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MODELING OF CHEMICAL AND ELECTRICAL FLOWS IN LOW PERMEABILITY SOILS UNDER ELECTRICAL GRADIENT

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ABSTRACT
If an electrical gradient is imposed on wet fine-grained soil, contaminant transport occurs by a complex phenomenon called electrokinetics. Even though electrokinetics has been proven to be feasible in bench-scale experimental studies, there is still a lack of thorough understanding of its cleanup mechanisms. A theoretical model is derived for electrokinetic phenomena, a numerical formulation is presented, and a model is validated. Coupled flow theory is applied to derive the governing equations. The model is implemented by computer using finite element methods. Validation is based on one-dimensional experimental data from the literature. The model provides an effective tool to better understand the electrokinetic extraction processes and to optimize operation parameters.

Reference: Kim, Geonha; Modeling of Chemical and Electrical Flows in Low Permeability Soils Under Electrical Gradient, Journal of Environmental Hydrology, Vol. 7, Paper 9, August 1999.

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