
The Experimental Transformation of Mica toward Smectite* ; Relative Importance of Total Charge and Tetrahedral Substitution

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* This general term refers to all expansible minerals of the montmorillonite group.

Abstract: This article emphasizes the influence of crystal-chemical composition on the ease of transformation of micas to vermiculite or more smectite-like minerals. The swelling test, with glycerol, of Mg-saturated mineral is used to characterize the degree of transformation.

The main structural factors of this evolution are tetrahedral substitution of Si by Al, and total charge. There is a relation between these two factors, i.e. the lower the tetrahedral substitution, the greater can be the charge without affecting the smectite swelling behavior.

In this respect there is a contrast between tri and dioctahedral micas. In the first, tetrahedral Al is so high ($> 1 \cdot 20$ for Si_4O_{10}) that transformation into smectite must imply modification of the tetrahedral layer. For dioctahedral micaceous phyllites (illites, glauconites) where tetrahedral charge is lower, transformation can be easier. Only a lowering of total charge is needed and reduction-oxidation seems to play a very important role in this process.

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