

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 (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(*l*)]

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

SmPO₄

Monazite group;
structure determined

Monoclinic: *P*₂/*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, 2*V*(meas.) 29°,
2*V*(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

Cu₁₇Bi₁₇S₃₅

Related to cuprobismutite

Monoclinic: *C*2/*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)

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IMA No. 2001-004

$\text{CaCu}_6[(\text{PO}_4)_2(\text{PO}_3\text{OH})(\text{OH})_6]\cdot 3\text{H}_2\text{O}$ 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: $C2/m$
 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)

IMA No. 2001-006

$\text{K}_2\text{Zn}(\text{Nb},\text{Ti})_4(\text{Si}_4\text{O}_{12})_2$ Labuntsovite group;
 $(\text{O},\text{OH})_4\cdot 6\text{H}_2\text{O}$ structure determined
Monoclinic: $C2/m$

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, $2V(\text{meas.})$ 45°,
 $2V(\text{calc.})$ 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

$(\text{K},\text{Ba})_2\text{Fe}(\text{Ti},\text{Nb})_4(\text{Si}_4\text{O}_{12})_2$ Labuntsovite group;
 $(\text{O},\text{OH})_4\cdot 7\text{H}_2\text{O}$ structure determined
Monoclinic: $C2/m$

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, $2V(\text{meas.})$ 22°,
 $2V(\text{calc.})$ 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)

IMA No. 2001-009

$\text{K}_2(\text{H}_2\text{O})_2(\text{Fe},\text{Mn})[(\text{Nb},\text{Ti})_4$ Labuntsovite group;
 $(\text{Si}_4\text{O}_{12})_2(\text{O},\text{OH})_4]\cdot 4\text{H}_2\text{O}$ structure determined
Monoclinic: $C2/m$

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

$(\text{Ag}_3\text{Hg})(\text{V},\text{As})\text{O}_4$ New structure-type
Tetragonal: $I4$
 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

$\text{CsNa}_6[\text{Be}_2(\text{Si},\text{Al})_{18}\text{O}_{39}\text{F}_2]$ Related to leifite;
structure determined

Trigonal: $P3$
 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

$\text{CaSr}(\text{Mn}^{3+},\text{Fe}^{3+})_2$ Epidote group;
 $\text{Al}[\text{Si}_3\text{O}_{12}](\text{OH})$ structure determined
Monoclinic: $P2_1/m$

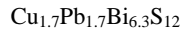
a 8.900, b 5.700, c 10.350 Å, β 114.50°
Deep red; vitreous; transparent
Biaxial (+), average index of refraction 1.825
3.513(50), 2.936(100), 2.854(40), 2.703(80), 2.586(80),
2.415(30), 2.182(80)

IMA No. 2001-015

$\text{Cu}_{2.68}\text{Pb}_{2.68}\text{Bi}_{5.32}\text{S}_{12}$ Derivative of bismuthinite;
structure determined

Orthorhombic: $Pmc2_1$
 a 4.0285, b 44.986, c 11.599 Å

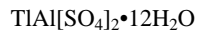
Tin white; metallic; opaque
In reflected light (air): white; internal reflectance: none;
moderate anisotropy. R_{\min} and R_{\max} : 39.52–46.88%
(460 nm), 39.26–48.06% (540 nm), 39.02–48.34% (580
nm), 38.51–47.35% (640 nm)
4.04(49), 3.656(100), 3.605(49), 3.567(81), 3.174(71),
3.152(78), 2.852(95)

IMA No. 2001-016Derivative of bismuthinite;
structure determinedOrthorhombic: *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**Cuprobismutite series;
structure determinedMonoclinic: *C2/m**a* 17.512, *b* 3.9103, *c* 12.869 Å, β 108.57°

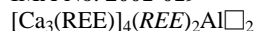
Grey; metallic; opaque.

