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Removal of nitrogen from simulated ground water by scoria: dynamic processes and modeling

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ABSTRACT

In this study, the dynamic processes of nitrogen removal from aqueous solutions were identified. The study used column experiments at different influent flow rates (40 mL/min, 60 mL/min and 80 mL/min) and different nitrogen concentrations (1 mg/L, 2 mg/L, and 5 mg/L for NH_4^+-N and NO_2^--N; 30 mg/L, 50 mg/L, and 80 mg/L for NO_3^--N). The adsorption data for nitrogen fitted well with the Thomas and Yoon-Nelson models. At different filled heights (0.5 m, 0.75 m, and 1.0 m), the adsorption data fitted well with the Bed Depth Service Time model. The back-flush method can enable scoria to recover purification efficiency. After seven back flushes, the regeneration rate was better than 90%. Breakthrough curves from tank experiments yielded very similar results to the column experiments. The breakthrough time of NH_4^+-N and NO_2^--N in the tank experiments were almost the same as in the column experiments. However, the breakthrough time of NO_3^--N was slightly shorter than in column experiments.

Keywords: Scoria; Nitrogen adsorption; Dynamic processes; Modeling; Back flush

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