242(20), 8.872(30), 8.571(100), 7.270(40), 5.477(15), 4.590(15), 4.355(15), 2.137(20)

IMA No. **2007-026**
Blue Cap mine, about 15 km east of La Sal, San Juan Co., Utah, USA
Anthony R. Kampf
$Zn_3V_2O_7(OH)_2\cdot 2H_2O$
Zn-dominant analogue of volborthite
Hexagonal: $P\bar{3}m1$; structure determined
a 6.0818, *c* 7.1793 Å
7.211(100), 4.252(20), 2.968(50), 2.628(35), 2.470(40), 1.773(20), 1.513(20), 1.485(25)

OLDER PROPOSAL
IMA No. **2002-045b**
Menzenschwand, Southern Black Forest, Baden-Württemberg, Germany
Kurt Walenta and Frédéric Hatert
$(K,U,\square)(UO_2)_3(AsO_4)(OH)_4\cdot H_2O$
New structure type
Orthorhombic: *Cccm*; structure determind
a 8.154, *b* 11.55, *c* 13.75 Å
6.71(80), 6.03(100), 3.78(70), 3.33(80), 2.96(60), 2.88(40), 2.63(50), 1.942(50).

REDEFINITION
IMA No. **07-B**
The mineral calcio-olivine is redefined as the calcium-dominant member of the olivine group. Calcio-olivine is the natural equivalent of synthetic γ-Ca_2SiO_4, not of synthetic α-Ca_2SiO_4 as erroneously reported in literature. Calcio-olivine is a polymorph of larnite, monoclinic β-Ca_2SiO_4.

NOMENCLATURE CHANGES
Ardennite
The approval of IMA No. 2005-037 for ardennite-(V) and its publication in Eur. J. Mineral., 19 (2007), 581-587 necessitates a name change for ardennite into ardennite-(As).

IMA No. **07-C**
Several decisions have been taken on the nomenclature of a number of mineral names:
The authors of new-mineral proposals should use a suffix nomenclature rather than a prefix nomenclature. Some minerals in well-known groups are to be renamed.
Mineral names consisting of two words are to be renamed.
Mineral names having superfluous hyphens are to be renamed (with the exception of the current amphibole names, for which a subcommittee is discussing a new nomenclature).
Minerals named after localities or persons should have the original spelling in their name, including the diacritical marks. A list of such names is to be published.
Mineral names having superfluous diacritical marks (marks not present in the original names of localities or persons) are to be renamed.

Lists of mineral names to be changed by these decisions will be published by the chairman in *Mineralogical Record*.

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IMA No. **2007-027**
Allende meteorite, Pueblito de Allende, Chihuahua, Mexico
Chi Ma
$Sc_4Zr_3O_{12}$
New structure type
Trigonal: $R\bar{3}$; structure determined
a 9.396, *c* 8.720 Å
4.698(5), 2.900(100), 2.513(18), 1.779(27), 1.776(32), 1.515(19), 1.450(4), 1.152(4)

IMA No. **2007-028**
Tsumeb, Namibia
Marcus J. Origlieri
$AsSbO_3$
Claudetite group
Monoclinic: $P2_1/n$; structure determined
a 4.5757, *b* 13.1288, *c* 5.4216 Å, β 95.039°
4.99(32), 3.51(100), 3.282(82), 3.238(71), 2.805(39), 2.801(31), 2.656(28), 2.279(34)

IMA No. **2007-029**
Allende meteorite, Pueblito de Allende, Chihuahua, Mexico
Chi Ma
(Mo,Ru,Fe,Ir,Os)
Hexagonal: *P*63/*mmc*
a 2.7506, *c* 4.4318 Å
2.382(24), 2.216(26), 2.098(100), 1.622(15), 1.375(17), 1.255(18), 1.169(20), 1.150(14)

IMA No. **2007-030**
La Fossa crater, Vulcano, Aeolian Islands, Italy
Francesco Demartin
$K_2[AlF_3|SO_4]$
Orthorhombic: *Pbcn*; structure determined
a 10.810, *b* 8.336, *c* 6.822 Å
6.631(70), 5.429(14), 3.317(28), 2.983(100), 2.702(82), 2.648(14), 2.208(30), 1.712(58)

IMA No. **2007-031**
Mount Kukisvumchorr, Khibina alkaline massif, Kola Peninsula, Russia
Alexander P. Khomyakov
$K_3Na_3Ca_5Si_{12}O_{30}F_4{\cdot}H_2O$
Canasite group
Monoclinic: *Cm*; structure determined
a 18.846, *b* 7.242, *c* 12.650(2) Å, β 111.84°
5.872(31), 4.724(20), 4.711(25), 4.204(40), 3.012(22), 2.915(100), 2.357(30), 2.310(23)

IMA No. **2007-032**
Poudrette quarry, Mont Saint-Hilaire, Rouville County, Québec, Canada
Igor V. Pekov
$NaBe(CO_3)(OH){\cdot}2H_2O$
New structure type
Tetragonal: *P*4/*mcc*; structure determined
a 13.087, *c* 5.404 Å
13.01(100), 9.20(62), 3.611(34), 3.256(95), 2.693(44), 2.605(37), 2.489(60), 2.076(32)

IMA No. **2007-033**
Allende meteorite, Pueblito de Allende, Chihuahua, Mexico
Chi Ma
MoNiP
Barringerite group
Hexagonal: $P\bar{6}2m$
a 5.681, *c* 3.704 Å
2.298(100), 2.094(69), 1.918(73), 1.852(24), 1.408(20), 1.332(17), 1.316(18), 1.111(14)

PUBLICATION OF IMA-CNMNC REPORT
The report of the Subcommittee for Unnamed Minerals on a system of codification for unnamed minerals has been published by Dorian G.W. Smith and Ernest H. Nickel in Canadian Mineralogist, 45 (2007), 983-1055. The paper contains a complete list of unnamed minerals.

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IMA No. **2007-034**
Luobusa mine, Qusong County, Tibet, China
Fang Qinsong
WC
Hexagonal: $P\bar{6}m2$
a 2.902, *c* 2.831 Å
2.833(44), 2.511(94), 1.878(90), 1.449(25), 1.291(36), 1.233(22), 1.149(23), 0.9008(23)

IMA No. **2007-035**
Luobusa mine, Qusong County, Tibet, China
Shi Nicheng
$(Cr_4Fe_4Ni)_{\Sigma 9}C_4$
Hexagonal: $P6_3mc$; structure determined
a 18.839, *c* 4.4960 Å
6.920(100), 4.530(35), 3.596(55), 2.493(36), 2.023(98), 1.998(32), 1.825(47), 1.798(45)

IMA No. **2007-036**
Luobusa mine, Qusong County, Tibet, China
Li Guowu
$TiFeSi_2$
Orthorhombic: *Pbam*; structure determined
a 8.6053, *b* 9.5211, *c* 7.6436 Å
3.822(35), 2.294(18), 2.230(97), 2.124(100), 2.098(43), 1.911(44), 1.829(19), 1.292(19)

IMA No. **2007-037**
Horoman, Samani-cho, Samani-gun, Hokkaido, Japan
Arashi Kitakaze
$Fe_6Ni_3S_8$
Tetragonal: *P*4/*mmm*
a 8.707, *c* 10.439 Å
6.160(10), 3.080(100), 2.955(32), 2.435(6), 1.984(25), 1.947(51), 1.825(60), 1.805(54)

IMA No. **2007-038**
Horoman, Samani-cho, Samani-gun, Hokkaido, Japan
Arashi Kitakaze
$Cu_2Fe_5Ni_2S_8$
Tetragonal: $P4_2/mmm$
a 10.089, *c* 10.402 Å
5.880(15), 3.118(100), 3.050(20), 2.703(5), 1.981(5), 1.873(25), 1.844(50), 1.595(45)

OLDER PROPOSALS

IMA No. **89-035a**
Glücksstern mine, Gottlob Hill, Friedrichroda, Thüringen, Germany
Thomas Witzke
$LaVO_4$
Xenotime group
Tetragonal: $I4_1/amd$; structure determined
a 7.406, *c* 6.504 Å
3.707(100), 2.939(5), 2.759(10), 2.623(7), 2.309(5), 2.088(5), 1.902(4), 1.853(19)

