
Supergene Vermiculitization of a Magnesian Chlorite: Iron and Magnesium Removal Processes

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Abstract: An X-ray powder diffraction study of a vermiculitized chlorite in an amphibole schist near Limoges, France, shows the following weathering sequence: chlorite → ordered interstratified chlorite/vermiculite → vermiculite. Mössbauer spectroscopy indicates that vermiculitization proceeded by the release of ferrous iron from the 2:1 mica layer of the chlorite. The ferric iron content of the vermiculite product is almost the same as that of the initial chlorite. Infrared spectroscopy and chemical microprobe analyses show that Mg was preferentially extracted from the hydroxide sheet of the chlorite, whereas the Si and Al contents progressively increased to the point of the formation of a pure dioctahedral aluminous vermiculite. The Si, Al, and Mg removal processes support currently accepted vermiculitization mechanisms, but the behavior of Fe is slightly different. In this weathering sequence, vermiculitization does not appear to have taken place by the oxidation of Fe²⁺, but rather, by the simultaneous leaching of Fe²⁺ and Mg.

Key Words: Chlorite • Infrared spectroscopy • Interstratified chlorite/vermiculite • Iron • Mössbauer spectroscopy • Vermiculite • Weathering

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