

**NEW MINERALS APPROVED IN 2002 AND NOMENCLATURE MODIFICATIONS
APPROVED IN 1998–2002 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, 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 No.
Chemical formula
Crystal system, space group
unit-cell parameters
Color; luster; diaphaneity
Optical properties
Strongest lines in the X-ray powder-diffraction pattern

any relationship to other minerals;
structure analysis

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. Note that new proposals should be sent to the new Chairman: Prof. Ernst A. J. Burke, Faculty of Earth and Life Sciences, Vrije Universiteit, De Boelelaan 1085, 1081 HV Amsterdam, The Netherlands. *E-mail address:* ernst.burke@falw.vu.nl

2002 PROPOSALS

<p>IMA No. 2002-001 (Ce,La,Nd,Ba)(Fe³⁺,Al)₃ [(As,Al)O₄]₂(OH)₆ Trigonal, $R\bar{3}m$ a 7.260, c 16.77 Å</p> <p>Light green to brownish; resinous; transparent Uniaxial (–), mean index of refraction 1.97 5.906(25), 3.636(40), 3.052(100), 2.792(30), 2.239(35), 1.817(35)</p> <p>IMA No. 2002-002 (□,K)(Mg, Fe²⁺)₃Fe³⁺₂[Si₁₂O₃₀] Hexagonal, $P6/mcc$ a 10.050, c 14.338 Å</p>	<p>Fe-dominant analogue of arsenoflorencite-(Ce)</p> <p>Milarite group; structure determined</p>	<p>Deep blue to yellowish green; vitreous; translucent Uniaxial (–), ω 1.589, ϵ 1.586 8.70(97), 7.17(100), 5.535(96), 5.026(61), 4.352(53), 3.207(85)</p> <p>IMA No. 2002-003 NaSrKZn(Ti,Nb)₄(Si₄O₁₂)₂(O,OH)₄•7H₂O Labuntsovite group; structure determined Monoclinic, Cm a 14.495, b 13.945, c 7.838 Å, β 117.75° White, pale brown; vitreous; translucent to transparent Biaxial (+), α 1.680, β 1.687, γ 1.787, $2V$(meas.) 25°, $2V$(calc.) 31° 6.96(100), 3.21(80), 3.11(90), 2.60(35), 2.50(40), 1.74(30), 1.70(40)</p>
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- IMA No. **2002-004**
 $\text{CoSO}_4 \cdot \text{H}_2\text{O}$ Kieserite group
 Monoclinic, *C2/c*
 a 6.980, b 7.588, c 7.639 Å, β 118.65°
 Pink; powdery; transparent
 Biaxial (+), $n \sim 1.65$ (calc.)
 4.83(33), 3.405(100), 3.339(34), 3.291(32), 3.062(56),
 2.567(30), 2.513(49)
- IMA No. **2002-005**
 $(\text{K,Ba,Na})_2(\text{Ti,Nb})_2(\text{Si}_4\text{O}_{12})(\text{OH},\text{O})_2 \cdot 3\text{H}_2\text{O}$
 Labuntsovite group;
 Monoclinic, *Cm* structure determined
 a 14.327, b 13.802, c 7.783 Å, β 116.95°
 Light brown, white, and colorless; vitreous; transparent
 Biaxial (+), α 1.689, β 1.700, γ 1.775, $2V$ (meas.) 35°,
 $2V$ (calc.) 43°
 6.87(100), 4.85(50), 3.95(50), 3.20(60), 3.05(80),
 3.00(60), 2.56(90)
- IMA No. **2002-006**
 $(\text{Ba,Na,K})_{2-x}(\text{Ti,Nb})_2(\text{Si}_4\text{O}_{12})(\text{OH},\text{O})_2 \cdot 4\text{H}_2\text{O}$
 Labuntsovite group;
 Monoclinic, *C2/m* structure determined
 a 14.551, b 14.001, c 15.702 Å, β 117.58°
 Brown; vitreous; transparent
 Biaxial (+), α 1.667, β 1.674, γ 1.770, $2V$ (meas.) 30°,
 $2V$ (calc.) 31°
 7.11(100), 4.08(80), 3.95(100), 3.24(90), 3.11(80),
 2.403(80), 1.914(90)
- IMA No. **2002-007**
 $\text{NaK}_3\text{Fe}(\text{Ti,Nb})_4(\text{Si}_4\text{O}_{12})_2$
 $(\text{O},\text{OH})_4 \cdot 6\text{H}_2\text{O}$ Labuntsovite group;
 Monoclinic, *Cm* structure determined
 a 14.450, b 13.910, c 7.836 Å, β 117.42°
 Pale brown; vitreous; translucent to transparent
 Biaxial (+), α 1.677, β 1.684, γ 1.790, $2V$ (meas.) 25°,
 $2V$ (calc.) 30°
 6.93(100), 4.93(80), 3.21(100), 3.11(90), 2.62(60),
 2.49(50), 1.687(40)
- IMA No. **2002-008**
 $\text{Na}_2\text{H}(\text{PO}_4) \cdot 8\text{H}_2\text{O}$ New structure-type
 Orthorhombic, *Ibca*
 a 11.488, b 11.647, c 16.435 Å
 Colorless; vitreous to resinous; transparent
 Biaxial (-), α 1.443, β 1.457, γ 1.458, $2V$ (meas.) 29°,
 $2V$ (calc.) 30°
 5.78(40), 4.90(43), 4.73(62), 3.75(81), 2.876(77),
 2.782(100), 2.744(74)
- IMA No. **2002-010**
 $\text{NaNa}_2(\text{Al}_2\text{Mg}_3)(\text{Si}_7\text{Al})\text{O}_{22}(\text{F},\text{OH})_2$ Amphibole group;
 Monoclinic, *C2/m* structure determined
 a 9.666, b 17.799, c 5.311 Å, β 104.10°
- Bluish grey; luster not given; translucent
 Biaxial (+), α 1.633, β 1.624, γ 1.626, $2V$ moderate,
 calculated from chemical composition
 8.31(64), 4.45(26), 3.38(42), 3.079(58), 2.691(100),
 2.571(32), 2.532(47)
- IMA No. **2002-011**
 $\text{GaO}(\text{OH})$ Isostructural with goethite
 Orthorhombic, *Pbnm*
 a 4.512, b 9.772, c 2.967 Å
 Pale greenish yellow to beige; pearly; translucent
 Biaxial, n (calc.) 1.96.
 4.09(100), 2.632(33), 2.530(22), 2.404(100), 1.690(26),
 1.538(21)
- IMA No. **2002-012**
 $\text{Na}_2(\text{Na,Ca})_4\text{Ca}_4(\text{Mn,Ca})_2$
 $\text{Zr}_2\text{Ti}_2(\text{Si}_2\text{O}_7)_4(\text{O},\text{F})_4\text{F}_4$ Rosenbuschite group;
 Triclinic, *P1* structure determined
 a 10.032, b 11.333, c 7.202 Å, α 90.19, β 100.33, γ
 111.55°
 Colorless to pale shade of brown; vitreous; transparent
 Biaxial (+), α 1.684, β 1.695, γ 1.718, $2V$ (meas.) 73°,
 $2V$ (calc.) 70°
 3.951(30), 3.028(60), 2.908(100), 2.600(80), 1.868(60),
 1.670(50)
- IMA No. **2002-013**
 $\text{Ba}_3\text{NaCe}(\text{PO}_4)_3(\text{F},\text{Cl})$ Ba-dominant analogue
 of belovite-(Ce);
 Triclinic, $P\bar{3}$ structure determined
 a 9.909, c 7.402 Å
 Light rose; vitreous; translucent
 Uniaxial (-), ω 1.694, ϵ 1.669
 4.078(40), 3.693(40), 2.969(100), 2.867(60), 1.965(80),
 1.863(60)
- IMA No. **2002-014**
 $\text{Pb}_3[(\text{UO}_2)_6\text{O}_8(\text{OH})_2](\text{H}_2\text{O})_x$, $x \approx 3$ New structure-type
 Monoclinic, *C2/c*
 a 28.355, b 11.990, c 13.998 Å, β 104.248°
 Bright orange; vitreous; transparent
 Biaxial, n_{\min} 1.807, n_{\max} 1.891
 6.92(60), 6.02(30), 3.46(80), 3.10(100), 2.74(30),
 2.01(30), 1.918(60)
- IMA No. **2002-015**
 $\text{BaBe}_2\text{Si}_2\text{O}_7$ Dimorphous with barylite;
 Monoclinic, *Pm* structure determined
 a 11.637, b 4.918, c 4.668 Å, β 89.80°
 Colorless; vitreous; transparent
 Biaxial (+), α 1.698, β 1.700, γ 1.705, $2V$ (meas.) 70°,
 $2V$ (calc.) 65°
 3.39(84), 3.25(45), 3.04(40), 2.926(55), 2.458(100),
 2.335(48), 2.076(38)

