
Interstratification in Expandable Mica Produced by Cation-Exchange Treatment

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Abstract: A unique interstratified expandable mica was obtained by cation exchange treatments using an expandable mica synthesized from talc. The ²³Na magic angle spinning (MAS) nuclear magnetic resonance (NMR) spectrum of the expandable mica used as a starting material showed that it had 2 kinds of Na⁺: one was exchangeable and the other was not exchangeable. Half of the Na⁺ per unit cell of the expandable mica was replaced with Mg²⁺ by cation exchange treatments. The X-ray powder diffraction (XRD) analysis of the Mg²⁺-exchanged expandable mica, after heating at 73 ° C, indicated that Na⁺ in the interlayer sheets was exchanged with Mg²⁺ in every second layer and that it had an interstratified structure with a 12.5- Å, layer thickness and a 9.6- Å layer thickness. The structure of the Mg²⁺-exchanged expandable mica was changed into a unique interstratified structure by the calcination at 600 ° C; one component had a stacking sequence of talc and a small amount of OH⁻, but the other had a different stacking sequence from talc and no structural OH⁻.

Key Words: ¹H MAS NMR Spectra • ²³Na • ²⁹Si • Cation Exchange • Interstratification • Migration

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