Effects of Colloid Type and Porous Medium Properties on Colloid Transport. (S01-zhuang130406-Poster)

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Abstract:

Colloid-facilitated transport has been investigated as one of the major mechanisms of radionuclide migration in the subsurface of nuclear waste disposal sites. By conducting saturated column experiments, we examined transport of a Hanford colloid and a model colloid (kaolinite) in a coarse Hanford sand and a silica Ottawa sand. We found that, in NaNO3 (1 mM, pH 10) at pore velocity of 4.5 cm/h, transport of the colloid through the Hanford sand became steady after 2.5 pore volumes (PVs), with a breakthrough concentration (C/C0) of roughly 45%, which was 10% lower than through the Ottawa sand. The same trend was also observed for kaolinite in both media, except that the breakthrough plateau appeared at about 1.5 PVs, with C/C0 values at 60% in the Hanford sand and about 76% in the Ottawa sand. The higher deposition rate of the Hanford colloid in the Hanford sand is probably due to their surface properties and mineralogical composition. Removing of the metal oxides from the sands was found to significantly decrease transport of the colloid in the Hanford sand. However, no significant change was observed in the Ottawa sand.

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