IMA No. 2002-016

$\text{CaFe}^{2+}\text{Fe}^{3+}(\text{Mn},\text{Fe}^{2+})$
 $(\text{Si}_2\text{O}_7)\text{O}(\text{OH})$ Mn-dominant analogue of ilvaite

Monoclinic, $P2_1/a$

a 13.0246, b 8.8511, c 5.8485 Å, β 90.17°

Black; vitreous; opaque

In reflected light (in air): grey to bluish grey; internal reflections: red; anisotropy: strong in blue-greyish hues.

R_{\min} and R_{\max} : 8.3–10% (460 nm), 7.5–9.8% (540 nm), 7–9.7% (580 nm), 6.1–9.5% (640 nm)

2.875(85), 2.848(90), 2.718(100), 2.687(70), 2.180(48), 2.111(47), 1.475(48)

IMA No. 2002-017

$\text{MnV}_2\text{O}_6 \cdot 4\text{H}_2\text{O}$ New structure-type

Monoclinic, $C2/c$

a 13.171, b 10.128, c 6.983 Å, β 111.57°

Carmine red; adamantine; transparent

Biaxial, n_{\min} 1.797, n_{\max} 1.856

7.82(100), 5.69(20), 5.06(20), 4.51(30), 3.91(30), 3.029(70)

IMA No. 2002-018

$(\text{Mg},\text{Fe})(\text{Ta},\text{Nb})_2\text{O}_6$ Columbite–tantalite group

Orthorhombic, $Pbcn$

a 14.355, b 5.735, c 5.058 Å

Black; semimetallic to metallic; opaque

Light grey; internal reflections (in air): brownish red; anisotropism: weak; bireflectance: very weak.