IMA No. **2007-019**
Matsumaezawa pit, Tanohata mine, Tanohata Village, Iwate Prefecture, Japan
Hidemichi Hori
$LiMn_2Si_3O_8(OH)$
Wollastonite group
Triclinic: $P\bar{1}$
a 7.612, *b* 7.038, *c* 6.700 Å, α 90.23, β 94.70, γ 105.26°
6.640(35), 3.666(26), 3.134(89), 3.109(69), 2.946(100), 2.814(33), 2.581(22), 2.182(40)

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IMA No. **2007-039**
Poudrette quarry, Mont Saint-Hilaire, Rouville County, Quebec, Canada.
Joel D. Grice
$(Ce,REE)_3(Na,H_2O)_6MnSi_9Be_5(O,OH)_{30}F_4$
Monoclinic: *C*2/*c*; structure determined
a 11.654, *b* 13.916, *c* 16.583 Å, β 95.86˚
8.120(100), 3.543(39), 3.454(21), 3.176(19), 2.959(24), 2.863(48), 2.749(23), 2.668(33)

IMA No. **2007-040**
Fuengirola, Málaga Province, Spain
María Dolores Ruiz Cruz
$(NH_4)Fe_3(Si_3Al)O_{10}(OH)_2$
Mica group
Monoclinic: *C*2/*m*?
a 5.296, *b* 9.199, *c* 10.412(6) Å, β 99.991˚
10.242(83), 3.422(46), 3.170(33), 2.290(16), 2.011(16), 2.007(18), 1.544(23), 1.524(15)

IMA No. **2007-041**
Koashva Mountain, Khibiny Massif, Kola Peninsula, Russia
Victor N. Yakovenchuk
Polytype *C*
$Na_2[Ti_4O_2(OH)_2(SiO_4)_3]\cdot 6H_2O$
Cubic: $P\bar{4}3m$
a 7.856 Å
7.88(100), 4.53(30), 3.20(80), 2.774(30), 2.622(40), 2.478(40), 1.96(30), 1.843(30)
Polytype *T*
$Na_3[Ti_4(OH)O_3(SiO_4)_3]\cdot 7H_2O$
Trigonal: *R*3*m*
a 10.94, *c* 13.97 Å
7.88(100), 3.277(60), 3.175(80), 2.730(50), 2.607(70), 2.471(50), 1.960(60), 1.916(50)

IMA No. **2007-042**
Koashva Mountain, Khibiny Massif, Kola Peninsula, Russia
Victor N. Yakovenchuk
$K_2[Ti_4(OH)_2O_2(SiO_4)_3]\cdot 9H_2O$
Cubic: $P\bar{4}3m$
a 7.808 Å
7.85(100), 3.91(20), 3.201(80), 2.765(20), 2.602(30), 2.471(40), 1.951(30), 1.839(30)

IMA No. **2007-043**
Koashva Mountain, Khibiny Massif, Kola Peninsula, Russia
Victor N. Yakovenchuk
$Cu[Ti_4(OH)_2O_2(SiO_4)_3]\cdot 7H_2O$
Cubic: $P\bar{4}3m$
a 7.850 Å
7.87(100), 3.94(20), 3.205(80), 2.774(20), 2.616(30), 2.481(30), 1.960(30), 1.843(30)

IMA No. **2007-044**
Biachella Valley, Sacrofano municipality, Rome province, Latium region, Italy
Nikita V. Chukanov
$(Na,Ca,K)_8(Si_6Al_6O_{24})(SO_4)_2(OH)_{0.5}\cdot H_2O$
Cancrinite group
Trigonal: *P*3; structure determined
a 12.913, *c* 79.605 Å
11.07(19), 6.45(18), 4.782(15), 3.720(100), 3.576(18), 3.469(14), 3.300(47), 3.220(16)

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IMA No. **2007-045**
Colima volcano, Colima State, México
Mikhail Ostrooumov
K_3VS_4
Orthorhombic: *Pnma*
a 9.138, *b* 10.627, *c* 9.131 Å
3.464(77), 3.237(57), 3.229(66), 2.926(70), 2.890(52), 2.799(100), 2.787(75), 2.676(80)

IMA No. **2007-046**
Sarbai Mine, Turgai region, Kazakhstan
Luca Bindi
$[Cu_6As_2S_7][Ag_9CuS_4]$
Pearceite-polybasite group
Trigonal: $P\bar{3}m1$; structure determined
a 7.3218, *c* 11.8877 Å
11.89(54), 3.063(38), 2.972(100), 2.797(44), 2.476(45), 2.349(45), 2.168(42), 1.831(50)

IMA No. **2007-047**
Mina Asunción, Sierra Gorda, Caracoles District, Antofagasta Province, Chile
Joël Brugger
$Pb_2[B_5O_9]Cl \cdot 0.5H_2O$
Hilgardite group
Orthorhombic: *Pnn*2; structure determined
a 11.3757, *b* 11.5051, *c* 6.5568 Å
5.71(80), 4.04(100), 3.29(40), 3.16(30), 2.84(100), 2.55(40), 2.019(70), 1.877(40)

IMA No. **2007-049**
Kumdy Kol, Kokchetav, Northern Kazakhstan
Shyh-Lung Hwang
$NaAlSi_3O_8$
Feldspar group
Orthorhombic: *P*2*nn* or *Pmnn*
a 8.24, *b* 8.68, *c* 4.84 Å
5.97, 4.33, 4.21, 4.18, 4.12, 3.76, 3.23, 3.02, 2.95, 2.74

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Santa Rosa mine, Sijes, Salta province, Argentina
Frank C. Hawthorne
$Ca_4(H_2O)_4\,[B_4O_4(OH)_6]_4\,\{H_2O\}_{15}$
New structure type
Orthorhombic: *Pca*2_1; structure determined
a 12.161, *b* 40.477, *c* 10.1843 Å
10.501(10), 9.992(5), 5.226(7), 4.623(6), 3.837(7), 3.118(7), 2.612(6), 2.538(6)

IMA No. **2007-051**
Eldfell, Heimaey island, Vestmannaeyjar archipelago, Iceland
Tonči Balić-Žunić
$NaFe(SO_4)_2$
Yavapaiite group
Monoclinic: *C*2/*m*
a 8.022, *b* 5.135, *c* 7.123 Å, β 92.15°

3.72(76), 3.64(54), 3.43(54), 2.77(100), 2.72(57), 2.57(31), 2.370(63), 1.650(32)

IMA No. **2007-052**
Mt. Vasin-Myl'k, Voron'i Tundry, Kola Peninsula, Russia
Igor V. Pekov
$Rb(LiAl_{1.5}\square_{0.5})(Al_{0.5}Si_{3.5})O_{10}F_2$
Mica group
Monoclinic: *C*2/*c*
a 5.191, *b* 9.025, *c* 20.40 Å, β 95.37°
10.1(60), 5.08(40), 4.55(80), 3.98(40), 3.49(50), 3.35(60), 2.575(100), 2.017(50)

IMA No. **2007-053**
Kabutoichiba, Kameyama, Mie Prefecture, Japan
Yasuyuki Banno
$KCa_2(Fe^{2+}{}_4Al)Si_6Al_2O_{22}(OH)_2$
Amphibole group
Monoclinic: *C*2/*m*; structure determined
a 9.937, *b* 18.108, *c* 5.335 Å, β 105.30°
8.48(81), 3.40(51), 3.15(46), 2.72(100), 2.61(59), 2.57(43), 2.36(37), 2.17(39)

IMA No. **2007-054**
Klöch, north of Bad Radkersburg, Eastern Styria, Austria
Hans-Peter Bojar
$(\square_1Na_1)KFe_2Zn_3[Si_{12}O_{30}]$
Milarite group
Hexagonal: *P*6/*mcc*; structure determined
a 10.120, *c* 14.298 Å
7.149(100), 5.540(43), 4.130(40), 3.736(70), 3.227(67), 2.920(40), 2.770(68), 2.530(43)

IMA No. **2007-055**
Keeley mine, South Lorrain Township, Timiskaming District, Ontario, Canada
Frank C. Hawthorne
$Co(H_2O)_2[AsO_3(OH)]\{H_2O\}_{0.5}$
New structure type
Monoclinic: $P2_1/n$; structure determined
a 4.7058, *b* 9.299, *c* 12.738 Å, β 98.933°
7.446(100), 6.267(44),3.725(29), 3.260(25), 3.089(20), 2.998(31), 2.970(21), 2.596(23)

