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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.

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
$Hg_2^{+1}Hg_3^{+2}Cr^{+6}O_5S_2^{-2}$
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
$(Zn,Co,Ni)_6(SO_4)(OH,Cl)_{10} \cdot 5\ H_2O$
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
$(Na,K)_{17}Fe^{+3}TiSi_{16}O_{29}(OH)_{30} \cdot 2\ H_2O$
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
$Na_4K_3(Fe,Mn,Ti)_2Si_8O_{20}(OH)_4 \cdot 4\ H_2O$
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
$Na_8KSi_9O_{18}(OH)_9 \cdot 19\ H_2O$
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.
$PbFe_3^{+3}H(AsO_4)_2(OH)_6$
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
$Fe_3^{+2}(Fe^{+3},Ti)_3[O_2As_2O_5]_2$

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%) 470 nm, (15.0–15.5%) 546 nm, (14.8–15.0%) 589 nm, (14.2–14.5%) 650 nm.
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. $R_{min.}$ and $R_{max.}$: (31.5, 32.5%) 470 nm, (31.1, 32.0%) 546 nm, (30.3, 31.15%) 589 nm, (27.2, 23.4%) 650 nm.
3.36 (7), 2.999 (100), 2.594 (20), 2.238 (6), 1.833 (40), 1.564 (15b).

IMA No. 91-026
$(Co,Zn,Ni)_6(SO_4)(OH,Cl)_{10} \cdot 8\ H_2O$
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
$NiSb_2(OH)_{12} \cdot 6\ H_2O$
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 and R_2 (19.6, 22.0%) 470 nm, (18.0, 20.5%) 546 nm, (17.4, 19.6%) 589 nm, (16.95, 18.8%) 650 nm.
3.507 (32), 2.983 (100), 2.816 (78), 1.989 (75), 1.658 (51), 1.586 (33).

IMA No. 91-031
$Ca_6Cu_3(SO_4)_3(OH)_{12} \cdot 2\ H_2O$
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%) 470 nm, (59.5%) 546 nm, (60.0%) 589 nm, (62.0%) 650 nm.
4.595 (21), 2.810 (30), 2.391 (100), 2.301 (25), 1.526 (23), 1.196 (26).

IMA No. 91-034
$Ca(UO_2)_3(CO_3)_4 \cdot 3\ H_2O$
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, $R_{max.}$ and $R_{min.}$ (42.2, 39.7%) 470 nm, (41.4, 38.8%) 546 nm, (40.8, 37.9%) 589 nm, (39.8, 36.9%) 650 nm.
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 and $R_{E'}$ (23.6, 22.3%) 470 nm, (22.8, 21.9%) 546 nm, (22.2, 21.5%) 589 nm, (21.3, 21.0%) 650 nm.
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%) 470 nm, (28.3%) 546 nm, (29.9%) 589 nm, (31.0%) 650 nm.
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%) 470 nm, (27.3%) 546 nm, (27.9%) 589 nm, (27.9%) 650 nm.
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.
$(Cu,Co)_5(AsO_4)_2(AsO_3OH)_2 \cdot 10\ H_2O$
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%) 481 nm, (4.64, 3.86%) 547 nm, (8.64, 7.81%) 591 nm, (13.72, 11.78%) 644 nm.
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%) 470 nm, (36.6, 32.2%) 546 nm, (35.7, 31.8%) 589 nm, (34.0, 30.2%) 650 nm.
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%) 470 nm, (58.7%) 546 nm, (58.7%) 589 nm, (58.7%) 650 nm.
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).