CLAY MINERAL NOMENCLATURE

(Report of Discussions and Recommendations of The Clay Mineral Society Nomenclature Committee)

by

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ABSTRACT

Discussions and recommendations of The Clay Mineral Society, Nomenclature Committee, 1965–6, are summarized.

INTRODUCTION

The Nomenclature Committee of The Clay Minerals Society (C.M.S.) for 1965–6 consisted of G. W. Brindley (Chairman), S. W. Bailey, G. T. Faust, S. A. Forman, and A. A. Levinson; for 1966–7, the committee will consist of the first four members together with C. I. Rich in place of A. A. Levinson. In the year 1965–6 discussions were maintained by correspondence, with one full-day meeting in State College, Pa., May 2, 1966. Previous work of the committee was summarized at the conference held in Berkeley, August 1965 (Brindley, 1966). In the year under review, 1965–6, the C.M.S. Nomenclature Committee discussed further the C.I.P.E.A. recommendations to the International Mineralogical Association (I.M.A.) and the subsequent I.M.A. Report on Clay Mineral Nomenclature (Mackenzie, 1965; Brindley, 1966); the results were submitted to the C.I.P.E.A. Nomenclature Committee at the International Clay Conference held in Jerusalem, June 1966.

RECOMMENDATIONS AND DISCUSSIONS OF C.M.S. NOMENCLATURE COMMITTEE, 1965–6

Discussion of the C.I.P.E.A. and I.M.A. Reports led to the following:

(a) The use of the term "layer lattice" in these Reports is considered unfortunate. "Layer" is a term that can be applied to structures but not to a crystal lattice; "lattice" denotes a three-dimensional array of points. The classification discussed in the C.I.P.E.A. and I.M.A. Reports should be entitled "A Classification of Layer Silicate Minerals, including Clays", or simply "A Classification of Phyllosilicates". It should be noted that the classification is partial in that it does not cover all layer silicate structures.

https://doi.org/10.1346/CCMN.1967.0150143 Published online by Cambridge University Press

(b) *Layer sequence notation for kaolinite, dickite, and nacrite.* The I.M.A. Committee endorsed the *principle* of using a layer sequence notation analogous to that applied to the micas. The C.M.S. Committee considers that the time is not yet right to assign notations. Nacrite is primarily a two-layer monoclinic structure, as also is dickite. The apparently obvious symbolism of $2M_1$ and $2M_2$, analogous to the mica symbols, is not valid, however, without attaching a different significance to these terms when applied to dickite and nacrite. In order *not* to misuse these terms, which have a clear significance in relation to micas, one must find other symbols for dickite and nacrite. It is not yet clear to the C.M.S. Committee what symbols would be appropriate for dickite and nacrite. It is recommended that the selection of kaolinite layer sequence symbols be deferred for further study.

(c) The term "layer charge x" used in the classification scheme requires clearer definition. The C.M.S. Committee recommends that the definition read: "Layer charge x per formula unit." This formula unit for micas corresponds to $O_{10}(OH)_2$ and for kaolinite to $O_5(OH)_4$. Not all phyllosilicates are conveniently referred to the C-centered unit cell. This cell has two formula units within the 5×9 Å^2 cell. When a hexagonal cell is required, the formula unit carries the same compositional significance. This means that the values of x as presently listed should be halved. The C.M.S. Committee recommends further that the *charge limits be kept under supervision.* The upper limits in the groups $x \sim 0.5$–1 and $x \sim 1$–1.5 may be too low. Further information is sought.

(d) *Montmorillonite—saponite versus smectite.* The C.M.S. Committee noted the continued use of smectite, and possibly its increased usage, though there was not unanimity on the latter point. It was noted that the I.M.A. questionnaire did not allow an answer directly for or against the C.I.P.E.A. recommendation, viz. allowing both terms to be used for a period to help decide the question on the basis of usage. (Possibly the I.M.A. Committee cannot sanction continued use of two terms, even temporarily.)

