

TIDYING UP MINERAL NAMES: AN IMA-CNMNC SCHEME FOR SUFFIXES, HYPHENS AND DIACRITICAL MARKS

Ernst A.J. Burke

Chairman, Commission on New Minerals, Nomenclature and Classification (CNMNC)
of the International Mineralogical Association (IMA)
Department of Petrology, Faculty of Earth and Life Sciences, Vrije Universiteit
De Boelelaan 1085, NL-1081 HV Amsterdam, Netherlands

*Mineral names which do not conform to the current nomenclature guidelines
of the Commission on New Minerals, Nomenclature and Classification
have to be corrected, and in the future a suffix-based nomenclature
is to be used for new mineral names.*

INTRODUCTION

In 2004, Peter Bayliss successfully proposed (IMA 04-C) to change the two-word mineral name cesium kupletskite to kupletskite-(Cs). In October 2005, Bayliss submitted a proposal to the Commission on New Minerals and Mineral Names (CNMNC) to eliminate the space in all similar two-word cases. This proposal was forwarded to the members for comments, but was not voted on because the CNMNC chairman and vice-chairman were of the opinion that a more generalized correction exercise was needed. Bayliss then revised his proposal into a wider discussion paper (March 2006) on suffix and prefix nomenclature, which was made available to the members on the occasion of the IMA meeting in Kobe, July 2006. It was decided in Kobe that the Chairman of the newly merged Commission on New Minerals, Nomenclature and Classification (CNMNC) would take up the issue for further discussion.

The efforts of Bayliss coincided indeed with the experiences of the Chairman during the operation to clean up the GQN* minerals (Burke, 2006): on going through the list of mineral names it was evident that mineralogical nomenclature has not always been applied in a consistent way. Many names have been given to minerals before the CNMNC started to draft any rules for nomenclature, and later such rules have regularly been ignored, even by the CNMNC itself.

The present paper aims to give a view on suffix nomenclature versus prefix nomenclature, to list mineral names with correct diacritical marks, and to correct mineral names consisting of two words or having superfluous hyphens and diacritical marks. The names and the name changes given in this paper have been approved by the CNMNC (proposal IMA 07-C, September 2007). Names

*G (Grandfathered) = names considered to represent valid species described before 1959; Q (Questionable) = names published before 1959 and considered not to represent valid species; N (Non-approved) = names published after 1959 without CNMNC approval.

written in **bold** in this paper were approved by the CNMNC to be correctly spelled names.

SUFFIX NOMENCLATURE VERSUS PREFIX NOMENCLATURE

Bayliss has summed up in his 2006 discussion paper the pros and the cons of the suffix nomenclature versus the prefix nomenclature, and his conclusion was that the CNMNC should require that the author(s) of a new-mineral proposal should use a suffix nomenclature rather than a prefix nomenclature.

The suffix nomenclature has been introduced by Levinson (1966) for rare-earth mineral species. This nomenclature has been extended to other chemical elements with minerals such as ardenite, jahnsite, julgoldite, meurigite, pumpellyite, struvite, wallkilldellite, and whiteite. Bayliss and Levinson (1988) made a revision and extension to the suffix nomenclature, where multiple chemical elements in parentheses indicate different structural positions such as jahnsite-(CaMnFe).

The suffix nomenclature (single and multiple) has subsequently been used in revised nomenclature schemes for several mineral groups: zeolites (Coombs *et al.*, 1997), labuntsovites (Chukanov *et al.*, 2002), arrojadites (Chopin *et al.*, 2006) and epidotes (Armbruster *et al.*, 2006). Chemical-element suffixes without parentheses indicate extra-framework cations (e.g., zeolites and labuntsovites).

The CNMNC should perhaps impose that a suffix nomenclature be used in new-mineral proposals, but making a general rule of this principle would encounter several problems. The authors of the eudialyte report (Johnsen *et al.*, 2003) have given strong arguments for using unique names in this group. Bayliss himself stated that the vast majority of the about 500 existing mineral names with prefixes that indicate a structural analogue or polymorph should remain unchanged. It is not the intention of the CNMNC to propose to change these traditional names, as the advantage of

changing these names would not be greater than the chaos created by changing these names. The CNMNC should thus adhere to its traditional principle that each nomenclature proposal should be considered on its own merits.

