

CNMNC guidelines for the nomenclature of polymorphs and polysomes

Frédéric Hatert, Stuart J. Mills, Marco Pasero
and Ritsuro Miyawaki

IMA-2022, Lyon, July 21st, 2022

The CNMNC mineral list



- Originally handled by E. H. Nickel
- Compiled in a database by Materials Data, Inc.
- Last available version published in 2009

- Since 2013, the list is updated by the CNMNC
- Marco Pasero, 2nd Vice-Chairman, is responsible for that
- Occurrence of numerous inconsistencies in mineral names

N°	DESIGNATION	DATE	PRIX
ANNEE	ANNEE	ANNEE	d'acquisition
ANNEE	ANNEE	ANNEE	Francs
<i>Grande armoire vitrée</i>			
DÉSIGNATION DES OBJETS			
	Diamant	Dans une même boîte. 5 tubes :	
	N° 2. (violet). Kimberly		125.00
	N° 13. Mado a ¹ "		100.00
	N° 15. " "		60.00
	N° 18. H. cristaux "		285.00
	N° 270. Cap.		100.00
	Or.	N° 60. H. 60. Broisoides à Branylwanie	100.00
		N° 4. 3. dans une boîte. Lames a ¹ " 30" et 30"	100.00
		N° 6. 14. " " Lames a ¹ et a ¹ " 100" et 40"	140.00
		N° 14. "	70.00
		N° 356. Sur quartz. Kilo (Congo). Rare.	150.00
		N° 357 et 358. Petites. Avec Congo	110.00
		N° 213. Sur quartz.	30.00
	Argent	N° 218. Lardagne.	25.00
	Platine	Dans une même boîte. Fechant. Platine et Sidosmine (2 points)	150.00

Chemical suffixes in mineral names



- Guidelines for chemical prefixes and suffixes redefined by Hatert *et al.* (2013)
- Structural prefixes and suffixes not discussed in this paper

- Levinson suffixes for REE: allanite-(Ce), allanite-(Y)
- Modified Levinson suffixes without parentheses for extra-framework cations: meurigite-K, meurigite-Na
- Modified Levinson suffixes with parentheses: ardennite-(V), ardennite-(As)
- Multiple chemical suffixes: arrojadite-(BaNa), jahnsite-(MnMnFe)

Eur. J. Mineral.
2013, 25, 113–115
Published online December 2012

CNMNC guidelines for the use of suffixes and prefixes in mineral nomenclature, and for the preservation of historical names

FRÉDÉRIC HATERT^{1,*}, STUART J. MILLS², MARCO PASERO³ and PETER A. WILLIAMS⁴

¹ Laboratoire de Minéralogie, Université de Liège, B-4000 Liège, Belgium

*Corresponding author, e-mail: fhatert@ulg.ac.be

² Geosciences, Museum Victoria, GPO Box 666, Melbourne 3001, Victoria, Australia

³ Dipartimento di Scienze della Terra, Università degli Studi di Pisa, Via Santa Maria 53, I-56126 Pisa, Italy


⁴ School of Science and Health, University of Western Sydney, Locked Bag 1797, Penrith, NSW 2751, Australia

Occurrence of « inconsistencies » in mineral names



- Polysomatic sequences: högbomite supergroup with suffixes – $2N1S$, - $2N2S$, - $2N3S$, ... to designate the number of nolanite and spinel modules
- Greek symbols for polymorphs: dimorphite- β , sulfur- β , uranophane- α ,
- Roman numerals: mertieite-I, mertieite-II, andorite IV, andorite VI,...

- Gersdorffite polymorphs with space group notations as suffixes: gersdorffite- $Pa3$, gersdorffite- $P2_13$, gersdorffite- $Pca2_1$
- Joséite-A and Joséite-B with different Te:S ratios: Bi_4TeS_2 and Bi_4Te_2S , respectively
- Halloysite-7Å and halloysite-10Å with different hydration degrees and unit-cell parameters

 Necessary to establish guidelines for the nomenclature of polymorphs and polysomes

1. Polymorphs with different crystal systems



Addition of prefixes to designate the crystal system:

- Cubo- (cubic)
- Hexa- (hexagonal)
- Tetra- (tetragonal)
- Trigo- (trigonal)
- Ortho- (orthorhombic)
- Clino- (monoclinic)
- Anortho- (triclinic)



Fergusonite-(Y), Mendig, Germany
(© Mindat)



Roselite- β , Bou Azzer, Morocco
(© Mindat)

- Domeykite- β becomes trigodomeykite
- Fergusonite-(Y,Ce,Nd)- β become clinofergusonite-(Y,Ce,Nd)
- Ice-VII becomes cubo-ice
- Roselite- β becomes anorthoroselite
- Sulfur- β becomes clinosulfur

2. Polymorphs with the same crystal system but different space groups



Uranophane- β , São Paulo, Brazil
(© Mindat)



Two polymorphs with the same crystal system and different space groups:

- Prefix « Para- »

Three or more polymorphs with the same crystal system and different space groups:

- Space group as a suffix

- Uranophane- α and uranophane- β are both monoclinic. Uranophane- α becomes uranophane, and uranophane- β becomes parauranophane.
- Gersdorffite- $P2_13$ becomes gersdorffite, gersdorffite- $Pa3$ becomes paragersdorffite, and gersdorffite- $Pca2_1$ becomes orthogersdorffite.

