

**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 any relationship to other minerals;  
Crystal system, space group structure analysis  
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. 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

**IMA No. 2002-001**

(Ce,La,Nd,Ba)(Fe<sup>3+</sup>,Al)<sub>3</sub>

[(As,Al)O<sub>4</sub>]<sub>2</sub>(OH)<sub>6</sub>

Trigonal, *R* $\bar{3}m$

*a* 7.260, *c* 16.77 Å

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)

**IMA No. 2002-002**

(□,K)(Mg, Fe<sup>2+</sup>)<sub>3</sub>Fe<sup>3+</sup><sub>2</sub>[Si<sub>12</sub>O<sub>30</sub>]

Hexagonal, *P*6/*mcc*

*a* 10.050, *c* 14.338 Å

Fe-dominant analogue of  
arsenoflorencite-(Ce)

Milarite group;  
structure determined

Deep blue to yellowish green; vitreous; translucent

Uniaxial (–),  $\omega$  1.589,  $\epsilon$  1.586

8.70(97), 7.17(100), 5.535(96), 5.026(61), 4.352(53),

3.207(85)

**IMA No. 2002-003**

NaSrKZn(Ti,Nb)<sub>4</sub>(Si<sub>4</sub>O<sub>12</sub>)<sub>2</sub>(O,OH)<sub>4</sub>•7H<sub>2</sub>O

Monoclinic, *Cm* Labuntsovite group;

structure determined

*a* 14.495, *b* 13.945, *c* 7.838 Å,  $\beta$  117.75°

White, pale brown; vitreous; translucent to transparent

Biaxial (+),  $\alpha$  1.680,  $\beta$  1.687,  $\gamma$  1.787, 2*V*(meas.) 25°,

2*V*(calc.) 31°

6.96(100), 3.21(80), 3.11(90), 2.60(35), 2.50(40),

1.74(30), 1.70(40)

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**IMA No. 2002-004**

CoSO<sub>4</sub>•H<sub>2</sub>O Kieserite group  
 Monoclinic, *C2/c*  
 $a$  6.980,  $b$  7.588,  $c$  7.639 Å,  $\beta$  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**

(K,Ba,Na)<sub>2</sub>(Ti,Nb)<sub>2</sub>(Si<sub>4</sub>O<sub>12</sub>)(OH,O)<sub>2</sub>•3H<sub>2</sub>O  
 Labuntsovite group;  
 Monoclinic, *Cm* structure determined  
 $a$  14.327,  $b$  13.802,  $c$  7.783 Å,  $\beta$  116.95°  
 Light brown, white, and colorless; vitreous; transparent  
 Biaxial (+),  $\alpha$  1.689,  $\beta$  1.700,  $\gamma$  1.775, 2*V*(meas.) 35°,  
 2*V*(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**

(Ba,Na,K)<sub>2-x</sub>(Ti,Nb)<sub>2</sub>(Si<sub>4</sub>O<sub>12</sub>)(OH,O)<sub>2</sub>•4H<sub>2</sub>O  
 Labuntsovite group;  
 Monoclinic, *C2/m* structure determined  
 $a$  14.551,  $b$  14.001,  $c$  15.702 Å,  $\beta$  117.58°  
 Brown; vitreous; transparent  
 Biaxial (+),  $\alpha$  1.667,  $\beta$  1.674,  $\gamma$  1.770, 2*V*(meas.) 30°,  
 2*V*(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**

NaK<sub>3</sub>Fe(Ti,Nb)<sub>4</sub>(Si<sub>4</sub>O<sub>12</sub>)<sub>2</sub>  
 (O,OH)<sub>4</sub>•6H<sub>2</sub>O Labuntsovite group;  
 Monoclinic, *Cm* structure determined  
 $a$  14.450,  $b$  13.910,  $c$  7.836 Å,  $\beta$  117.42°  
 Pale brown; vitreous; translucent to transparent  
 Biaxial (+),  $\alpha$  1.677,  $\beta$  1.684,  $\gamma$  1.790, 2*V*(meas.) 25°,  
 2*V*(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**

Na<sub>2</sub>H(PO<sub>4</sub>)•8H<sub>2</sub>O New structure-type  
 Orthorhombic, *Ibca*  
 $a$  11.488,  $b$  11.647,  $c$  16.435 Å  
 Colorless; vitreous to resinous; transparent  
 Biaxial (-),  $\alpha$  1.443,  $\beta$  1.457,  $\gamma$  1.458, 2*V*(meas.) 29°,  
 2*V*(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**

