



## **Experimental investigation of viruses and clay particles cotransport in unsaturated porous media**

Vasiliki I. Syngouna (1) and Constantinos V. Chrysikopoulos (2)

(1) Environmental Engineering Laboratory, Civil Engineering Department, University of Patras, Patras 26500, Greece (kikisygouna@upatras.gr), (2) School of Environmental Engineering, Technical University of Crete, Chania 73100, Greece (cvc@enveng.tuc.gr)

Suspended clay particles in groundwater can play a significant role as carriers of viruses, because, depending on the physicochemical conditions, clay particles may facilitate or hinder the mobility of viruses. This study examines the effects of clay colloids on the transport of viruses in variably saturated porous media. All cotransport experiments were conducted in partially saturated columns packed with glass beads, using bacteriophages MS2 and  $\Phi$ X174 as model viruses, and kaolinite (KGa-1b) and montmorillonite (STx-1b) as model clay colloids. The various experimental collision efficiencies were determined using the classical colloid filtration theory. The experimental data indicated that the mass recovery of viruses and clay colloids decreased as the water saturation decreased. Temporal moments of the various breakthrough concentrations collected, suggested that the presence of clays significantly influenced virus transport and irreversible deposition onto glass beads. The mass recovery of both viruses, based on total effluent virus concentrations, was shown to reduce in the presence of suspended clay particles. Furthermore, the transport of both suspended and attached onto suspended clay-particles viruses was retarded, compared to the conservative tracer.