Gersdorffite, Bou Azzer, Morocco
(© Mindat)



3. Polymorphs with the same space group



The prefix « Para- » is added

- Dimorphite- β is the high temperature polymorph of dimorphite. Both are orthorhombic, $Pnma$. Dimorphite- β becomes paradimorphite.
- Lammerite and lammerite- β are polymorphs with the same space group $P2_1/c$. Lammerite- β is renamed paralammerite.

- Betalomonosovite and lomonosovite are both triclinic, space group $P-1$. In order to remove the unusual prefix « Beta- », we renamed betalomonosovite as paralomonosovite.

4. Minerals with polymorph suffixes but different chemical compositions



Difference in main constituents:

- Prefix « Meta- »

Difference in hydration degrees:

- Prefix « Meta- » (lower hydration degree)
- Prefix « Hydro- » (higher hydration degree)

- Nováčekite-I, nováčekite-II, and metanováčekite contain 12, 10 and 8 water molecules *p.f.u.*, respectively. Nováčekite-I is renamed hydronováčekite, and nováčekite-II is renamed nováčekite.

- Halloysite-10Å and halloysite-7Å are both monoclinic, and halloysite-10Å is the more hydrated species. Halloysite-10Å becomes hydrohalloysite, and halloysite-7Å becomes halloysite.



Nováčekite, Brumado, Brazil
(© Mindat)

5. Unnecessary polymorph suffixes



Polymorph suffix occur in some mineral names, but the original un-suffixed root-name doesn't exist any more:

- The unnecessary suffix has to be deleted



Uranocircite-II, Viseu, Portugal (© Mindat)



Uranocircite-II, Bergen, Saxony, Germany (© Mindat)

- Metauranocircite-I becomes metauranocircite
- Taimyrite-I becomes taimyrite
- Uranocircite-II becomes uranocircite

6. Polysomatic sequences



Polysomes are produced by the stacking of different modules, leading to different global chemical compositions:

- Polysomatic symbols have to be suffixes, showing the number and types of the different modules (ferrohögbomite- $2N2S$, ferronigerite- $2N1S$, ferronigerite- $6N6S$, ferrotaffeite- $2N'2S$, ferrotaffeite- $6N'3S$, ...)

Polysomatic sequences with the same type of modules:

- A prefix should be added to indicate the number of modules. These prefixes must be different from the crystal system prefixes (heptasartorite, enneasartorite and hendekasartorite)

- Andorite IV and andorite VI are chemical twins produced by different stacking of slabs along the c axis. Andorite IV becomes quatrandorite, and andorite VI becomes senandorite.

Renamings to remove inconsistencies



Previous name	New name
Domeykite- β	Trigodomeykite
Fergusonite-(Y)- β	Clinofergusonite-(Y)
Fergusonite-(Ce)- β	Clinofergusonite-(Ce)
Fergusonite-(Nd)- β	Clinofergusonite-(Nd)
Ice-VII	Cubo-ice
Roselite- β	Anorthoroselite
Sulphur- β	Clinosulphur
Mertieite-II	Mertieite
Mertieite-I	Pseudomertieite

Previous name	New name
Uranophane- α	Uranophane
Uranophane- β	Parauranophane
Gersdorffite- $P2_13$	Gersdorffite
Gersdorffite- $Pa3$	Paragersdorffite
Gersdorffite- $Pca2_1$	Orthogersdorffite
Betalomonosovite	Paralomonosovite

Previous name	New name
Dimorphite- β	Paradimorphite
Lammerite- β	Paralammerite
Nováčekite-I	Hydronováčekite
Nováčekite-II	Nováčekite
Halloysite-7Å	Halloysite
Halloysite-10Å	Hydrohalloysite
Metauranocircite-I	Metauranocircite
Taimyrite-I	Taimyrite
Uranocircite-II	Uranocircite
Andorite IV	Quatrandorite
Andorite VI	Senandorite



26 necessary renamings

Conclusions



- New CNMNC guidelines for the nomenclature of polymorphs and polysomes were established.
- These guidelines have to be followed for each new mineral proposal involving polymorphs or polysomes.
- In order to remove inconsistencies in mineral nomenclature, 26 names were already changed.
- Each supplementary name change has to pass through the CNMNC via the classical voting process, in order to avoid unnecessary changes of historical names.