NaNa<sub>2</sub>(Al<sub>2</sub>Mg<sub>3</sub>)(Si<sub>7</sub>Al)O<sub>22</sub>(F,OH)<sub>2</sub> Amphibole group;  
 Monoclinic, *C2/m* structure determined  
 $a$  9.666,  $b$  17.799,  $c$  5.311 Å,  $\beta$  104.10°

Bluish grey; luster not given; translucent  
 Biaxial (+),  $\alpha$  1.633,  $\beta$  1.624,  $\gamma$  1.626, 2*V* 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**

GaO(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**

Na<sub>2</sub>(Na,Ca)<sub>4</sub>Ca<sub>4</sub>(Mn,Ca)<sub>2</sub>  
 Zr<sub>2</sub>Ti<sub>2</sub>(Si<sub>2</sub>O<sub>7</sub>)<sub>4</sub>(O,F)<sub>4</sub>F<sub>4</sub> Rosenbuschite group;  
 Triclinic, *P1* structure determined  
 $a$  10.032,  $b$  11.333,  $c$  7.202 Å,  $\alpha$  90.19,  $\beta$  100.33,  $\gamma$   
 111.55°  
 Colorless to pale shade of brown; vitreous; transparent  
 Biaxial (+),  $\alpha$  1.684,  $\beta$  1.695,  $\gamma$  1.718, 2*V*(meas.) 73°,  
 2*V*(calc.) 70°  
 3.951(30), 3.028(60), 2.908(100), 2.600(80), 1.868(60),  
 1.670(50)

**IMA No. 2002-013**

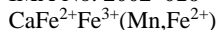
Ba<sub>3</sub>NaCe(PO<sub>4</sub>)<sub>3</sub>(F,Cl) Ba-dominant analogue  
 of belovite-(Ce);  
 Trigonal, *P $\bar{3}$*  structure determined  
 $a$  9.909,  $c$  7.402 Å  
 Light rose; vitreous; translucent  
 Uniaxial (-),  $\omega$  1.694,  $\epsilon$  1.669  
 4.078(40), 3.693(40), 2.969(100), 2.867(60), 1.965(80),  
 1.863(60)

**IMA No. 2002-014**

Pb<sub>3</sub>[(UO<sub>2</sub>)<sub>6</sub>O<sub>8</sub>(OH)<sub>2</sub>](H<sub>2</sub>O)<sub>x</sub>,  $x \approx 3$  New structure-type  
 Monoclinic, *C2/c*  
 $a$  28.355,  $b$  11.990,  $c$  13.998 Å,  $\beta$  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**

BaBe<sub>2</sub>Si<sub>2</sub>O<sub>7</sub> Dimorphous with barylite;  
 Monoclinic, *Pm* structure determined  
 $a$  11.637,  $b$  4.918,  $c$  4.668 Å,  $\beta$  89.80°  
 Colorless; vitreous; transparent  
 Biaxial (+),  $\alpha$  1.698,  $\beta$  1.700,  $\gamma$  1.705, 2*V*(meas.) 70°,  
 2*V*(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** $(\text{Si}_2\text{O}_7)\text{O}(\text{OH})$  Mn-dominant analogue of ilvaiteMonoclinic,  $P2_1/a$ 

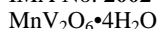
$a$  13.0246,  $b$  8.8511,  $c$  5.8485 Å,  $\beta$  90.17°

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**

New structure-type

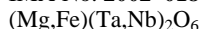
Monoclinic,  $C2/c$ 

$a$  13.171,  $b$  10.128,  $c$  6.983 Å,  $\beta$  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**

Columbite–tantalite group

Orthorhombic,  $Pbcn$ 

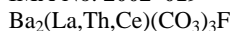
$a$  14.355,  $b$  5.735,  $c$  5.058 Å

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**

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

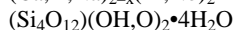
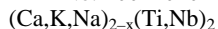
Monoclinic,  $P2_1/m$ 

$a$  13.396,  $b$  5.111,  $c$  6.672 Å,  $\beta$  106.63°

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

Biaxial (–),  $\alpha$  1.581,  $\beta$  1.715,  $\gamma$  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**

