Geological Museum of Lausanne, Switzerland (MGL)
Catalogue of Type Mineral Specimens (updated March 2007)

MGL, Lausanne
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1. The Definitions of Type Mineral Specimens *(after H.A. Stalder, Natural History Museum, Bern, Switzerland)*

1.1 The Formal Definition by P.J. Dunn and J.A. Mandarino (1987)

Holotype (HT): A single specimen (designated by the author) from which all the data for the original description were obtained. Where portions of such a specimen have been sent to other museums for preservation, the author will designate each of these as "*part of the holotype*".

Cotype (CT): Specimens (designated by the author) as those used to obtain quantitative data for the original descriptions. Specimens examined only visually should not be considered cotypes.

Neotype (NT): A specimen chosen by the author of a redefinition or re-examination of a species to represent the species when the holotype or cotypes can not be found. It must be shown that every attempt has been made to locate the originally described material. Neotypes can also be designated when examination of all holotypes and cotypes has shown that the definitive unitcell parameters and chemical composition can not be experimentally determined. All neotypes require the approval of the CNMMN of the IMA.

Both holotypes and cotypes are possible, and even advantageous, for a mineral species. The use of "*holo*" here is to indicate that all the necessary data were obtained from the holotype specimen. If the author of a new mineral description chooses to designate additional samples as cotypes, this is permissible. Such cotypes are designated only if they were used to obtain quantitative, but not necessary, data. Thus, a mineral species may be represented by a holotype and one or more cotypes and/or neotypes.

Comment: These formal definitions have been accepted 1987 by two IMA-Commissions, the CNMMN and the CM. They are valid for all new mineral descriptions after 1987 (and if possible for the newer descriptions before this time).

1.2 Type Specimens in Mineralogy by P.G. Embrey and M.H. Hey (1970)

Holotype: A single specimen selected by the author of a species as its type, or the only specimen known at the time of description.

Cotypes: (more than one) Specimens other than the type used in making the original description. Ideally, cotypes should be from the same locality.

Metatype(s): Specimen(s) compared with the type by the author, and **determinated** as co-specific with it.

Ideotypes: Metatypes from a different locality.

Plesiotype(s): Specimen(s) upon which subsequent or additional description is based. This may, in some instances, be a neotype.

Neotype: A plesiotype selected to represent the holotype when the holotype is lost or destroyed.

Topotype: A specimen from the original locality, and corresponding to the original description**.**

Comment: These definitions have been accepted by many curators after their publication. But the CM decided 1987 to use the terms no more in the sens of Embrey and Hey, especially the terms ideotype and topotype. On the other hand the terms metatype and plesiotype can or must be used sometimes discussing "*old type specimens*".

1.3 Pragmatic Definitions of I.V. Pekov (1998)

A Type specimen is meant to be a studied specimen (piece, grain, polished section, etc.) of a new mineral from its Type Locality presented to a museum by the discoverer.

Type specimens may also include the material of revisional studies that confirms (**Neotypes**) or discredits (**Nekrotype**) the individuality of a mineral species in doubt.

Comment: These definitions have been used by Pekov 1998 in his book *Minerals first discovered on the Territory of the former Soviet Union*.

1.4 Pragmatic Definitions used for CTMS (since 1990)

Holo-, Co-, and Neotype based on the formal definitions of Dunn and Mandarino (1987).
Abbreviations: HT, CT and NT.

Cotype (cryst) and Cotype (chem.) Cotypes for old, but good defined CT concerning the goniometrical measurements of a crystal (or crystals) or concerning a chemical analysis.

Plesiotype based on the definition of Embrey and Hey (1970) with a designation before 1986 will accept for the CTMS.

Type the Type specimen is (only) very probably a „real“ type specimen (HT, CT or NT after Dunn and Mandarino, 1987), but at least it is a Metatype (MT, after Embrey and Hey, 1970). This definition includes also all designated type specimens of Pekov (1998).

Type Mineral Specimens are : reference samples used for the definition of a mineral species

2. Catalogue of Type Mineral Specimens preserved at the Geological Museum of Lausanne, Switzerland (MGL) *(March 2007)*

2.1 Used abbreviations

CT: cotype
HT: holotype
NT: neotype
T: type

Amer. Min. : American Mineralogist
Bull.Min. : Bulletin de Minéralogie
Bull.Soc.fr.Min.Crist. : Bulletin de la Société française de Minéralogie et de Cristallographie
C.R.Acad.Sci.Paris : Comptes Rendus de l'Académie des Sciences de Paris
Can. Min. : Canadian Mineralogist
DAN-SSSR : Doklady Akademiia Nauk, SSSR
Eur.J.Min. : European Journal of Mineralogy
Min.Mag. : Mineralogical Magazine
Neues Jahrb.Min.,Mh. : Neues Jahrbuch Mineralogische (Monatshefte)
Riviera Sci. : Riviéra Scientifique, Nice
ZVMO : Zapiski Vsesoyuznogo Mineralogicheskogo Obshchestva = Proceedings of the Russian Mineralogical Society

2.2 Alphabetical list of Type Mineral Specimens

Alluaivite
$Na_{19}(Ca,Mn^{+2})_6(Ti,Nb)_3Si_{26}O_{74}Cl \cdot 2H_2O$ - trig.
Khomyakov AP, Nechelyustov GN, Rastsvetaeva RK: ZVMO (1990) 119, n°1, 117-120
Russia - Kola Peninsula - Lovozero massif - Alluaiv Mt.
T 58950 (From A. P. Khomyakov, 1994)

Althupite
$ThAl(UO_2)_7O_2(PO_4)_4(OH)_5 \cdot 15H_2O$ - tricl.
Deliens M and Piret P: Bull.Mineral.(1987) 110, 65-72
Zaire - Kivu - Mwenga - Kobokobo open pit
T 79991 (part of type material from M. Deliens given in June 2004. EDX-analysed in Lausanne)

Ansermetite
$MnV_2O_6 \cdot 4H_2O$ - mon.
Brugger J, Berlepsch P, Meisser N, Armbruster T: Can. Min. (2003) 41, 1423-1431
Switzerland - Graübunden - Val Ferrera - Fianel (Mn-mine)
HT 68936
CT 79286 (sample with good crystals used for SEM picture)

Arctite
$Na_5Ca_7Ba(PO_4)_6F_3$ - trig.
Khomyakov AP, Bykova AV, Kurova TA: ZVMO (1981) 110, n°4, 506-508
Russia - Kola Peninsula - Khibiny massif - Vuonnemiok River Valley
T 58965 (From A. P. Khomyakov, 1994)

Avogadrite
KBF_4 - orth.
Zambonini F: Atti R. Accad. Lincei. Rend. Cl. Sci. fis. mat. nat. Roma, ser. 6 (1926) 3, 644-649
Italia - Campania - Napoli - Vesuvio, Monte Somma
T 53383 (Part of T 126.148 from Museum National d'Histoire Naturelle de Paris, given in 2000. X-rayed: NM 2650, and chemically analyzed: contains no Cs!)

