

The role of transients in ionic strength in colloid remobilization in saturated porous media

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The deposition and remobilization of soil colloids in groundwater are important with respect to the environmental fate of contaminants and the remediation of subsurface contamination. We conducted a series of column experiments to investigate the effect of solution ionic strength on colloid transport and remobilization. In the experiment, model colloids-Polystyrene latex microspheres with diameter of 1 μ m were employed, quartz sand packed column was used as porous medium. During the experiment, ionic strength was changed from 50mM to 10mM, 60mM to 20mM, 70mM to 30mM, then to ultrapure water, or reduced from 50mM, 60mM, 70mM to ultrapure water directly.

We found that colloid remobilization occur under the condition of transients in ionic strength. When ionic strength was 50mM, 3.88% percent of the attached colloid was remobilized after it changed to 10mM. When ionic strength was 60mM, 0.71% percent of the attached colloid was remobilized after it changed to 20mM. When ionic strength was 70mM, 0.07% percent of the attached colloid was remobilized after it changed to 30mM. When ionic strength was reduced from 60mM to 10mM, 20mM, 30mM respectively, the corresponding remobilization rate was 1.75%, 0.71%, 0.09%, the total remobilization rate was 52.12%, 50.86%, 42.73% respectively after injecting to ultrapure water.

We concluded that the amount of colloid remobilization was related to the magnitude of the change in ionic strength.

Keywords: transients in ionic strength, colloid remobilization, saturated steady-state flow