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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
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.

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**
$Cu_{17}Bi_{17}S_{35}$
Monoclinic: C2/*m* Related to cuprobismutite
a 35.054, *b* 3.91123, *c* 43.192 Å, β 96.713°
Lead gray, 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**
$CaCu_6[(PO_4)_2(PO_3OH)(OH)_6]\cdot 3H_2O$
Hexagonal: $P6_3/m$ Mixite group
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**
$PdSe_2$
Monoclinic: *C*2/*m* New structure-type
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)

IMA No. **2001-006**
$K_2Zn(Nb,Ti)_4(Si_4O_{12})_2(O,OH)_4\cdot 6H_2O$
Monoclinic: *C*2/*m* Labuntsovite group; structure determined
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°
6.91(10), 4.87(60), 3.19(10), 3.09(10), 2.58(7), 1.524(9), 1.422(8)

IMA No. **2001-008**
$KAlSiO_4$ Close to kalsilite; structure determined
Hexagonal: $P6_3$
a 18.106, *c* 8.462 Å
Colorless; 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)

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IMA No. **2001-009**
$K_2(H_2O)_2(Fe,Mn)[(Nb,Ti)_4(Si_4O_{12})_2(O,OH)_4]\cdot 4H_2O$ Labuntosovite 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**
$(Ag_3Hg)(V,As)O_4$
Tetragonal: $I\bar{4}$ New structure-type
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**
$ZrSiO_4$
Tetragonal: $I4_1/a$ Scheelite structure
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**
$CaSr(Mn^{3+}, Fe^{3+})_2Al[Si_3O_{12}](OH)$
Monoclinic: $P2_1/m$ Epidote group; structure determined
a 8.900, *b* 5.700, *c* 10.350 Å, β 114.50°
Deep red; vitreous; transparent
Biaxial (+), average refractive index *n* = 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**
$Cu_{2.68}Pb_{2.68}Bi_{5.32}S_{12}$
Orthorhombic: $Pmc2_1$ Derivative of bismuthinite; structure determined
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**
$Cu_{1.7}Pb_{1.7}Bi_{6.3}S_{12}$
Orthorhombic: *Pmcn* Derivative of bismuthinite; structure determined
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**
$Cu_{3.4}Fe_{0.6}Bi_5S_{10}$
Monoclinic: *C*2/*m* Cuprobismutite series; structure determined
a 17.512, *b* 3.9103, *c* 12.869 Å, β 108.57°
Grey; metallic; opaque.
In reflected light (air): grayish 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; *n* 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: *P*2/*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: *P*2/*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: *P*2/*a*
a 19.059, *b* 4.729, *c* 10.291 Å, β 111.33°
Pale-brown; vitreous; transparent
Biaxial (–), cf. 2001-20
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, γ 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
n ~ 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 *P*2/*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: *C*2/*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: *C*2/*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 (polarization 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: $R\bar{3}$
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: $A\bar{1}$
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% (580nm), 21.80–24.00% (640nm)
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**
$K_2Zn(Ti,Nb)_4(Si_4O_{12})_2(OH,O)_4{\cdot}6\text{-}8H_2O$ Labuntsovite group; structure determined
Monoclinic: *Cm*
a 14.43, *b* 13.898, *c* 7.797 Å, β 117.4°
Colourless, white, grayish, 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: $R\bar{3}$
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: $P\bar{1}$
a 7.533, *b* 7.792, *c* 7.818 Å, α 78.96, β 71.86, χ 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**
$(La,Ce,Ca)_9(Fe^{+3},Mg)(SiO_4)_6[SiO_3(OH)](OH)_3$ 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: C2/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**
$KMn_3(AlSi_3)O_{10}(OH,F)_2$ Mn-dominant analogue of phlogopite; structure determined
Monoclinic: *C*2/*m*
a 5.3791, *b* 9.319, *c* 10.2918 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: $P6_3mc$
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°
Colorless; vitreous; transparent to translucent
Biaxial; n_{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
Colorless to white; vitreous; transparent to translucent
Biaxial (+), α 1.516, β 1.532, γ 1.554, 2*V*(meas.) 82° , 2*V*(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
Gray 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: *P* $2_1/m$
a 8.890, *b* 5.5878, *c* 10.211 Å, β 115.12°
Pale grey; vitreous; transparent
Biaxial; *n* ~ 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**
$[Mg_3(H_2O)_{28}](UO_2)_8(SO_4)_4O_6(OH)_2$ 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; *n* 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, P2,* 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°
Colorless 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**
$Ba(Na,Ba)\{Na_3Ti[Ti_2O_2Si_4O_{14}](OH,F)_2\}$ 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, *n* ~ 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°
Colorless 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°
Colorless; 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: C2/*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
Pseudo monoclinic: Pseudo 2/*m* Pyrophyllite group
a 5.2, *b* 9.1, *c* 24.4 Å
Grey to yellowish gray; 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: $R\bar{3}$
a 10.576, *c* 21.324 Å
Black; sub-metallic, opaque
In reflected light (air): light gray; 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
n 1.695