Baratovite
$KCa_7(Ti,Zr)_2Li_3Si_{12}O_{36}(OH,F)_2$ - mon.
Dusmatov VD, Semenov EI, Khomyakov AP, Bykova AV, Dzhafarov NKh: ZVMO (1975) 104, 580-582
Tajikistan - Districts of the Republican Subordination - Tien Shan Mts - Alayskiy (Alai) Range - Dara-i-Pioz Glacier
T 58941 (From A. P. Khomyakov, 1994)

Barentsite
$Na_7AlH_2(CO_3)_4F_4$ - tricl.
Khomyakov AP, Kurova TA, Nechelyustov GN, Piloyan GO: ZVMO (1983) 112, n°4, 474-479
Russia - Kola Peninsula - Khibiny massif (NE) - Restin'yun Mt.
T 58973 (From A. P. Khomyakov, 1994)

Betafite
$(Ca,Na,U)_2(Ti,Nb,Ta)_2O_6(OH)$ - cub.
Lacroix A: C. R. Acad. Sci., Paris (1912) 154, 1042
Madagascar - (Central) - Betafo (near) - Amlolotaro
T 30245 (Don A. Lacroix, May 1929)

Bonaccordite
$Ni_2Fe^{+3}(BO_3)O_2$ - orth.
De Waal SA, Viljoen EA, Calk LC: Trans.Geol.Soc.S.Afr.(1974) 77, 373
South Africa - Eastern Transvaal - Barberton District - Bon Accord Ni-deposit
T 90750 (part of type material from De Waal, CMT- Randburg. Part of same spec. with T of nimite and liebenbergite. This unique mineral assemblage was interpreted as "meta-meteorite")

Bouazzerite (IMA 2005-042)
$(Mg,\square)_{11}\,Bi_6\,(Fe,Cr)_{14}\,(AsO_4,CrO_4)_{14}\,[AsO_3(H_2O)]_4O_{12}(OH)_4(H_2O)_{86}$ - mon.
Pre-official publication: Meisser N and Brugger J: Lapis (2006) 31(7/8), 69-71
Marocco - Anti-Atlas - Bou-Azzer, filon 7 (Co-mine)
HT 79798
CT 79803

Burpalite
$Na_8Ca_4Zr_4(Si_2O_7)_4F_8$ - mon.
Merlino S, Perchaiazzi N, Khomyakov AP, Pushcharovskii DYu, Kulikova IM, Kuzmin VI: Eur. J. Mineral. (1990) 2, 177-185
Russia - Buryatskaya A.R. - Baikal Lake (120 km NE of) - Burpal alkalic massif (N56 33', E110 45')
T 58942 (From A. P. Khomyakov, 1994)

Cabalzarite
$Ca(Mg,Al,Fe)_2(AsO_4)_2(H_2O,OH)_2$ - mon.
Brugger J, Meisser N, Schenk KJ, Berlepsch P, Bonin M, Armbruster T, Nyfeler D, Schmidt S: Amer. Min. (2000) 85, 1307-1314
Switzerland - Graubünden - Oberhalbstein - Falotta (Mn-mine)
HT 73785 & 73786
CT 65185 & 73787

Cancrisilite
$Na_7Al_5Si_7O_{24}(CO_3)\cdot 3H_2O$ - hex.
Khomyakov AP, Semenov EI, Pobedimindkaya EA, Nadezhina TN, Rastsvetaeva RK: ZVMO (1991) 120, n°6, 80-84
Russia - Kola Peninsula - Lovozero massif - Alluaiv Mts.

T 58949 (From A. P. Khomyakov, 1994)

Chantalite
$CaAl_2SiO_4(OH)_4$ - tetr.
Sarp H, Deferne J, Liebich BW: Schweiz.Min.Petr.Mitt.(1977) 57, 149-156
Turkey - Burdur Province - Taurus Mts. - Yesilova (near) - Covur Yokusutepe (N37 33', E29 40')
T 90731 (about 110 mm^3 of massive white vein with chantalite inclusions. Part of type material from MHN-Genève - Type: HT: 435/1)

Chiavennite
$CaMn[Be_2Si_5O_{13}(OH)_2] \cdot 2H_2O$ - orth.
Bondi M, Griffin WL, Mattioli V, Mottana A: Amer.Min.(1983) 68, 623-627
Italia - Lombardia - Sondrio - Chiavenna (near) - Val San Giacomo - Tanno (first TL)
T 90755 (original material from V. Mattioli)

Cleusonite
$Pb(U^{+4},U^{+6})(Ti,Fe^{+2},Fe^{+3})_{20}(O,OH)_{38}$ - trig.
Wülser PA, Meisser N, Brugger J, Schenk K, Ansermet S, Bonin M, Bussy, F: Eur. J. Min. (2005) *(in press)*
Switzerland - Wallis - Nendaz Valley - Cleuson lake
HT 65200 (polished section, optical properties and chemical analysis); 65201 (powder and single crystal XRD preparation), 64202 (FT-IR preparation), 65203 (goniometric study)
CT 65204 (9 isolated crystals up to 27 mm)

Cobaltarthurite
$Co^{2+}Fe_3^{+2}(AsO_4)_2(OH)_2 \cdot 4H_2O$ - mon.
Jambor JL, Viñals J, Groat LA, Raudsepp M: Can. Min. (2002) 40/2, 725-732
Spain - Murcia - Mazarráron-Águila - Pastrana - Dolores prospect
T 79540 (Part of original material from J. Viñals, February 2004)

