NEW MINERALS RECENTLY APPROVED BY THE COMMISSION ON NEW MINERALS AND MINERAL NAMES INTERNATIONAL MINERALOGICAL ASSOCIATION

The information given here is provided by the Commission on New Minerals and Mineral Names, I. M. A., for comparative purposes and as a service to mineralogists working on new species.

Each mineral is described in the following format:
IMA No. (any relationship to other minerals)
Chemical formula
Crystal system, space group,
unit cell parameters
Colour; lustre; diaphaneity.
Optical properties.
Strongest lines in the X-ray powder diffraction pattern.

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

NO OTHER INFORMATION WILL BE RELEASED BY THE COMMISSION.

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

1991 PROPOSALS

IMA No. 91-001
$Hg_2^{+1}Hg^{+2}Cr^{+6}O_5S_2^{-2}$
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), 2.486 (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
$Mn_3SnB_2Si_2O_{20}$
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
$(Na,K)_{17}Fe^{+3}TiSi_{16}O_{50}(OH)_{10}2H_2O$
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
$Na_4K_3(Fe,Mn,Ti)_3Si_8O_{20}(OH)_2\cdot 4H_2O$
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: R3m
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
$Fe^{3+}_3(Fe^{2+},Ti)_3[O_2As_2O_4]_2$
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
$Ba(Al,Mg)(PO_4,CO_3)(OH)_2H_2O$
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.
$Ca(NH_4)_2(HPO_4)_2H_2O$
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: R3c
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: P1
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
$(Co,Zn,Ni)_6(SO_4)(OH,Cl)_{10}8H_2O$
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.
$(Na,K)Na_2[Mg_3(Fe^{3+},Mn^{3+})_2Li]Si_8O_{22}(OH,F)_2$
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
$NiSb_2(OH)_{12}6H_2O$
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}$2m, I4m2, I4mm or I$\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 P62c
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_D & 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: P43n
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: P43n
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
$Na_{22}Ba(Y,Gd,Dy)_2(CO_3)_{11}(HCO_3)_4(SO_4)_2F_2Cl$
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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