

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

JOEL D. GRICE* (Chairman, CNMMN) and GIOVANNI FERRARIS** (Vice-Chairman, CNMMN)

* Canadian Museum of Nature, P. O. Box 3443, Station 'D', Ottawa, Ontario, Canada K1P 6P4;
e-mail: jgrice@mus-nature.ca

** Dipartimento di Scienze Mineralogiche e Petrologiche, Università di Torino, Via Valperga Caluso 35,
I-10125 Torino, Italy; e-mail: ferraris@dsmp.unito.it

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

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. 2001-001

SmPO₄ 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, $2V(\text{meas.})$ 29°, $2V(\text{calc.})$ 32°

5.19(40), 4.65(50), 4.16(80), 3.492(40), 3.264(70), 3.065(100), 2.857(90)

IMA No. 2001-004

CaCu₆[(PO₄)₂(PO₃OH)(OH)₆] \cdot 3H₂O Mixite group

Hexagonal: $P6_3/m$

a 13.284, c 5.902 Å

Olive green; vitreous; translucent to transparent

Uniaxial (+), ω 1.674, $\epsilon > 1.739$ (~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. 2001-002

Cu₁₇Bi₁₇S₃₅ 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)

IMA No. 2001-005

PdSe₂ New structure-type

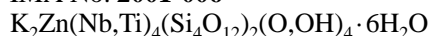
Monoclinic: $C2/m$

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

Labuntsovite group; 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

Labuntsovite group; structure determined

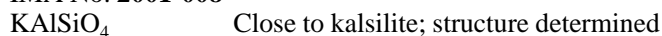
Monoclinic: $C2/m$

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°

6.96(100), 6.43(24), 4.92(30), 3.222(84), 3.114(66), 2.514(30), 1.430(22)

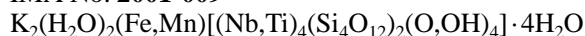
IMA No. 2001-008Hexagonal: $P6_3$

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

Labuntsovite group; 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, $2V(\text{meas.})$ 58.5°, $2V(\text{calc.})$ 63.71°

6.92(80), 6.42(50), 4.94(70), 3.225(100), 3.114(80), 3.069(20), 2.512(50)

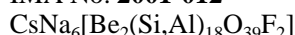
IMA No. 2001-010Tetragonal: $I\bar{4}$

a 7.727, c 4.648 Å

Red, brownish red; adamantine; translucent

Uniaxial (+), $\omega \sim 2.3$, $\epsilon \sim 2.5$

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

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

Scheelite structure

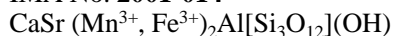
Tetragonal: $I4_1/a$

a 4.738, c 10.506 Å

White; adamantine; translucent

Indices $\gg 1.64$, 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

Epidote group; structure determined

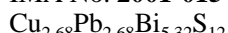
Monoclinic: $P2_1/m$

a 8.900, b 5.700, c 10.350 Å, β 114.50°

Deep red; vitreous; transparent

Biaxial (+), average refractive index $\eta = 1.825$

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

Derivative of bismuthinite; structure determined

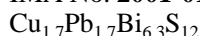
Orthorhombic: $Pmc2_1$

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

Derivative of bismuthinite; structure determined

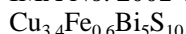
Orthorhombic: $Pmcn$

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

Cuprobismutite series; structure determined

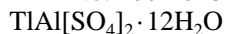
Monoclinic: $C2/m$

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. 2001-018Cubic: $Pa\bar{3}$

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

$[\text{Ca}_3(\text{REE})_4(\text{REE})_2\text{Al}\square_2[\text{Si}_4\text{B}_4\text{O}_{22}](\text{OH},\text{F})_2]$

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

$\text{Ca}_4(\text{Ca},\text{Ce})_2\text{AlBe}_2[\text{Si}_4\text{B}_4\text{O}_{22}](\text{O})_2$

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), $2V(\text{meas.})$
 $\sim 90^\circ$, $2V(\text{calc.})$ 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

$\text{Ca}_4[(\text{Th},\text{U})(\text{REE})_2\text{Al}\square_2[\text{Si}_4\text{B}_4\text{O}_{22}](\text{OH},\text{F})_2]$

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

$\text{Pb}_2\text{Fe}^{3+}(\text{VO}_4)_2(\text{OH})$

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

$(\text{Ca},\text{K},\text{Na},\text{Sr},\text{Ba})_{48}[(\text{Ti},\text{Nb},\text{Fe},\text{Mn})_{12}(\text{OH})_{12}\text{Si}_{48}\text{O}_{144}]$