Cobaltaustinite
$Ca(Co,Cu)(AsO_4)(OH)$ - orth.
Nickel EH and Birch WD: Austral. Mineral. (1988) 3, 53-57
Australia - South Australia - Mingary (42km N of) - Dome Rock Cu-deposit (S31 52', E140 24')
T 90003 (Don W. D. Birch, February 2005)

Davidite-(La)
$(La,Ce)(Y,U,Fe^{+2})(Ti,Fe^{+3})_{20}(O,OH)_{38}$ - trig.
Mawson D : Transactions Royal Soc. South Austral. (1906) 30, 188-193.
Australia-South - Australia - Olary (40 km ESE of) - Radium Hill pegmatite (32°20´S, 140°37´E)
T 90756 (81 g aggregate of chocolate brown crystals up to 25 mm. Don of School of Earth & Environmental Sciences, University of Adelaide in 2004 as part of original described material from the collection of D. Mawson)

Deloryite
$Cu_4^{+2}(UO_2)(MoO_4)_2(OH)_6$ - mon.
Sarp H and Chiappero PJ: Neues Jahrb. Min., Mh. (1992) 58-64
France - Provence-Alpes-Côte d'Azur - Var dép. - Pradet, near - Cap Garonne mine
CT 53592 (Don P.-J. Chiappero, 1993)

Dzhalindite
$In(OH)_3$ - cub.
Genkin AD and Murav'eva IV: ZVMO, (1963) 92, 445-457
Russia - Siberia - Khabarovskiy Kray - Malyi Khingan Range - Dzhalindinskoye Sn- deposit

CT 90203 (Polished section, inclusions in cassiterite, sample IN 16/1 from Prof. N. Rudashevsky, 2005)

Dugganite
$Pb_3Zn_3Te^{+6}O_6As_2O_{14}$ - trig.
Williams SA: Amer. Min. (1978) 63, 1016-1019
USA - Arizona - Cochise County - Tombstone - Emerald mine
T 84547 (Part of original material from S. A. Williams, 1980)

Ershovite
$Na_4K_3(Fe^{+2},Mn^{+2},Ti)_2Si_8O_{20}(OH)_4 \cdot 4H_2O$ - tricl.
Khomyakov AP, Men'shikov YuP, Rastsvetaeva RK, Nechelyustov GN: ZVMO (1993) 122, n°1, 116-120
Russia - Kola Peninsula - Khibiny massif - Koashva and Rasvumchorr Mts.
T 58971 (From A. P. Khomyakov, 1994)

Ferrohögbomite-2*N*2*S*
$(Fe^{2+}{}_3Zn,Mg,Al)_6(Al_{14}Fe^{3+}Ti)_{16}O_{30}(OH)_2$ - hex.
Hejny C, Gnos E, Grobety B, Armbruster T: Eur. J. Mineral. (2002) 14, 957-967
Algeria - Sahara, Grand Erg Oriental (NW edge) - Aïn Tab□ a - 30°16.44'N, 5°48.94'E, 227m
CT 90511
(26x25x18 mm sliced counterface of HT 36156 NMBE-Bern, thru Serge Guillod, finder of this isolated rock originally considered as a meteorite. Associated minerals are ilmenite, pseudorutile, hercynite, magnetite the last largely replaced by hematite. The new species seams to be a typical mineral of a metamorphic environment, T > 500° C).

Françoisite-(Ce) (IMA 2004-29)
$(Ce,Nd,Ca)[(UO_2)_3O(OH)(PO_4)_2](H_2O)_6$ - mon.
Meisser N, Brugger J, Ansermet S, Thélin P, Bussy F: Eur.J.Min. (200X) *(to be submitted for publication)*
Switzerland - Valais - Trient Valley - Les Marécottes - La Creusaz (U-mine)
Australia - South Australia - Flinders Ranges - Arkaroola, Radium Ridge - Working 2 (U-mine)
HT 58321 (from La Creusaz, Switzerland)
CT 79288 (from Arkaroola, Australia)

Fianelite
$Mn_2^{+2}(V,As)_2O_7 \cdot 2H_2O$ - mon.
Brugger J and Berlepsch P: Amer. Min. (1996) 81, 1270-1276
Switzerland - Graübunden - Val Ferrera - Fianel (Mn-mine)
CT 73803 (isolated crystals for optical measurements) & CT 73815 (part of holotype material. Massive black Mn-ore, covered with about 6 cm^2 orange-red fianelite crust)

Gabrielsonite
$PbFe^{+2}(AsO_4)(OH)$ - orth.
Moore PB: Arkiv Min.Geol.(1967) 4, 401-405
Sweden - Värmland - Filipstad - Filipstad - Langban, Hindenburgstope
T 90757 (Isolated crystal of about 1 mm. Part of original material from P.B. Moore)

Gaudefroyite
$Ca_8Mn_6^{+3}(BO_3)_6(CO_3)_2O_6$ - hex.
Jouravsky G and Permingeat F in: Bull. Soc. fr. Min. Crist. (1964) 87, 216-219
Morocco - Anti Atlas, Ouarzazate (17 km SSE of), Tachgagalt Mn-mine
T 90766 (cm-sized black crystal spray in calcite. Part of HT specimen from ENSM, Paris, thru Paul Sainfeld)

Gerstleyite
$(Na,Li)_2(Sb,As)_8S_{13} \cdot 2H_2O$ - mon.
Frondel C and Morgan V: Amer. Min. (1956) 41 (11-12), 839-843
USA - California - Kramer deposit, Boron, Kern Co.
T 54059 (part of type material from C. Frondel)

Grumantite
$NaHSi_2O_5 \cdot H_2O$ - orth.
Khomyakov AP, Korobitsyn MF, Kurova TA, Cherepivskaya GE: ZVMO (1987) 116, 244-248
Russia - Kola Peninsula - Lovozero massif - Alluaiv Mt.
T 58947 (From A. P. Khomyakov, 1994)

Gysinite-(Nd)
$Pb(Nd,La)(CO_3)_2(OH)H_2O$ - orth.
Sarp H and Bertrand J: Amer. Min. (1985) 70, 1314-1317
Zaire - Shaba - Likasi - Kasompi copper mine
HT 53204 (Don H. Sarp, 1987. Part of HT 435/60 from MHN-Genève)

