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Mathematical modeling of bacteria and clay co-transport in porous media

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The present study focuses on *Pseudomonas putida* bacteria transport in porous media in the presence of suspended kaolinite clay particles. Experiments were performed with bacteria and kaolinite particles separately to determine their individual transport characteristics in water saturated columns packed with glass beads. The results indicate that the mass recovery of bacteria and clay particles decreased as the pore water velocity decreased. Batch experiments were carried out to investigate the adsorption of *Pseudomonas putida* onto kaolinite particles. The adsorption process is adequately described by a Langmuir isotherm. Finally, bacteria and kaolinite particles were injected simultaneously into a packed column in order to investigate their co-transport behavior. The experimental data suggest that the presence of clay particles significantly inhibit the transport of bacteria in water saturated porous media. The observed reduction of *Pseudomonas putida* recovery at the column exit is attributed to bacteria attachment onto kaolinite particles, which are retained onto the solid matrix of the column. A mathematical model was developed to describe the transport of bacteria in the presence of suspended clay particles in one-dimensional water saturated porous media. Model simulations are in good agreement with the experimental results.