

Biocolloid and colloid transport through water-saturated columns packed with glass beads: Effect of gravity

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ABSTRACT

The role of gravitational force on biocolloid and colloid transport in water-saturated columns packed with glass beads was investigated. Transport experiments were performed with biocolloids (bacteriophages: Φ X174, MS2) and colloids (clays: kaolinite KGa-1b, montmorillonite STx-1b). The packed columns were placed in various orientations (horizontal, vertical, and diagonal) and a steady flow rate of $Q=1.5$ mL/min was applied in both up-flow and down-flow modes. All experiments were conducted under electrostatically unfavorable conditions. The experimental data were fitted with a newly developed, analytical, one dimensional, colloid transport model, accounting for gravity effects. The results revealed that flow direction has a significant influence on particle deposition. The rate of particle deposition was shown to be greater for up-flow than for down-flow direction, suggesting that gravity was a significant driving force for biocolloid and colloid deposition.