Hibonite
$(Ca,Ce)(Al,Ti,Mg)_{12}O_{19}$ - hex.
Curien H, Guillemin C, Orcel J, Sternberg M: C.R.Acad.Sci.Paris (1956) 242, 2845-2847
Madagascar - (South) - Toliara - Fort Dauphin reg. - Esiva
T 90758 (Aggregate of hexagonal crystals of about 30 mm in diameter. Part of CT specimen from ENSM-Paris thru Paul Sainfeld)

Hsianghualite
$Li_2Ca_3[Be_3Si_3O_{12}]F_2$ - cub.
Huang WH, Tu SH, Wang KH, Chao CL, Yu CC: Ti-chih-yueh-k'an (1958) 7, 35 (Abstract in Amer. Min. 44, 1327-1328 and 46, 244)
China - Hunan - Linwu - Hsianghua
T 79982
(Fragment of 5 x 4 cm given in 1993 to Prof. Henri Masson by an official delegation of the Academy of geological sciences of China and designated as a fragment used for the description of the new species. From metamorphosed Devonian limestones with fluorite, taaffeite and zinnwaldite)

Huanghoite-(Ce)
$BaCe(CO_3)_2F$ - trig.
Semenov EI and Chang Pei-Shan: Scientia Sinica (1961) 10, 1007-1011
China - Nei Mongol Autonomous Region (Inner Mongolia)- Bayan Obo (Bayun-Obo; Baiyunebo) deposit
T 90759 (3 mm brown grain embedded in aegirine crystal. Part of original material from Mineralogical Museum of Bejing)

Hydroxycancrinite
$Na_8Al_6Si_6O_{24}(OH)_2 \cdot 2H_2O$ - trig.
Khomyakov AP, Nadezhina TN, Rastsvetaeva RK, Pobedimskaya EA: ZVMO (1992) 121, n°1, 100-105
Russia - Kola Peninsula - Lovozero massif - Karnasurt Mt.
T 58962 (From A. P. Khomyakov, 1994)

IMA 86-036a
$(Na,K)(Mg,Ca)_4Al_8(PO_4)_8(CO_3)(OH)_7 \cdot 30H_2O$ - mon.
William D. Birch & al. *in prep.*
Australia - Victoria - 45 km WNW of Melbourne - Bacchus Marsh - Parwan lava cave

T 90700 (6 x 6 cm massive extremely altered guano sample with massive taranakite, crusts of montgomeryite and platy crystals of IMA 86-036a. Don W. D. Birch, February 2005. Approved by CNMNC in January 2007)

Imiterite
Ag_2HgS_2 - mon.
Guillou JJ, Monthel J, Picot P, Pillard F, Protas J, Sahama JC: Bull. Min. (1985) 108, 457-464
Morocco - Anti Atlas - Jbel Sarhro – Imiter(Ag- mine)
T 79733 (part of type material from Ecole des Mines de Paris)

Jacquesdietrichite
$Cu_2[BO(OH)_2](OH)_3$ - orth.
Kampf AR and Favreau G: Eur.J.Min. (2004) 16, 361-366
Marocco - Anti-Atlas - Ouarzazate - Filon 2, Tachgagalt (Mn-mine)
T 79711 (don G. Favreau, June 2004)

Jagoite
$Pb_3Fe^{+3}Si_4O_{12}(Cl,OH)$ - hex.
Blix R, Gabrielson O, Wickman FE: Arkiv Min.Geol.(1957) 2, 315-317
Sweden - Värmland - Filipstad - Filipstad - Langban, Canberrastope
T 90760 (Isolated crystal of about 1 mm; from P.B. Moore. Part of original material from NMNH-Washington T: 113302)

Jouravskite
$Ca_6Mn_2^{+4}(SO_4,CO_3)_4(OH)_{12} \cdot 26H_2O$ - hex.
Gaudefroy C and Permingeat F in: Bull. Soc. fr. Min. Crist. (1965) 88, 254-262
Morocco - Anti Atlas, Ouarzazate (17 km SSE of), Tachgagalt Mn-mine (no. 2 vein, on the dumps)
T 90767 (mm-sized tan brown fibrous crystals on gaudefroyite in calcite. Part of HT specimen from ENSM, Paris, thru Paul Sainfeld)

Kalborsite
$K_6[Al_4Si_6O_{20}]B(OH)_4Cl$ - tetr.
Khomyakov AP, Sandomirskaya SM, Malinovskii YuA: DAN-SSSR (1980) 252, 1465-1468
Russia - Kola Peninsula - Khibiny massif - Rasvumchorr Mt.
T 58967 (From A. P. Khomyakov, 1994)

Kalicinite
$KHCO_3$ - mon.
Pisani F: C. R. Acad. Sci., Paris (1865) 60, 918
Switzerland - Valais - Chippis, "under a dead tree"
CT 53205 (Part of CT: 99.775 from Museum National d'Histoire Naturelle de Paris, given in 1992. X-rayed: NM 793 & 794 and chemically analyzed in Lausanne)

Kamotoite-(Y)
$(Y,Nd,Gd)_2[(UO_2)_4O_4(CO3)_3] \cdot 14{,}5H_2O$ - mon.
Deliens M and Piret P: Bull.Minéral.(1986) 109, 643-647
Zaire - Shaba - Kolwezi - Eastern Kamoto open pit
T 79593 (part of type material from M. Deliens given in June 2003. 45 x 30 mm uraninite specimen covered with about 1cm^2 of yellow kamotoite-(Y))

Khibinskite
$K_2ZrSi_2O_7$ - mon.
Khomyakov AP, Voronka AA, Lebedeva SI, Boyokov VP, Yurkiva KV: ZVMO (1974) 103, 110-116
Russia - Kola Peninsula - Khibiny massif - Hackman valley, Yukspor Mt.
T 58969 (From A. P. Khomyakov, 1994)

Krettnichite
$PbMn_2^{+3}(VO_4)_2(OH)_2$ - mon.
Brugger J, Armbruster T, Berlepsch P, Criddle A, Graeser S, Reeve S: Eur. J. Min. (2001) 13, 145-158
Germany - Saarland - Saarbrück - Primstal - Krettnich - Bungerts Hütte (Mn-mine)
HT 65317