Labuntsovitte group; structure determined

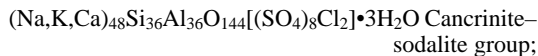
Monoclinic,  $C2/m$ 

$a$  14.484,  $b$  14.191,  $c$  7.907 Å,  $\beta$  117.26°

White, pale brownish; vitreous; transparent

Biaxial (+),  $\alpha$  1.666,  $\beta$  1.676,  $\gamma$  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**

Hexagonal or trigonal,

 $P\bar{6}2c$  or  $P31c$ 

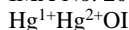
structure discussed

$a$  12.880,  $c$  31.761 Å

Colorless; vitreous; transparent

Uniaxial(+),  $\epsilon$  1.497,  $\omega$  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**

Related to terlinguaite;

Monoclinic,  $C2/c$ 

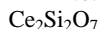
new structure-type

$a$  17.580,  $b$  6.979,  $c$  6.693 Å,  $\beta$  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)

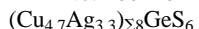
**IMA No. 2002-023**Isostructural with  $\text{Ln}_2\text{Si}_2\text{O}_7$ Trigonal,  $P4_1$ 

$a$  6.781,  $c$  24.689 Å

White to colorless; resinous; transparent

Uniaxial(+),  $\omega$  1.840,  $\epsilon$  1.846

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

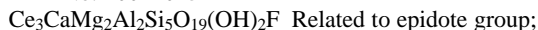
**IMA No. 2002-024**Argentine variety of  $\alpha$ - $\text{Cu}_8\text{GeS}_6$ Cubic,  $F43m$ 

$a$  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**

Related to epidote group;

Monoclinic,  $P2_1/m$ 

structure determined

$a$  8.939,  $b$  5.706,  $c$  15.855 Å,  $\beta$  94.58°

Dark brown; vitreous

Biaxial(+),  $\alpha$  1.781,  $\beta$  1.792(calc.),  $\gamma$  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)<sub>6</sub>(Ca,Na)<sub>3</sub>Si<sub>16</sub>O<sub>38</sub>(F,OH)<sub>2</sub>•3H<sub>2</sub>OTriclinic, *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)

Reyerite group;  
structure determined

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**Na<sub>1-2</sub>(Ti,Fe<sup>3+</sup>)<sub>4</sub>(Si<sub>7</sub>Al)O<sub>22</sub>(OH)<sub>4</sub>(H<sub>2</sub>O)Triclinic, *P1**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)

Related to vinogradovite;  
structure determined**IMA No. 2002-027**BaB<sub>2</sub>Si<sub>2</sub>O<sub>8</sub>Orthorhombic, *Pnma**a* 8.141, *b* 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)

Ba-dominant analogue of danburite;  
structure determined**IMA No. 2002-034**CdSO<sub>4</sub>•4H<sub>2</sub>OMonoclinic, *P2<sub>1</sub>/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)

Rozenite group

**IMA No. 2002-028**Ca<sub>0.3</sub>(Fe<sup>2+</sup>,Mg,Fe<sup>3+</sup>)<sub>3</sub>(Si,Al)<sub>4</sub>O<sub>10</sub>(OH)<sub>2</sub>•4H<sub>2</sub>OMonoclinic, 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)

Smectite group

**IMA No. 2002-035**(□,Cu<sup>2+</sup>,V<sup>3+</sup>)<sub>8</sub>Al<sub>8</sub>(PO<sub>4</sub>)<sub>8</sub>F<sub>8</sub>(H<sub>2</sub>O)<sub>23</sub> New structure-typeOrthorhombic, *Pmmn**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. 2002-029**Na<sub>6</sub>MnTi<sub>4</sub>Si<sub>8</sub>O<sub>28</sub>•4H<sub>2</sub>OOrthorhombic, *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)

Mn-dominant analogue  
of kukisvumite**IMA No. 2002-036**(Ba,Ca)<sub>2</sub>Al<sub>3</sub>(Si,Al)<sub>4</sub>O<sub>10</sub>(CO<sub>3</sub>)(OH)<sub>6</sub>•*n*H<sub>2</sub>O Surite groupMonoclinic, *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. 2002-030**Mg<sub>2</sub>(BO<sub>3</sub>)FOrthorhombic, *Pna2<sub>1</sub>**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)