IMA No. **2007-056**
Suizhou L6 chondrite: Dayanpo, Suizhou County, Hubei Province, China
Ming Chen
$FeCr_2O_4$
Spinel group
Orthorhombic: *Bbmm*
a 9.462, *b* 9.562, *c* 2.916 Å
2.650(100), 2.389(20), 2.089(10), 1.953(90), 1.566(60), 1.439(15), 1.425(15), 1.337(40)

NEW MINERALS APPROVED IN 2007
NOMENCLATURE MODIFICATIONS APPROVED IN 2007
BY THE
COMMISSION ON NEW MINERALS, NOMENCLATURE AND CLASSIFICATION
INTERNATIONAL MINERALOGICAL ASSOCIATION

Ernst A.J. Burke* (Chairman, CNMNC) and Frédéric Hatert** (Vice-Chairman, CNMNC)

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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 number
Type locality
Corresponding author
Chemical formula
Relationship to other minerals
Crystal system, Space group; Structure determined, yes or no
Unit-cell parameters
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

PROPOSALS APPROVED IN MARCH 2008

IMA No. **2007-057**
Granite quarry 10 km SSW of the township of Lake Boga, northwestern Victoria, Australia
Stuart J. Mills
$CuFe^{3+}_2(PO_4)_2(OH)_2 \cdot 4H_2O$
Whitmoreite group
Monoclinic: $P2_1/c$
a 9.863, *b* 9.661, *c* 5.476 Å, β 92.45°
9.849(100), 6.892(80), 4.924(80), 4.386(90), 4.333(45), 4.225(35), 2.697(60), 2.654(31)

IMA No. **2007-058**
Altebürg, Otting and Seelbronn in and around the Ries Crater in Bavaria, Germany
Ahmed El Goresy
TiO_2
Baddeleyite group
Monoclinic: $P2_1/c$
a 4.606, *b* 4.986, *c* 4.933 Å, β 99.17°

2.929(100), 2.626(91), 2.494(24), 2.437(42), 2.017(40), 1.742(40), 1.686(42), 1.54(31)

IMA No. **2007-059**
Talnakh deposit, Noril'sk-Talnakh camp, Taimyr Autonomous District, Siberia, Russia
Anna Vymazalová
$Pd_3Pb_2Te_2$
Shandite group
Orthorhombic: *Pmmn*; structure determined
a 8.599, *b* 5.9381, *c* 6.3173 Å
6.3152(34), 3.1572(33), 3.0495(100), 2.5456(63), 2.4424(34), 2.2786(42), 2.1637(71), 1.8906(42)

IMA No. **2007-060**
Ratti quarry, Baveno, Verbania, Piemonte region, Italy
Fabrizio Nestola
$(Ce,Ln,Ca)_9(Al,Fe^{3+})(SiO4)_3[SiO_3(OH)]_4(OH)_3$
Cerite group
Trigonal: *R*3*c*; structure determined.
a 10.581, *c* 37.932 Å
3.405(27), 3.250(26), 2.914(100), 2.647(58), 2.198(40), 1.923(34), 1.750(46), 1.732(34)

IMA No. **2007-061**
Mono Lake, California, USA
Hexiong Yang
$KNaMg_2(PO_4)_2{\cdot}14H_2O$
Struvite group
Orthorhombic: *Pmnb*; structure determined
a 6.9349, *b* 25.1737, *c* 11.2189 Å
4.302(100), 4.184(22), 3.262(20), 2.803(32), 2.786(43), 2.767(51), 2.742(48), 2.670(51)

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Strongest lines in the X-ray powder-diffraction pattern

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2007 PROPOSALS

IMA No. **2007-001**
A quarry, 10 km SSW of the township of Lake Boga, north-western Victoria, Australia
Stuart J. Mills
$CaNaFe_2H(UO_2)_2(PO_4)_4(OH)_2(H_2O)_8$
Uranyl phosphate
Monoclinic: *Cc*; structure determined
a 19.6441, *b* 7.0958, *c* 18.7029 Å, β 115.692˚
6.60(10), 4.07(2), 3.80(2), 3.56(2), 3.31(2), 3.16(4), 2.797(2), 2.002(2)

IMA No. **2007-002**
Dovyren massif, Siberia, Russia
Evgeny V. Galuskin
$Ca_6ZrSi_4O_{14}(OH)_4$
New structure
Orthorhombic: *Pnnm*; structure determined
A 5.666, *B* 18.844, *C* 3.728 Å

5.4260(63), 3.1406(39), 3.0727(100), 2.7468(36), 2.5979(25), 1.8786(26), 1.8640(33), 1.6848(26)

IMA No. **2007-003**
Chende Region, China
Zuxiang Yu
$CuPtBiS_3$
Lapieite group
Orthorhombic: $P2_12_12_1$; structure determined
a 7.7152, *b* 12.838, *c* 4.9248 Å
6.40(30), 5.93(20), 3.24(80), 3.03(100), 2.27(40), 2.14(50), 1.865(60), 1.423(30)

IMA No. **2007-004**
Grandview mine, Grand Canyon National Park, Coconino County, Arizona, USA
Peter A. Williams
$Cu_3Al_9(SO_4)_2(OH)_{29}$
Monoclinic: *P*2, *Pm* or *P*2/*m*
a 10.908, *b* 6.393, *c* 10.118 Å, β 107.47˚
9.667(33), 6.208(100), 5.287(35), 3.949(79), 3.625(10), 2.990(9), 2.816(14), 2.413(9)

IMA No. **2007-005**
Vanadium Queen mine, 18 km east of La Sal, San Juan County, Utah, USA
John M. Hughes
$Na_2Mg_2(V_{10}O_{28})\cdot 20H_2O$
Pascoite-sherwoordite group
Monoclinic: *C*2/*c*; structure determined
a 23.9019, *b* 10.9993, *c* 17.0504 Å, β 118.284˚
9.72(100), 9.09(60), 8.19(60), 7.42(70), 6.67(80), 2.882(50), 2.706(50), 1.861(50)

IMA No. **2007-006**
San Piero in Campo, Elba, Italy
Rainer Thomas
$Rb[B_5O_6(OH)_4]\cdot 2H_2O$
Neso-pentaborate
Orthorhombic: *Aba*2
a 11.304, *b* 10.963, *c* 9.337 Å
3.554(100), 5.481(85), 3.391(63), 2.826(47), 6.018(38), 3.329(38), 2.894(28), 3.259(26)

IMA No. **2007-007**
San Piero in Campo, Elba, Italy
Rainer Thomas
$Cs[B_5O_6(OH)_4]\cdot 2H_2O$
Neso-pentaborate
Monoclinic: *C*2/*c*
a 8.130, *b* 12.045, *c* 11.792 Å, β 93.34˚
6.023(100), 3/365(68), 2.943(55), 3.278(49), 3.467(44), 3.464(44), 5.886(43), 3.321(34)

IMA No. **2007-008**
Koashva apatite quarry, Khibina alkaline massif, Kola Peninsula, Russia
Alexander P. Khomyakov

$Na_{12}(K,Sr,Ce)_3Ca_6Mn_3Zr_3NbSi_{25}O_{73}(O,H_2O,OH)_5$
Eudialyte group
Trigonal: *R*3*m*; structure determined
a 14.281, *c* 30.243 Å
6.447(60), 5.719(40), 4.322(71), 3.540(38), 3.222(70), 3.170(50), 2.982(100), 2.860(94)

IMA No. **2007-009**
Monte Trisa, Torrebelvicino, Vicenza, Italy
Paolo Orlandi
$Cu_6(SO_4)(OH)_{10}\cdot H_2O$
Dimorphous with redgillite
Orthorhombic: $Cmc2_1$; structure determined
a 2.989, *b* 16.970, *c* 14.812 Å
7.45(100), 3.73(35), 2.788(18), 2.654(8), 2.503(14), 2.341(9), 2.166(9), 1.598(20)

IMA No. **2007-010**
Zarshuran deposit, Takab region, NW Iran
Werner H. Paar
$PbHgAs_2S_6$
Sulphosalt
Monoclinic: *P* lattice
a 19.113, *b* 4.233, *c* 22.958 Å, β 114.78˚
8.672(80), 5.680(30), 4.653(50), 3.867(40), 3.395(50), 3.148(40), 2.722(100), 2.187(50)

