

SOLUTE TRANSPORT IN FRACTURED MEDIA
- THE IMPORTANT MECHANISMS FOR
PERFORMANCE ASSESSMENT

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ABSTRACT

The most important mechanisms that control the release of contaminants from a repository for nuclear or chemical waste have been studied. For the time scale of interest for the disposal of nuclear and even chemical waste, diffusion into the rock matrix is an important factor which retards and dilutes the contaminants. It is found that the water flow-rate distribution and the flow-wetted surface are the entities that primarily determine the solute transport. If the diffusion into the rock matrix is negligible, the solute transport is determined by the water flow rate and the flow porosity. This is shown by simulations using analytical solutions obtained for simple geometries, such as the flow in a fracture or a channel. Similar results are obtained for more complex systems, such as flow in a fracture with variable aperture and through a network of channels. It is also found that the use of a retardation factor relating the travel times of interacting and noninteracting solutes is inappropriate and may be misleading.