

SOLUTE TRANSPORT THROUGH CYLINDRICAL PORES WITH MATRIC DIFFUSION

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Solute movement through heterogeneous porous media under unsaturated conditions occurs in continuous large-diameter pores called preferential pathways; these pores may be caused by drying, earthworms, etc. This porosity system is the result of hydraulic, mechanical and biological events. It is associated with a porosity system that is defined by the granulometric, mineralogic and organic matter properties of the soil and whose pores are measured on the scale of a micron, it is in pores of this scale solute is slowly diffused. To differentiate the interactions of solute transport phenomena in such a system, a non-swelling porous medium was constructed containing a cylindrical macropore of known dimensions. By passing a solute through this cylindrical pore, two transfer phenomena are elucidated : solute hydrodynamic dispersion in the continuous macropore and solute diffusion through the pore wall into the matrix (Fig. 2). The retention of solute in the matrix is dependent upon solute residence time in the macropore, temperature, and the coefficient of ion diffusion in the matrix (Fig. 6). In addition circulation of pure water through the macropore, system of a porous medium saturated with a mobile solute is subject to the same mechanisms. A study of this system demonstrated more efficient leaching of solute when the total volume of pure water was introduced in fractions separated by a redistribution interval (Fig. 7).

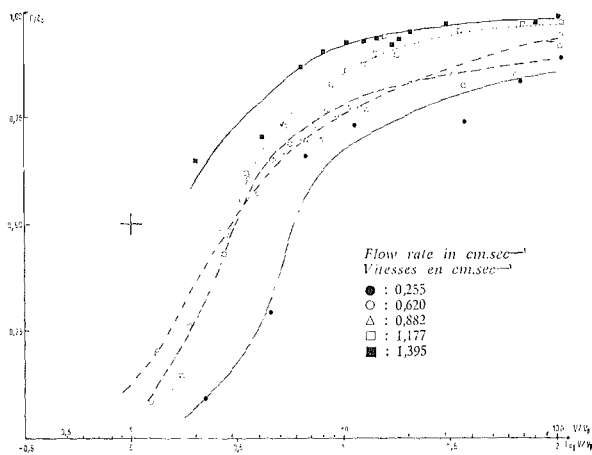


Figure 2 : Breakthrough curves for a cylindrical pore, diameter 0,120 cm.

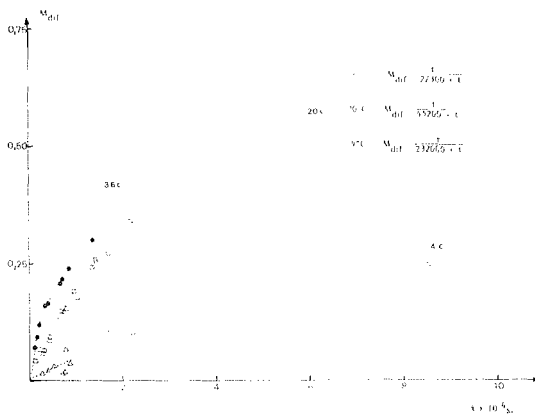


Figure 6 : Relative amount of solute diffused in microporosity versus time, in relation to temperature.

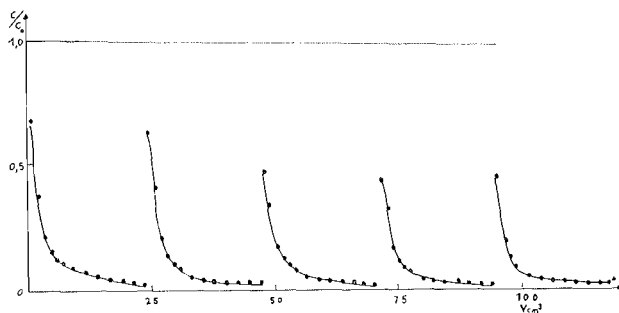


Figure 7 : De-sorption curves after a period of 24 hours redistribution between leachings ($\varnothing = 0,035$ cm ; $U = 2,546$ cm.s⁻¹) (number of pores : 8)