

Transport of *Pseudomonas putida* in a 3-D Bench Scale Experimental Aquifer

Abstract

This study is focused on the transport of *Pseudomonas (P.) putida* bacterial cells in a 3-D model aquifer. The pilot-scale aquifer consisted of a rectangular glass tank with internal dimensions: 120 cm length, 48 cm width, and 50 cm height, carefully packed with well-characterized quartz sand. The *P. putida* decay was adequately represented by a first-order model. Transport experiments with a conservative tracer and *P. putida* were conducted to characterize the aquifer and to investigate the bacterial behavior during transport in water saturated porous media. A 3-D, finite-difference numerical model for bacterial transport in saturated, homogeneous porous media was developed and was used to successfully fit the experimental data. Furthermore, theoretical interaction energy calculations suggested that the extended-DLVO theory seems to predict bacteria attachment onto the aquifer sand better than the classical DLVO theory.