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# X-ray Powder Diffraction Studies on the Rehydration Properties of Beidellite

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**Abstract:** The rehydration properties of Ca-, Mg-, Na-, and K-saturated homoionic beidellites after heating at various temperatures were compared with those of montmorillonites. The behavior of interlayer Na<sup>+</sup> during dehydration and rehydration was also investigated by means of one-dimensional Fourier analysis. The K- and Mg-saturated specimens exhibited fast and slow rehydration rates, respectively, during exposure to air of 50% RH after heating at 800° C. These homoionic specimens showed strong rehydration properties on saturation with deionized water after heating <900° C for 1 hr. On the basis of Fourier analysis, the interlayer cations appeared to have migrated into the hexagonal holes of SiO<sub>4</sub> network on thermal dehydration, and the migrated cations returned to the interlayer space on rehydration. This behavior of the interlayer cations appears to have been strongly dependent on value of the octahedral negative charge and on the sizes of interlayer cations. The small octahedral negative charge of beidellite produced a weaker attractive electrostatic force between the octahedral sheets and the migrated interlayer cations. Therefore, the migrated interlayer cations in beidellite were easily extracted from the hexagonal holes, and rehydration was rapid. The small cation migrated easily into hexagonal holes and was fixed to the holes. On the contrary, large cations were probably difficult to fix and were easily extracted from the hexagonal holes. Consequently, the rehydration rate of K-saturated beidellite was fast, and that of Mg-saturated beidellite was slow.

**Key Words:** Beidellite • Cation migration • Dehydration • Fourier analysis • Interlayer cation • Rehydration • X-ray powder diffraction

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