Isostructural with Mg<sub>2</sub>(BO<sub>3</sub>)F;  
structure determined**IMA No. 2002-037**(Ca,Na)(Ba,K)(Fe<sup>2+</sup>,Mn)<sub>4</sub>Ti<sub>2</sub>(Si<sub>4</sub>O<sub>14</sub>)O<sub>2</sub>(F,OH,O)<sub>3</sub>Monoclinic, *C2**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)

Bafertsite series;  
structure determined**IMA No. 2002-031**Na<sub>2</sub>K(Y,REE) [Si<sub>6</sub>O<sub>15</sub>]Orthorhombic, *Ibmm**a* 10.623, *b* 14.970, *c* 8.552 ÅK and REE analogue  
of Na<sub>3</sub>Y [Si<sub>6</sub>O<sub>15</sub>];  
structure determined

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,  $\beta$  94.46°

Brown to blue-green in transmitted light; luster not observed; transparent

Biaxial (+),  $\alpha'$  1.78,  $\gamma'$  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,  $\beta$  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,  $Pnmm$   
 $\alpha$  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 (+),  $\omega$  1.705,  $\varepsilon$  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,  $\beta$  99.6(1)°

Grey; vitreous; translucent

In reflected light (air): grey; internal reflections not observed, anisotropy weak.  $R_{\text{min}}$  and  $R_{\text{max}}$ : 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 (–),  $\omega$  1.560,  $\varepsilon$  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,  $\beta$  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,  $\beta$  105.47°

Brownish black; vitreous; translucent

Biaxial (+),  $\alpha$  1.674,  $\beta$  (calc.) 1.683,  $\gamma$  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,  $\beta$  100.067°

Colorless; vitreous; transparent

Biaxial (–),  $\alpha$  1.532,  $\beta$  1.535,  $\gamma$  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,  $\alpha$  78.537,  $\beta$  84.715,  $\gamma$  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**

La(CO<sub>3</sub>)(OH) Ancylyte group  
 Orthorhombic, *Pm**cn*  
 $a$  4.986,  $b$  8.513,  $c$  7.227 Å  
 Pale pinkish purple to white; vitreous; diaphaneity not given  
 No optical data provided  
 4.31(100), 3.69(72), 2.93(57), 2.64(30), 2.49(29), 2.33(50), 2.06(48), 1.994(35)

**IMA No. 2002-055**

Na<sub>12</sub>Sr<sub>3</sub>Ca<sub>6</sub>Fe<sub>3</sub>Zr<sub>3</sub>NbSi<sub>25</sub>O<sub>73</sub>(O,OH,H<sub>2</sub>O)<sub>3</sub>Cl<sub>2</sub> Eudialyte group;  
 structure determined  
 Trigonal, *R3m*  
 $a$  14.286,  $c$  29.99 Å  
 Clove brown to yellowish brown; vitreous; transparent  
 Uniaxial (–),  $\omega$  1.649,  $\varepsilon$  1.638  
 11.49(50), 9.51(90), 3.43(90), 3.19(80), 2.98(100), 2.86(100)

**IMA No. 2002-056**

(Na,□)<sub>12</sub>(Na,Ce)<sub>3</sub>Ca<sub>6</sub>Mn<sub>3</sub>Zr<sub>3</sub>Nb  
 (Si<sub>25</sub>O<sub>73</sub>)(OH)<sub>3</sub>(CO<sub>3</sub>)•H<sub>2</sub>O Eudialyte group;  
 structure determined  
 Trigonal, *R3m*  
 $a$  14.239,  $c$  30.039 Å  
 Yellow; vitreous; transparent  
 Uniaxial (–),  $\omega$  1.645,  $\varepsilon$  1.635  
 6.39(25), 4.30(24), 3.204(38), 3.155(35), 3.019(34), 2.970(83), 2.849(100), 2.134(23)

**IMA No. 2002-057**

(Na,□)<sub>12</sub>(Ce, Na)<sub>3</sub>Ca<sub>6</sub>Mn<sub>3</sub>Zr<sub>3</sub>  
 Nb(Si<sub>25</sub>O<sub>73</sub>)(OH)<sub>3</sub>(CO<sub>3</sub>)•H<sub>2</sub>O Eudialyte group;  
 structure determined  
 Trigonal, *R3m*  
 $a$  14.248,  $c$  30.076 Å  
 Cream; vitreous; transparent  
 Uniaxial(–),  $\omega$  1.648,  $\varepsilon$  1.637  
 4.32(51), 3.975(37), 3.536(33), 3.220(100), 3.166(56), 2.979(95), 2.857(88)