Laforêtite
$AgInS_2$ - tetr.
Meisser N, Thélin P, Chiappero PJ, Maurel C: Eur. J. Min. (1999) 11, 891-897
France - Haute-Loire - Langeac (10 km SW of) - La Boriette - Montgros (Pb-mine)
HT 58600 (polished section. Laforêtite forms inclusions of max. 30 x 10 μm in galena)

Lengenbachite
$Pb_6(Ag,Cu)_2As_4S_{13}$ - tricl.
Solly RH: Nature (1904) 71, 118 and Min. Mag. (1905) 14, 72-82 (p. 78)
Switzerland - Wallis - Binntal - Lengenbach
T 40537 (gorgeous crystals spray up to 12 mm on dolomite matrix. Don R. H. Solly, June 1904)

Liebenbergite
$(Ni,Mg)_2SiO_4$ - orth.
De Waal SA and Calk LC: Amer.Min.(1973) 58, 733-735
South Africa - Eastern Transvaal - Barberton District - Bon Accord Ni-deposit
T 90752 (part of type material from De Waal, CMT- Randburg. Part of same spec. with T of bonaccordite and nimite. This unique mineral assemblage was interpreted as "meta-meteorite")

Lintisite
$Na_3LiTi_2Si_4O_{14} \cdot 2H_2O$ - mon.
Khomyakov AP, Polezhaeva LI, Merlino S, Pazero M: ZVMO (1990) 119, n°3, 76-80
Russia - Kola Peninsula - Lovozero massif - Alluaiv Mt.
T 58954 (From A. P. Khomyakov, 1994)

Lithosite
$K_6Al_4Si_8O_{25} \cdot 2H_2O$ - mon.
Khomyakov AP, Chernitsova NM, Christyakova NI: ZVMO (1983) 112, 218-222
Russia - Kola Peninsula - Khibiny massif - Vuonnemiok river
T 58964 (From A. P. Khomyakov, 1994)

Lovdarite
$K_4Na_{12}[Be_8Si_{28}O_{72}] \cdot 18H_2O$ - orth.
Men'shikov YuP, Denisov AP, Uspenskaya EI, Lipatova EA: DAN-SSSR (1973) 213, 429-432
Russia - Kola Peninsula - Lovozero massif - Karnasurt Mt. - Jubilejnaja pegmatite
T 58958 (From A. P. Khomyakov, 1994)

Maghrebite (IMA 2005-044)
$MgAl_2(AsO_4)_2(OH)_2 \cdot 8H_2O$ - tricl.
Pre-official publication: Meisser N and Brugger J: Lapis (2006) 31(7/8), 69-71
Marocco - Anti-Atlas - Bou-Azzer - Aghbar (Co-mine)
HT 79792
CT 79793 & 79794

Magnesium-zippeite
$Mg(UO_2)_2(SO_4)(OH)_4 \cdot 1.5H_2O$ - mon.
Brugger J, Burns P, Meisser N: Amer. Min. (2003) 88, 676-685
USA - Utah - Emery Co. - San Rafael District (San Rafael Swell) - Lucky Strike n° 2 (U-mine)

NT 54060 (part of original material of C. Frondel from Harvard Museum)
IMA Code 2000-G – Neotype approved and magnesium-zippeite ***redefined*** *as monoclinic*

Manaksite
$KNaMn^{+2}Si_4O_{10}$ - tricl.
Khomyakov AP, Kurova TA, Nechelyustrov GN: ZVMO (1992) 121, n°1, 112-115
Russia - Kola Peninsula - Lovozero massif - Alluaiv Mt.
T 58953 (From A. P. Khomyakov, 1994)

Manganolotharmeyerite
$Ca(Mn^{+3},Mg,X)_2(AsO_4)_2(OH,H_2O)_2$ - mon.
Brugger J, Krivovichev S, Kolitsch U, Meisser N, Andrut M, Ansermet S, Burns PC: Can. Min. (2003) 40, 1597-1608
Switzerland - Graübunden - Val Ferrera - Starlera (Mn-mine)
HT 54000
CT 54014

Manganotychite
$Na_6Mn_2^{+2}(SO_4)(CO_3)_4$ - cub.
Khomyakov AP, Bakhchisaraitsev AYu, Martynova AV, Parashchenko TM: ZVMO (1990) 119, n°5, 46-49
Russia - Kola Peninsula - Lovozero massif - Alluaiv Mt.
T 58951 (From A. P. Khomyakov, 1994)

Marécottite
$[Mg_3(H_2O)_{28}](UO_2)_8(SO_4)_4O_6(OH)_2$ - tricl.
Brugger J, Burns P, Meisser N: Amer. Min. (2003) 88, 676-685
Switzerland - Valais - Trient Valley - Les Marécottes - La Creusaz (U-mine)
HT 58285 (polished section and 2 x 3 cm uraninite sample covered by marécottite crystals)
CT 58290 (associated with ktenasite, johannite and pseudojohannite)

Margaritasite
$(Cs,K,H_3O)_2(UO_2)_2(V_2O_8) \cdot H_2O$ - mon.
Wenrich KJ, Modreski PJ, Zielinski RA, Seeley JL: Amer.Min.(1982) 67, 1273-1289
Mexico - Chihuahua - Municipio de Chihuahua - Chihuahua (near), Peña Blanca district - Margarita's deposit
T 65085 (Part of original material from K. J. Wenrich)

Marokite
$CaMn_2^{+3}O_4$ - orth.
Gaudefroy C, Jouravski G, Permingeat F in: Bull. Soc. fr. Min. Crist. (1963) 86, 359-367
Morocco - Anti Atlas, Ouarzazate (17 km SSE of), Tachgagalt Mn-mine (no. 2 vein)
T 90768 (63 g massive black material. Part of HT specimen from ENSM, Paris, thru Paul Sainfeld)