In the past years, there have been repeated complaints from the mineralogical community, especially from mineral collectors, that several well-known traditional names are no longer mineral names because of the prefix nomenclature used in these cases, and thus do not appear in an alphabetical index of mineral names. Bayliss proposed to change a number of mineral groups to suffix-nomenclature names; the proposal was taken over and approved by the CNMNC:

chlorapatite	=	apatite-(CaCl)
fluorapatite	=	apatite-(CaF)
hydroxylapatite	=	apatite-(CaOH)
strontium apatite	=	apatite-(SrOH)
clinohydroxylapatite	=	apatite-(CaOH)-M

This system would allow “apatite-(SrF),” etc., if found, and it follows the criteria of Bayliss and Levinson (1988).

Carbonate-fluorapatite and carbonate-hydroxylapatite are not valid mineral names.

chlorellestadite	=	ellestadite-(Cl)
fluorellestadite	=	ellestadite-(F)
hydroxylellestadite	=	ellestadite-(OH)
fluorapophyllite	=	apophyllite-(KF)
hydroxypophyllite	=	apophyllite-(KOH)
natroapophyllite	=	apophyllite-(NaF)

This system would allow “apophyllite-(NaOH)” if found, and it follows the criteria of Bayliss and Levinson (1988).

ferro-axinite	=	axinite-(Fe)
magnesio-axinite	=	axinite-(Mg)
manganaxinite	=	axinite-(Mn)
ferrocolumbite	=	columbite-(Fe)
magnesiocolumbite	=	columbite-(Mg)
manganocolumbite	=	columbite-(Mn)
ferrotantalite	=	tantalite-(Fe)
magnesiotalantalite	=	tantalite-(Mg)
manganotalantalite	=	tantalite-(Mn)
ferrotapiolite	=	tapiolite-(Fe)
manganotapiolite	=	tapiolite-(Mn)
ferropyrosmalite	=	pyrosmalite-(Fe)
manganpyrosmalite	=	pyrosmalite-(Mn)

TWO-WORD NAMES

According to the current CNMNC procedures and guidelines on mineral nomenclature (Nickel and Grice, 1998), names should consist of one word only. As mentioned above, proposal 04-C by Bayliss to change cesium kupletskite into kupletskite-(Cs) was approved by the CNMNC. There are 12 more two-word mineral names that also have to be changed into one word only. Several renaming systems are applied here, according to which is the best compared with other existing mineral names.

calcium catapleite	=	calciocatapleite:
there are many minerals with calcio- as prefix		
cobalt pentlandite	=	cobaltpentlandite:
there is an argentopentlandite and several minerals with cobalt- as prefix		

hydronium jarosite	=	hydroniumjarosite:
there are plenty of minerals with hydro-, hydroxy- or hydroxyl- as prefixes		
magnesium astrophyllite	=	magnesioastrophyllite:
there are many minerals with magnesio- as prefix		
potassium alum and sodium alum	=	alum-(K) and alum-(Na)
sal ammoniac	=	salammoniac
strontium apatite (also written as strontium-apatite)	=	apatite-(SrOH): see above.
sodium betpakdalite, sodium boltwoodite, sodium pharmacosiderite (also written as sodium-pharmacosiderite) and sodium uranospinite (also written as sodium-uranospinite)	=	respectively natrobetpakdalite, natroboltwoodite, natropharmacosiderite and natro-uranospinite: to bring these names in accordance with other names with natro- as prefix

SUPERFLUOUS HYPHENS

According to the current CNMNC procedures and guidelines on mineral nomenclature (Nickel and Grice, 1998), hyphens are used in mineral names to connect suffixed symbols, such as poly-type suffixes and Levinson modifiers, and the use of a hyphen to distinguish a prefix from the root name is to be discouraged, but where an unhyphenated name is awkward and a hyphen assists in deciphering the name, it may be used, e.g., bario-orthojoaquinite. In spite of this, there are several dozen mineral names with such superfluous hyphens. It has been decided to delete such hyphens from the names. Amphibole-group mineral names, however, have deviating rules for the use of hyphens (Leake *et al.*, 2003, Burke & Leake, 2004), and are not considered here.