**IMA No. 2002-058**

Cu<sub>4</sub>AgPb<sub>2</sub>Bi<sub>9</sub>S<sub>18</sub> Related to makovickyite;  
 structure determined  
 Monoclinic, *C2/m*  
 $a$  13.396,  $b$  4.013,  $c$  29.93 Å,  $\beta$  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)  
 3.645(56), 3.486(40), 3.478(100), 3.345(32), 2.964(33), 2.885(29), 2.842(95), 2.282(31)

**IMA No. 2002-059**

(Ni,Co,Cu)<sub>30</sub>(As<sub>2</sub>O<sub>7</sub>)<sub>15</sub> New structure-type  
 Monoclinic, *C2*  
 $a$  33.256,  $b$  8.482,  $c$  14.191 Å,  $\beta$  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)  
 4.23(30), 3.118(100), 3.005(60), 2.567(50), 1.637(50), 1.507(30)

**IMA No. 2002-060**

Cu<sub>2</sub>Pd<sub>3</sub>Se<sub>4</sub> Chrisstanleyite series;  
 structure determined  
 Monoclinic, *P2<sub>1</sub>/c*  
 $a$  5.672,  $b$  9.910,  $c$  6.264 Å,  $\beta$  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)  
 2.776(22), 2.759(23), 2.676(100), 2.630(64), 2.508(31), 2.269(27)

**IMA No. 2002-061**

Na(H<sub>3</sub>O)(UO<sub>2</sub>)<sub>3</sub>(SeO<sub>3</sub>)<sub>2</sub>O<sub>2</sub>•4H<sub>2</sub>O Related to haynesite;  
 structure determined  
 Monoclinic, *P11m*  
 $a$  6.9806,  $b$  17.249,  $c$  7.6460 Å,  $\beta$  90.039°  
 Yellow; vitreous; transparent  
 Biaxial (–),  $\alpha$  1.597,  $\beta$  1.770,  $\gamma$  1.775,  $2V(\text{meas.})$  20°;  $2V(\text{calc.})$  18°  
 8.63(43), 7.67(100), 7.02(33), 3.85(40), 3.107(77), 2.874(53), 1.411(30)

**IMA No. 2002-062**

Cu<sub>2</sub>HgPb<sub>23</sub>Sb<sub>27</sub>S<sub>65.5</sub> New structure-type  
 Monoclinic, *C2* or *C2/m*  
 $a$  43.113,  $b$  4.059,  $c$  37.874 Å,  $\beta$  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)  
 3.84(31), 3.402(100), 3.369(74), 2.815(70), 2.756(36), 2.251(31), 2.116(31), 1.955(30)

**IMA No. 2002-063**

(Ni,Zn)Al<sub>4</sub>(VO<sub>3</sub>)<sub>2</sub> Ni-dominant analogue of alvanite;  
 structure determined  
 Monoclinic, *P2<sub>1</sub>/n*  
 $a$  17.8098,  $b$  5.1228,  $c$  8.8665 Å,  $\beta$  92.141°  
 Colorless to white, light green to light blue; vitreous; diaphaneity not given  
 Biaxial (–),  $\alpha$  1.653,  $\beta$  1.680,  $\gamma$  1.706,  $2V(\text{meas.})$  86°,  $2V(\text{calc.})$  88°  
 8.89(100), 7.83(100), 3.266(50), 1.970(80), 1.904(70), 1.605(50), 1.481(80)

IMA No. **2002-064**

(K,Na, $\square$ )(Mn<sup>2+</sup>,Fe<sup>2+</sup>,Li)<sub>2</sub>  
(Al,Si)<sub>4</sub>Si<sub>4</sub>O<sub>12</sub>(OH)<sub>4</sub>(F,OH)<sub>4</sub> Carpholite group  
Orthorhombic, *Ccca*