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**Cubic: *Pa3**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. 2001-019Hellandite group;
structure determinedMonoclinic: *P2/a**a* 19.068, *b* 4.745, *c* 10.289 Å, β 111.18°

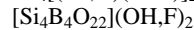
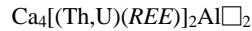
Pale-brown; vitreous; transparent

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. 2001-020Hellandite group;
structure determinedMonoclinic: *P2/a**a* 19.032, *b* 4.746, *c* 10.248 Å, β 110.97°

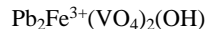
Brownish; vitreous; transparent

Biaxial (–), α 1.680(5), β 1.694(2), γ 1.708(5), $2V(\text{meas.}) \sim 90^\circ$, $2V(\text{calc.}) 89.3^\circ$
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**Hellandite group;
structure determinedMonoclinic: *P2/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

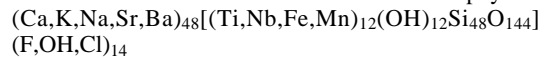
Mn-free brackebuschite

Monoclinic: *P2₁/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

Indices of refraction > 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

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, $2V(\text{calc.}) 75^\circ$

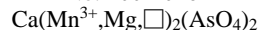
12.33(51), 6.199(42), 3.127(65), 3.110(52), 2.990(59), 2.940(45), 2.835(100)

IMA No. 2001-024Orthorhombic: *Pnam**a* 10.42, *b* 5.28, *c* 10.34 Å

Pale olive green; vitreous; transparent

n \approx 2

5.16(m), 3.45(w), 3.00(s), 2.88(w), 1.85(m)

IMA No. 2001-026Tsumcorite group;
structure determinedMonoclinic: *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, $2V(\text{meas.}) \sim 85^\circ$, $2V(\text{calc.}) 82^\circ$

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(CO₃)₄Cl(OH)₅•2H₂OMonoclinic: *P2₁, 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(Si₄O₁₂)₂(O,OH)₄•7H₂O

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, 2*V*(meas.) 30°, 2*V*(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. 2001-029Cu(CH₃COO)₂•H₂O Structure determinedMonoclinic: *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, 2*V*(meas.) 85°, 2*V*(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. 2001-030CaCu(CH₃COO)₄•6H₂OTetragonal: *I4/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. 2001-031Pb₂Al(PO₄)(VO₄)(OH) Brackebuschite group; structure determinedMonoclinic: *P2₁/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, 2*V*(meas.) large, 2*V*(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. 2001-032NaLi₂(Fe³⁺)₂Mg₂LiSi₈O₂₂(OH)₂ Amphibole group; structure determinedMonoclinic: *C2/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, 2*V*(meas.) 125°, 2*V*(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)Pb₁₀Sb₁₂S₂₇(Cl,S)_{0.6}O Zinkenite group; structure determinedMonoclinic: *C2/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)Fe₂(Ti,Fe)₁₈O₃₈ Crichtonite group; structure determinedTrigonal: *R**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. 2001-035Hg²⁺Hg¹⁺₁₀O₄I₂(Cl_{1.16}Br_{0.84})_{Σ2} New structure-typeTriclinic: *A1**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)Ca₂(Mg,Fe²⁺)₄Al Amphibole group(Si₆Al₂O₂₂)(Cl,OH)₂Monoclinic: *C2/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, 2*V*(meas.) 65°, 2*V*(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•6–8H₂O

Labuntsovitte group;
structure determined

Monoclinic: *Cm*

a 14.43, *b* 13.898, *c* 7.797 Å, β 117.4°

Colorless, white, grayish, pale pink, light brown; vitreous; transparent to translucent.