alumino-magnesiohulsite	=	aluminomagnesiohulsite
barium-pharmacosiderite	=	bariopharmacosiderite
calcio-andyrobetsite	=	calcioandyrobetsite
calcio-ancylite	=	calcioancylite
carbonate-cyanotrichite	=	carbonatecyanotrichite
cobalt-zippeite	=	cobaltzippeite
ferro-alluaudite	=	ferroalluaudite
ferro-aluminoceladonite	=	ferroaluminoceladonite
ferro-axinite	=	renamed to axinite-(Fe) (see above)
hydroxyl-bastnäsité	=	hydroxylbastnäsité
hydroxyl-herderite	=	hydroxylherderite
hydroxyl-pyromorphite	=	hydroxylpyromorphite
magnesio-axinite	=	renamed to axinite-(Mg) (see above)
magnesium-chlorophoenicite	=	magnesiochlorophoenicite
magnesium-zippeite	=	magnesiozippeite
manganese-hörnesite	=	manganohörnesite
manganese-shadlunite	=	manganoshadlunite
mangan-neptunite	=	manganoneptunite
meta-lodèveite	=	metalodèveite
meta-natro-autunite	=	metanatroautunite
meta-uramphite	=	metauramphite
meta-uranocircite	=	metauranocircite
meta-uranopilite	=	metauranopilite
meta-uranospinite	=	metauranospinite
Na-komarovite	=	natrokomarovite
natro-autunite	=	natroautunite
nickel-boussingaultite	=	nickelboussaingaultite
nickel-skutterudite	=	nickelskutterudite

nickel-zippeite	=	nickelzippeite
niobo-aeschnite	=	nioboaeschnite
potassic-carpholite	=	potassiccarpholite
sodium-pharmacosiderite	=	natropharmacosiderite
sodium-uranospinite	=	natrouranospinite
sodium-zippeite	=	natrozippeite
tantal-aeschnite	=	tantalaeschnite
tetra-ferri-annite	=	tetraferriannite
tetra-ferriphlogopite	=	tetraferriphlogopite
zinc-melanterite	=	zincmelanterite
zinc-zippeite	=	zinczippeite

Because of possible problems in deciphering the name, hyphens are preserved in **bario-orthojoaquinite**, **calcio-olivine**, **meta-aluminite**, **meta-alunogen**, **meta-ankoleite**, **meta-autunite**, **para-alumohydrocalcite** and **tetra-auricupride**.

There is, however, georgeericksenite, which for the sake of conformity is to be changed to **george-ericksenite**.

DIACRITICAL MARKS

A diacritical mark (also called accent mark) is a small sign added to a letter to alter pronunciation or to distinguish between similar words. Its main usage is to change the phonetic value of the letter to which it is added. Diacritical marks in mineral names include the *acute accent* (e.g., in andrémeyerite), the *grave accent* (e.g., in cesàrolite), the *circumflex accent* (e.g., in laforêtite), the *double acute accent* (unique to Hungarian) (e.g., in felsőbányaite), the *cedilla* (e.g., in françoisite), the *ring* (e.g., in håleniusite), the *caron* (e.g., in čekite), the *trema* (or umlaut or diaeresis) (e.g., in moëloite), the *tilde* (e.g., in ordoñezite), the *bar* (or slash) (e.g., in jørgensenite), and the *apostrophe* (e.g., in d'ansite).

The use of diacritical marks in mineral names has been the subject of several proposals to the CNMNC, lastly in 1999 by the former member for New Zealand, Douglas Coombs. The aim of these repeated proposals was to avoid insertion of diacritical marks into mineral names in which they had not been in standard use in the past, and to eliminate diacritical marks from existing mineral names as published in English. These repeated proposals have not been approved by the CNMNC. These decisions were correct, as they follow the current CNMNC procedures and guidelines on mineral nomenclature (Nickel and Grice, 1998):

“If the mineral is to be named after a geographical occurrence, care must be taken to ensure that the spelling conforms to that in use at the locality; the spelling should not be taken from translations.”

“If the mineral is to be named after a person (...). Otherwise, the original spelling of the person's name should be retained.”

Such mineral names after persons or geographical occurrences have these diacritical marks as an integral part of these names, e.g., the mineral jaskólskiite was named for the Polish person S. Jaskólski, and the mineral örebroite was named for the Swedish town Örebro. In both cases these names were approved by the CNMNC with their diacritical marks, and they should consequently be used as such. A decision to eliminate these diacritical marks would definitely amount to a kind of amputation of these names.

Sometimes mineral names have been approved (and published) without diacritical marks although the name of the person or locality for which they were named had such marks; these names are corrected here.

Special cases are the names nybøite, ferronybøite and fluoronybøite, originally published as nyböite, etc., supposedly after the Norwegian island “Nybö,” but the letter ö is not part of the Norwegian alphabet; the correct name of the island is Nybø. The

tourmaline-group mineral schorl is often written as “schörl”; Ertl (2006, and pers. comm.) is of the opinion that the name of the mineral is derived from the village Schorl (later Schorlau, today Zschorlau) and thus should be written without diacritical mark, in spite of the widespread use of “schörl” in the German-speaking areas, starting in the 18th century and continuing until today (see title of Ertl, 2006).

