



## **Transport of viruses in water saturated columns packed with sand: Effect of pore water velocity, sand grain size, and suspended colloids**

V. Syngouna and C. Chrysikopoulos

University of Patras, Department of Civil Engineering, Greece (kikisyg@yahoo.gr, gios@upatras.gr,+30 2610 996534)

In this study, the attachment behavior of model viruses (bacteriophages MS2 and  $\Phi$ X174) onto quartz sand of three different grain sizes for various pore water velocities with and without the presence of suspended model clay colloids (kaolinite: KGa-1b and montmorillonite: STx-1b) were evaluated. No obvious relationships between virus mass recoveries and water velocity or grain size could be established from the experimental results. The observed mean dispersivity values for each sand grain size were higher for MS2 than  $\Phi$ X174. The interaction of viruses with KGa-1b and STx-1b was investigated with batch as well as virus-clay cotransport experiments. The batch experimental data suggested that virus attachment onto KGa-1b and STx-1b is adequately described by the Freundlich isotherm equation. The presence of suspended colloids was shown to significantly influence virus deposition. In both batch and co-transport experiments, MS2 and  $\Phi$ X174 were attached in greater amounts onto KGa-1b than STx-1b with MS2 having greater affinity than  $\Phi$ X174 for both clays. Furthermore, extended-DLVO interaction energy calculations explained that the attachment of viruses onto model clay colloids was primarily caused by hydrophobic interaction. The theoretical and experimental results of this study were found to be in good agreement with previous findings.