Biaxial (+), α 1.680, β 1.688, γ 1.785, 2*V*(meas.) 25°, 2*V*(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•5H₂O

Labuntsovitte 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, 2*V*(meas.) 35°, 2*V*(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, γ 65.41°

Pale blue, vitreous, transparent

Biaxial (+), α 1.548, β 1.555, γ 1.574, 2*V*(meas.) 86°, 2*V*(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: *P6₃cm*

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

$(La,Ce,Ca)_9(Fe^{3+},Mg)(SiO_4)_6$
[SiO₃(OH)](OH)₃

La-dominant
analogue of cerite-(Ce);
structure determined

Trigonal: *R3c*

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 *C2/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, 2*V* 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•6H₂O

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, 2*V*(meas.) 80°, 2*V*(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

$KMn_3(AlSi_3)O_{10}(OH)_2$

Mn-dominant analogue
of phlogopite; structure determined

Monoclinic: *C2/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, 2*V* 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)₂O₃₀(OH)₂

Högbomite group;
structure determined

Hexagonal: *P6₃mc*

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

$\text{KNa}_2\text{Mg}_2\text{Fe}^{3+}_2\text{LiSi}_8\text{O}_{22}(\text{OH})_2$ Amphibole group;
structure determined

Monoclinic: $C2/m$

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, $2V(\text{calc})$ 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

$(\text{Ca},\text{REE})_4(\text{Al},\text{Mg},\text{Fe})_4$ Related to epidote;
 $[\text{Si}_2\text{O}_7][\text{SiO}_4]_3(\text{O},\text{F},\text{OH})_3$ 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

$\text{Ca}_{16}(\text{Mg},\text{Li},\square)_2[\text{B}_{13}\text{O}_{17}$ Structure determined
 $(\text{OH})_{12}]_4\text{Cl}_6 \cdot 28\text{H}_2\text{O}$

Orthorhombic: $Pba2$

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, $2V(\text{meas.})$ 82°,
 $2V(\text{calc.})$ 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

$\text{CoFe}^{3+}_2(\text{AsO}_4)_2(\text{OH})_2 \cdot 4\text{H}_2\text{O}$ 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, $2V(\text{calc.})$ 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

$(\text{Fe},\text{Mg})\text{S}$ Fe-dominant analogue of niningerite

Cubic: $Fm\bar{3}m$

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

$\text{CaFe}^{3+}_2(\text{AsO}_4)_2(\text{OH})_2$ 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

$\text{CaSrAl}_3(\text{Si}_2\text{O}_7)(\text{SiO}_4)\text{O}(\text{OH})$ Epidote group;
structure determined

Monoclinic: $P2_1/m$

a 8.890, b 5.5878, c 10.211 Å, b 115.12°

Pale grey; vitreous; transparent

Biaxial; $n \approx 1.725$

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

$[\text{Mg}_3(\text{H}_2\text{O})_{28}](\text{UO}_2)_8(\text{SO}_4)_4\text{O}_6(\text{OH})_2$ 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

$\text{Ca}_6\text{B}_{14}\text{O}_{19}(\text{SO}_4)(\text{OH})_{14} \cdot 5\text{H}_2\text{O}$

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, $2V(\text{meas.})$ 75°,
 $2V(\text{calc.})$ 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

$(\text{Cu}_{0.70-0.30})(\text{Cd}_{1.68}\text{Ca}_{0.32})_{\Sigma 2.00}\text{Al}_3$ New structure-type
 $(\text{PO}_4)_4\text{F}_2(\text{H}_2\text{O})_{10}(\text{H}_2\text{O},\text{F})_2$

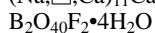
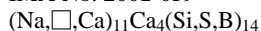
Triclinic: $P1$

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, $2V(\text{meas.})$ 30°,
 $2V(\text{calc.})$ 75.7°

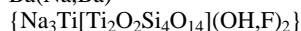
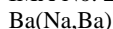
9.43(100), 4.73(30), 3.70(30), 3.17(30), 3.01(30),
2.896(30), 2.820(50)

IMA No. 2001-059Triclinic: $P\bar{1}$ 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, $2V(\text{meas.})$ 38°, $2V(\text{calc.})$ 35°

13.18(100), 6.58(43), 3.29(34), 2.968(37), 2.908(27), 1.794(20)

Reyerite group;
structure determined**IMA No. 2001-060**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, $2V(\text{meas.})$ 40°

9.87(96), 3.75(65), 3.45(90), 3.28(78), 3.04(41), 2.797(100), 2.610(43)