R_{\min} and R_{\max} : 13.97–12.82% (460 nm), 13.33–13.20% (540 nm), 14.25–13.94% (580 nm), 15.61–15.31% (640 nm)

3.67(60), 2.96(100), 1.774(60), 1.728(70), 1.462(90), 1.196(60), 1.105(60)

IMA No. 2002-019

$\text{Ba}_2(\text{La},\text{Th},\text{Ce})(\text{CO}_3)_3\text{F}$ La-dominant analogue of kukharenkoite-(Ce); structure determined

Monoclinic, $P2_1/m$

a 13.396, b 5.111, c 6.672 Å, β 106.63°

Pale leek-green, colorless, white; vitreous; transparent to translucent

Biaxial (–), α 1.581, β 1.715, γ 1.715, $2V(\text{meas.})$ 5°, $2V(\text{calc.})$ 0°

4.01(100), 3.27(100), 2.54(50), 2.38(20), 2.14(80), 1.998(80), 1.636(20)

IMA No. 2002-020

$(\text{Ca},\text{K},\text{Na})_{2-x}(\text{Ti},\text{Nb})_2$
 $(\text{Si}_4\text{O}_{12})(\text{OH},\text{O})_2 \cdot 4\text{H}_2\text{O}$ Labuntsovite group; structure determined

Monoclinic, $C2/m$

a 14.484, b 14.191, c 7.907 Å, β 117.26°

White, pale brownish; vitreous; transparent

Biaxial (+), α 1.666, β 1.676, γ 1.780, $2V(\text{meas.})$ 30°, $2V(\text{calc.})$ 36°

7.02(60), 6.38(40), 3.53(45), 3.16(100), 2.62(45), 2.51(85), 1.718(50)

IMA No. 2002-021

$(\text{Na},\text{K},\text{Ca})_{48}\text{Si}_{36}\text{Al}_{36}\text{O}_{144}[(\text{SO}_4)_8\text{Cl}_2] \cdot 3\text{H}_2\text{O}$ Cancrinite–sodalite group;

Hexagonal or trigonal,

$P6_2c$ or $P31c$

structure discussed

a 12.880, c 31.761 Å

Colorless; vitreous; transparent

Uniaxial (+), ε 1.497, ω 1.495

4.20(42), 3.725(100), 3.513(80), 3.296(35), 3.089(40), 2.555(35), 2.150(40)

IMA No. 2002-022

$\text{Hg}^{1+}\text{Hg}^{2+}\text{OI}$ Related to terlinguaite; new structure-type

Monoclinic, $C2/c$

a 17.580, b 6.979, c 6.693 Å, β 101.71°

Dark grey-black; metallic; opaque

Calculated index of refraction: 2.35–2.38

8.55(70), 3.275(100), 2.993(80), 2.873(80), 2.404(50), 1.878(50)

IMA No. 2002-023

$\text{Ce}_2\text{Si}_2\text{O}_7$ Isostructural with $\text{Ln}_2\text{Si}_2\text{O}_7$

Tetragonal, $P4_1$

a 6.781, c 24.689 Å

White to colorless; resinous; transparent

Uniaxial (+), ω 1.840, ε 1.846

3.27(31), 3.14(27), 3.12(24), 3.08(100), 3.011(18), 2.846(22), 2.034(19)

IMA No. 2002-024

$(\text{Cu}_{4.7}\text{Ag}_{3.3})_{28}\text{GeS}_6$ Argentinian variety of α - Cu_8GeS_6

Cubic, $F43m$

a 10.201 Å

Iron-black; vitreous to metallic; opaque

In reflected light (air): pale rose-brownish; internal reflections: none; R_{\min} and R_{\max} : 29.4% (460 nm), 23.6% (560 nm), 26.0% (580 nm), 25.3% (640 nm)

5.90(30), 3.07(60), 2.943(100), 1.962(50), 1.805(70)

IMA No. 2002-025

$\text{Ce}_3\text{CaMg}_2\text{Al}_2\text{Si}_5\text{O}_{19}(\text{OH})_2\text{F}$ Related to epidote group; structure determined

Monoclinic, $P2_1/m$

a 8.939, b 5.706, c 15.855 Å, β 94.58°

Dark brown; vitreous

Biaxial (+), α 1.781, β 1.792(calc.), γ 1.810, $2V(\text{meas.})$ 75°, $2V(\text{calc.})$ 78°

4.64(10), 3.50(20), 2.979(100), 2.847(10), 2.682(13), 2.622(19), 2.185(15)

IMA No. **2002-026**

(Na,Ca)₆(Ca,Na)₃Si₁₆O₃₈
(F,OH)₂•3H₂O
Triclinic, *P1*
a 9.613, *b* 12.115, *c* 9.589 Å, α 92.95, β 119.81, γ 96.62°

Colorless; pearly

Biaxial (–), α 1.522, β 1.528, γ 1.529, 2*V*(meas.) 48°, 2*V*(calc.) 44°
11.99(100), 5.97(85), 3.97(40), 2.967(50), 2.888(100), 1.820(50)

IMA No. **2002-027**

BaB₂Si₂O₈ Ba-dominant analogue of danburite;
Orthorhombic, *Pnma* structure determined
a 8.141, 8.176, *c* 9.038 Å

White; vitreous; transparent

Biaxial (–), α 1.649, β 1.656, γ 1.656, 2*V*(meas.) 5°, 2*V*(calc.) 0°
6.07(60), 4.86(30), 3.62(100), 3.39(60), 2.83(50), 2.481(40), 2.021(70)