Mandarino (2007) published on his own initiative, disregarding the then ongoing discussion within the CNMNC, a list of mineral names which in his opinion needed diacritical marks. The following CNMNC-approved list gives mineral names having correct diacritical marks; some recently approved names have not yet been published by their authors.

åkermanite	hodrušite
alacránite	høgtuvaite
andrémeyerite	hörnesite
bariците	horváthite-(Y)
bastnäsite-(Ce)	hübnerite
bastnäsite-(La)	hügelite
bastnäsite-(Y)	hydromoméite
bálinite	hydroxylbastnäsite-(Ce)
blödite	hydroxylbastnäsite-(La)
bøggildite	hydroxylbastnäsite-(Nd)
bøgvadite	hyttjsjöite
böhmité	ilímaussite-(Ce)
brüggenite	jáchymovite
bukovskýite	jaguéite
bütschliite	jankoviците
byströmite	jaskólskiite
calderónite	jökokuite
čekite	jørgensenite
čejkaite	joséite-A
černýite	joséite-B
cesàrolite	joséite-C
chabournéite	kañkite
chaméanite	karupmøllerite-Ca
cobaltneustädteite	kësterite
d'ansite	kochsándorite
daubrécieite	köttigite
daubrélite	kôzulate
dufrénite	kratochvílite
dufrénoysite	kröhnkite
felsőbányaite	krut'aite
ferrohøgbomite-2N2S	kupčkite
ferrokësterite	laforêtite
ferronybøite	långbanite
fizélyite	låvenite
fluoronybøite	lévyclaudite
fluorthalénite-(Y)	lévyne-Ca
fougèrite	lévyne-Na
françoisite-(Ce)	lindströmite
françoisite-(Nd)	löllingite
fülöppite	lópezite
gaspéite	lorándite
görgeyite	löweite
götzenite	lüneburgite
guérinite	lun'okite
guimarãesite	magnesiöhøgbomite-2N2S
häggité	magnesiöhøgbomite-2N3S
håleniusite-(La)	magnesiöhøgbomite-6N6S
hauýne	mäkinenite
heyrovskýite	manganohörnesite
hiärneite	marécottite

maričite
mélonjosephite
metaköttigite
metalodèveite
metanováčekite
metasaléite
moëloite
mogánite
mrázekite
mückeite
nagyágite
natrodufrénite
népouite
neustädtelite
nežilovite
nickelblöditite
nordenskiöldine
nordströmitite
nováčekite I
nováčekite II
novákite
nybøite
o'danielite
ordñezite
örebroite
otrélite
pääkkönenite
padéraite
parthéite
patrónite
phosphorrösslerite
písekite-(Y)
plombièreite
potosíte
protojoséite
ranciéite
rhönite
rokühnite
romanèchite
roméite
römerite
röntgenite-(Ce)
rosickýite
rosièresite
rösslerite
saléite
sanrománite
schäferite
schneiderhöhnite
schöllhornite

schröckingerite
seinäjokite
sénarmontite
sérandite
sillénite
sjögrenite
slavíkite
söhngéite
sørensenite
součekite
šreinite
staněkite
strätlingite
stützite
švenekite
szaibélyite
sztrókayite
szymańskiite
takéuchiite
tarapacáite
thalénite-(Y)
thérèsemagnanite
thorbastnäsité
törnebohmitite-(Ce)
törnebohmitite-(La)
trögerite
trüstedtite
tschörtnerite
tučekite
ulvöspinel
västmanlandite-(Ce)
vavřínite
väyrynenite
veselovskýite
vésigniéite
villamanínite
wöhlerite
wölsendorfite
wülfingite
wüstite
ye'elimitite
zairite
zálesiite
zdeněkite
zenzénite
zincohögbomite-2N2S
zincohögbomite-2N6S
zincohögbomite
zýkaite

benavidesite, not bénavidésite
boleite, not boléite
ceruleite, not ceruléite or céruleite
cobaltomenite, not cobaltoménite
cumengeite, not cumengéite
curienite, not curiénite
diaboleite, not diaboléite
francevillite, not françevillite
henritermierite, not henritermiérite
hureaulite, not huréaulite
imiterite, not imitérite
julienite, not juliénite or juliënite
kamitugaite, not kamitugaíte
kamotoite, not kamotoíte
kolwezite, not kolwézite
kutinaite, not kutínaite
magnesiocarpholite, not magnésiocarpholite
mantiennéite, not mantiennéite
metavanmeersscheite, not métavanmeersscheite
minguetite, not minguéite
molybdomenite, not molybdoménite
neltnerite, not neltnérite
noelbenzonite, not noélbensonite
offretite, not offrérite
ojuelaite, not ojuélaite
plancheite, not planchéite
pseudoboleite, not pseudoboléite
renierite, not reniérite
roquesite, not roquésite
routhierite, not routhiérite
schorl, not schörl
schubnelite, not schubnélite
sengierite, not sengiérite
tremolite, not trémolite
uchucchacuaite, not uchucchacuaíte