IMA No. **2007-011**
Venables Valley, 20 km SSW of Ashcroft, British Columbia, Canada
Ronald C. Peterson and Elif Genceli
$MgSO_4\cdot 11H_2O$
Triclinic: $P\bar{1}$; structure determined
a 6.7459, *b* 6.8173, *c* 17.2799 Å, α 88.137, β 89.481, γ 62.719˚
5.73(35), 5.62(56), 5.41(54), 4.91(84), 4.85(90), 2.988(58) 2.958(100), 2.940(67)

IMA No. **2007-012**
Kato mine, Munakata City, Fukuoka Prefecture, Japan
Satoshi Matsubara
$Pb_2Cu_2(Se^{4+}O_3)(SO_4)(OH)_4$
Linarite-chenite group
Monoclinic: $P2_1/m$
a 9.766, *b* 5.666, *c* 9.291(10) Å, β 102.40˚
4.86(44), 4.47(57), 3.53(39), 3.18(100), 3.14(68), 2.72(22), 2.33(18), 1.813(19)

IMA No. **2007-013**
Mina Santa Rosa, Iquique, Northern Chile
Jochen Schlüter
CuB_2O_4
Natural analogue of copper metaborate
Tetragonal: $I\bar{4}2d$; structure determined
a 11.517, *c* 5.632 Å
3.797(100), 3.638(47), 2.876(17), 2.775(35), 2.572(26), 2.501(26), 1.822(21), 1.793(20)

IMA No. **2007-014**
Verkhn'echegemskiy volcanic structure, Kabardino-Balkaria, North Caucasus, Russia
Evgeny V. Galuskin
$CaZrO_3$
Perovskite group
Orthorhombic: *Pnma*; structure determined
a 5.65, *b* 7.93, *c* 5.55 Å
4.013(35), 4.009(16), 2.881(25), 2.836(100), 2.796(22), 2.006(29), 1.654(17), 1.622(24)

IMA No. **2007-015**
Sierra de los Filabres, Almería, SE Spain
Roberta Oberti
$K(CaNa)(Fe^{2+}{}_3Al_2)(Si_6Al_2)O_{22}(OH)_2$
Amphibole group
Monoclinic: *C*2/*m*; structure determined
a 9.8505, *b* 18.0075, *c* 5.3518 Å, β 104.775°
8.420(100), 3.400(38), 3.127(53), 2.714(75), 2.596(49), 2.565(60), 2.340(32), 2.166(34)

IMA No. **2007-016**
Tip Top mine, Custer County, South Dakota, USA
Anthony R. Kampf
$NaFe^{3+}Mg_2Fe^{3+}{}_2(PO_4)_4(OH)_2{\cdot}8H_2O$
Whiteite-jahnsite group
Monoclinic: *P*2/*a*
a 15.0811, *b* 7.1403, *c* 9.8299 Å, β 110.445°
9.218(100), 4.884(25), 3.537(25), 2.973(25), 2.854(20), 2.819(70), 2.593(25), 1933(20)

IMA No. **2007-017**
Vesle Arøy island, Langesundsfjord district, Larvik community, Vestfold county, Norway
Alf Olav Larsen
$KNa_6Be_2(Si_{15}Al_3)_{\Sigma=18}O_{39}F_2$
Leifite group
Trigonal: $P\bar{3}m1$; structure determined
a 14.3865, *c* 4.8733 Å
4.710(29), 4.153(21), 3.386(70), 3.161(100), 3.115(17), 2.466(31), 2.398(19), 2.217(20)

IMA No. **2007-019**
Matsumaezawa pit, Tanohata mine, Tanohata Village, Iwate Prefecture, Japan
Hidemichi Hori
$LiMn_2Si_3O_8(OH)$
Wollastonite group
Triclinic: $P\bar{1}$
a 7.612, *b* 7.038, *c* 6.700 Å, α 90.23, β 94.70, γ 105.26°
6.640(35), 3.666(26), 3.134(89), 3.109(69), 2.946(100), 2.814(33), 2.581(22), 2.182(40)

IMA No. **2007-020**
Bambolla mine, Moctezuma, Sonora, Mexico
Joël Brugger
$Ca_2Mn^{4+}{}_2Te^{6+}{}_2O_{12}{\cdot}H_2O$
Tellurate

Monoclinic: *P*2, *P*2/*m*, *Pm*, $P2_1$ or $P2_1/m$
a 10.757, *b* 4.928, *c* 8.492 Å, β 102.39˚
4.924(34), 4.361(51), 3.267(100), 2.520(71), 2.244(32), 1.996(21), 1.762(39), 1.455(24)

IMA No. **2007-021**
Mount Stafford, Northern Territory, Australia
Edward S. Grew
$Al_{4.5}SiB_{0.5}O_{9.5}$
Structurally related to mullite
Orthorhombic: $Cmc2_1$; structure determined
a 5.7168, *b* 15.023, *c* 7.675 Å
5.37(50), 3.38(100), 2.67(60), 2.51(60), 2.19(80), 2.11(50), 1.682(30), 1.512(80)

IMA No. **2007-022**
La Fossa crater, Vulcano, Aeolian Islands, Italy
Francesco Demartin
BiSBr
New structure type
Orthorhombic: *Pnam*; structure determined
a 8.0424, *b* 9.8511, *c* 4.0328 Å
4.220(68), 3.740(62), 3.721(44), 2.909(100), 2.429(43), 2.036(47), 1.865(63), 1.774(88)

IMA No. **2007-023**
Mt. Alluaiv, Lovozero alkaline massif, Kola Peninsula, Russia
Alexander P. Khomyakov
$Na_{15}(Na,Ca,Ce)_3(Mn,Ca)_3Fe_3Zr_3Si_{26}O_{72}(OH,O)_4Cl \cdot H_2O$
Eudialyte group
Trigonal: *R*3; structure determined
a 14.205, *c* 30.265 Å
4.316(85), 3.536(41), 3.221(43), 3.166(37), 3.039(41), 2.970(100), 2.848(84), 2.157(34)

IMA No. **2007-024**
Silver Coin mine, Valmy, Iron Point district, Humboldt County, Nevada, USA
Anthony R. Kampf
$[Na(H_2O)_{2.5}][Fe^{3+}_8(PO_4)_6(OH)_7(H_2O)_4]$
Meurigite group
Monoclinic: *C*2/*c*
a 28.835, *b* 5.1848, *c* 19.484 Å, β 106.983˚
13.80(20), 9.349(100), 4.843(20), 4.318(20), 3.206(40), 3.107(30), 2.971(15), 1.574(20)

IMA No. **2007-025**
Blue Cap mine, about 15 km east of La Sal, San Juan Co., Utah, USA
Anthony R. Kampf
$Ca_2Mg[V_{10}O_{28}]\cdot 16H_2O$
Pascoite group
Monoclinic: *C*2/*m*; structure determined
a 19.8442, *b* 9.9353, *c* 10.7149 Å, β 120.305˚
9.242(20), 8.872(30), 8.571(100), 7.270(40), 5.477(15), 4.590(15), 4.355(15), 2.137(20)

IMA No. **2007-026**

Blue Cap mine, about 15 km east of La Sal, San Juan Co., Utah, USA
Anthony R. Kampf
$Zn_3V_2O_7(OH)_2 \cdot 2H_2O$
Zn-dominant analogue of volborthite
Hexagonal: $P\bar{3}m1$; structure determined
a 6.0818, *c* 7.1793 Å
7.211(100), 4.252(20), 2.968(50), 2.628(35), 2.470(40), 1.773(20), 1.513(20), 1.485(25)

IMA No. **2007-027**
Allende meteorite, Pueblito de Allende, Chihuahua, Mexico
Chi Ma
$Sc_4Zr_3O_{12}$
New structure type
Trigonal: $R\bar{3}$; structure determined
a 9.396, *c* 8.720 Å
4.698(5), 2.900(100), 2.513(18), 1.779(27), 1.776(32), 1.515(19), 1.450(4), 1.152(4)

IMA No. **2007-028**
Tsumeb, Namibia
Marcus J. Origlieri
$AsSbO_3$
Claudetite group
Monoclinic: $P2_1/n$; structure determined
a 4.5757, *b* 13.1288, *c* 5.4216 Å, β 95.039°
4.99(32), 3.51(100), 3.282(82), 3.238(71), 2.805(39), 2.801(31), 2.656(28), 2.279(34)