$(\text{F},\text{OH},\text{Cl})_{14}$ 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, $2V(\text{calc.})$ 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

$\eta \sim 2$

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

IMA No. 2001-026

$\text{Ca}(\text{Mn}^{3+},\text{Mg},\square)_2(\text{AsO}_4)_2(\text{OH},\text{H}_2\text{O})_2$

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, $2V(\text{meas.}) \sim 85^\circ$,
 $2V(\text{calc.})$ 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

$(\text{Y},\text{REE})_4\text{Cu}(\text{CO}_3)_4\text{Cl}(\text{OH})_5 \cdot 2\text{H}_2\text{O}$

Monoclinic: $P2$, 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, $\beta \sim \gamma$ 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

$(\text{Na},\text{Ca},\text{K})_2\text{Ca}(\text{Nb},\text{Ti})_4(\text{Si}_4\text{O}_{12})_2(\text{O},\text{OH})_4 \cdot 7\text{H}_2\text{O}$

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

$\text{Cu}(\text{CH}_3\text{COO})_2 \cdot \text{H}_2\text{O}$

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, $2V(\text{meas.})$ 85°,
 $2V(\text{calc.})$ 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

$\text{CaCu}(\text{CH}_3\text{COO})_4 \cdot 6\text{H}_2\text{O}$

Tetragonal: $I4/m$

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. 2001-031

$\text{Pb}_2\text{Al}(\text{PO}_4)(\text{VO}_4)(\text{OH})$

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

$\text{NaLi}_2(\text{Fe}^{3+}_2\text{Mg}_2\text{Li})\text{Si}_8\text{O}_{22}(\text{OH})_2$

Amphibole group; structure determined

Monoclinic: $C2/m$

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, 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

$(\text{Cu,Ag})\text{Pb}_{10}\text{Sb}_{12}\text{S}_{27}(\text{Cl,S})_{0.6}\text{O}$

Zinkenite group; structure determined

Monoclinic: $C2/m$

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

$(\text{Pb,Sr})(\text{Y,Mn})\text{Fe}_2(\text{Ti,Fe})_{18}\text{O}_{38}$

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

$\text{Hg}^{2+}\text{Hg}^{1+}_{10}\text{O}_4\text{I}_2(\text{Cl}_{1.16}\text{Br}_{0.84})_{22}$

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 % (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

$(\text{K,Na})\text{Ca}_2(\text{Mg,Fe}^{2+})_4\text{Al}(\text{Si}_6\text{Al}_2\text{O}_{22})(\text{Cl,OH})_2$

Amphibole group

Monoclinic: $C2/m$

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, 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

$\text{K}_2\text{Zn}(\text{Ti,Nb})_4(\text{Si}_4\text{O}_{12})_2(\text{OH,O})_4 \cdot 6\text{--}8\text{H}_2\text{O}$

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

$\text{CaK}_2\text{Mn}(\text{Ti,Nb})_4(\text{Si}_4\text{O}_{12})_2(\text{O,OH})_4 \cdot 5\text{H}_2\text{O}$

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

$\text{NaFe}^{2+}_6\text{Al}_3(\text{SO}_4)_2(\text{OH})_{18}(\text{H}_2\text{O})_{12}$

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

$\text{VO}(\text{SO}_4)(\text{H}_2\text{O})_5$

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, 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

$\text{Na}_{15}\text{Sr}_{12}\text{Zr}_{14}\text{Si}_{42}\text{B}_6\text{O}_{138}(\text{OH})_6 \cdot 12\text{H}_2\text{O}$

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,Fe³⁺)(SiO₄)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

Na₂KMn₂LiV₂Si₈O₂₄
 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, 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

Ca₂Be₄(Fe²⁺,Mn)₅(PO₄)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, 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

KMn₃(AlSi₃)₄O₁₀(OH,F)₂
 Mn-dominant analogue of phlogopite; structure determined
 Monoclinic: *C2/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)₆Al₁₄(Ti,Fe)₂O₃₀(OH)₂
 Högbomite group; structure determined
 Hexagonal: *6₃mc*
 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

KNa₂Mg₂Fe³⁺₂LiSi₈O₂₂(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(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[Si₂O₇][SiO₄]₃(O,F,OH)₃
 Related to epidote; structure determined
 Monoclinic: *P2₁/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

Ca₁₆(Mg,Li,□)₂[B₁₃O₁₇(OH)₁₂]₄Cl₆·28H₂O
 Structure determined
 Orthorhombic: *Pba2*
 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

