

CODIFICATION OF UNNAMED MINERALS*

Dorian G.W. Smith¹

Dept. of Earth & Atmospheric Sciences, University of Alberta, Edmonton, Alberta, Canada, T6G2E3

Ernest H. Nickel²

Division of Exploration & Mining, CSIRO, PO Box 5, Wembley, W.A. 6913, Australia

The Subcommittee for Unnamed Minerals of the IMA Commission on New Minerals, Nomenclature and Classification (CNMNC, formerly CNMMN) has developed a codification system that includes the year of publication and qualitative chemical composition for unnamed minerals reported in the literature. Such minerals are divided into two categories: Those regarded as being "valid as unnamed minerals" are those that do not correspond to existing species, have not been reported previously, and whose published descriptions enable them to be recognized if found elsewhere. Unnamed minerals regarded as being "invalid as unnamed minerals" are those whose published descriptions are inadequate for their confident recognition if found elsewhere, or which correspond to existing mineral species or unnamed minerals published previously.

Introduction

References to unnamed mineral are frequently encountered in the literature, where they are described in varying degrees of detail and referred to in a haphazard manner. Furthermore, no comprehensive compilation of unnamed minerals has been published, which makes it difficult to find descriptions of unnamed minerals of a particular composition. In an effort to remedy this situation, the authors, together with the late Jiri Just (d. 1994) submitted a proposal to the IMA Commission on New Minerals and Mineral Names (CNMMN, now CNMNC) to establish a subcommittee to compile a list of unnamed minerals from the literature, and to devise a systematic method of codifying them. This proposal was approved as CNMMN Nomenclature Proposal 95-B. A final report, including a proposed coding system and compilations of unnamed minerals using the coding, was submitted to the CNMMN and was approved in 2005. The report was published by Smith & Nickel (2007). This paper is a brief summary of the report.

The Coding System

For the purposes of this work, an unnamed mineral is one that is referred to as being unnamed, has been given a designation such as

"Mineral A" or some descriptive or working name that does not correspond to the name of a valid mineral species.

In the literature, descriptions of unnamed minerals vary from detailed descriptions that would enable the mineral to be recognized and identified in a different context, to incomplete descriptions that would not enable a confident identification to be made. We have endeavoured to separate these minerals into two categories, "valid as an unnamed mineral" and "invalid as an unnamed mineral", respectively. For simplicity these categories will hereafter be referred to as "valid" and "invalid". Included among the "invalid" unnamed minerals are those that **have** been found to correspond to existing mineral species, either at the time of publication, or subsequently. In making a distinction between these two categories, there is, of course, a "grey" area that comprises minerals that could have been assigned to either category.

In an effort to make the coding as meaningful as possible, the coding includes the year of first publication and compositional information. In addition, the two categories of unnamed minerals are distinguished by differences in the coding system.

For minerals in the "Valid" category, a primary concern in devising a system was to make the codes indexable and to simplify literature and computer database searches. The designation finally adopted takes the form shown in

* The paper of the chairman and vice-chairman, Subcommittee for Unnamed Minerals, IMA Commission on new Minerals, Nomenclature and Classification, published earlier in *Canadian Mineralogist*, is reproduced here in brief version by request of the Commission in order to introduce the new and approved coding system as widely as possible.

¹ Chairman and ² vice-chairman, Subcommittee for Unnamed Minerals, IMA Commission on New Minerals, Nomenclature and Classification

the following example:
UM1959-01-BO:CaMgMn.

The use of the initial letters "UM" clearly places unnamed minerals in an alphabetical listing such as is used in most journals and books, as well as in computer databases. It also has the somewhat fortuitous advantage that the abbreviation could also stand in some other Germanic languages.

The "UM" is followed by two groups of numerals. The initial group indicates the year when the mineral was first reported. The two numerals after the first hyphen constitute a trivial "serial" number which has been assigned to give different identities to minerals described in the same year. Although it is recognized that, in time, some numbers will be eliminated when previously unnamed minerals are given names, discredited, or declared synonymous with other named or unnamed minerals, to avoid confusion, the sequential numbers will not be changed, nor will eliminated numbers be reused, now that this system of coding has been adopted by the IMA.