IMA No. **2007-029**
Allende meteorite, Pueblito de Allende, Chihuahua, Mexico
Chi Ma
(Mo,Ru,Fe,Ir,Os)
Hexagonal: *P*63/*mmc*
a 2.7506, *c* 4.4318 Å
2.382(24), 2.216(26), 2.098(100), 1.622(15), 1.375(17), 1.255(18), 1.169(20), 1.150(14)

IMA No. **2007-030**
La Fossa crater, Vulcano, Aeolian Islands, Italy
Francesco Demartin
$K_2[AlF_3|SO_4]$
Orthorhombic: *Pbcn*; structure determined
a 10.810, *b* 8.336, *c* 6.822 Å
6.631(70), 5.429(14), 3.317(28), 2.983(100), 2.702(82), 2.648(14), 2.208(30), 1.712(58)

IMA No. **2007-031**
Mount Kukisvumchorr, Khibina alkaline massif, Kola Peninsula, Russia
Alexander P. Khomyakov
$K_3Na_3Ca_5Si_{12}O_{30}F_4 \cdot H_2O$
Canasite group
Monoclinic: *Cm*; structure determined
a 18.846, *b* 7.242, *c* 12.650(2) Å, β 111.84°
5.872(31), 4.724(20), 4.711(25), 4.204(40), 3.012(22), 2.915(100), 2.357(30), 2.310(23)

IMA No. **2007-032**
Poudrette quarry, Mont Saint-Hilaire, Rouville County, Québec, Canada
Igor V. Pekov
$NaBe(CO_3)(OH)\cdot 2H_2O$
New structure type
Tetragonal: *P*4/*mcc*; structure determined
a 13.087, *c* 5.404 Å
13.01(100), 9.20(62), 3.611(34), 3.256(95), 2.693(44), 2.605(37), 2.489(60), 2.076(32)

IMA No. **2007-033**
Allende meteorite, Pueblito de Allende, Chihuahua, Mexico
Chi Ma
MoNiP
Barringerite group
Hexagonal: $P\bar{6}2m$
a 5.681, *c* 3.704 Å
2.298(100), 2.094(69), 1.918(73), 1.852(24), 1.408(20), 1.332(17), 1.316(18), 1.111(14)

IMA No. **2007-034**
Luobusa mine, Qusong County, Tibet, China
Fang Qinsong
WC
Hexagonal: $P\bar{6}m2$
a 2.902, *c* 2.831 Å
2.833(44), 2.511(94), 1.878(90), 1.449(25), 1.291(36), 1.233(22), 1.149(23), 0.9008(23)

IMA No. **2007-035**
Luobusa mine, Qusong County, Tibet, China
Shi Nicheng
$(Cr_4Fe_4Ni)_{\Sigma 9}C_4$
Hexagonal: $P6_3mc$; structure determined
a 18.839, *c* 4.4960 Å
6.920(100), 4.530(35), 3.596(55), 2.493(36), 2.023(98), 1.998(32), 1.825(47), 1.798(45)

IMA No. **2007-036**
Luobusa mine, Qusong County, Tibet, China
Li Guowu
$TiFeSi_2$
Orthorhombic: *Pbam*; structure determined
a 8.6053, *b* 9.5211, *c* 7.6436 Å
3.822(35), 2.294(18), 2.230(97), 2.124(100), 2.098(43), 1.911(44), 1.829(19), 1.292(19)

IMA No. **2007-037**
Horoman, Samani-cho, Samani-gun, Hokkaido, Japan
Arashi Kitakaze
$Fe_6Ni_3S_8$
Tetragonal: *P*4/*mmm*
a 8.707, *c* 10.439 Å
6.160(10), 3.080(100), 2.955(32), 2.435(6), 1.984(25), 1.947(51), 1.825(60), 1.805(54)

IMA No. **2007-038**
Horoman, Samani-cho, Samani-gun, Hokkaido, Japan
Arashi Kitakaze
$Cu_2Fe_5Ni_2S_8$
Tetragonal: $P4_2/mmm$
a 10.089, *c* 10.402 Å
5.880(15), 3.118(100), 3.050(20), 2.703(5), 1.981(5), 1.873(25), 1.844(50), 1.595(45)

IMA No. **2007-039**
Poudrette quarry, Mont Saint-Hilaire, Rouville County, Quebec, Canada.
Joel D. Grice
$(Ce,REE)_3(Na,H_2O)_6MnSi_9Be_5(O,OH)_{30}F_4$
Monoclinic: $C2/c$; structure determined
a 11.654, *b* 13.916, *c* 16.583 Å, β 95.86°
8.120(100), 3.543(39), 3.454(21), 3.176(19), 2.959(24), 2.863(48), 2.749(23), 2.668(33)

IMA No. **2007-040**
Fuengirola, Málaga Province, Spain
María Dolores Ruiz Cruz
$(NH_4)Fe_3(Si_3Al)O_{10}(OH)_2$
Mica group
Monoclinic: $C2/m$?
a 5.296, *b* 9.199, *c* 10.412(6) Å, β 99.991°
10.242(83), 3.422(46), 3.170(33), 2.290(16), 2.011(16), 2.007(18), 1.544(23), 1.524(15)

IMA No. **2007-041**
Koashva Mountain, Khibiny Massif, Kola Peninsula, Russia
Victor N. Yakovenchuk
Polytype *C*
$Na_2[Ti_4O_2(OH)_2(SiO_4)_3]\cdot 6H_2O$
Cubic: $P\bar{4}3m$
a 7.856 Å
7.88(100), 4.53(30), 3.20(80), 2.774(30), 2.622(40), 2.478(40), 1.96(30), 1.843(30)
Polytype *T*
$Na_3[Ti_4(OH)O_3(SiO_4)_3]\cdot 7H_2O$
Trigonal: $R3m$
a 10.94, *c* 13.97 Å
7.88(100), 3.277(60), 3.175(80), 2.730(50), 2.607(70), 2.471(50), 1.960(60), 1.916(50)

IMA No. **2007-042**
Koashva Mountain, Khibiny Massif, Kola Peninsula, Russia
Victor N. Yakovenchuk
$K_2[Ti_4(OH)_2O_2(SiO_4)_3]\cdot 9H_2O$
Cubic: $P\bar{4}3m$
a 7.808 Å
7.85(100), 3.91(20), 3.201(80), 2.765(20), 2.602(30), 2.471(40), 1.951(30), 1.839(30)

IMA No. **2007-043**
Koashva Mountain, Khibiny Massif, Kola Peninsula, Russia

Victor N. Yakovenchuk
$Cu[Ti_4(OH)_2O_2(SiO_4)_3]\cdot 7H_2O$
Cubic: $P\bar{4}3m$
a 7.850 Å
7.87(100), 3.94(20), 3.205(80), 2.774(20), 2.616(30), 2.481(30), 1.960(30), 1.843(30)

IMA No. **2007-044**
Biachella Valley, Sacrofano municipality, Rome province, Latium region, Italy
Nikita V. Chukanov
$(Na,Ca,K)_8(Si_6Al_6O_{24})(SO_4)_2(OH)_{0.5}\cdot H_2O$
Cancrinite group
Trigonal: *P*3; structure determined
a 12.913, *c* 79.605 Å
11.07(19), 6.45(18), 4.782(15), 3.720(100), 3.576(18), 3.469(14), 3.300(47), 3.220(16)

IMA No. **2007-045**
Colima volcano, Colima State, México
Mikhail Ostrooumov
K_3VS_4
Orthorhombic: *Pnma*
a 9.138, *b* 10.627, *c* 9.131 Å
3.464(77), 3.237(57), 3.229(66), 2.926(70), 2.890(52), 2.799(100), 2.787(75), 2.676(80)

IMA No. **2007-046**
Sarbai Mine, Turgai region, Kazakhstan
Luca Bindi
$[Cu_6As_2S_7][Ag_9CuS_4]$
Pearceite-polybasite group
Trigonal: $P\bar{3}m1$; structure determined
a 7.3218, *c* 11.8877 Å
11.89(54), 3.063(38), 2.972(100), 2.797(44), 2.476(45), 2.349(45), 2.168(42), 1.831(50)