Lamprophyllite group;
structure determined**IMA No. 2001-061**Orthorhombic: $Pmmm$, $P2_1mn$ 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)

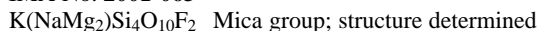
4.82(40), 4.37(40), 2.797(60), 2.743(100), 2.325(40), 2.116(40), 2.091(100)

IMA No. 2001-062Triclinic: $P\bar{1}$ 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, $n \approx 1.9$

10.06(100), 3.35(43), 3.25(72), 3.12(86), 3.08(95), 3.00(52), 2.726(42)

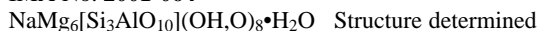
P-dominant analogue
of walpurgite**IMA No. 2001-063**Monoclinic: $C2/m$ a 5.269, b 9.071, c 10.178 Å, β 100.03°

Colorless to pale grey; pearly to vitreous; transparent to translucent

Biaxial (–), α 1.526, β 1.553, γ 1.553, $2V(\text{meas.})$ 5°, $2V(\text{calc.})$ 0°

10.0(70), 3.36(90), 2.59(90), 2.41(100), 1.665(80), 1.522(100)

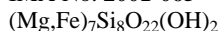
Mica group; structure determined

IMA No. 2001-064Triclinic: $C1$ (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, $2V(\text{meas.})$ 17°, $2V(\text{calc.})$ 0°

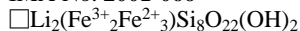
7.27(30), 4.63(30), 2.992(40), 2.597(60), 2.556(100), 2.457(50), 1.544(100)

IMA No. 2001-065Orthorhombic: $Pnmm$ a 9.3553, b 17.9308, c 5.3117 Å

White; vitreous; translucent

Biaxial (–), α 1.593, β (calc.) 1.609, γ 1.615, $2V(\text{meas.})$ 64°

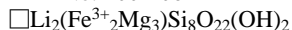
8.32(71), 3.66(100), 3.27(49), 3.08(81), 2.84(96), 2.56(49), 2.51(57)

Amphibole group;
structure determined**IMA No. 2001-066**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)

Amphibole group;
structure determined**IMA No. 2001-067**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)

Amphibole group;
structure determined

PROPOSALS FROM PREVIOUS YEARS APPROVED IN 2001

IMA No. **1997-040**

$(\text{Na,K,Ca})_x(\text{Al,Fe,Mg})_4(\text{Si,Al})_8\text{O}_{20}$ Pyrophyllite
 $(\text{OH})_4 \cdot n\text{H}_2\text{O}$, $x = 0.35$, $n = 3.54$ group

Pseudomonoclinic: 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**

$\text{Pb}(\text{U}^{4+}, \text{U}^{6+})(\text{Ti, Fe}^{2+}, \text{Fe}^{3+})_{20}(\text{O, OH})_{38}$ Crichtonite
 Trigonal: $R\bar{3}$ group

a 10.576, c 21.324 Å

Black; submetallic, 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**

$\text{NaCaCu}_5(\text{AsO}_4)_4\text{Cl} \cdot 5\text{H}_2\text{O}$

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**

$\text{Li}_{1+3x}\text{Al}_{4-x}(\text{BSi}_3)\text{O}_{10}(\text{OH})_8$, Chlorite group
 where $0 < x < 0.33$

Pseudo-monoclinic: pseudo $C2/m$

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, $2V(\text{calc.})$ 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**

$\text{VO}(\text{SO}_4)(\text{H}_2\text{O})_3$ 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, $2V(\text{meas.})$ 72°,
 $2V(\text{calc.})$ 69°

5.79(100), 5.41(37), 4.57(20), 3.88(48), 3.498(90)

IMA No. **2000-052**

$\text{Fe}^{3+}_3(\text{PO}_4)_2(\text{OH})_3 \cdot 5\text{H}_2\text{O}$

Amorphous

Light brown to brown; vitreous; translucent

n 1.695