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# Reduction of Nitrate By Fe<sup>2+</sup> in Clay Minerals

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**Abstract:** In the 12 km<sup>2</sup> catchment area of Syv creek, Denmark, moderate to high concentrations of nitrate (NO<sub>3</sub><sup>-</sup>) occurred in the upper part of the oxidized zone (oxic-I), but dropped within the lower suboxic part (oxic-II), to below the detection limit in the unoxidized zone. Structural Fe<sup>2+</sup> in the clay minerals made up 10 to 12% of the Fe in the oxidized zone and increased to approximately 50% in the unoxidized zone. Concurrent with changes in the distribution of structural Fe<sup>2+</sup> the clay mineral constituents changed. Vermiculite was typically found in the oxidized zone whereas chlorite was found in the unoxidized zone only. A conversion of illite and chlorite into vermiculite seems to take place. A significant correlation between NO<sub>3</sub><sup>-</sup> and the amount of reduced Fe<sup>2+</sup> in the suboxic (oxic-II) zone, indicates that primary structural Fe<sup>2+</sup> in the clay minerals is the reductant in a NO<sub>3</sub><sup>-</sup> reduction process.

**Key Words:** Chlorite • Clayey till • Exchangeable ferrous iron • Illite • Mössbauer • Nitrate • Oxidized • Structural ferrous iron • Unoxidized • Vermiculite • Weichselian • X-ray

*Clays and Clay Minerals*; October 1996 v. 44; no. 5; p. 599-608; DOI: [10.1346/CCMN.1996.0440503](https://doi.org/10.1346/CCMN.1996.0440503)  
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