

**“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**

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ABSTRACT

The IMA–CNMMN has now recognized a new category of names, “named amphiboles”, which can be published without its previous approval, so long as the names agree with its system of amphibole nomenclature. Generally in these cases, only the chemical composition and the symmetry, either monoclinic or orthorhombic, will be known. These are not new species of amphibole, and the IMA–CNMMN criteria for recognition of new species remain unchanged. In addition, for the first time, the order in which prefixes appear in amphibole names, whether in names of species or in “named amphiboles”, is here defined.

Keywords: amphibole-group minerals, nomenclature, prefixes.

SOMMAIRE

La commission de l’IMA responsable des nouveaux minéraux et des noms de minéraux reconnaît maintenant une nouvelle catégorie de noms, les “amphiboles nommées”, que l’on peut publier sans consentement préalable de la Commission, pourvu que ces noms soient conformes à son système de nomenclature des minéraux du groupe de l’amphibole. Dans le cas général, seules la composition chimique et la symétrie, soit monoclinique ou orthorhombique, seront connues. Il ne s’agit pas de nouvelles espèces d’amphibole, et les critères de la Commission pour reconnaître une espèce nouvelle demeurent en vigueur. De plus, et pour la première fois, nous précisons la séquence dans laquelle les préfixes doivent être utilisés dans le nom d’une amphibole.

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Mots-clés: minéraux du groupe de l’amphibole, nomenclature, préfixes.

INTRODUCTION

The extensive solid-solutions shown by the amphiboles, together with their widespread occurrence, has presented particular difficulties in devising a rational nomenclature for the group. Consequently, it was not until 1978, after 13 years of work, that the IMA–CNMMN was able to first approve a systematic nomenclature for amphibole-group minerals (Leake 1978). After 15 years of further work, the scheme was developed, refined, simplified and adjusted for newly discovered species, giving the present scheme (Leake *et al.* 1997, 2003). This scheme consists of 34 root names

(*e.g.*, glaucophane) with a range of compulsorily used prefixes (*e.g.*, *ferro*) to indicate particular richness in certain elements (in order to avoid unnecessary proliferation of the already large number of root names), and a number of optionally usable modifiers (*e.g.*, titanian) for less important substitutions. Prefixes are an essential part of a mineral name (Nickel & Grice 1998). Only where new substitutions are discovered that involve distributions of ionic charge of a new type are new root-names now approved for amphibole species. All new species names, whether a new root-name is involved or simply an existing root-name with a particular prefix not previously approved with that root name, require to

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be submitted to the IMA–CNMMN for approval before publication. Such new species are only approved, as for any other mineral, if accompanied by an acceptable variety of defining features, such as chemical composition, crystal symmetry, cell sizes, and X-ray-diffraction patterns.

“NAMED AMPHIBOLES”

Although the scheme of naming amphiboles has been widely accepted and generally successful in bringing order to names within this group, a few problems have arisen. In particular, the following situation has become increasingly common. If a new amphibole composition is discovered, for instance as a result of electron-microprobe analyses that yield an existing root-name prefixed for the first time by one of the IMA–CNMMN-approved prefixes, or a certain combination of such prefixes, which have therefore not been previously submitted to the IMA–CNMMN with this root name for approval, then naming can become a problem. The discoverers may not have the time, inclination, equipment, expertise or adequate sample, to carry out the full range of tests to ensure approval by the IMA–CNMMN as a new species. If they submit an account of their work for publication and include the new name, correctly deduced according to the current IMA–CNMMN scheme, it is commonly published if the editor and referees are not aware of IMA–CNMMN rules. This is the usual situation at present and has yielded dozens of “unapproved”, but usually “correct” names whose status is ambiguous. If the editor or referees are aware of the IMA–CNMMN rules, the new name is refused publication until IMA–CNMMN approval as a new species is obtained. The author(s) rarely submit such names to the IMA–CNMMN; in order not to delay publication of their paper, generally resort to removing the name, and instead refer to the composition in very general terms (“a sodic amphibole”), which the editor accepts. The special character, the solid-solution extension involved, and the name of the particular composition are thus not brought to the attention of others and are potentially lost. This second possibility has occurred several times.

