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Transport of MS2 and PRD1 through saturated and unsaturated columns packed with sand

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Laboratory-scale virus transport experiments were conducted in columns packed with sand under saturated and unsaturated conditions. The viruses employed were the male-specific RNA coliphage, MS2, and the *Salmonella typhimurium* phage, PRD1. The mathematical model developed by *Sim and Chrysikopoulos* [2000] to quantify the processes responsible for removal of viruses during vertical transport in one-dimensional, unsaturated porous media was used to fit the data collected from the laboratory experiments. The liquid to liquid-solid and liquid to air-liquid interface mass transfer rate coefficients were shown to increase for both bacteriophage as saturation levels were reduced. The experimental results indicate that even for unfavorable attachment conditions within a sand column (e.g., phosphate-buffered saline solution; pH = 7.5; ionic strength = 2 mM), saturation levels can affect virus transport through porous media.