

COMMENT

REPORT OF THE CLAY MINERALS SOCIETY NOMENCLATURE COMMITTEE FOR 1977 AND 1978

In 1971 the CMS Nomenclature Committee published a summary of national and international recommendations on clay mineral nomenclature (Bailey *et al.*, 1971a), as well as the committee report for 1969-1970 (Bailey *et al.*, 1971b). The present report covers the committee's activities for the years 1976-1977 and 1977-1978. No formal reports were issued for the years 1971-1976.

1. The CMS Nomenclature Committee for 1977 recommends simplification of the nomenclature of trioctahedral chlorites along the lines suggested by Bayliss (1975). Trioctahedral chlorites should be named according to the dominant divalent octahedral cation present. Recommended names are *clinochlore* for Mg-dominant [end member = $(Mg_5Al)(Si_3Al)O_{10}(OH)_8$], *chamosite* for Fe^{2+} -dominant [end member = $(Fe_5Al)(Si_3Al)O_{10}(OH)_8$], *nimite* for Ni-dominant [end member = $(Ni_5Al)(Si_3Al)O_{10}(OH)_8$], and *pennantite* for Mn^{2+} -dominant [end member = $(Mn_5Al)(Si_3Al)O_{10}(OH)_8$]. All other species and varietal names should be discarded because arbitrary subdivisions according to octahedral and tetrahedral compositions have been shown to have little or no structural significance. Tetrahedral compositions and trivalent octahedral cations are not considered in the recommended species names, nor is the distribution of octahedral cations between the 2:1 layer and the interlayer. Adjectival modifiers, such as those of Schaller (1930), may be used to indicate either important octahedral cations other than the dominant cation or unusual tetrahedral compositions. Thus, terms such as ferroan clinochlore and magnesian chamosite would be appropriate for compositions intermediate between the end member com-

positions of those two species, ferrian nimite for a Ni-dominant chlorite with Fe^{3+} as the major trivalent cation, and so forth. Bayliss (1975) gives modifiers appropriate for many of the chlorite species listed in other nomenclature systems.

2. Species names previously recommended by the AIPEA Nomenclature Committee for dioctahedral chlorites are deemed adequate for those species now known. These names are *donbassite* for chlorites with two dioctahedral sheets and *cookeite* (Li-rich) and *sudoite* (Li-poor) for chlorites with a dioctahedral 2:1 layer and a trioctahedral interlayer.

3. Attention centered on nomenclature for glauconite and celadonite during 1978. A survey of the literature was made, and the views of 15 people who had worked with these minerals were solicited. The views of the 11 respondents varied considerably, but there were common views that the species names should be divorced from mode of origin (marine vs. nonmarine), that celadonite should be the tetrasilicic end member, and that a species name for glauconite should apply only to a pure single-phase compound. The committee also had advance access to a paper on the subject by Buckley *et al.* (1978). Our conclusions are as follows.

Celadonite

All of the evidence points to natural celadonites being close to the ideal end member $K(R^{2+}R^{3+})Si_4O_{10}(OH)_2$ with R^{2+} largely Mg and R^{3+} largely Fe. For example, in the paper by Buckley *et al.*, 11 of 13 specimens, excluding two interstratifications, had less than 0.1 atoms of tetrahedral Al per formula unit and the total R^{3+} was quite constant at 1.04 ± 0.15 atoms.

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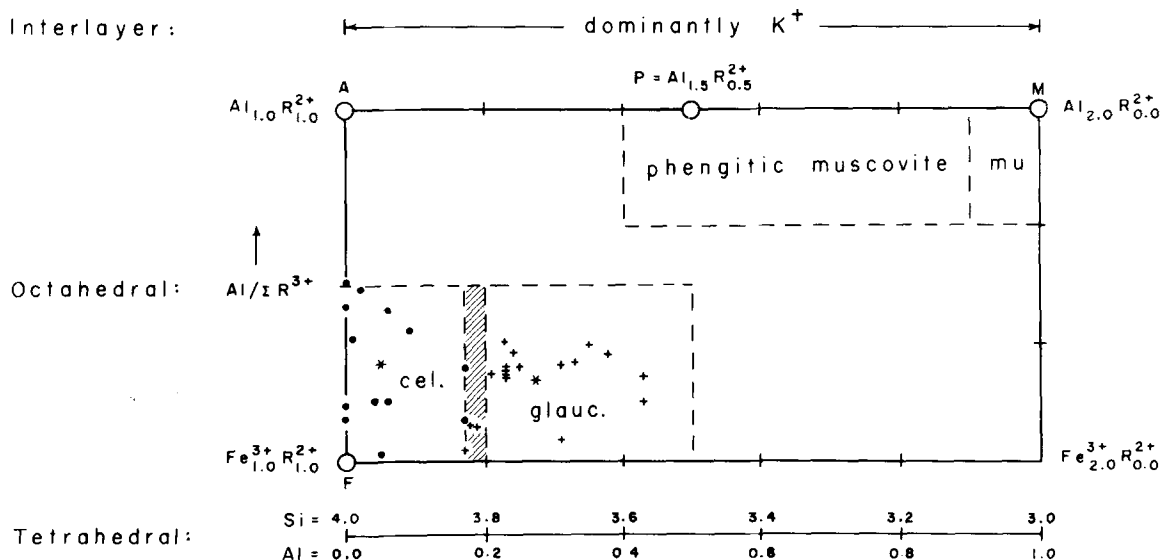