IMA No. **2007-047**
Mina Asunción, Sierra Gorda, Caracoles District, Antofagasta Province, Chile
Joël Brugger
$Pb_2[B_5O_9]Cl\cdot 0.5H_2O$
Hilgardite group
Orthorhombic: *Pnn*2; structure determined
a 11.3757, *b* 11.5051, *c* 6.5568 Å
5.71(80), 4.04(100), 3.29(40), 3.16(30), 2.84(100), 2.55(40), 2.019(70), 1.877(40)

IMA No. **2007-049**
Kumdy Kol, Kokchetav, Northern Kazakhstan
Shyh-Lung Hwang
$NaAlSi_3O_8$
Feldspar group
Orthorhombic: *P*2*nn* or *Pmnn*
a 8.24, *b* 8.68, *c* 4.84 Å
5.97, 4.33, 4.21, 4.18, 4.12, 3.76, 3.23, 3.02, 2.95, 2.74

IMA No. **2007-050**
Santa Rosa mine, Sijes, Salta province, Argentina
Frank C. Hawthorne
$Ca_4(H_2O)_4\ [B_4O_4(OH)_6]_4\ \{H_2O\}_{15}$
New structure type
Orthorhombic: *Pca*2_1; structure determined
a 12.161, *b* 40.477, *c* 10.1843 Å
10.501(10), 9.992(5), 5.226(7), 4.623(6), 3.837(7), 3.118(7), 2.612(6), 2.538(6)

IMA No. **2007-051**
Eldfell, Heimaey island, Vestmannaeyjar archipelago, Iceland
Tonči Balić-Žunić
$NaFe(SO_4)_2$
Yavapaiite group
Monoclinic: *C*2/*m*
a 8.022, *b* 5.135, *c* 7.123 Å, β 92.15º
3.72(76), 3.64(54), 3.43(54), 2.77(100), 2.72(57), 2.57(31), 2.370(63), 1.650(32)

IMA No. **2007-052**
Mt. Vasin-Myl'k, Voron'i Tundry, Kola Peninsula, Russia
Igor V. Pekov
$Rb(LiAl_{1.5}\square_{0.5})(Al_{0.5}Si_{3.5})O_{10}F_2$
Mica group
Monoclinic: *C*2/*c*
a 5.191, *b* 9.025, *c* 20.40 Å, β 95.37˚
10.1(60), 5.08(40), 4.55(80), 3.98(40), 3.49(50), 3.35(60), 2.575(100), 2.017(50)

IMA No. **2007-053**
Kabutoichiba, Kameyama, Mie Prefecture, Japan
Yasuyuki Banno
$KCa_2(Fe^{2+}{}_4Al)Si_6Al_2O_{22}(OH)_2$
Amphibole group
Monoclinic: *C*2/*m*; structure determined
a 9.937, *b* 18.108, *c* 5.335 Å, β 105.30˚
8.48(81), 3.40(51), 3.15(46), 2.72(100), 2.61(59), 2.57(43), 2.36(37), 2.17(39)

IMA No. **2007-054**
Klöch, north of Bad Radkersburg, Eastern Styria, Austria
Hans-Peter Bojar
$(\square_1Na_1)KFe_2Zn_3[Si_{12}O_{30}]$
Milarite group
Hexagonal: *P*6/*mcc*; structure determined
a 10.120, *c* 14.298 Å
7.149(100), 5.540(43), 4.130(40), 3.736(70), 3.227(67), 2.920(40), 2.770(68), 2.530(43)

IMA No. **2007-055**
Keeley mine, South Lorrain Township, Timiskaming District, Ontario, Canada
Frank C. Hawthorne
$Co(H_2O)_2[AsO_3(OH)]\{H_2O\}_{0.5}$
New structure type

Monoclinic: $P2_1/n$; structure determined
a 4.7058, *b* 9.299, *c* 12.738 Å, β 98.933˚
7.446(100), 6.267(44),3.725(29), 3.260(25), 3.089(20), 2.998(31), 2.970(21), 2.596(23)

IMA No. **2007-056**
Suizhou L6 chondrite: Dayanpo, Suizhou County, Hubei Province, China
Ming Chen
$FeCr_2O_4$
Spinel group
Orthorhombic: *Bbmm*
a 9.462, *b* 9.562, *c* 2.916 Å
2.650(100), 2.389(20), 2.089(10), 1.953(90), 1.566(60), 1.439(15), 1.425(15), 1.337(40)

IMA No. **2007-057**
Granite quarry 10 km SSW of the township of Lake Boga, northwestern Victoria, Australia
Stuart J. Mills
$CuFe^{3+}_2(PO_4)_2(OH)_2{\cdot}4H_2O$
Whitmoreite group
Monoclinic: $P2_1/c$
a 9.863, *b* 9.661, *c* 5.476 Å, β 92.45˚
9.849(100), 6.892(80), 4.924(80), 4.386(90), 4.333(45), 4.225(35), 2.697(60), 2.654(31)

IMA No. **2007-058**
Altebürg, Otting and Seelbronn in and around the Ries Crater in Bavaria, Germany
Ahmed El Goresy
TiO_2
Baddeleyite group
Monoclinic: $P2_1/c$
a 4.606, *b* 4.986, *c* 4.933 Å, β 99.17˚
2.929(100), 2.626(91), 2.494(24), 2.437(42), 2.017(40), 1.742(40), 1.686(42), 1.54(31)

IMA No. **2007-059**
Talnakh deposit, Noril'sk-Talnakh camp, Taimyr Autonomous District, Siberia, Russia
Anna Vymazalová
$Pd_3Pb_2Te_2$
Shandite group
Orthorhombic: *Pmmn*; structure determined
a 8.599, *b* 5.9381, *c* 6.3173 Å
6.3152(34), 3.1572(33), 3.0495(100), 2.5456(63), 2.4424(34), 2.2786(42), 2.1637(71), 1.8906(42)

IMA No. **2007-060**
Ratti quarry, Baveno, Verbania, Piemonte region, Italy
Fabrizio Nestola
$(Ce,Ln,Ca)_9(Al,Fe^{3+})(SiO4)_3[SiO_3(OH)]_4(OH)_3$
Cerite group
Trigonal: $R3c$; structure determined.
a 10.581, *c* 37.932 Å
3.405(27), 3.250(26), 2.914(100), 2.647(58), 2.198(40), 1.923(34), 1.750(46), 1.732(34)

IMA No. **2007-061**
Mono Lake, California, USA
Hexiong Yang
$KNaMg_2(PO_4)_2 \cdot 14H_2O$
Struvite group
Orthorhombic: *Pmnb*; structure determined
a 6.9349, *b* 25.1737, *c* 11.2189 Å
4.302(100), 4.184(22), 3.262(20), 2.803(32), 2.786(43), 2.767(51), 2.742(48), 2.670(51)

OLDER PROPOSALS

IMA No. **2006-019a**
Cassagna mine, Val Graveglia, eastern Liguria, northern Apennines, Italy
Riccardo Basso
$(Ca,Mn^{2+})_4(Fe^{3+},Mn^{3+},Al)_4(OH)_4(V^{3+},Mg,Al)_2(O,OH)_4(Si_3O_{10})(SiO_4)_2$
Orthorhombic: *Cmcm*; structure determined
a 6.066, *b* 8.908, *c* 18.995 Å
9.52(100), 4.98(45), 4.85(50), 4.03(40), 3.02(60), 2.66(70), 2.54(60), 2.32(40)

IMA No. **98-053a**
Bendada near Guarda, province Beira Alta, central Portugal
Uwe Kolitsch
$Fe^{2+}Fe^{3+}{}_2(AsO_4)_2(OH)_2 \cdot 4H_2O$
Whitmoreite group
Monoclinic: $P2_1/c$; structure determined
a 10.239, *b* 9.713, *c* 5.552 Å, β 94.11˚
10.22(10), 7.036(8), 4.833(3), 4.520(2), 4.250(5), 3.490(2), 2.907(3), 2.865(4)

IMA No. **2002-045b**
Menzenschwand, Southern Black Forest, Baden-Württemberg, Germany
Kurt Walenta and Frédéric Hatert
$(K,U,\square)(UO_2)_3(AsO_4)(OH)_4 \cdot H_2O$
New structure type
Orthorhombic: *Cccm*; structure determind
a 8.154, *b* 11.55, *c* 13.75 Å
6.71(80), 6.03(100), 3.78(70), 3.33(80), 2.96(60), 2.88(40), 2.63(50), 1.942(50).