Mineevite-(Y)
$Na_{25}Ba(Y,Gd,Dy)_2(CO_3)_{11}(HCO_3)_4(SO_4)_2F_2Cl$ - hex.
Khomyakov AP, Polezhaeva LI, Yamnova NA, Pushcharovskii DYu: ZVMO (1992) 121, n°6, 138-143
Russia - Kola Peninsula - Lovozero massif - Alluaiv Mt.
T 58952 (From A. P. Khomyakov, 1994)

Nabiasite
$BaMn_9[(V,As)O_4]_6(OH)_2$ - cub.
Brugger J, Bonin M, Schenk KJ, Meisser N, Berlepsch P: Eur. J. Min. (1999) 11, 879-890
France - Hautes-Pyrénées - Loudervielle - Nabias - Pla de Labasse (Mn-mine)

HT 65000
CT 52805

Nacaphite
$Na(Na,Ca)_2(PO_4)F$ - tricl.
Khomyakov AP, Kazakova ME, Pushcharovskii DYu: ZVMO (1980) 109, 50-52
Russia - Kola Peninsula - Khibiny massif - Rasvumchorr Mt.
T 58966 (From A. P. Khomyakov, 1994)

Nastrophite
$Na(Sr,Ba)PO_4 \cdot 9H_2O$ - cub.
Khomyakov AP, Kazakova ME, Popova GN, Malinovskii YuA: ZVMO (1981) 110, 604-607
Russia - Kola Peninsula - Lovozero massif - Alluaiv and Karnasurt Mts.
T 58946 (From A. P. Khomyakov, 1994)

Natrite
Gamma Na_2CO_3 - mon.
Khomyakov AP: ZVMO (1982) 111, 220-225
Russia - Kola Peninsula - Khibiny and Lovozero massifs - Rasvumchorr resp. Karnasurt Mts.
T 58960 (From A. P. Khomyakov, 1994)

Nimite
$(Ni,Mg,Fe^{+2})_5Al(Si_3Al)O_{10}(OH)_8$ - mon.
Hiemstra SA and de Waal SA: Res.Rep.Nat.Inst.Met.S.Africa,(1968) 344, 1-10
South Africa - Eastern Transvaal - Barberton District - Bon Accord Ni-deposit
T 90753 (part of type material from De Waal, CMT- Randburg. Part of same spec. with T of bonaccordite and liebenbergite. This unique mineral assemblage was interpreted as “meta-meteorite”)

Paranatisite
Na_2TiSiO_5 - orth.
Khomyakov AP, Polezhaeva LI, Sokolova EV: ZVMO (1992) 121, 133-136
Russia - Kola Peninsula - Khibiny massif - Yukspor Mt.
T 58968 (From A. P. Khomyakov, 1994)

Paraumbite
$K_3(H_3O)Zr_2[Si_3O_9]_2 \sim 2H_2O$ - orth.
Khomyakov AP, Voronkov AA, Kobyashev YuS, Polezhaeva LI: ZVMO (1983) 112, 461-469
Russia - Kola Peninsula - Khibiny massif - Eveslogchorr Mt., near lake Umba
T 58974 (From A. P. Khomyakov, 1994)

Penkvilksite-2O
$Na_4Ti_2Si_8O_{22} \cdot 5H_2O$ - orth.
Bussen IV, Men'shikov YuP, Merkov AM, Nedorezova AP, Uspanskaya EI, Khomyakov AP: DAN-SSSR (1974) 217, 1161-1164
Russia - Kola Peninsula - Lovozero massif - Karnasurt Mt. - Jubilejnaja pegmatite
T 58961 (From A. P. Khomyakov, 1994)

Perroudite
$Hg_{5-x}Ag_{4+x}S_{5-x}(Cl,I,Br)_{4+x}$ (x ~1,4) - orth.
Sarp H, Birch WD, Hlava PF, Pring A, Sewell DKB, Nickel E H: Amer. Min. (1987) 72, 1251-1256
France - Var - Cap Garonne, Le Pradet
HT 53203 (Don P. Perroud & H. Sarp, 1987. Part of HT 435/80 from MHN-Genève)
Coppin Pool, New South Wales (= 2nd TL)
T 90694 (part of T specimen from MOV-Melbourne. Don Bill Birch, 2003)

Picotpaulite
$TlFe_2S_3$ - orth.
Johan Z, Pierrot R, Schubnel HJ, Permingeat F: Bull. Soc. fr. Min. Crist. (1970) 93, 545-549
Macedonia - Rozden (near) - Allchar deposit
T 79983 (polished section with 3 twinned crystals associated with realgar, marcasite, raguinite and lorandite ; part of HT sample from Ecole des Mines de Paris)

Pittongite (IMA 2005-034a)
$Na_{0.22}[(W,Fe^{3+})(O,OH)_3 \cdot 0.44H_2O$ - hex.
Birch WD, Grey IE, Mills SJ, Bougerol C, Pring A, Ansermet S, Pring A: Can. Min (2007) 45 *(in press)*
Australia - Victoria - Ballarat (40 km W of) - Pittong (W-mine)
CT 79680 (part of HT # M48268 of Museum Victoria. Optical properties - Don W.D. Birch, Melbourne, 2003)

Pizgrischite (IMA 2001-02)
$PbBi_{17}(Cu,Fe)_{15}S_{35}$ - mon.
Meisser N, Schenk K, Berlepsch P, Brugger J, Bonin M, Criddle A, Thélin P, Bussy F: Can. Min. (2007) *(accepted for publication)*
Switzerland - Graübunden - Val Ferrera - Piz Grisch (northern face of)
HT 58622 (isolated crystals) & 53660 (polished section)
CT 79981 (cm-sized spray of crystals on quartz)

Preiswerkite
$NaMg_2AlAl_2Si_2O_{10}(OH)_2$ - mon.
Keusen HR and Peters T: Amer. Min.(1980) 65, 1134-1137
Switzerland - Wallis - Binntal - Geisspfad (ultramafic complex)
T 90761 (part of type material from NMBE-Bern - Type: HT & CT: B2548)

Pseudojohannite (IMA 2000-019)
$Cu_{6.5}[(UO_2)_4O_4(SO_4)_2]_2(OH)_5 \cdot 25H_2O$ - tricl.
Brugger J, Sheree K, Meisser N, Ondrus P, Cejka J: Amer. Min. (2005) 91, 929-936
Czech Republic - Nortern Bohemia - Jáchymov (St. Joachimsthal) - Rovnost (Werner) shaft, Jáchymov
HT 79290 (earthy material - part of the HT sample P1p 1/2000 deposited at the National Museum Prague, Czech Republic)

