

# **Effect of gravity on colloid transport through water-saturated columns packed with glass beads: Modeling and experiments**

## **Abstract**

The role of gravitational force on colloid transport in water-saturated columns packed with glass beads was investigated. Transport experiments were performed with 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. The effect of gravity is incorporated in the mathematical model by combining the interstitial velocity (advection) with the settling velocity (gravity effect). The results revealed that flow direction influences colloid transport in porous media. 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 colloid deposition.