IMA No. **2002-028**

Ca_{0.3}(Fe²⁺,Mg,Fe³⁺)₃(Si,Al)₄
O₁₀(OH)₂•4H₂O Smectite group
Monoclinic, probably *C*-cell
a 5.363, *b* 9.306, *c* 14.64 Å, β 94.98°

Dark green, brownish green; vitreous, translucent

Biaxial (–), α 1.448 (calc.), β 1.641, γ 1.642; 2*V*(meas.) 5°, 2*V*(calc.) 7.5°
7.37(90), 4.72(90), 3.80(80), 3.03(100), 2.585(90), 2.429(90), 1.549(90)

IMA No. **2002-029**

Na₆MnTi₄Si₈O₂₈•4H₂O Mn-dominant analogue
of kukisvumite
Orthorhombic, *Pccn*
a 29.05, *b* 8.612, *c* 5.220 Å

Colorless; vitreous; transparent

Biaxial (–), α (calc.) 1.657, β 1.744, γ 1.792, 2*V*(meas.) 70°, 2*V*(calc.) 70°
14.47(100), 6.43(20), 4.83(10), 3.025(40), 2.881(20)

IMA No. **2002-030**

Mg₂(BO₃)F Isostructural with Mg₂(BO₃)F;
Orthorhombic, *Pna2₁* structure determined
a 20.490, *b* 4.571, *c* 11.890 Å

Colorless; vitreous; transparent

Biaxial (+), α 1.609, β 1.620, γ 1.642, 2*V*(meas.) 65°, 2*V*(calc.) 71°
2.743(77), 2.474(49), 2.414(46), 2.241(100), 2.234(49), 1.708(92), 1.705(44)

IMA No. **2002-031**

Na₂K(Y,REE) [Si₆O₁₅] K and REE analogue
of Na₃Y [Si₆O₁₅]
Orthorhombic, *Ibmm* structure determined
a 10.623, *b* 14.970, *c* 8.552 Å

White; vitreous; transparent

Biaxial (+), α 1.555, β 1.558, γ 1.566, 2*V*(meas.) 64°, 2*V*(calc.) 63°
5.32(35), 4.98(100), 3.45(50), 3.26(85), 3.05(75), 2.753(42), 2.490(45)

IMA No. **2002-033**

Na₁₋₂(Ti,Fe³⁺)₄(Si₇Al)
O₂₂(OH)₄(H₂O) Related to vinogradovite;
Triclinic, *P1* structure determined
a 5.2533, *b* 8.7411, *c* 12.9480 Å, α 70.47, β 78.47, γ 89.93°

White; vitreous; translucent to transparent

Biaxial (–), α 1.707, β 1.741, γ 1.755, 2*V*(meas.) 64°, 2*V*(calc.) 64°
11.9(58), 5.98(35), 5.88(65), 4.35(38), 3.182(100), 3.085(29), 2.735(21)

IMA No. **2002-034**

CdSO₄•4H₂O Rozenite group
Monoclinic, *P2₁/n*
a 6.5859, *b* 14.329, *c* 8.5712 Å, β 91.51°

Colorless to light blue; vitreous, transparent

Uniaxial (–), α 1.430, β 1.454, γ 1.470, 2*V*(meas.) ~70°, 2*V*(calc.) 77.3°
5.98(85), 4.84(70), 3.146(85), 2.967(85), 2.708(75), 2.654(100)

IMA No. **2002-035**

(□,Cu²⁺,V³⁺)₈Al₈(PO₄)₈F₈(H₂O)₂₃ New structure-type
Orthorhombic, *Pmmm*
a 12.123, *b* 18.999, *c* 4.961 Å

Pale green to turquoise; vitreous; translucent

Biaxial (–), α 1.540, β 1.548, γ 1.553, 2*V*(meas.) 76°, 2*V*(calc.) 76°
9.54(80), 6.08(100), 5.62(90), 3.430(40), 2.983(60), 2.661(40)

IMA No. **2002-036**

(Ba,Ca)₂Al₃(Si,Al)₄O₁₀(CO₃)(OH)₆•*n*H₂O Surite group
Monoclinic, *C2/m*, *C2* or *Cm*
a 5.176, *b* 8.989, *c* 16.166 Å, γ 96.44°

White with light greenish tint; pearly; translucent

Biaxial (–), α 1.580, β 1.625, γ 1.625, 2*V*(meas.) 0–10°, 2*V*(calc.) 0°
4.49(90), 3.68(60), 2.585(100), 2.230(90), 2.069(80), 1.692(60)

IMA No. **2002-037**

(Ca,Na)(Ba,K)(Fe²⁺,Mn)₄
Ti₂(Si₄O₁₄)O₂(F,OH,O)₃ Bafertsite series;
Monoclinic, *C2* structure determined
a 10.723, *b* 13.826, *c* 20.791 Å, β 95.00°

Brownish red; vitreous; transparent to translucent

Biaxial (–), α 1.790(calc.), β 1.858, γ 1.888, 2*V*(meas.) 65°
10.39(20), 3.454(100), 3.186(15), 2.862(15), 2.592(70), 2.074(40), 1.728(15)

