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# NITRATE REMOVAL WITH SULFUR-LIMESTONE AUTOTROPHIC DENITRIFICATION PROCESSES: APPLICATION AND KINETICS

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## ABSTRACT

Nitrate contamination in ground and surface water has become an increasingly serious problem in the world. As an alternative biological denitrification process, sulfur-limestone autotrophic denitrification processes (SLAD) can be used for nitrate removal in water or wastewater that contains a limited amount of organic carbon sources. This paper summarizes applications of SLAD processes for nitrate removal in drinking water treatment, wastewater stabilization, and septic tank effluent treatment. By reviewing the principles and mechanisms involved in nitrate removal in SLAD processes, the paper indicates that the lack of full understanding on kinetics of SLAD processes is one area that needs urgent research. For this reason, the paper describes a recently conducted kinetic study in which five fixed-bed, lab-scale sulfur columns have been used. Two sets of kinetics coefficients of  $Y$ ,  $K_s$ ,  $k$ ,  $\mu_{max}$ , one corresponding to nitrite feeding, the other to nitrate feeding, have been evaluated using the non-linear, multiple-parameter modeling technique. A design procedure is proposed based on these kinetic parameters. Comparison was made between the results obtained and those from some existing tests.

**Key words:** nitrate, autotrophic denitrification, biofilm modeling, kinetics