*a* 13.715, *b* 20.302, *c* 5.138 Å

White to straw-yellow; silky; diaphaneity not given  
Biaxial (-),  $\alpha$  1.578,  $\beta$  1.592,  $\gamma$  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)<sub>35</sub>Ca<sub>12</sub>Fe<sub>3</sub>Zr<sub>6</sub>TiSi<sub>51</sub>  
O<sub>144</sub>(O,OH,H<sub>2</sub>O)<sub>9</sub>Cl<sub>3</sub> Eudialyte group;  
Trigonal, *R3* structure determined

*a* 14.239, *c* 60.733 Å

Pink; vitreous; transparent  
Uniaxial (+),  $\omega$  1.597,  $\varepsilon$  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**

(H<sub>3</sub>O)<sub>8</sub>(Na,K,Sr)<sub>5</sub>Ca<sub>6</sub>  
Zr<sub>3</sub>Si<sub>26</sub>O<sub>66</sub>(OH)<sub>9</sub>Cl Eudialyte group;  
Trigonal, *R3* structure determined

*a* 14.078, *c* 31.24 Å

Pink; vitreous; translucent  
Uniaxial (+),  $\omega$  1.569,  $\varepsilon$  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**

Na<sub>15</sub>Ca<sub>3</sub>Fe<sub>3</sub>(Na,Zr)<sub>3</sub>Zr<sub>3</sub>(Si,Nb)  
(Si<sub>25</sub>O<sub>73</sub>)(OH,H<sub>2</sub>O)<sub>3</sub>(Cl,OH) Eudialyte group;  
Trigonal, *R3* structure determined

*a* 14.229, *c* 30.019 Å

Red; vitreous; transparent  
Uniaxial (+),  $\omega$  1.608,  $\varepsilon$  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,H<sub>3</sub>O)<sub>15</sub>(Ca,Mn,*REE*)<sub>6</sub>Fe<sup>3+</sup><sub>2</sub>Zr<sub>3</sub>( $\square$ ,Zr)  
( $\square$ ,Si)Si<sub>24</sub>O<sub>66</sub>(O,OH)<sub>6</sub>Cl•nH<sub>2</sub>O Eudialyte group;  
Trigonal, *R3m* structure determined

*a* 14.167, *c* 30.081 Å

Yellow; vitreous; translucent  
Uniaxial (+),  $\omega$  1.612,  $\varepsilon$  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**

Na<sub>27</sub>K<sub>8</sub>Ca<sub>12</sub>Fe<sub>3</sub>Zr<sub>6</sub>Si<sub>52</sub>  
O<sub>144</sub>(OH,O)<sub>6</sub>Cl<sub>2</sub> Eudialyte group;  
Trigonal, *R3m* structure determined

*a* 14.249, *c* 60.969 Å

Pink; vitreous; transparent  
Uniaxial (+),  $\omega$  1.598,  $\varepsilon$  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<sub>1.0-1.5</sub>Li<sub>0.5-1.0</sub>)<sub>2</sub>  
(Fe<sup>3+</sup><sub>2</sub>Mg<sub>2</sub>Li)Si<sub>8</sub>O<sub>22</sub>(OH)<sub>2</sub> Amphibole group;  
Monoclinic, *C2/m* structure determined

*a* 9.712, *b* 17.851, *c* 5.297 Å,  $\beta$  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**

Ca<sub>3</sub>(PO<sub>4</sub>) Related to whitlockite  
Trigonal, *R3m*

*a* 5.258, *c* 18.727 Å

White to yellowish grey; vitreous; diaphaneity not given  
Uniaxial (+),  $\omega$  1.706,  $\varepsilon$  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 **segnitite**

IMA Case 99-A: discreditation  
Platynite = mixture of **laitakarite** and selenian **galena**

IMA Case 99-B: redefinition  
**Peprossiite-(Ce)** is (Ce,La)(Al<sub>3</sub>O)<sub>2/3</sub>B<sub>4</sub>O<sub>10</sub> (approximate ideal formula)

IMA Case 00-A: redefinition  
Vuoriyarvite = **vuoriyarvite-K**  
Kuzmenkoite = **kuzmenkoite-Mn**  
Lemleinite = **lemleinite-K**  
Labuntsovite (of Semenov & Burova 1955) =  
**labuntsovite-Mn**  
Labuntsovite (of Milton *et al.* 1958) =  
**paralabuntsovite-Mg**

IMA Case 00-B: revalidation  
**Kurgantaitite**

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)**

Tadzhikite = **tadzhikite-(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  $\text{FeSbO}_4$

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**