- IMA No. **2002-038**
 $\text{Mg}_2(\text{Al}_{1-2x}\text{Mg}_x\text{Sn}_x)(\text{BO}_3)\text{O}_2$ Hulsite group;
 Monoclinic, $P2/m$ structure determined
 a 5.3344, b 3.0300, c 10.506 Å, β 94.46°
 Brown to blue-green in transmitted light; luster not observed; transparent
 Biaxial (+), α' 1.78, γ' 1.805, $2V(\text{meas.})$ 33°, $2V(\text{calc.})$ 39°
 10.47(29), 5.24(49), 4.90(32), 2.618(50), 2.532(100), 2.318(30), 2.001(54), 1.515(28)
- IMA No. **2002-039**
 $\text{Hg}^{1+}_4\text{Al}(\text{PO}_4)_{1.74}(\text{OH})_{1.78}$ New structure-type
 Monoclinic, $C2/c$
 a 17.022, b 9.074, c 7.015 Å, β 101.20°
 Colorless to white; vitreous; transparent to translucent
 Biaxial (+), $n(\text{calc.})$ 1.94
 8.33(100), 4.74(50), 2.979(80), 2.952(50), 2.784(80), 2.660(75)
- IMA No. **2002-041**
 $\text{KPb}_{1.5}\text{ZnCu}_6\text{O}_2(\text{SeO}_3)_2\text{Cl}_{10}$ New structure-type
 Orthorhombic, $Pnmm$
 a 9.132, b 19.415, c 13.213 Å
 Olive green; vitreous, transparent
 Biaxial (-), no indices of refraction given
 8.26(70), 7.63(60), 4.11(90), 3.660(100), 2.996(40), 2.887(50), 2.642(40)
- IMA No. **2002-043**
 $\text{Na}_2(\text{Ba,K})_6\text{Ce}_2\text{Fe}^{2+}\text{Ti}_3\text{Si}_{12}\text{O}_{36}(\text{OH})_3(\text{OH},\text{H}_2\text{O})_9$ New structure-type
 Trigonal, $R\bar{3}$
 a 10.713, c 60.67 Å
 Yellowish orange; vitreous; transparent
 Uniaxial (+), ω 1.705, ϵ 1.708
 10.12(27), 3.236(100), 3.094(21), 2.654(38), 2.642(44), 2.234(19), 2.026(61)
- IMA No. **2002-047**
 $\text{Zn}_2\text{Te}_3\text{O}_8$ Related to spiroffite
 Monoclinic, $C2/c$
 a 12.676, b 5.198, c 11.781 Å, β 99.6(1)°
 Grey; vitreous; translucent
 In reflected light (air): grey; internal reflections not observed, anisotropy weak. R_{\min} and R_{\max} : 6.7–7.3% (460 nm), 7.4–7.8% (540 nm)
 4.76(w), 3.240(w), 2.928(m), 2.820(w), 2.155(w), 1.985(w), 1.599(w)
- IMA No. **2002-048**
 $\text{K}(\text{Na})_2(\text{Mn,Fe,Mg})_2(\text{Be,Al})_3[\text{Si}_{12}\text{O}_{30}]$ Milarite group;
 Hexagonal, $P6/mcc$ structure determined
 a 9.997, c 14.090 Å
 Yellow to orange; vitreous; transparent
- Uniaxial (-), ω 1.560, ϵ 1.559
 7.05(40), 5.00(40), 4.08(80), 3.187(90), 2.882(100), 2.732(50), 1.826(40)
- IMA No. **2002-049**
 $(\text{Mn}^{2+},\text{Ca})(\text{Ce,REE})\text{AlMn}^{3+}\text{Mn}^{2+}\text{Si}_2\text{O}_7\text{SiO}_4\text{O}(\text{OH})$ Epidote group;
 Monoclinic, $P2_1/m$ structure determined
 a 8.901, b 5.738, c 10.068 Å, β 113.425°
 Dark brown; vitreous to adamantine; transparent
 Biaxial (+), $\alpha > 1.74$, $2V(\text{meas.})$ 81°
 3.51(37), 2.896(100), 2.713(34), 2.707(43), 2.622(58), 2.591(32), 2.185(31)
- IMA No. **2002-050**
 $\text{Ca}_4\text{AlSi}(\text{SO}_4)\text{F}_{13}\cdot 12\text{H}_2\text{O}$ Related to chukhrovite-(Ce)
 Cubic, $Fd\bar{3}$
 a 16.722 Å
 White to yellowish; vitreous; transparent
 Isotropic; $n(\text{calc.})$ 1.430
 9.63(100), 5.91(46), 5.04(27), 4.17(19), 3.219(32), 2.235(28), 2.178(33)
- IMA No. **2002-051**
 $(\text{Na,K})\text{Ca}_2(\text{Mg}_3\text{Al}_2)\text{Si}_5\text{Al}_3\text{O}_{22}(\text{OH})_2$ Amphibole group;
 Monoclinic, $C2/m$ structure determined
 a 9.905, b 18.00, c 5.322 Å, β 105.47°
 Brownish black; vitreous; translucent
 Biaxial (+), α 1.674, β (calc.) 1.683, γ 1.694, $2V(\text{meas.})$ 85°
 8.47(70), 3.38(60), 3.13(70), 2.70(100), 2.59(70), 2.57(100), 2.16(60), 1.447(60)
- IMA No. **2002-052**
 $\text{K}[(\text{Al,Zn})_2(\text{As,Si})_2\text{O}_8]$ Feldspar group;
 Monoclinic, $C2/c$ structure determined
 a 13.416, b 13.370, c 8.772 Å, β 100.067°
 Colorless; vitreous; transparent
 Biaxial (-), α 1.532, β 1.535, γ 1.537, $2V(\text{meas.})$ 60°; $2V(\text{calc.})$ 78°
 4.33(70), 3.90(70), 3.364(100), 3.300(50), 3.066(40), 2.981(60), 2.646(40)
- IMA No. **2002-053**
 $\text{Tl}_6\text{Ag}_3\text{Cu}_6\text{As}_9\text{S}_{21}$ Related to imhofite;
 Triclinic, $P\bar{1}$ structure determined
 a 12.138, b 12.196, c 15.944 Å, α 78.537, β 84.715, γ 60.470°
 Black; metallic; translucent
 In reflected light (air): white; internal reflections frequent, anisotropy weak. R : 30.7% (460 nm), 29.4% (540 nm), 28.2% (580 nm), 26.8% (640 nm)
 15.63(100), 3.531(80), 3.263(50), 3.143(90), 2.978(60), 2.911(70), 2.520(60)