CoFe³⁺₂(AsO₄)₂(OH)₂·4H₂O
 Co-dominant analogue of arthurite; structure determined
 Monoclinic: *P2₁/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: *Fm3m*
 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

CaFe³⁺₂(AsO₄)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

CaSrAl₃(Si₂O₇)(SiO₄)O(OH)
 Epidote group; structure determined
 Monoclinic: *P2₁/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

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

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

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(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

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

$(\text{Na},\square,\text{Ca})_{11}\text{Ca}_4(\text{Si},\text{S},\text{B})_{14}\text{B}_2\text{O}_{40}\text{F}_2\cdot 4\text{H}_2\text{O}$

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

$\text{Ba}(\text{Na},\text{Ba})\{(\text{Na},\text{Ba})\{\text{Na}_3\text{Ti}[\text{Ti}_2\text{O}_2\text{Si}_4\text{O}_{14}](\text{OH},\text{F})_2\}$

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

$\text{Pd}_8\text{Hg}_3\text{Se}_9$

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

$(\text{UO}_2)\text{Bi}_4(\text{PO}_4)\text{O}_4\cdot 2\text{H}_2\text{O}$ 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, $\eta \sim 1.9$

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

$\text{K}(\text{NaMg}_2)\text{Si}_4\text{O}_{10}\text{F}_2$ 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

$\text{NaMg}_6[\text{Si}_3\text{AlO}_{10}](\text{OH},\text{O})_8\cdot \text{H}_2\text{O}$ Structure determined

Triclinic: $C1$ (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

$(\text{Mg},\text{Fe})_7\text{Si}_8\text{O}_{22}(\text{OH})_2$

Amphibole group; structure determined

Orthorhombic: $Pnmm$

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(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

$\square\text{Li}_2(\text{Fe}^{3+}_2\text{Fe}^{2+}_3)\text{Si}_8\text{O}_{22}(\text{OH})_2$

Amphibole group; structure determined

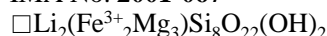
Monoclinic: $C2/m$

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**

Amphibole group; structure determined

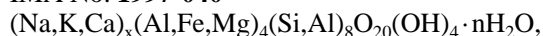
Monoclinic: $C2/m$

$$a 9.535, b 17.876, c 5.234 \text{ \AA}, \beta 102.54^\circ$$

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 2001IMA No. **1997-040**

$$x = 0.35, n = 3.54$$

Pyrophyllite group

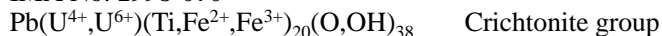
Pseudo monoclinic: Pseudo $2/m$

$$a 5.2, b 9.1, c 24.4 \text{ \AA}$$

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**

Crichtonite group

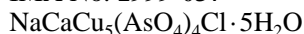
Trigonal: R

$$a 10.576, c 21.324 \text{ \AA}$$

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**Tetragonal: $P4_122$ or $P4_322$

$$a 10.0156, c 36.691 \text{ \AA}$$

Dark blue; vitreous; translucent

Uniaxial (-), $\omega 1.749$, $\epsilon 1.647$

$$9.18(100), 4.59(40), 4.17(11), 3.06(18), 2.610(6)$$

IMA No. **2000-013**

Chlorite group

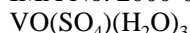
Pseudo-monoclinic: pseudo $C2/m$

$$a 5.121, b 8.856, c 14.073 \text{ \AA}, \beta 96.95^\circ$$

Light pinkish grey; greasy; opaque

Biaxial: $\alpha 1.574$, $\beta 1.580$, $\gamma 1.591$, $2V(\text{calc.}) 72^\circ$

$$14.1(10), 7.05(50), 4.71(70), 3.51(100), 2.807(20), \\ 2.304(16), 1.946(17)$$

IMA No. **2000-045**

Structure determined

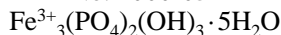
Monoclinic: $P2_1/m$

$$a 7.3940, b 7.4111, c 12.0597 \text{ \AA}, \beta 106.55^\circ$$

Pale to bright blue; vitreous; transparent

Biaxial (+), $\alpha 1.555$, $\beta 1.561$, $\gamma 1.574$, $2V(\text{meas.}) 72^\circ$, $2V(\text{calc.}) 69^\circ$

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

IMA No. **2000-052**

Amorphous

Light brown to brown; vitreous; translucent

$$\eta 1.695$$