IMA No. **2006-051**
Dolores prospect, Pastrana, Murcia Province, Spain
John L. Jambor
$(Ca,Cu,Na,Fe^{3+},Al)_{12}Al_2(AsO_4)_8(OH,Cl)_x \cdot nH_2O$
Smolianinovite group (?)
Monoclinic: *P*2/*a* or *Pa*
a 9.972, *b* 22.44, *c* 5.272(8) Å, β 92.9˚
22.0(100), 11.16(70), 4.983(50), 3.655(25), 3.333(45), 3.003(30), 2.767(30)

IMA No. **89-035a**
Glücksstern mine, Gottlob Hill, Friedrichroda, Thüringen, Germany
Thomas Witzke
$LaVO_4$

Xenotime group
Tetragonal: $I4_1/amd$; structure determined
a 7.406, *c* 6.504 Å
3.707(100), 2.939(5), 2.759(10), 2.623(7), 2.309(5), 2.088(5), 1.902(4), 1.853(19)

WITHDRAWAL OF AN APPROVED MINERAL

Proposal 2005-012 was approved (mineral and name) in June 2005. The authors have recently submitted additional data on this phase which show that it is merely a monoclinic polytype of mackelveyite-(Y), namely mackelveyite-(Y)-2*M*. The approval for this proposal is thus withdrawn.

CHANGES IN EXISTING NOMENCLATURE

IMA No. **07-A**
The mineral surkhobite and its name are revalidated. Surkhobite is redefined as $(Ba,K)_2CaNa(Mn,Fe^{2+},Fe^{3+})_8Ti_4(Si_2O_7)_4O_4(F,OH,O)_6$, it differs from jinshajiangite because Mn prevails over Fe^{2+}, and it differs from perraultite because Ca dominates in the A(6) site. Decision IMA No. **06-E** [Species and name surkhobite (IMA 2002-037) have been discredited because the species corresponds to jinshajiangite (IMA 81-061)] is thus nullified.

Meurigite
The approval of IMA No. 2007-024 necessitates a name change for meurigite (IMA No. 95-022) into meurigite-K.

Ardennite
The approval of IMA No. 2005-037 for ardennite-(V) and its publication in Eur. J. Mineral., 19 (2007), 581-587 necessitates a name change for ardennite into ardennite-(As).

IMA No. **07-B**
The mineral calcio-olivine is redefined as the calcium-dominant member of the olivine group. Calcio-olivine is the natural equivalent of synthetic γ-Ca_2SiO_4, not of synthetic α-Ca_2SiO_4 as erroneously reported in literature. Calcio-olivine is a polymorph of larnite, monoclinic β-Ca_2SiO_4.

IMA No. **07-C**
Several decisions have been taken on the nomenclature of a number of mineral names:
The authors of new-mineral proposals should use a suffix nomenclature rather than a prefix nomenclature. Some minerals in well-known groups are to be renamed.
Mineral names consisting of two words are to be renamed.
Mineral names having superfluous hyphens are to be renamed (with the exception of the current amphibole names, for which a subcommittee is discussing a new nomenclature).
Minerals named after localities or persons should have the original spelling in their name, including the diacritical marks. A list of such names is to be published.
Mineral names having superfluous diacritical marks (marks not present in the original names of localities or persons) are to be renamed.

Lists of mineral names to be changed by these decisions have been published by the chairman in *Mineralogical Record*, 39 (2008), 131-135. The paper is available on the CNMNC website.

PUBLICATION OF IMA-CNMNC REPORT

The report of the Subcommittee for Unnamed Minerals on a system of codification for unnamed minerals has been published by Dorian G.W. Smith and Ernest H. Nickel in Canadian Mineralogist, 45 (2007), 983-1055. The paper contains a complete list of unnamed minerals. Paper and lists are available on the CNMNC website.

NEW MINERALS APPROVED IN 2008
NOMENCLATURE MODIFICATIONS APPROVED IN 2008
BY THE
COMMISSION ON NEW MINERALS, NOMENCLATURE AND CLASSIFICATION
INTERNATIONAL MINERALOGICAL ASSOCIATION

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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 number
Type locality
Corresponding author
Chemical formula
Relationship to other minerals
Crystal system, Space group; Structure determined, yes or no
Unit-cell parameters
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

PROPOSALS APPROVED IN APRIL 2008

IMA No. **2008-001**
Khibinpakhchorr Mt., Khibiny massif, Kola Peninsula, Russia.
Yulya V. Azarova
$(K,Na,Sr,Ba)_4Ca_2(Ti,Nb)_8[Si_4O_{12}]_4(OH,O)_8 \cdot 12H_2O$
Labuntsovite group
Monoclinic: *C*2/*m*; structure determined
a 14.529, *b* 14.203, *c* 7.899 Å, β 117.37˚
7.08(70), 3.25(100), 3.11(70), 2.61(50), 2.49(70), 1.712(70), 1.577(70), 1,444(70)

IMA No. **2008-003**
Dronino village, Kasimov District, Ryazan' Oblast, 350 km south-east of Moscow, Russia
Nikita V. Chukanov
$Ni_3Fe^{3+}Cl(OH)_8 \cdot 2H_2O$
Hydrotalcite group
Trigonal: $R\bar{3}m$, $R3m$ or $R32$
a 6.206, *c* 46.184 Å

7.76(100), 3.88(40), 2.64(25), 2.32(20), 1.965(15), 1.546(10), 1.536(10), 1.337(10)

IMA No. **2008-004**
Premier Mine, Stewart, British Columbia, Canada
Luca Bindi
$[Cu_6Sb_2S_7][Ag_9CuS_4]$
Pearceite-polybasite group
Trigonal: $P\bar{3}m1$; structure determined
a 7.341, *c* 11.805 Å
11.81(44), 3.069(44), 2.951(100), 2.799(52), 2.473(43), 2.355(40), 2.163(43), 1.835(46)

CHANGES IN EXISTING NOMENCLATURE

07-E
The mineral hastite, orthorhombic $CoSe_2$ (marcasite group), is discredited. The type material has been shown to be consist of ferroselite, $FeSe_2$.

STATUS OF OLGITE and BARIO-OLGITE

E.A.J. Burke, chairman IMA-CNMNC

It is stated, in several media, that bario-olgite, approved by the IMA-CNMMN as 2003-002 and published by Pekov *et al.* (2004), has been discredited, or should be discredited as a valid mineral. These opinions are based on the conclusion by Sokolova *et al.* (2005) that "bario-olgite is not distinct from olgite, the former should be considered for discreditation". This consideration became reality when Sokolova and Hawthorne submitted in 2005, on invitation of the IMA-CNMMN, an official proposal to discredit bario-olgite. In the period from January to May 2006, this proposal was intensely discussed, guided by Giovanni Ferraris as vice-chairman of the CNMMN, between its authors, the authors of bario-olgite and the members of the CNMMN.

The history of olgite and bario-olgite is as follows:

1. Until 2004, olgite was considered in all mineralogical reference books to be a strontium mineral, due to the formula given in the original description by Khomyakov *et al.* (1980), $Na(Sr,Ba)PO_4$, and to the composition of the *M*1 structural site as obtained by Sokolova *et al.* (1984), $(Sr_{0.52}Ba_{0.48})$, on type material from Mt. Karnasurt, Lovozero massif, Kola Peninsula, Russia.
2. Sokolova *et al.* (1990) published data on 'olgite II' and 'olgite III' (the original olgite being 'olgite I'), two specimens from Mt. Alluaiv in the Lovozero massif having Ba as dominant constituent on the *M*1 site. This paper failed to give a clear definition of olgite, no nomenclatural distinction was made between the 1984 olgite (Sr-dominant *M*1) and the 1990 olgite (Ba-dominant *M*1).
3. Pekov *et al*. started in 2002 a study on 'olgite' specimens from several pegmatites and hydrothermal veins at Mt. Kedykverpakhk in the Lovozero massif. The results indicated that 'olgite' consists of two mineral species, with either Sr or Ba dominant on the *M*1 site. Because olgite was traditionally interpreted as a strontium mineral, Pekov *et al.* (2004) published their material with a Ba-dominant *M*1 site as the new mineral bario-olgite after approval by the CNMMN in 2003. It is evident that 'olgite II' and 'olgite III' are also bario-olgite. Pekov (2005) published data of an 'olgite'

specimen from one of the veins having a Sr-dominant *M*1 composition of ($Sr_{0.57}Ba_{0.42}K_{0.01}$).