- IMA No. **2002-054**
 $\text{La}(\text{CO}_3)(\text{OH})$ Ancylyte group
 Orthorhombic, *Pmcn*
 a 4.986, b 8.513, c 7.227 Å
 Pale pinkish purple to white; vitreous; diaphaneity not given
 No optical data provided
 d_{100} 4.31(100), d_{110} 3.69(72), d_{111} 2.93(57), d_{200} 2.64(30), d_{210} 2.49(29), d_{220} 2.33(50), d_{300} 2.06(48), d_{310} 1.994(35)
- IMA No. **2002-055**
 $\text{Na}_{12}\text{Sr}_3\text{Ca}_6\text{Fe}_3\text{Zr}_3\text{NbSi}_{25}\text{O}_{73}(\text{O},\text{OH},\text{H}_2\text{O})_3\text{Cl}_2$
 Eudialyte group;
 Trigonal, *R3m* structure determined
 a 14.286, c 29.99 Å
 Clove brown to yellowish brown; vitreous; transparent
 Uniaxial (-), ω 1.649, ϵ 1.638
 d_{100} 11.49(50), d_{110} 9.51(90), d_{111} 3.43(90), d_{200} 3.19(80), d_{210} 2.98(100), d_{220} 2.86(100)
- IMA No. **2002-056**
 $(\text{Na},\square)_{12}(\text{Na},\text{Ce})_3\text{Ca}_6\text{Mn}_3\text{Zr}_3\text{Nb}(\text{Si}_{25}\text{O}_{73})(\text{OH})_3(\text{CO}_3)\cdot\text{H}_2\text{O}$
 Eudialyte group;
 Trigonal, *R3m* structure determined
 a 14.239, c 30.039 Å
 Yellow; vitreous; transparent
 Uniaxial (-), ω 1.645, ϵ 1.635
 d_{100} 6.39(25), d_{110} 4.30(24), d_{111} 3.204(38), d_{200} 3.155(35), d_{210} 3.019(34), d_{220} 2.970(83), d_{300} 2.849(100), d_{310} 2.134(23)
- IMA No. **2002-057**
 $(\text{Na},\square)_{12}(\text{Ce},\text{Na})_3\text{Ca}_6\text{Mn}_3\text{Zr}_3\text{Nb}(\text{Si}_{25}\text{O}_{73})(\text{OH})_3(\text{CO}_3)\cdot\text{H}_2\text{O}$
 Eudialyte group;
 Trigonal, *R3m* structure determined
 a 14.248, c 30.076 Å
 Cream; vitreous; transparent
 Uniaxial(-), ω 1.648, ϵ 1.637
 d_{100} 4.32(51), d_{110} 3.975(37), d_{111} 3.536(33), d_{200} 3.220(100), d_{210} 3.166(56), d_{220} 2.979(95), d_{300} 2.857(88)
- IMA No. **2002-058**
 $\text{Cu}_4\text{AgPb}_2\text{Bi}_9\text{S}_{18}$ Related to makovickyite;
 Monoclinic, *C2/m* structure determined
 a 13.396, b 4.013, c 29.93 Å, β 100.07°
 Grey; metallic; opaque
 In reflected light (air): greyish white; internal reflections not observed, anisotropy moderate. R_{\min} and R_{\max} : 42.3–48.5% (460 nm), 41.1–47.1% (540 nm), 40.0–46.0% (580 nm), 39.8–45.2% (640 nm)
 d_{100} 3.645(56), d_{110} 3.486(40), d_{111} 3.478(100), d_{200} 3.345(32), d_{210} 2.964(33), d_{220} 2.885(29), d_{300} 2.842(95), d_{310} 2.282(31)
- IMA No. **2002-059**
 $(\text{Ni},\text{Co},\text{Cu})_{30}(\text{As}_2\text{O}_7)_{15}$ New structure-type
 Monoclinic, *C2*
 a 33.256, b 8.482, c 14.191 Å, β 104.145°
- Dark violet-red to dark brownish red; vitreous; translucent
 In reflected light (air): dark grey; internal reflections orange, anisotropy not obvious. R : 9.63% (460 nm), 9.33% (540 nm), 9.27% (580 nm), 9.33% (640 nm)
 d_{100} 4.23(30), d_{110} 3.118(100), d_{111} 3.005(60), d_{200} 2.567(50), d_{210} 1.637(50), d_{220} 1.507(30)
- IMA No. **2002-060**
 $\text{Cu}_2\text{Pd}_3\text{Se}_4$ Chrisstanleyite series;
 Monoclinic, *P2_1/c* structure determined
 a 5.672, b 9.910, c 6.264 Å, β 115.40(2)°
 Silvery grey; metallic; opaque
 In reflected light (air): buff to grey-green; internal reflections not observed, anisotropy moderate. R_{\min} and R_{\max} : 40.4–48.4% (460 nm), 44.2–50.7% (540 nm), 44.7–50.6% (580 nm), 45.1–50.6% (640 nm)
 d_{100} 2.776(22), d_{110} 2.759(23), d_{111} 2.676(100), d_{200} 2.630(64), d_{210} 2.508(31), d_{220} 2.269(27)
- IMA No. **2002-061**
 $\text{Na}(\text{H}_3\text{O})(\text{UO}_2)_3(\text{SeO}_3)_2\text{O}_2\cdot 4\text{H}_2\text{O}$ Related to haynesite;
 Monoclinic, *P11m* structure determined
 a 6.9806, b 17.249, c 7.6460 Å, β 90.039°
 Yellow; vitreous; transparent
 Biaxial (-), α 1.597, β 1.770, γ 1.775, $2V(\text{meas.})$ 20°; $2V(\text{calc.})$ 18°
 d_{100} 8.63(43), d_{110} 7.67(100), d_{111} 7.02(33), d_{200} 3.85(40), d_{210} 3.107(77), d_{220} 2.874(53), d_{300} 1.411(30)
- IMA No. **2002-062**
 $\text{Cu}_2\text{HgPb}_{23}\text{Sb}_{27}\text{S}_{65.5}$ New structure-type
 Monoclinic, *C2* or *C2/m*
 a 43.113, b 4.059, c 37.874 Å, β 117.35°
 Black; metallic, opaque
 In reflected light (air): white; internal reflections red, anisotropy distinct. R : 39.0% (460 nm), 36.4% (540 nm), 35.2% (580 nm), 33.4% (640 nm)
 d_{100} 3.84(31), d_{110} 3.402(100), d_{111} 3.369(74), d_{200} 2.815(70), d_{210} 2.756(36), d_{220} 2.251(31), d_{300} 2.116(31), d_{310} 1.955(30)
- IMA No. **2002-063**
 $(\text{Ni},\text{Zn})\text{Al}_4(\text{VO}_3)_2(\text{OH})_{12}(\text{H}_2\text{O})_{2.5}$ Ni-dominant analogue of alvanite;
 Monoclinic, *P2_1/n* structure determined
 a 17.8098, b 5.1228, c 8.8665 Å, β 92.141°
 Colorless to white, light green to light blue; vitreous; diaphaneity not given
 Biaxial (-), α 1.653, β 1.680, γ 1.706, $2V(\text{meas.})$ 86°, $2V(\text{calc.})$ 88°
 d_{100} 8.89(100), d_{110} 7.83(100), d_{111} 3.266(50), d_{200} 1.970(80), d_{210} 1.904(70), d_{220} 1.605(50), d_{300} 1.481(80)