Figure 1. Compositional fields for nomenclature purposes of celadonite (cel.), glauconite (glauc.), phengite, and muscovite (mu) with tentative boundaries (dashed). All R^{2+} cations have been grouped together. Individual analyses of the Buckley *et al.* (1978) study are shown as filled circles (celadonites) and crosses (glauconites). Average compositions of the study are shown as stars. Large open circles represent the ideal compositions of muscovite (M), phengite (P), the ferric form of celadonite (F), and the aluminian form of celadonite (A).

The average formula for 13 analyses is $R_{0.94}^{1+}(R_{0.96}^{2+}R_{1.04}^{3+})(Si_{3.95}Al_{0.05})O_{10}(OH)_2$.

The committee defines *celadonite* as a dioctahedral mica of composition $KMgFe^{3+}Si_4O_{10}(OH)_2$ with a tetrahedral Al (or Fe^{3+}) range of 0.0 to about 0.2 atoms. Substantial octahedral variations from this formula can be described by adjectival modifiers, such as aluminian celadonite or ferroan celadonite. Further characteristics of celadonite are $d(060) < 1.510 \text{ \AA}$ and sharp infrared spectra, as described by Buckley *et al.* There is an area of potential overlap of celadonite and glauconite analyses between about $Al^{IV} = 0.17$ to 0.20 (Figure 1). For compositions near this boundary and for cases where analytical errors or impurities are suspected, application of the other identification criteria are especially important.

Glauconite

Electron microprobe analyses have shown that glauconites are compositionally heterogeneous, even after careful purification and removal of expandable components. The core may be of somewhat different composition than the rind of the same grain, and one grain may be of different composition than another grain from the same sample. Nevertheless, Buckley *et al.* (1978) showed that with careful purification and with modern analytical techniques there is little or no overlap between glauconite and celadonite compositions and that they can be differentiated also by $d(060)$ and infrared spectra. The average of 18 analyses of unaltered and single-phase glauconites in their study is $R_{0.91}^{1+}(R_{1.34}^{2+}R_{0.69}^{3+})(Si_{3.73}Al_{0.27})O_{10}(OH)_2$. The tetrahedral Al range was 0.17 to 0.43 and octahedral $R^{3+} = 1.34 \pm 0.15$ atoms. $Fe^{3+} \gg Al$ and $Mg > Fe^{2+}$ (unless altered). See Figure 1.

The committee defines *glauconite* as an Fe-rich dioctahedral mica with tetrahedral Al (or Fe^{3+}) usually greater than 0.2 atoms per formula unit and octahedral R^{3+} correspondingly greater than 1.2 atoms. A generalized formula is $K(R_{1.33}^{2+}R_{0.67}^{3+})(Si_{3.67}Al_{0.33})O_{10}(OH)_2$. Further characteristics of glauconite are $d(060) > 1.510 \text{ \AA}$ and (usually) broader infrared spectra than celadonite, as described by Buckley *et al.*

(1978). The species glauconite is single-phase and ideally is non-interstratified. Mixtures containing an iron-rich mica as a major component can be called *glauconitic*. Specimens with expandable layers can be described as randomly interstratified *glauconite-smectite*. Mode of origin is not a criterion, and a green fecal pellet in a marine sediment that meets the definition for celadonite should be called celadonite.

4. The CMS Nomenclature Committee Reports for 1977 and 1978 were forwarded to the AIPEA Nomenclature Committee. At its July 12, 1978, meeting in Oxford the AIPEA Nomenclature Committee approved simplification of the chlorite nomenclature (as in the 1977 report) and the definitions for celadonite and glauconite (as in the 1978 report).

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- (Received 3 January 1979)

ERRATUM

In the paper by Russell, Goodman, and Fraser (Volume 27, Number 1, pp. 63–71), the first sentence of the second paragraph of the Introduction should read as follows:

These studies were limited in that they considered only two nontronites, a specimen from Grant County, Washington (Rozenon and Heller-Kallai, 1976a, 1976b) and one from Garfield, Washington (Roth and Tullock, 1973; Stucki *et al.*, 1976) and thus were unable to illustrate the full effect of composition on the reduction.