4. Sokolova *et al.* (2005) re-examined the material described previously as 'olgite I' (= the original type material) and 'olgite III'. They found that the real space group of these specimens is *P*-3*m*1, not *P*3 as published in 1984 and 1990 and also by Pekov *et al.* (2004) for bario-olgite. The change of space group has no implications for the occupancy of the *M*1 site, which is identical in both space groups. The new data obtained on the type 'olgite I' specimen, however, show that its *M*1 site has a composition ($Ba_{0.76}Sr_{0.20}K_{0.04}$). Calculation of the empirical formula from the original analysis by Khomyakov *et al.* (1980) along the same crystal-chemical principles leads to essentially the same results. No convincing explanation was offered for the strong difference with the 1984 results (with a Sr-dominant *M*1 site) on the same specimen.

Giovanni Ferraris proposed in June 2006 the following compromise to end the discussion:

1. It is evident that 're-examined olgite' and 'bario-olgite' represent the same mineral species.
2. According to the CNMMN rules, the older name (olgite) should have priority. But taking into account the work done by Pekov in 2005 showing that in the near future a 'strontio-olgite' will be described, as an exception (but that would not be the first time!) to the priority rule, the name 'olgite' is discredited and the name 'bario-olgite' is retained.
3. The samples studied by Pekov *et al.* (2004) and by Sokolova *et al.* (2005) are the cotypes of the redefined 'bario-olgite'.

It was at that time also agreed between Ferraris, Pekov, Sokolova and Hawthorne that:

1. Sokolova and Hawthorne have withdrawn their proposal to discredit bario-olgite after reading the comments of the CNMMN members.
2. In the future, 'olgite' will be used as the name of a series consisting of the species 'bario-olgite' and 'strontio-olgite' after approval of the latter as a mineral.
3. Pekov *et al.* will at some moment submit a proposal for the Mt. Kedykverpakhk 'strontio-olgite' together with an official discreditation of the old 'olgite' and a revision of the formula of 'bario-olgite'.

Conclusions in 2008:

1. The 2006 compromise and agreements are taken over by the CNMNC: bario-olgite is to be redefined, olgite is to be discredited as a mineral name and is to be used as a series name (comparable to the apatite, columbite, apophyllite, *etc.*), and 'strontio-olgite' is to be proposed as a new mineral. The authors of the latter are invited to consider renaming the minerals of the olgite series along a suffix-based nomenclature: olgite-(Ba) and olgite-(Sr). Until that time, the names bario-olgite and olgite, respectively, are to be used for these two minerals.
2. Sokolova *et al.* (2005) would have avoided a lot of confusion and discussion if they had contacted the authors of bario-olgite and/or the CNMMN before publishing their results.
3. Publication of the results of the 2006 discussion within the CNMMN is necessary to correct wrong statements in several media.

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NEW MINERALS APPROVED IN 2008
NOMENCLATURE MODIFICATIONS APPROVED IN 2008
BY THE
COMMISSION ON NEW MINERALS, NOMENCLATURE AND CLASSIFICATION
INTERNATIONAL MINERALOGICAL ASSOCIATION

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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 number
Type locality
Corresponding author
Chemical formula
Relationship to other minerals
Crystal system, Space group; Structure determined, yes or no
Unit-cell parameters
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

PROPOSALS APPROVED IN MAY 2008

IMA No. **2008-005**
La Fossa crater, Vulcano, Aeolian Islands, Italy
Italo Campostrini
$(NH_4)_2SnCl_6$
Cubic: $Fm\bar{3}m$; structure determined
a 10.064 Å
5.81(100), 5.03(73), 3.035(48), 2.516(69), 2.250(39), 1.937(23), 1.779(42), 1.701(22)

IMA No. **2008-006**
Torre Stracciacappe, Trevignano community (Rome province), Latium, Italy
Fabio Bellatreccia
$[Na_{82.5}Ca_{33}K_{16.5}]_{132}(Si_{99}Al_{99}O_{396})(SO_4)_{33}\cdot 4H_2O$
Cancrinite-sodalite group
Trigonal: $P\bar{3}$; structure determined
a 12.8742, c 87.215 Å
6.85(66), 6.39(65), 5.74(52), 3.773(60), 3.691(100), 3.587(70), 3.551(53), 2.639(73)

IMA No. **2008-007**
Tommot, Yakutia, Russia
Gunnar Raade
$(Y,REE,Ca,Na,Mn)_{15}Fe^{2+}Ca\ (P,Si)Si_6B_3(O,F)_{48}$
Vicanite group
Trigonal: *R*3*m*; structure determined
a 10.7527, *c* 27.4002 Å
4.441(36), 3.144(77), 3.028(45), 2.968(100), 2.672(30), 1.806(30), 1.782(32), 1.713(32)

IMA No. **2008-008**
Angaston, in the Mount Lofty Ranges, 100 km NNE of Adelaide, South Australia, Australia
Stuart J. Mills
$CaMgAl_2(PO_4)_2(OH)_4{\cdot}7H_2O$
Triclinic: $P\bar{1}$
a 19.819, *b* 12.858, *c* 5.468 Å, α 90.088, β 89.067, γ 91.032°

IMA No. **2008-009 (Name NOT approved)**
Kirovskii underground apatite mine, Mountain Kukisvumchorr, Khibiny alkaline complex, Kola Peninsula, Russia
Igor V. Pekov
$Sr_5(PO_4)_3F$
Apatite group
Hexagonal: $P6_3/m$; structure determined
a 9.845, *c* 7.383 Å
3.71(30), 3.21(40), 2.940(100), 2.823(35), 2.009(50), 1.955(45), 1.831(50), 1.500(30)

GENERAL NOMENCLATURE PROPOSAL
A proposal from CNMNC officers Frédéric Hatert and Ernst A.J. Burke to revise and extend the dominant-constituent rule (also known under the misleading name “50% rule”) has been approved. The (rather long) manuscript will be published in one or more mineralogical journals.

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PROPOSALS APPROVED IN JUNE 2008

IMA No. **2008-010**
Jáchymov, Krušné hory Mountains, western Bohemia, Czech Republic
Jiří Sejkora
$CaCu_4(AsO_4)_2(AsO_3OH)_2 \cdot 10H_2O$
Lindackerite group
Triclinic: $P\bar{1}$; structure determined
a 6.432, *b* 7.986, *c* 10.827 Å, α 85.75, β 81.25, γ 85.04°
10.67(100), 3.970(10), 3.648(11), 3.560(18), 3.286(10), 3.173(13), 2.922(10), 2.736(10)

IMA No. **2008-011**
Interplanetary dust particle collected from the stratosphere over south-western USA, probably from Comet 26P/Grigg-Skjellerup
Keiko Nakamura-Messenger
MnSi
Fersilicite group
Cubic: $P2_13$

a 4.557 Å
3.223(18), 2.632(16), 2.038(100), 1.861(50), 1.374(10), 1.218(24), 0.9946(12), 0.8464(15)

IMA No. **2008-012**
Mutnovsky volcano, Kamchatka Peninsula, Far East Asia, Russia
Filippo Vurro
$Pb_{20}Cd_2(As,Bi)_{22}S_{50}Cl_{10}$
Zinkenite plesiotypic series
Monoclinic: *C*2/*c*; structure determined
a 8.352, *b* 45.592, *c* 27.261 Å, β 98.84˚
4.35(21), 4.07(39), 3.80(53), 3.66(24), 3.361(65), 3.313(100), 2.835(39), 2.789(36)

IMA No. **2008-013**
Broken Hill, New South Wales, Australia
Peter Elliott
$ZnFe^{3+}_4(PO_4)_3(OH)_5$
Rockbridgeite group
Orthorhombic: *Cmcm*; structure determined
a 5.141, *b* 13.811, *c* 16.718 Å
4.638(50), 3.388(50), 3.369(55), 3.168(100), 2.753(60), 2.575(90), 2.414(75), 2.400(50)