

Mineralogy and applications of Sokli vermiculite

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Vermiculites ((Mg,Fe,Al)₃(Al,Si)₄O₁₀(OH)₂·4H₂O) are naturally occurring minerals from hydromica group with a high cation exchange capacity (CEC) and large surface area.

The purpose of this study is to give a mineralogical description of vermiculite from the weathered top of the Sokli massif, northeast Finland, and show its ability to absorb ammonium into the mineral lattice of NMV (nanomodified vermiculite).

In the present study vermiculites from Sokli massif, were investigated in detail using electron probe microanalysis (EPMA, Microprobe), X-ray diffraction (XRD) and Thermal analysis (TGA). The results showed that vermiculite was present as dominant mineral phase, but they also showed the existence of minor phases of phlogopite.

The application tests were performed using landfill leachate. Crude vermiculites have been nanomodified by heat treatment using a patented technology. Vermiculite samples are heated in an oven until the interlayer distance of them is 11.7 Å. After this, they have been exposed to the leachate. In this experiment 200 ml of leachates were treated with 4 g of solid samples. In performed test NMV from Sokli and Kovdor were compared. Tests were performed at room temperature (24°C) using small grain size (0.075-0.125 mm) and stirring of the solution.

Ammonium decrease in leachate was higher for heat treated Sokli NMV than it was for Kovdor NMV. The decrease of ammonium in leachate was from initial 280 mg/l to 89 mg/l (reduction 68%) for Sokli NMV and the reduction of ammonium in leachate was 50 % for Kovdor NMV.