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Diffusion, Dissolution and Dispersion

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The diffusion constants of hydrocarbons in saline solutions have been measured by the flow of droplets in a microscopic pore. Our pressure reversal technique allows us to measure the diameter of single droplets as a function of time. The diffusion constants in water of Pentane, Hexane, Ethylbenzene and Cyclohexane are reported.

Tracers in porous media flow escape the stagnation points by diffusion. Experiments and simulations are consistent and show that inertial effects are important even at extremely low Reynolds numbers. We also show that dispersion fronts in porous media at high Peclet numbers are well represented by the convection diffusion equation, however, within diffusional width the front has a fractal structure.