

## REPORT OF THE ASSOCIATION INTERNATIONALE POUR L'ÉTUDE DES ARGILES (AIPEA) NOMENCLATURE COMMITTEE FOR 1996

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### INTRODUCTION

The most recent report of the AIPEA Nomenclature Committee involved the definition and use of the terms “clay” and “clay mineral”; see Guggenheim and Martin (1995, 1996). Additional items acted upon by this committee are reported here.

### POLYMORPHISM, POLYTYPISM AND THE KAOLIN MINERALS

#### Background

“Polymorphism” is the ability of a given element or compound to crystallize in more than 1 form, with each form having a distinct crystal structure. “Polytypism” is defined as the existence of an element or compound in 2 or more layer-like crystal structures that differ in layer-stacking sequences. The layers need not be crystallographically identical, but they should be similar. In part, polytypism differs from polymorphism in permitting small differences in chemical composition between structures, not to exceed 0.25 atoms per formula unit of any constituent element (see Bailey 1977, 1980 for additional comments).

In general, polytypes should not receive individual names. Instead, a set of related polytypes should be designated by a single name followed by a structural symbol suffix that defines the layer-stacking differences. Polytype mineral names already in existence that have international acceptance and serve a useful function need not be discarded. Decision on the reten-

tion of individual names is the responsibility of the International Mineralogical Association (IMA) Commission on New Minerals and Mineral Names (Bailey 1977, 1980).

Kaolinite, nacrite and dickite have 1:1 layers with close similarities in structure. They are polytypes. Most properly, they should be designated by a single name followed by a structural symbol suffix that defines the layer stacking sequence. In accord with the above procedures, the Comité Internationale Pour l'Étude des Argiles (CIPEA) Nomenclature Committee (succeeded by the AIPEA Nomenclature Committee) agreed unanimously in 1963 and reconfirmed in 1967 (Brindley 1967) that kaolinite, nacrite and dickite should be renamed as a single mineral, with symbols expressing the stacking sequence of kaolinite layers. In 1971, the Clay Minerals Society (CMS) Nomenclature Committee (Bailey et al. 1971) acknowledged these changes in its report, but the report left open the question of the exact nature of the stacking-sequence symbols pending further study.

#### Recommendation

The present AIPEA Nomenclature Committee recommends that the names “kaolinite”, “nacrite” and “dickite” be retained as mineral names, in contrast to previous committee actions. This action is simply a recognition that, after nearly 35 years, it is apparent that the earlier recommendations are not being followed and that the present names are well established

Table 1. Recommended use of kaolin and kaolinite in the classification† of 1:1 layer silicates.

Layer type	Group	Subgroup‡	Species§
1:1	kaolin-serpentine	kaolin	kaolinite, dickite, nacrite
1:1	kaolin-serpentine	serpentine	lizardite, amesite, berthierine

† Refer to Martin et al. (1991) for a complete classification scheme.

‡ Octahedral character (“dioctahedral” or “trioctahedral”) may be used also.

§ Only a few examples are given.

in the literature. Final determination of this matter resides within the IMA Commission.

### GROUP AND SUBGROUP NAMES FOR 1:1 PHYLLOSILICATES

#### Background

In 1980, the AIPEA Nomenclature Committee (Bailey 1980) recommended a classification scheme of phyllosilicates in which 1:1 and 2:1 layer types are divided into groups (for example, kaolinite-serpentine) on the basis of charge per formula unit. Subgroups (for example, kaolinite, serpentine) are based on dioctahedral and trioctahedral characteristics. Each subgroup is further divided into mineral species (for example, kaolinite, nacrite, dickite, etc. for kaolinite; lizardite, berthierine, amesite, etc. for serpentine). The classification scheme is not only based on details of structure, but also it corresponds to a succession of stages of refinement in identification. It was noted that several “dual” names exist for which the group, subgroup or species names were identical, as is the case for kaolinite. The Committee recognized the potential for confusion and stated that “It is anticipated that the precise definitions of the groups and subgroups and their names will evolve and change with time.”

The AIPEA Nomenclature Committee (Bailey 1980) rejected terms such as “kandite” or “septechlorite” as alternative group and subgroup names for kaolinite or serpentine, respectively, and these terms should not be used. Interestingly, the AIPEA Nomenclature Committee used the term “kaolin” interchangeably with “kaolinite” group in the text of the report (Bailey 1980, p. 86), as did the report of the CMS Nomenclature Committee (Martin et al. 1991, Table 1). However, the use of “kaolin” as the group name was apparently never discussed by either committee.

Studies of the kaolinite-serpentine group minerals (for example, Ehrenberg et al. 1993) suggest the need for a group name that differs from the species name, since authors use the term “kaolinite” to refer to any of the 3 polytypes: kaolinite, nacrite or dickite. “Kaolin” was defined (see Kuzvart 1977) at the Third Ka-

olin Symposium (1974) as the following: “Kaolin is a rock characterized by a useful content of kaolin [*sic*] minerals.” The economic-mineralogy aspects were elaborated by Patterson and Murray (1975): “Kaolin is a clay consisting of substantially pure kaolinite, or related clay minerals, that is naturally or can be beneficiated to be white or nearly white, will fire white or nearly white and is amenable to beneficiation by known methods to make it suitable for use in white ware, paper, rubber, paint and similar uses.” In recent years, however, the term “kaolin” has been used interchangeably with “kaolinite” group.

#### Recommendation

It is the recommendation of this committee that the term “kaolin-serpentine” group be used to designate what was previously referred to as the “kaolinite-serpentine” group, as shown in Table 1. The Committee believes that little confusion will result in the use of “kaolin”, since the distinction of “kaolin” as a rock term or as a mineral group name is recognizable by context.

### COMMERCIAL NAMES AND SYNTHETIC MATERIAL

Commercially available synthetic material must be explicitly referred to as a commercial name in quotations and, if the name is recorded as a trademark, capitalized. Thus, for a hypothetical hectorite-like material, “Xyzite”, the name of which has been recorded as a trademark, the appropriate reference in a publication should read: “Xyzite” (a synthetic hectorite-like material, Xyz Manufacturing Co., Chicago, Illinois, USA). Synthetic material should be referred to as “hectorite-like” and not “hectorite”, because the latter implies a *naturally occurring* mineral. Because the term “synthetic” is unambiguous, specifically negates the naturally occurring aspect of the mineral characteristic in question and is commonly used, the use of “synthetic” as a description modifier to a mineral name (for example, “synthetic quartz”) is acceptable. The issue of the use of “synthetic” has recently been discussed by the IMA (Nickel 1996), and the above usage is consistent with these recommendations.

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