IMA No. **2002-064**

(K,Na, \square)(Mn²⁺,Fe²⁺,Li)₂
 (Al,Si)₄Si₄O₁₂(OH)₄(F,OH)₄ Carpholite group
 Orthorhombic, *Ccca*
a 13.715, *b* 20.302, *c* 5.138 Å
 White to straw-yellow; silky; diaphaneity not given
 Biaxial (-), α 1.578, β 1.592, γ 1.598, 2*V*(meas.) 57°, 2*V*(calc.) 66°
 5.70(100), 3.819(80), 3.43(80), 3.048(90), 2.744(80), 2.613(100), 2.050(80), 1.467(80)

IMA No. **2002-065**

(Na,K,Sr)₃₅Ca₁₂Fe₃Zr₆TiSi₅₁
 O₁₄₄(O,OH,H₂O)₉Cl₃ Eudialyte group;
 Trigonal, *R3* structure determined
a 14.239, *c* 60.733 Å
 Pink; vitreous; transparent
 Uniaxial (+), ω 1.597, ϵ 1.601
 6.45(33), 5.70(34), 4.32(68), 3.55(39), 3.230(44), 3.049(36), 2.977(100), 2.853(88)

IMA No. **2002-066**

(H₃O)₈(Na,K,Sr)₅Ca₆
 Zr₃Si₂₆O₆₆(OH)₉Cl Eudialyte group;
 Trigonal, *R3* structure determined
a 14.078, *c* 31.24 Å
 Pink; vitreous; translucent
 Uniaxial (+), ω 1.569, ϵ 1.571
 11.43(39), 10.50(44), 7.06(42), 6.63(43), 4.39(100), 3.624(41), 2.987(100), 2.850(79)

IMA No. **2002-067**

Na₁₅Ca₃Fe₃(Na,Zr)₃Zr₃(Si,Nb)
 (Si₂₅O₇₃)(OH,H₂O)₃(Cl,OH) Eudialyte group;
 Trigonal, *R3* structure determined
a 14.229, *c* 30.019 Å
 Red; vitreous; transparent
 Uniaxial (+), ω 1.608, ϵ 1.611
 11.48(33), 5.72(35), 4.31(66), 4.09(37), 3.209(58), 3.023(40), 2.974(86), 2.853(100)