The numerals are followed by a further hyphen and then one or more alphabetic characters that represent a chemical code designed to indicate the chemical grouping to which the mineral has been assigned. The following chemical codes have been devised:

As arsenides (if both S and As present, S takes precedence)

AsO	arsenates or arsenites
Bi	bismuthides
BO	borates
Br	bromides
C	carbides
CH	hydrocarbons, oxalates, porphyrins, organic compounds
CO	carbonates
Cl	chlorides
CrO	chromates
E	elements and intermetallic compounds
F	fluorides
FCO	fluorcarbonates
GeO	germanates
I	iodides
IO	iodates
MoO	molybdates
N	nitrides
NO	nitrates
O	oxides
OC	oxalates
OH	hydroxides

OS	oxysulphides
P	phosphides
PO	phosphates
S	sulphides or sulphosalts
Sb	antimonies
SO	sulphates or sulphites
Se	selenides
SeO	selenates or selenites
Si	silicides
SiO	silicates
Te	tellurides
TeO	tellurates or tellurites
VO	vanadates
WO	tungstates

Thus, in the above example, BO indicates that the mineral is a borate. In cases where a mineral includes multiple anions or anionic groups of similar importance, both have been used; for example, carbonate-phosphate minerals have been represented by the coding COPO. It is possible that some further composite groups may be introduced in the future.

Following a colon are further element symbols (in mixed case and alphabetical order) for the **principal** elemental constituents, but omitting any element defined by the chemical code. Thus, oxygen can also be omitted in most cases since its presence will be implied by the chemical code. This system allows rapid computer searching/matching on the basis of observed elements and the compositional symbol for an unnamed mineral. In alphabetical listings, indices and databases, the chemical extension of the coding (-BO:CaMgMn in the above example) may, if appropriate, be omitted for the sake of brevity since the number alone makes the code unique. It was further decided that only the chemical elements **reported or implied** for an unnamed mineral would appear in its code. Thus, if an unnamed mineral was later shown to contain one or more elements that had originally been missed, such additional elements would not be included in the code.

The coding for minerals in the "invalid" category is similar to that used for those in the "valid" category, except that the second set of numerical symbols (the serial number) is replaced by a double forward stroke, as, for example, UM1997-//F:KMgNa.

Compilation of Unnamed Minerals

The authors have searched the available literature for unnamed minerals and have found ref-

ferences to about 2800 at the time of writing. Most of the data have been acquired directly from the primary literature sources, but where access to the primary literature was lacking, reliance was placed on secondary sources. The unnamed minerals were coded according to the system outlined above, and compiled into two lists, representing "valid" and "invalid" types. In the interest of saving space, these lists are not included in this paper, but have been published elsewhere (Smith & Nickel, 2007). The lists will also appear in due course on the CNMNC website <<http://www.geo.vu.nl/-ima-cnmmn/imareport.htm>> in a computer-searchable form

The data in both lists include the codings, primary and/or secondary literature references, and relevant comments, commonly including the chemical formulae, if known. During the compilation of the lists, the authors had recourse to their completely independent and very comprehensive databases "Minident" and "Mineral" (www.micronex.ca), Smith & Leibovitz, 1986; and www.materialsdata.com, respectively), and vigorously discussed contentious aspects until agreement was attained.

Future Developments

The codings for the unnamed minerals in the two lists published by Smith & Nickel (2007) represent the official IMA designations for the mineral, Additions and/or changes to the lists should be made solely by the Subcommittee for Unnamed Minerals of the CNMNC. At the present time this Subcommittee, which is expected to be a permanent subcommittee of the CNMNC, consists of the two authors of this paper, and they intend to provide periodic updates, and to make necessary changes such as transferring unnamed minerals from the "valid" to the "invalid" list as they are equated with existing species. However, it is anticipated that, over the course of time, additional members will be added to the Subcommittee, and a new executive established.

Researchers encountering what they believe to be new unnamed minerals are encouraged to submit their data to the Subcommittee on Unnamed Minerals, preferably via the CNMNC website. Pending approval of the final coding, it is recommended that they use the following scheme for interim coding. As in the example below, the code

should begin with the letters UKI, all in upper case. These letters may be thought of as standing for "unknown" and "interim" and are distinct from any IMA code that may eventually be assigned. Then, following a hyphen, four alpha/numeric characters (in lower case) take the place of the serial number in the IMA code for valid unnamed minerals. Following a further hyphen, and in parentheses, a chemical code can be indicated using the system described earlier in this paper. Note that the year of description has been deliberately omitted from this code because of uncertainties concerning publication delays.

Example: UKI-ab71-(S:CoCuFeZn)

It should be noted **that** authors who have described new minerals without names do not have any priority rights on the subsequent naming of such minerals. Any names proposed subsequently (for previously unnamed minerals) have to be approved by the CNMNC, as do the minerals for which the names are proposed.

Conclusions

The CNMNC will establish a permanent Subcommittee for Unnamed Minerals whose job it will be to:

- oversee the assignment of numbers to future unnamed minerals, including those already described but which have not been identified in the initial lists.
- decide and act upon future recommendations from the mineralogical community concerning the rejection of previously "Valid" unnamed minerals.

The Subcommittee will make recommendations to the CNMNC regarding the status of unnamed minerals.

References

- Smith, D.G.W. & Leibovitz, D.P. (1986):* Minident: a data base for minerals and a computer program for their identification // *Can. Mineral.* 24, 695–708.
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