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BIBLIOGRAPHY

- ARMBRUSTER, T., BONAZZI, P., AKASAKA, M., BERMANEC, V., CHOPIN, C., GIERÉ, R., HEUSS-ASSBICHLER, S., LIEBSCHER, A., MENCHETTI, S., PAN, Y., and PASERO, M. (2006) Recommended nomenclature of epidote-group minerals. *European Journal of Mineralogy*, **18**, 551–567.
- BAYLISS, P., and LEVINSON, A. A. (1988) A system of nomenclature for rare-earth mineral species: revision and extension. *American Mineralogist*, **73**, 422–423.
- BURKE, E. A. J. (2006) A mass discreditation of GQN minerals. *Canadian Mineralogist*, **44**, 1557–1560.
- BURKE, E. A. J., and LEAKE, B. E. (2004) “Named amphiboles”: a new category of amphiboles recognized by the International Mineralogical Association (IMA), and the proper order of prefixes to be used in amphibole names. *Canadian Mineralogist*, **42**, 1881–1883.
- CHOPIN, C., OBERTI, R., and CÁMARA, F. (2006) The arrojadite enigma: II. Compositional space, new members, and nomenclature of the group. *American Mineralogist*, **91**, 1260–1270.
- CHUKANOV, N. V., PEKOV, I. V., and KHOMYAKOV, A. P. (2002) Recommended nomenclature for labuntsovite-group minerals. *European Journal of Mineralogy*, **14**, 165–173.

SUPERFLUOUS DIACRITICAL MARKS

In some languages (e.g., French, Portuguese) diacritical marks have been added to mineral names as a pronunciation guide because the words would otherwise become incomprehensible in that language. French examples are, e.g., curiénite and roquésite, but the persons which they honoured had no such marks in their names: Hubert Curien and Maurice Roques. In English such diacritical marks should be left out of these mineral names. The following list gives mineral names which have been used with superfluous diacritical marks in English-language literature and handbooks.

aerinite, not aërinite
akaganeite, not akaganéite
behierite, not béhierite

COOMBS, D. S., ALBERTI, A., ARMBRUSTER, T., ARTIOLI, G., COLELLA, C., GALLI, E., GRIE, J. D., LIEBAU, F., MANDARINO, J. A., MINATO, H., NICKEL, E. H., PASSAGLIA, E., PEACOR, D. R., QUARTIERI, S., RINALDI, R., ROSS, M., SHEPPARD, R. A., TILLMANN, E., and VEZZALINI, G. (1997) Recommended nomenclature for zeolite minerals: report of the subcommittee on zeolites of the International Mineralogical Association, Commission on New Minerals and Mineral Names. *Canadian Mineralogist*, **35**, 1571–1606.

ERTL, A. (2006) Über die Etymologie und die Typelokalitäten des Minerals Schörl. *Mitteilungen der Österreichischen Mineralogischen Gesellschaft*, **152**, 7–16.

JOHNSEN, O., FERRARIS, G., GAULT, R. A., GRICE, J. D., KAMPF, A. R., and PEKOV, I. V. (2003) The nomenclature of eudialyte-group minerals. *Canadian Mineralogist*, **41**, 785–794.

LEAKE, B. E., WOOLLEY, A. R., BIRCH, W. D., BURKE, E. A. J., FERRARIS, G., GRICE, J. D., HAWTHORNE, F. C., KISCH, H. J., KRIVOVICHEV, V. G., SCHUMACHER, J. C., STEPHENSON, N. C. N., and WHITTAKER, E. J. W. (2003) Nomenclature of amphiboles: additions and revisions to the International Mineralogical Association's 1997 recommendations. *Canadian Mineralogist*, **41**, 1355–1362.

LEVINSON, A. A. (1966) A system of nomenclature for rare-earth minerals. *American Mineralogist*, **51**, 152–158.

MANDARINO, J. A. (2007) Diacritical marks in mineral names. *Mineralogical Record*, **38**, 193–194.

NICKEL, E. H., and GRICE, J. D. (1998) The IMA Commission on New Minerals and Mineral Names: procedures and guidelines on mineral nomenclature, 1998. *Canadian Mineralogist*, **36**, 913–926. ☒

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