PROPOSALS FROM PREVIOUS
 YEARS APPROVED IN 2002

IMA No. **2000-010**

(Na,H₃O)₁₅(Ca,Mn,REE)₆Fe³⁺₂Zr₃(\square ,Zr)
 (\square ,Si)₂₄O₆₆(O,OH)₆Cl•nH₂O Eudialyte group;
 Trigonal, *R3m* structure determined
a 14.167, *c* 30.081 Å
 Yellow; vitreous; translucent
 Uniaxial (+), ω 1.612, ϵ 1.615
 6.41(41), 4.30(91), 3.521(57), 3.205(44), 2.963(92), 2.841(100), 2.588(37)

IMA No. **2000-028**

Na₂₇K₈Ca₁₂Fe₃Zr₆Si₅₂
 O₁₄₄(OH,O)₆Cl₂ Eudialyte group;
 Trigonal, *R3m* structure determined
a 14.249, *c* 60.969 Å
 Pink; vitreous; transparent
 Uniaxial (+), ω 1.598, ϵ 1.600
 6.48(47), 4.34(81), 3.565(41), 3.249(57), 2.987(100), 2.861(73), 2.695(40)

IMA No. **2001-069**

Na(Na_{1.0-1.5}Li_{0.5-1.0})₂
 (Fe³⁺₂Mg₂Li)Si₈O₂₂(OH)₂ Amphibole group;
 Monoclinic, *C2/m* structure determined
a 9.712, *b* 17.851, *c* 5.297 Å, β 103.63(2)°
 Bluish black; vitreous; translucent
 No optical data could be given
 3.392(33), 3.098(37), 2.701(100), 2.576(14), 2.524(100), 2.157(20), 1.646(20), 1.581(15)

IMA No. **2001-070**

Ca₃(PO₄) Related to whitlockite
 Trigonal, *R3m*
a 5.258, *c* 18.727 Å
 White to yellowish grey; vitreous; diaphaneity not given
 Uniaxial (+), ω 1.706, ϵ 1.701
 2.891(80), 2.628(100), 2.214(20), 2.078(12), 2.047(16), 1.945(47), 1.730(25)

NOMENCLATURE MODIFICATIONS 1998-2002

IMA Case 98-D: discreditation

Monsmedite = **voltaite**

IMA Case 98-E: discreditation

Arsenobismite = mixture of **preisingerite**, minor **atelestite** and minor **beudantite** or **segnite**

IMA Case 99-A: discreditation

Platynite = mixture of **laitakarite** and selenian **galena**

IMA Case 99-B: redefinition

Peprossite-(Ce) is (Ce,La)(Al₃O)_{2/3}B₄O₁₀ (approximate ideal formula)

IMA Case 00-A: redefinition

Vuoriyarvite = **vuoriyarvite-K**Kuzmenkoite = **kuzmenkoite-Mn**Lemmleinite = **lemmleinite-K**

Labuntsovite (of Semenov & Burova 1955) =

labuntsovite-MnLabuntsovite (of Milton *et al.* 1958) =**paralabuntsovite-Mg**

IMA Case 00-B: revalidation

Kurgantaite

IMA Case 00–C: discreditation
 Baiyuneboite-(Ce) = **cordylite-(Ce)**

IMA Case 00–D: redefinition
 The nomenclature of the joaquinite group is redefined to conform with the Levinson system. The members of the group are: **orthojoaquinite-(La)**, **joaquinite-(Ce)**, **orthojoaquinite-(Ce)**, **strontiojoaquinite**, **strontio-orthojoaquinite**, **bario-orthojoaquinite**, **byelorussite-(Ce)**.

IMA Case 00–E: redefinition
Destinezite is triclinic $\text{Fe}_2(\text{PO}_4)(\text{SO}_4)(\text{OH})\cdot 6\text{H}_2\text{O}$

IMA Case 00–F: redefinition
 Hellandite = **hellandite-(Y)**
 Tadzshikite = **tadzshikite-(Ce)**

IMA Case 00–G: redefinition
 Neotype approved, and **magnesium-zippeite** is redefined as monoclinic $\text{Mg}(\text{UO}_2)_2(\text{SO}_4)(\text{OH})_4\cdot 1.5\text{H}_2\text{O}$

IMA Case 01–A: redefinitions
 Högbomite-8H = **magnesiohögbomite-2N2S**
 Högbomite-10T = **magnesiohögbomite-2N3S**
 Högbomite-24R = **magnesiohögbomite-6N6S**
 Zincohögbomite-8H = **zincohögbomite-2N2S**
 Zincohögbomite-16H = **zincohögbomite-2N6S**
 Nigerite-6T = **ferronigerite-2N1S**
 Nigerite-24R = **ferronigerite-6N6S**
 Pengzhizhongite-6T = **magnesionigerite-2N1S**
 Pengzhizhongite-24R = **magnesionigerite-6N6S**
 Taaffeite = **magnesiotaaffeite-2N'2S**
 Musgravite = **magnesiotaaffeite-6N'3S**
 Pehrmanite = **ferrotaaffeite-6N'3S**

IMA Case 01–B: discreditation
 Duhamelite = **mottramite**

IMA Case 02–A: redefinition and discreditation
 Squawcreekite (of Foord *et al.* 1991) = **tripuhyite**, redefined as FeSbO_4

IMA Case 02–B: redefinition
Arhbarite is redefined as triclinic $\text{Cu}_2\text{Mg}(\text{AsO}_4)(\text{OH})_3$

IMA Case 02–D: corrected spelling
 Mahlmoodite = **malhmoodite**
 Approval of change in name
 Magnocolumbite = **magnesiocolumbite**