Effect of denitrification on dispersion of nitrate in saturated porous media.

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Abstract

Nitrate with a concentration of 50 mg/1 as NO-N or greater would cause serious groundwater contamination problem. The natural biological denitrification existing in groundwater systems tends to effect the nitrate build-up in the groundwater zone. Denitrification is a biochemical process that, in presence of denitrifying bacteria and organic matter, converts nitrate in gaseous nitrogen species. The effect of denitrification on dispersion of nitrate on saturated sandy soil has been studied and compared with the temporal and spatial concentration of nitrate in nonreactive (without denitrification) and reactive (with denitrification) cases. A laboratory model has been fabricated to simulate steady one-dimensional flow and to transport nitrate with or without denitrification. Denitrification has been simulated at various rates with varied C:N ratio and detention time. Retardation constant dispersivity and degradation constants has been computed using existing analytical models. A numerical model has also been used to predict spatial and temporal nitrate transport and compared with experimental results.