



## **The use of Stop-flow leaching experiments for the detection of physical and chemical non-equilibrium**

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The fate of pollutants is closely linked to water pathways and flow homogeneity. Homogeneous flow in the vadose zone is less the rule than heterogeneous flow. Such flow pattern can be critical regarding the efficiency of pollutant removal by the soil. Indeed, preferential flow limits the access of pollutant to sorbent sites. In addition to non-equilibrium flow, kinetical limitations of sorption processes can also reduce the efficiency of pollutant removal (chemical non-equilibria). In this study, numerical modeling is used to demonstrate the potential of stop-flow experiments for the detection of physical and chemical non-equilibria theoretically. We model the injection of a tracer a reactive solute into columns assuming steady-state flow versus stop-flow experiments and depicts the evolution of the outlet breakthrough curve. We clearly show that the stop-flow test allows the identification of non-equilibrium processes and their nature (physical versus chemical).