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HOW TO DEFINE, REDEFINE OR DISCREDIT A MINERAL SPECIES?

The Commission on New Minerals, Nomenclature and Classification (CNMNC) was created by the International Mineralogical Association (IMA) in 2006 by merging the Commission on New Minerals and Mineral Names (established in 1959) with the Commission on Classification of Minerals (established in the 1980s). The CNMNC is one of the most active commissions within the IMA because it is in charge of all aspects of mineral species definition, naming, nomenclature, and classification. It is constituted by four officers and 34 members, representing the countries affiliated to the IMA. The national representatives are designated by the national mineralogical societies; their nominations are independent of the CNMNC itself. However, when a member is not active, or does not follow the CNMNC rules, the IMA officers may contact the corresponding national society to ask for a replacement of the member.

To define a new species, it is necessary, prior to publication, to pass a new mineral proposal through the CNMNC. A new mineral checklist is available on the CNMNC website (<http://nrmima.nrm.se/>), comprising a template in which all key data on the potential new species have to be reported: occurrence, appearance, physical and optical properties, chemical data, X-ray powder diffraction data, unit-cell parameters and space group, crystal structure and relationship to other species. Proposals are handled by the chairman, who carefully checks the data before assigning an official IMA number to the proposal. It is then forwarded to the CNMNC members for direct voting, with a two-month deadline. The members have to vote separately on the validity of the mineral, and on its name. A two-thirds voting majority is required for the acceptance of both.

Nomenclature proposals have to be submitted to the 1st Vice-Chairman, in a free publication-type format. These proposals mainly concern name modifications, species discreditations, revalidations or redefinitions, as well as type/neotype sample (re)definitions. To change a mineral name, good scientific arguments are necessary: a name cannot be modified for personal conflicts of interest. The CNMNC guidelines require authors to preserve historical and well-established mineral names (Hatert et al. 2013). For species revalidations or discreditations, it is recommended that the original type specimens, if available, be investigated in detail. If the type samples are missing, historical samples from the type locality, and/or investigations by the original authors of the mineral, may also be used. The redefinition of chemical formulae must pass through the CNMNC when some significant modifications occur, as for example when a new chemical element is added to or subtracted from the formula. However, if new data just show slight modifications of atomic ratios in the formula, as for example when the number of water molecules is revised, it is generally not necessary to submit a nomenclature proposal. In such cases, the data may be published without CNMNC approval, though we encourage authors to send a copy of the paper to the CNMNC 2nd Vice-Chairman in order to update the CNMNC official mineral list (<http://ima-cnmc.nrm.se/imalist.htm>). Such modifications are then noted in the *CNMNC Newsletter* (Mills, 2010).

The procedure to handle nomenclature proposals depends on the complexity of the proposal. When the proposal is quite simple and straightforward, a direct voting procedure is applied, with a maximum deadline of two months. However, if the proposal is more complex, a two-step procedure is applied, with a first round of comments, and a second round for voting. The comments of the CNMNC members are sent to the authors after the first round, and the new proposal, which takes these comments into account, is sent to the members for voting. This long procedure may take approximately four months.

Group nomenclature and classification proposals are handled by the Secretary. The guidelines for the classification of mineral groups were published by the CNMNC in 2009 (Mills et al. 2009). The establishment of an official CNMNC list of mineral (super)groups is in progress.

The commission's website is handled by the Chairman, and contains the new mineral checklist, all CNMNC published nomenclature and groups proposals, a list of unnamed mineral species, an official mineral list, and the *CNMNC Newsletter*. This newsletter presents recently accepted new minerals and changes to nomenclature, and it is published on a bimonthly basis in the *Mineralogical Magazine* and *European Journal of Mineralogy*. Its editor is the 2nd Vice-Chairman, who also updates the official IMA-CNMNC mineral list at the same time. We encourage all members of the mineralogical community to visit our website (<http://nrmima.nrm.se/>), where all documents are freely available.

Finally, we would like to underline the involvement of the CNMNC members, who work on a volunteer basis for the commission: thank you so much! This represents a huge task: nowadays, no less than 120 new mineral, ten nomenclature and two group proposals are handled each year. The work of the CNMNC can be compared to a classical review process in scientific journals. The main difference is that the proposals are evaluated by up to 34 reviewers, thus ensuring a good reliability of the CNMNC evaluation process. All authors are encouraged to submit their proposals to the CNMNC. They will be forwarded to the members if they are scientifically grounded and follow our guidelines. However, as in all scientific publications, it may appear that some mineralogists do not agree with our decisions; this is particularly sensitive when mineral species are discredited or renamed. In that case, the authors are free to submit a proposal to revalidate or rename the species; if it is scientifically grounded, the CNMNC may modify its decision. Neither the IMA, the CNMNC, nor its individual members and officers may be considered as legally responsible for any decision. We all act as volunteers to ensure a consistent mineral nomenclature, in order to facilitate the progress of mineral science.

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