Quadrupite
$Na_{14}Ca_2Ti_4(Si_2O_7)_2(PO_4)_4O_4F_2$ - tricl.
Khomyakov AP, Nechelyustov GN, Sokolova EA, Dorokhova GI: ZVMO (1992) 121, n°1, 105-112
Russia - Kola Peninsula - Lovozero massif - Alluaiv Mt.
T 58944 (From A. P. Khomyakov, 1994)

Raguinite
$TlFeS_2$ - orth.
Laurent Y, Picot P, Pierrot R, Permingeat F, Ivanov T: Bull. Soc. fr. Min. Crist. (1969) 92, 38-48 and 237
Macedonia - Rozden (near) - Allchar deposit
T 79683 & 79684 (polished section, massive fragment and isolated crystals admixed with realgar, marcasite and lorandite ; parts of type samples from Ecole des Mines de Paris)

Rimkorolgite
$(Mg,Mn^{+2})_5(Ba,Sr)(PO_4)_4 \cdot 8H_2O$ - orth./mon.
Britvin SN, Pakhomovsky YaA, Bogdanova AN, Khomyakov AP, Krashova NI: ZVMO (1995) 124, n°1, 90-95
Russia - Kola Peninsula - Kovdor massif - Kovdor iron deposit

T 58943 (From A. P. Khomyakov, 1994)

Roquesite
$CuInS_2$ - tetr.
Picot P and Pierrot R: Bull.Soc.fr.Min.Crist.(1963) 86, 7-14
France - Auvergne - Allier dép. - Charrier, Cu-Sn-Fe-mine
T 90762 (polished section with 5 main roquesite grains up to 0.3 mm. Part of type material from ENSM-Paris)

Routhierite
$TlCu(Hg,Zn)_2(As,Sb)_2S_6$ - tetr.
Johan Z, Mantienne J, Picot P: Bull.Soc.fr.Min.Crist.(1974) 97, 48-53
France - Provence-Alpes-Côte d'Azur - Hautes Alpes dépt. - La Chapelle-en-Valgaudemar, 10km E of - Jas Roux
T90765 (6 x 9 cm original sample collected and studied by J. Mantienne. Quartzitic black shale cutted with cm quartz, routhierite, realgar veins. Exchange with BRGM, Orléans, F)

Sazhinite-(Ce)
$Na_2CeSi_6O_{14}(OH) \cdot 5H_2O$ - orth.
Eskova EM, Semenov EI, Khomyakov AP, Kazakova ME, Shumyatskaya NG: ZVMO (1974) 103, 338-341
Russia - Kola Peninsula - Lovozero massif - Karnasurt Mt. - Jubilejnaja pegmatite
T 58955 (From A. P. Khomyakov, 1994)

Scheuchzerite (IMA 2004-44)
$Na(Mn,Mg,Zn)_9[VSi_9O_{28}(OH)](OH)_3$ - tricl.
Brugger J, Krivovichev SV, Meisser N, Ansermet S, Armbruster T: Amer. Min. (2006) 91, 937-943
Switzerland - Graübunden - Val Ferrera - Fianel (Mn-mine)
HT 79355 (4 samples)

Senegalite
$Al_2(PO_4)(OH)_3 \cdot H_2O$ - orth.
Johan Z: Lithos,(1976) 9, 165-171
Senegal - Faleme basin (Senegal/Guinea/Mali border area) - Kouroudiako iron deposit
T 90763 (Original material from Z. Johan, thru Paul Sainfeld from ENSM-Paris)

Shabynite
$Mg_5(BO_3)(Cl,OH)_2(OH)_5 \cdot 4H_2O$ - mon.
Pertsev NN, Malinko SV, Vakhrushev VA, Fitsev BP, Sokolova EV, Nikitina IB: ZVMO,(1980) 109, 569-573
Russia - Irkutskaya Oblast - Angara-Ilim iron ore region - Korshunovskoye deposit, in skarn
T 90722 (about 1 cm^3 of grey-white fibrous material. Part of cotype material from FMM-Moscow)

Sitinakite
$KNa_2Ti_4Si_2O_{13}(OH) \cdot 4H_2O$ - tetr.
Men'shikov YuP, Sokolova EV, Egorov-Tismenko YuK, Khomyakov AP: ZVMO (1992) 121, n°1, 94-99
Russia - Kola Peninsula - Khibiny massif - Kukisvumchorr and Yukspor Mts.
T 58972 (From A. P. Khomyakov, 1994)

Sobolevite
$Na_{11}(Na,Ca)_4(Mg,Mn^{+2})Ti_4(Si_2O_7)_2(PO_4)_4O_3F_3$ - tricl.
Khomyakov AP, Kurova TA, Chistyakova NI: ZVMO (1983) 112, 456-461
Russia - Kola Peninsula - Lovozero massif - Alluaiv Mt.
T 58948 (From A. P. Khomyakov, 1994)

Senaite
$Pb(Ti,Fe,Mn)_{21}O_{38}$ - trig.
Hussak E and Prior GT: Min.Mag. (1898) 12, 30-32
Brazil - Minas Gerais - Diamantina district - (from diamond-bearing sands of the)
T 53207 (Part of T: 101.319 from Museum National d'Histoire Naturelle de Paris, given in 1999. Chemically analyzed in Lausanne)

Shomiokite-(Y)
$Na_3Y(CO_3)_3 \cdot 3H_2O$ - orth.
Khomyakov AP, Shumyatskaya NG, Polezhaeva LI: ZVMO (1992) 121, n°6, 129-132
Russia - Kola peninsula - Lovozero massif - Alluaiv Mt. - Shomiok river
T 58945 (From A. P. Khomyakov, 1994)

Spriggite
$Pb_3[(UO_2)_6O_8(OH)_2](H_2O)_x$; $x \sim 3$ - mon.
Brugger J, Krivovichev SV, Berlepsch P, Meisser N, Ansermet S, Armbruster T: Amer. Min. (2004) 89, 339-347
Australia - South Australia - Flinders Ranges - Arkaroola, Radium Ridge - Working 2 (U-mine)
HT 68937