The C.M.S. Committee recommended that the C.I.P.E.A. Nomenclature Committee should request I.M.A. to reconsider this decision and to withhold final verdict for a period to be suggested.

(e) *Trioctahedral brittle-mica species.* In a forthcoming study by S. A. Forman, it will be recommended that consideration be given to *clintonite* as a species name in preference to seybertite, xanthophyllite, brandisite. Seybertite is highly disordered, and the other two may exhibit polysynthetic twinning that simulates a higher symmetry. It is argued that clintonite has historic priority, and the other three names are essentially synonymous with it.

The C.M.S. Committee defers a recommendation on this point until the paper by Forman is available for study. On the basis of the information available, it is anticipated that Forman's recommendation will be supported by the C.M.S. Committee.

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(f) *Sudoite*, which has been suggested as a group or as a sub-group name, is regarded as *not suitable* for either.

The C.M.S. Committee recommends that *sudoite* be kept available for use when dioctahedral chlorite *species* can be defined.

It is believed that the mineral studied by Müller* is approximately dioctahedral in the 2:1 layer and in the separate octahedral layer, whereas the material studied by Sudo may have been trioctahedral in the separate layer. A clear understanding is required of the type of mineral to which the name is applied.†

(g) *The kaolinite minerals* (excluding dickite and nacrite).

The varieties described by Brindley and Souza Santos (1966) in a forthcoming paper to the International Clay Conference in Jerusalem (Israel) were discussed at length. It would not be appropriate at this point to summarize the discussion until the data presented by Brindley and Souza Santos become generally available. It can be mentioned briefly, however, that the following consideration was prominent in the discussion. If it can be accepted as a general principle that minerals should not be named on the basis of morphology alone, then there is a question whether tubular and/or lath-shaped minerals with compositions approaching $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$ should have a different name from platy minerals of about the same chemical composition. Similar considerations apply to minerals with $4H_2O$ which now may exist in both platy and tubular (or lath-like) forms.

The C.M.S. Committee recommended that these ideas be submitted to the C.I.P.E.A. Nomenclature Committee at the time of the conference in Jerusalem, Israel.

(h) Nomenclature for mixed-layer minerals was considered. The terms suggested by Brown (1955), e.g. chloritic vermiculite, chlorite–vermiculite, vermiculitic chlorite, were criticized on the grounds that there is well-established use of such expressions as "chloritic mica schist", "chlorite–muscovite schist", which imply macroscopic mixtures of minerals, and not (presumably) mixed-layer minerals.

There is no easy solution but it is recommended that expressions such as "irregular chlorite–vermiculite interstratification" be used, with the dominant component being given first. If the components are comparable, then "irregular 1:1 chlorite–vermiculite interstratification" can be used. It is considered that confusion with other uses of the ratio 1:1 is not possible within the context.‡ The recommendation by Bloss (1966) that "terms such as 25–75 chlorite–mica or 50–50 chlorite–mica could be used increasingly in the future" as

* Engelhardt, Müller, and Kromer (1962) give octahedral occupancy for both layers "between 2 and 2.5". Müller (1963) gives a total octahedral content of 4.27 for two purified samples.

† Attention is directed to the paper by T. Sudo and M. Sato (1966), "Dioctahedral Chlorite".

‡ The suggestion by Bloss (1966) to use 1–1 instead of 1:1 would meet this objection (G. W. B.).

https://doi.org/10.1346/CCMN.1967.0150143 Published online by Cambridge University Press

methods are developed for determining quantitatively the proportions of components, was regarded as somewhat dangerous at present in that such designations may convey greater precision than is valid.

(i) The nature of illite was reviewed and previous conclusions confirmed.

FURTHER ACTION

This summary of recommendations and discussions was presented by the writer to the C.I.P.E.A. Nomenclature Committee in Jerusalem, Israel, and, together with other material submitted for consideration, was discussed at length. The outcome of these discussions has been circulated to some forty societies and groups throughout the world concerned with clay minerals, and the results of this much broader inquiry will be made known eventually.

The present publication aims primarily at making known to The Clay Minerals Society the work of its Nomenclature Committee.

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