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# Mössbauer and Infrared Study of Heat-Treated Nontronite

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**Abstract:** The Mössbauer and infrared spectra of Li- and Rb-saturated nontronites from Washington, USA (SWa-1), heat treated at different temperatures, were measured. The Mössbauer results show that diffusion of Li<sup>+</sup> into the 2:1 layer by heat treatment at 250– 300° C does not affect the magnetic hyperfine interactions of the octahedral iron centers. In contrast, significant changes were observed by calcination at temperatures >300° C for Li-saturated nontronites. The main features of the Mössbauer spectra recorded at different temperatures reveal superparamagnetic behavior with a blocking temperature of ~5 K. The superparamagnetic behavior is related to small magnetic domains created by partially broken Fe-O-Fe bonds upon heat treatment. The infrared spectra of Li-rich nontronite, heat treated at 300° C, show changes attributed to Li migration into the hexagonal cavities. Heating to higher temperatures, produced changes in the spectra of the Li- and Rb-saturated nontronites owing to the dehydroxylation of the layer structure. The dehydroxylation process begins with the loss of OH groups in the FeOHFe bridges and is completed with the disruption of the Al-O bonds at >600° C.

**Key Words:** CMS Clay SWa-1 • Dehydroxylation • Infrared Spectra • Lithium Migration • Mössbauer Spectra • Nontronite • Superparamagnetic Behavior

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