Strontiomélane
$SrMn_6^{+4}Mn_2^{+3}O_{16}$ - mon.
Meisser N, Perseil EA, Brugger J, Chiappero PJ: Can. Min. (1999) 37, 673-678
Italy - Piemont - Aosta - St. Marcel (5 km S of) - Praborna (Mn-mine)
HT 58770 (2 samples : thin slab and polished ore sample)

Tiettaite
$(Na,K)_{17}Fe^{+3}TiSi_{16}O_{29}(OH)_{30} \cdot 2H_2O$ - orth.
Khomyakov AP, Pavlov VP, Rogachev DL, Zalkind OA, Martynova AV: ZVMO (1993) 122, n°1, 121-125
Russia - Kola Peninsula - Khibiny massif - Koashva Mt.
T 58970 (From A. P. Khomyakov, 1994)

Tremolite
$Ca_2(Mg, Fe)_5Si_8O_{22}(OH)_2$ - mon.
Höpfner A. (1789): *Versuch einer neuen Classificationsmethode der Stein- und Erdarten, nach den neuesten chemischen Erfahrungen.* In: Höpfner A. (Ed.): Magazin fur die Naturkunde Helvetiens. Vol. 4., Orell, Gessner, Füssli & Co., Zurich, 324-332.
Switzerland - Ticino - Leventina - Campolungo (in metamorphic Triassic dolomite)
T 60746 (“Gemeiner Tremolith Gotthard”) & 60787

Turtmannite
$(Mn,Mg)_{22,5}Mg_{3-3x}[(V,As)O_4]_3[SiO_4]_3[AsO_3]_xO_{5-5x}(OH)_{20+x}$ - trig.
Brugger J, Armbruster T, Meisser N, Hejny C, Grobety B: Amer. Min. (2001) 86, 1494-1505
Switzerland - Wallis - Turmanntal - Pipji glacier
HT 53593
CT 58732 (associated with native copper and manganosite)

Ulrichite
$CaCu(UO_2)(PO_4)_2 \cdot 4H_2O$ - mon.
Birch WD, Mumme WG, Segnit ER: Austral.Mineral.(1988) 3, 125-134
Australia - Victoria - Lake Boga (granite quarry 10km SSW of) (ca. S35 29', E143 38')
T 90679 (part of T specimen from MOV-Melbourne. Don Bill Birch, 2003)

Umbite
$K_2ZrSi_3O_9H_2O$ - orth.
Khomyakov AP, Voronkov AA, Kobyashev YuS, Polezhaeva LI: ZVMO (1983) 112, 461-469
Russia - Kola Peninsula - Khibiny massif - Vuonnemiok river - Lake Umba
T 58963 (From A. P. Khomyakov, 1994)

Umbozerite
$Na_3Sr_4ThSi_8(O,OH)_{24}$ - amorphous
Eskova EM, Khomyakov AP, Merkov AN, Lebedina SI, Dubakina LS: DAN-SSSR (1974) 216, 169-174
Russia - Kola Peninsula - Lovozero massif - Karnasurt Mt. - Umbozero, near
T 58957 (From A. P. Khomyakov, 1994)

Vigezzite-(Ce)
$(Ca,Ce)(Nb,Ta,Ti)_2O_6$ - orth.
Graeser S, Schwander H, Hänni H, Mattioli V: Min.Mag.(1979) 43, 459-462
Italia - Piemonte - Novara - Valle d'Ossola, Valle Vigezzo - Alpe Rosso (near Orcesco)
T 90764 (5 samples. Part of original material from V. Mattioli)

Villiaumite
NaF - cub.
Lacroix A: C. R. Acad. Sci., Paris (1908) 146, 213.
Guinea - Conakry - Ruma Island, Los archipelagos
T 15841 (2 samples. Don A. Lacroix, 19th November 1924)

Vitusite-(Ce)
$Na_3(Ce,La,Nd)(PO_4)_2$ - orth.
Ronsbo JG, Khomyakov AP, Semenov EI, Voronkov AA, Garanin NN: Neues Jahrb. Min., Abh. (1980) 137, 42-53
Russia - Kola Peninsula - Lovozero massif - Karnasurt Mt. - Jubilejnaja pegmatite
T 58959 (From A. P. Khomyakov, 1994)

Wallkilldellite-(Fe)
$(Ca,Cu)_4Fe_6[(As,Si)O_4]_4(OH)_8 \cdot 18H_2O$ - hex.
Sarp H, Mari G, Chiappero PJ: Riviera Sci., Nice (1999) 5-12
France - Alpes-Maritimes - Guillaumes (6 km S of) - Var valley, Barrot Dome - Roua copper ore deposit (N46 02' E6 51')
CT 58680 (13 specimens used for the Fe^{2+}/Fe^{3+} colorimetric analysis) and 77501 (11 specimens used for the EMP analysis - Don P.-J. Chiappero 1992)

Willemseite
$(Ni,Mg)_3Si_4O_{10}(OH)_2$ - mon.
Hiemstra SA, de Waal SA: Nat.Inst.Met.(S.A.)Res.Rep.(1968) 352, 1-14
South Africa - Eastern Transval - Barberton District - Bon Accord Ni-deposit
T 90754 (part of type material from De Waal, CMT- Randburg. Associated with trevorite and nimite. This unique mineral assemblage was interpreted as “meta-meteorite”)

Yazganite
$NaFe_3^{+2}(Mg,Mn)(AsO_4)_3 \cdot H_2O$ - mon.
Sarp H and Cerny R: Eur. J. Min. (2005) 17, 367-373
Turkey - Kayseri - Hisarcik - Kiranardi (Kcranardi)
CT 80000 (Don H. Sarp, May 2005)

Zakharovite
$Na_4Mn_5^{+2}Si_{10}O_{24}(OH)_6 \cdot 6H_2O$ - trig.

Khomyakov AP, Kazakova ME, Vrublevskaya AP, Zvyagin BB, Piloyan GO: ZVMO (1982) 111, 491-495
Russia - Kola Peninsula - Lovozero massif - Karnasurt Mt.
T 58956 (Part of. From A. P. Khomyakov, 1994)