In order to resolve such problems and the present widespread flouting of IMA–CNMMN rules, the IMA–CNMMN has now agreed to institute a new category of “named amphiboles”, which can be published without individual IMA–CNMMN approval. These names will be limited to amphibole compositions which, once correctly calculated, yield an already IMA–CNMMN-approved root name, but with a certain IMA–CNMMN approved prefix, or a certain combination of approved prefixes, not previously approved with that root name. In addition, the monoclinic or orthorhombic symmetry must be known. Such names will not be new species of amphibole, nor have the requirements for approval of new species been changed in any way. New root names

will continue to be approved only for new (*i.e.*, those not included in the 1997 and 2004 schemes) heterovalent substitutions. “Named amphiboles” cannot involve root names not already approved by the IMA–CNMMN. As most “named amphiboles” will not have been approved by the IMA–CNMMN before publication (as is the present position with the publication of unapproved names), the IMA–CNMMN cannot guarantee that such names have been correctly deduced. However, from time to time, in order to alert the mineralogical community to the observed solid-solution ranges within the amphibole group, informal lists of previously published, or known, “named amphiboles” will be published by the IMA–CNMMN. Such lists will only include names which, if correctly given according to current IMA–CNMMN rules, constitute for the first time new names, not previously recognized as species. In such lists, the sequence in which multiple prefixes are written will follow the order described below, whether or not the authors of the original publication adhered to that order. Lists may include names already published before this new category of “named amphiboles” was agreed to, in an attempt to “regularize” the otherwise ambiguous names already in the literature. However, “named amphiboles” will not be included in official lists of the IMA–CNMMN, as they are not newly approved species. Authors not seeking approval for amphibole names run the risk that other researchers will submit their own material for species approval with the same name.

ORDER OF PREFIXES IN A SEQUENCE

The IMA–CNMMN system of naming an amphibole involves three types of prefixes. Primary prefixes are an essential part of the root name (“root-name prefixes”), generally a *ferro* or *magnesio* prefix, and all such names, *e.g.*, ferro-anthophyllite and magnesio-hastingsite, appear in the IMA–CNMMN classification diagrams, which are widely used by the community. Then there are the secondary prefixes like *proto* (*Pnmm* orthorhombic form instead of the usual *Pnma* form), *magno* and *parvo* (Group-5 amphiboles with ${}^B\text{Li} \leq 0.50$ apfu, which retain their traditional Group 1, 2 or 3 root-names because Group 5 was approved to accommodate ${}^B(\text{LiNa})$ amphiboles: Leake *et al.* 2003). Finally, there are prefixes such as *potassic*, *titano*, *chloro*, and *ferri*, which indicate richness in particular elements. The minimum cell-content needed to trigger these names is set to bring out only exceptional richness in the groups concerned, and so some of the tertiary prefixes do not apply to all the amphibole groups or root names.

Previously, the order in which prefixes were used where more than one prefix is present was not specified, except that it was generally understood by usage that root-name prefixes always came immediately before the root names, so that the names given in the classification diagrams were not split apart. With the

increase in the number of approved names of new species and with the expected number of “named amphiboles”, it has become apparent that systematic listing (*e.g.*, alphabetic), indexing, searching for, and recognition of amphibole names, are being made much more difficult by the lack of any system in the ordering of prefixes.

Accordingly, the IMA–CNMMN has now approved a standard sequence for prefixes. The IMA–CNMMN recognizes that root-name prefixes should never be split apart from their root names, and that many elements are not confined to one of the *M1*, *M2*, *M3* or *M4* positions. The convention of not hyphenating the prefix nearest to the root name (*e.g.*, ferrogedrite), except where two vowels adjoin (*e.g.*, ferro-eckermannite), or where it might be unclear, is retained. The order of prefixes follows.

1. The first prefix should always be any *proto*, *magno* or *parvo* prefix, if required;
2. Next should be any anion prefix, *i.e.*, *chloro*, *fluoro* or *oxy*, if required;
3. Next comes any necessary cation prefix, *e.g.*, *potassic* (if more than one, then in alphabetical order), except any trivalent substitutions and root-name prefixes;
4. Necessary trivalent substitutions, *i.e.*, *alumino*, *ferri*, *mangani* and *chromio*, come next, immediately before 5;
5. Any root-name prefixes immediately precede the root name, *e.g.*, ferrowinchite.

Although this listing suggests fiendishly complicated names with multiple prefixes, in fact over 90% of published names of amphiboles have either no prefix at all, one root-name prefix only or one root-name prefix plus a second prefix. The number of prefixes on new names now submitted to the IMA–CNMMN for approval tends to be larger because these names generally refer to rare and unusual compositions, infrequently encountered, whereas for most everyday usage, the need for more than two prefixes is distinctly rare, and about half the names lack any prefix (*e.g.*, Bosch *et al.* 2004).

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